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Central government guarantees and lending – a risk analysis

15 March 2016

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The Debt Office's commission

The Debt Office shall no later than 15 March 2016 and 17 March 2017 present a report containing a risk analysis of the central government portfolio of guarantees and lending. The report should contain both a qualitative and a quantitative risk analysis and cover the following risks:

Credit risk: The purpose of this analysis is to provide a clear picture of the risk that central government will incur losses linked to its guarantee and lending activities.

Liquidity risk: The purpose of this analysis is to provide a clear picture of the risk that central government must raise funds to meet undertakings in its guarantee activities and what effects this might have on borrowing requirements and borrowing costs.

The focus should be on analysing credit risk.

This report shall be produced in collaboration with the Swedish Export Credits Guarantee Board, the Swedish Board of Housing, Building and Planning, the Swedish International Development Cooperation Agency (Sida) and the Swedish Board for Study Support, as well as other agencies affected.

Central government portfolio of guarantees and lending

HOUSING GUARANTEES

The Swedish Board of Housing, Building and Planning is responsible for issuance, management and reporting on housing guarantees.

(SEK million)	2015-12-31	2014-12-31
Housing guarantees	1 489	2 093
Credit guarantees for first time borrowers	0,1	0,1

EXPORT CREDIT GUARANTEES

The Swedish Export Credits Guarantee Board provides various types of export guarantees to promote Swedish exports and the development of Swedish companies international operations.

(SEK million)	2015-12-31	2014-12-31
Export credit guarantees	214 134	174 245

GUARANTEE AND LOAN AID

A number of guarantees and loans have been issued as part of Swedish development aid and cooperation.

(SEK million)	2015-12-31	2014-12-31
Credit guarantees for development loans	985	964
Stand-alone guarantees	2 463	2 050
Loan Aid	35	67
Loans with conditional repayment	308	307

STUDENT LOANS AND HOME EQUIPMENT LOANS

A significant part of aggregate central government lending consists of student loans managed by the Swedish Board for Study Support.

The Swedish Board for Study Support also grants home equipment loans to foreign citizens resident in Sweden, mainly refugees.

(SEK million)	2015-12-31	2014-12-31
Student loans	207 095	201 611
Home equipment loans	1 498	1 438

FINANCIAL STABILITY AND CONSUMER PROTECTION

The deposit guarantee protects savings in bank accounts in case a bank or other deposit taking financial institution fails. The guarantee contributes to financial stability by reducing the risk of bank runs.

The investor compensation scheme covers securities and monies held in custody by a bank or securities firm on behalf of investors.

These guarantee schemes are managed by the Debt Office.

(SEK million)	2015-21-31	2014-12-31
Deposit guarantee	1 500 736	1 388 869
Investor compensation	-[1]	-

OTHER AREAS

Central government also issues guarantees and loans in a number of other areas. These include infrastructure projects, state-owned entities, membership of multilateral development banks, research and development and support for business, rural areas, environmental investments, etc.

(SEK million)	2015-12-31	2014-12-31
Guarantees in infrastructure	18 512	19 343
International undertakings	6 200	6 734
Capital adequacy guarantees	-	-
Guarantee funds	405	405
Callable capital	121 217	121 842
Public enterprise guarantees	1 217	1 217
Pension guarantees	8 575	8 158
Other credit guarantees	11	12
Lending to sovereigns	5 519	5 657
Location loans	95	94
Agricultural loans	44	49
Loans with conditional repayment	568	534
Lending in infrastructure	6 396	6 346
Lending to research and development	245	306

[1] *The investor compensation scheme is not reported in the table since the amount covered is only set when compensation is payable.*

Summary

The Swedish National Debt Office (henceforth referred to as the Debt Office) conducts a risk analysis of the aggregate central government portfolio of guarantees and lending with credit risk. The analysis is carried out in cooperation with the Swedish Export Credits Guarantee Board (EKN), the Swedish Board for Study Support (CSN), the Swedish Board of Housing, Building and Planning (BKN) as well as the Swedish International Development Cooperation Agency (Sida). The results of the analysis are presented in this report. The purpose of the report is to contribute to further transparency in the reporting of central government guarantees and lending.

The analysis covers guarantees and lending to corporations, private individuals and sovereigns (the regular portfolio of guarantees and loans) as well as the deposit guarantee.

The risk of large losses in the regular portfolio is assessed as low, though somewhat higher than a year ago. This is a result of an increase in name concentrations as well as a higher credit risk in some of these name concentrations.

The portfolio is well diversified overall, with a large number of guarantees and loans and counterparties in a number of different geographical and industrial sectors. The sector concentrations that exist relate to the telecommunications industry and private individuals in Sweden. Negative shocks to any of these sectors could result in default clustering (due to intra-sector correlations). However, both sectors are assessed as stable and the probability of severe shocks is low. In addition, the guarantee holders and borrowers have some resilience to such shocks.

The portfolio also contains name concentrations, i.e. guarantees and loans that are large relative to the size of the portfolio, where only one or a couple of random defaults could result in large losses in the portfolio. The risk of major losses relating to name concentrations is assessed as moderate. Some individual exposures have a moderate to high credit risk. Otherwise, the largest exposures relate to callable capital commitments to multilateral development banks with strong creditworthiness.

In addition to concentrations, default clustering may also occur due to default correlations between counterparties in different industries or geographical regions because of changes in the general economic environment (so-called inter-sector correlations). In the assessment of the Debt Office, a severe economic crisis with global spread would be required for such inter-sector correlations to arise in the regular portfolio.

The liquidity risk in the portfolio is assessed to be low. Liquidity risk is defined as the risk that borrowing to fund large and rapid payments due to calls on regular guarantees and loan commitments would come at a higher cost than the government's normal funding cost.

The risk of large losses linked to the deposit guarantee is assessed as low. Due to their relatively smaller size, large losses from r pay-outs to depositors, as a result of bankruptcy filings or a decision by Finansinspektionen (the Financial Supervisory Authority), would require the independent failure of several non-systemic institutions. For systemic institutions that, if failing or likely to fail, would be subject to resolution, any losses to the deposit guarantee would only occur once equity and more junior debt had been written down or converted to equity to absorb losses and recapitalise the institution (bail-in). Consequently, losses must be substantial in order for the deposit guarantee to be required to contribute to the resolution financing. This is especially true for institutions that, when placed in resolution, have equity and eligible liabilities in excess of the minimum regulatory requirements (MREL).

Introduction

A risk analysis contributes to further transparency in the reporting of the central government portfolio of guarantees and lending. This is important due to the uncertainty concerning the future losses and the special way in which losses are managed. As a basis for the risk analysis, the Debt Office has developed an analytical framework where basic definitions, methods and delimitations are determined.

At year-end 2015 the central government portfolio of guarantees and lending with credit risk amounted to SEK 2 098 billion, where the deposit guarantee accounted for SEK 1 501 billion.

Guarantees and lending are included in the annual report for the central government, where issued amounts, commitments, limits, expected losses and cash flows (calls on guarantees, fees, recoveries etc.) are disclosed. The information in this supplementing report contributes further to transparency by adding a risk perspective to the existing cost perspective in the regular financial reporting of central government.

For each guarantee or loan, there is an uncertainty about whether a financial loss will occur and the size of such any such loss. This fiscal risk is not unique to the central government's guarantee and lending activities.[2] However, losses incurred in these activities fall outside of the expenditure ceiling in the central government budget, as they are taken directly against the reserves created to cover expected losses. This means that the outcomes linked to guarantees and lending do not have the automatic transparency that is the case for other government expenditure – for example, expenditures financed directly from appropriations.

Accordingly, since both expenditures and the outcomes of guarantees and lending affect central government finances, a risk analysis of the aggregated portfolio of guarantees and lending contributes to a well-functioning fiscal framework.

Background

In 2008, the Government noted the lack of a comprehensive analysis of the central government portfolio of guarantees and lending.[3] In addition to the *expected loss* (the cost of providing credit), which is aggregated and reported in the annual report, the Government saw the need for an analysis of deviations from the expected outcome (the risk of providing credit) – generally referred to as *unexpected loss*.

The risk analysis has been developed in stages since it was initiated.

- At the end of 2009, the Government commissioned the Debt Office to present a proposal for how to conduct an annual assessment of the risks in the central government portfolio of guarantees and lending.[4] This commission was carried out in consultation with the other agencies that manage guarantees and lending. A report was submitted to the Government in autumn 2010.[5]

- On 1 April 2011, a revised Budget Act was adopted. The Act states that the Government has to provide information to the Riksdag (the Swedish Parliament), in addition to expected losses, about

[2] *This is particularly clear regarding uncertainties in assessments of central government income. However, central government also has a large number of other undertakings on the expenditure side that are sources of fiscal risk (for example rule-governed transfers).*

[3] *Årsredovisning för staten 2007 (available only in Swedish). Report from the Ministry of Finance 16 April 2008.*

[4] *Regleringsbrev för budgetåret 2010 avseende Riksgäldskontoret (available only in Swedish). Government decision 21 December 2009.*

[5] *Förslag till en samlad riskanalys av statliga garantier och krediter (available only in Swedish). Report from the Debt Office 26 November 2010.*

significant risks in central government guarantees and lending.[6]

- In May 2011, the Government commissioned the Debt Office to present a report to the Ministry of Finance containing a risk analysis. The analysis should be prepared in cooperation with the Swedish Export Credits Guarantee Board, the National Housing Credit Guarantee Board (now the National Board of Housing, Building and Planning), Sida and the Swedish Board for Study Support – and the other agencies concerned. The results in the report are then summarised in the central government annual report.

- This year's report is the fifth in the series since the Debt Office submitted its first report to the Government on 15 March 2012 (however, it is the first report that is translated to English).

Two perspectives on risk

The analysis in this report covers two perspectives on risk; credit risk and liquidity risk. In accordance with the commission, the focus is on analysing credit risk.

Credit risk

In the event that a guarantee holder or borrower does not fulfil their obligations according to the terms of the undertaking, a *default* occurs. This normally leads to a credit loss for central government. In the case of a guarantee, central government must compensate the lender covered by the guarantee. In the case of a loan, the loss consists of central government not getting the full outstanding amount repaid.

Liquidity risk

One important difference between guarantees and lending is that guarantees entail a liquidity risk for central government, while in the case of lending central government does not risk incurring additional payments. The exception is a loan commitment, where there is an uncertainty about whether and to what extent the commitment will be used.

If large payments must be made in a short space of time, there is a risk that the additional borrowing needed to raise the funds could be more expensive than normal. However, such an additional cost arises for the loans taken to meet the specific payment, or payments, and not for all central government borrowing.

Analytical framework

The risk analysis at hand requires a framework that lays down basic definitions and the applicable methodology.

Definition of loss

Throughout the report, losses are defined as credit losses in the central government portfolio of guarantees and lending net of any recoveries (i.e. net losses).

Loss = Exposure at Default – Recovery given Default

This means that losses are analysed without considering how the losses are financed. Hence, there is no consideration as to whether materialized losses correspond to the expected loss or if any fee has been charged or not.

Partly a simplified view on losses regarding the deposit guarantee

For the deposit guarantee, the chosen definition of loss is partly a simplification. If losses from pay-outs from the guarantee are large compared to the size of the deposit guarantee fund the central government is entitled to increase the annual statutory fees that the covered institutions pay (see the info box on page 42 for a more detailed explanation). Such a claim, if it arises, reduces the central government's loss – something that is overlooked in this report.

Analysis of the risk of large losses

A risk assessment is based on a subjective opinion of what events are viewed as a threat of some kind.

[6] *Chapter 10, Section 6 of the Budget Act (2011:203).*

However, there is no expressed view regarding the level of unexpected loss and potential threat (for example, regarding the management of the central government debt or the assessment of the budgetary leeway). The lack of an explicitly stated risk preference is not a problem in the management of guarantees and loans, since central government is marginally risk-neutral. However, a choice needs to be made in order to perform a risk analysis. In the view of the Debt Office, the most interesting to analyse is the risk of large losses. In this report, large losses amount to some tens of billions of Swedish kronor (SEK) or more.

This means disregarding, for example, losses that correspond to normal deviations from expected loss as well as minor cases of compensation pay-outs under the deposit guarantee.

Nor does the analysis focus on the risk of extreme losses. In the view of the Debt Office, such an analysis is of limited value. First, losses of such a magnitude are very unlikely and, second, it is difficult to assess what might cause such a development.

A partial risk analysis independent of central government finances as a whole

The risk analysis does not include an assessment of whether or not various portfolio are manageable for central government. Such an assessment must be integrated into a comprehensive analysis of the sustainability of central government finances, and such an analysis falls outside the commission for the risk analysis.

A risk analysis of the portfolio as reported in the central government annual report

For the purpose of the analysis, central government's risk exposure – the maximum amount that central government can lose – is set equal to the guarantee and loan amounts presented in the annual report.

Building a forward-looking risk analysis on financial reporting data means using a static and simplified basis since the portfolio is subject to more or less continuous change. Some guarantees and loans expire and others are reduced gradually by amortisation. In turn, decisions on new guarantees and loans increase the size of the portfolio, as do commitments that are called upon. Nevertheless, the advantages of this approach outweigh its disadvantages. First, the commission to carry out a risk analysis is closely linked to the central government annual report and, second, a more dynamic approach would increase both the complexity and the uncertainty of the analysis (requiring assumptions about future decisions not yet taken).

A medium-term horizon

Exposures and expected losses in the financial reporting can be consolidated even though they apply to guarantees and loans with different maturities. However, when it comes to risks, this is not as simple. Therefore, an explicit horizon needs to be chosen for the risk analysis.

The Debt Office has chosen a medium-term horizon (3–5 years) for the analysis. This is short enough to facilitate the risk analysis and is on a par with other central government financial forecasts (for example, the development of the central government debt). At the same time, the time horizon is long enough to include in a meaningful way the risk factors that are relevant in an analysis of large losses (see the next subsection below).

Risk factors

One central part of the risk analysis is to identify circumstances that are possible causes of large losses in the portfolio – so called risk factors.

In principle, there are two types of outcomes that result in large losses.

1. A small number of losses relating to large exposures that account for a considerable share of the portfolio.

2. Default clustering, i.e. a large number of failures involving small exposures. This is generally explained by correlations.

Based on this insight, the risk analysis builds on the following risk factors:

- *Name concentrations:* Large exposures with respect to individual guarantee holders or borrowers, where a few idiosyncratic defaults can result in large losses in the portfolio.

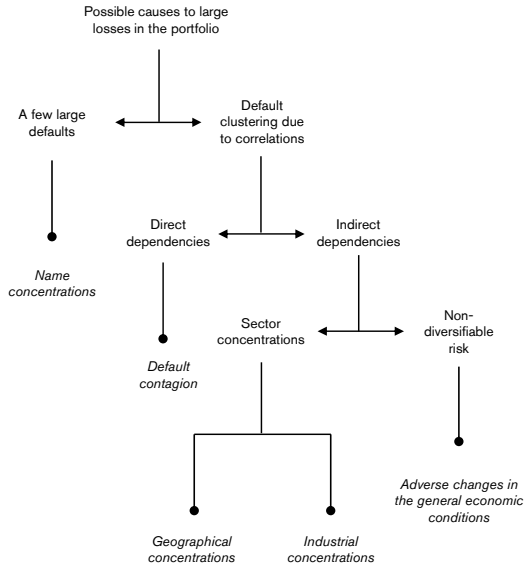
- *Default contagion:* Extensive exposure to guarantee holders or borrowers with connections (e.g. commercial or legal) that enables default contagion between them.

- *Sector concentration:* A significant exposure to a specific sector – such as an industry or geographical region – where a negative shock enables correlations between guarantee holders and borrowers in the sector (so called intra-sector correlations) that may lead to default clustering.

- *Adverse changes in the general economic conditions:* A severe macroeconomic shock enables correlations between guarantee holders and borrowers in different sectors (so called inter-sector correlations), which may in turn lead to default clustering.

The risk factors identified are summarised in figure 1 below.

FIGURE 1 SUMMARY OF RISK FACTORS



Guarantees and lending excluded from the risk analysis

The Debt Office has chosen to exclude from the analysis lending financed by appropriations, guarantees and loans issued by public enterprise agencies and the investor compensation scheme. This is primarily for practical reasons, but also because they involve either small amounts or negligible risks.

These exclusions only marginally limit the transparency in the reporting of the aggregate portfolio of guarantees and loans and do not affect the conclusions of the risk analysis.

Lending financed by appropriations

All lending financed by appropriations is excluded from the risk analysis.

Unlike lending financed by central government borrowing (sometimes referred to as on-lending), lending financed by appropriations is included in expenditure capped by the expenditure ceiling. Expressed differently, one can view lending

financed by appropriations as a transfer with repayment conditions.

Lending financed by appropriations amounted to SEK 5.2 billion on 31 December 2015.

Public enterprise agencies
The few guarantees issued by public enterprise agencies, are excluded from the risk analysis.[7]

Any losses related to such guarantees should be borne, firstly, by the respective agencies, and secondly by additional appropriations on the state budget. These commitments amounted to SEK 17 million on 31 December 2015.

Investor compensation scheme
The investor compensation scheme covers securities handled by certain securities companies, securities brokers and some other institutions on behalf of customers in the course of providing investment services (such as the purchase, sale and deposition of financial instruments).[8] The guarantee is triggered if such an institution goes bankrupt, and it turns out the institution has not held customers' assets separate from its own assets, as it is obliged to. Generally, this would require gross negligence or criminal activity.[9] The probability of the investor compensation scheme being triggered is therefore significantly lower than the probability that an institution providing investment services goes bankrupt.

The size of covered assets is unknown. Fees are only charged ex post to recover compensation paid out from the guarantee (ex-post fees), and compensation from the scheme has only paid out on one occasion, in 2010. At that time, the total assets covered by the guarantee were estimated to around SEK 93 billion. However, this figure referred to covered assets on 31 December 2004, the date of the bankruptcy that caused the compensation case.

Both theory and practice indicate that central government's cost for the investor compensation scheme is small. Since the guarantee was introduced, it has only been called once. In addition, since central government charges fees to the remaining institutions – recovering the full cost of any call on the guarantee – in principle, the investor compensation scheme does not give rise to any credit risk for central government. This is at least the position as long are there still are institutions that can be required to cover the cost.

Against this background, the investor compensation scheme is excluded from the risk analysis.

The outline of the report

The first section provides an overview of how central government guarantees and lending are managed in Sweden. The subsequent section presents analyses and assessments regarding regular guarantees and lending in the portfolio (guarantees and lending to corporations, private individuals and sovereigns). Finally, the deposit guarantee is analysed as well.

The report is accompanied by an annex containing in-depth disclosure on the central government portfolio of guarantees and lending.

[7] These agencies, though being involved in commercial activities, are not legally separate from the central government.

[8] The maximum compensation payable is SEK 250 000 per person and institution.

[9] Since customers have a statutory right of separation for the securities held by a securities institution, a bankruptcy should not normally affect customers.

The process for managing central government guarantees and lending in Sweden

In the following, the process for managing central government guarantees and lending in Sweden is illustrated.

Approval by the Riksdag

The Riksdag decides on central government guarantees and lending with respect to the purpose, amount and type of the instrument.

Approval by the Government

The Government normally delegates the Riksdag's approval to issue the central government guarantees or loans to specialized agencies. In most cases, these approvals are made annually by granting a maximum amount in the government directives for the related agency. In other cases, the approval from the Government is granted through individual decisions regarding a specific guarantee or loan, or a specific program of guarantees or loans.

Management of central government guarantees and lending by specialized agencies

Specialized agencies are responsible for issuing, monitoring, reporting and closing central government guarantees or lending.

Management of payments, reserves and consolidated reporting by the Debt Office

Even though the management of central government guarantees and lending is the responsibility of the specialized agencies, a few specific tasks are performed by the Debt Office as the central government debt manager. Such tasks include funding of lending and payments due to calls on guarantees. The Debt Office also provides each agency's notional reserve account. Moreover, the Debt Office is responsible for coordinating the consolidated reporting on the central government portfolio of guarantees and lending, both the financial reporting and this risk report.

Central government guarantee and lending activities

The management of central government guarantees and lending in Sweden builds on sound principles and clear rules. Many of the guarantees and loans are managed based on a common framework. However, the largest parts of the portfolio in monetary terms are regulated separately – one example being the deposit guarantee. Part of the transparency regarding central government guarantees and lending is an overview of the existing framework and other regulations.

The central government guarantee and lending framework

Background

In the mid-1990s, a framework for managing central government guarantees was adopted for the first time.[10] In the period up to and including 2001, previously issued guarantees were retroactively valued and included into the new framework.

The revised Budget Act (2011:203) further clarified the principles for the provision of central government guarantees. At the same time, it was decided that corresponding principles should also be applied to central government lending. The Lending and Guarantees Ordinance (2011:211) supplements the Budget Act with more detailed regulations. This means that there are uniform and clear rules for both guarantees and lending.

Overall, the central government guarantee and lending framework is intended to foster both responsible and cost-effective management of financial risks by ensuring that (i) decision-makers are aware of the risks and (ii) central government makes provisions for those risks. The framework is also intended to ensure that central government avoids taking excessive and unmanageable risks and reducing overall risk-taking by central government.

[10] *Budget Act (1996:1059).*

Cost-recovery principle

One of the fundamental principles is to charge a fee that corresponds to the expected cost of the guarantee or loan. An expected cost arises because there is a probability that the recipient of a guarantee or loan will not be able to fulfil their undertaking, which usually results in a credit loss for central government. The expected cost consists both of this expected credit loss (usually abbreviated to expected loss) and the administrative costs associated with the guarantee or loan.[11]

Expected loss = Exposure at Default x Probability of Default x (1 – Expected Recovery given Default)

Central government charges a fee to cover this expected cost. The expected cost for the guarantee or loan at hand is thus matched by an income. This means that, in theory, the financial position of central government is initially unaffected at the time of the decision to issue a central government guarantee or loan.

If the guarantee holder or borrower is allowed to pay a fee that is lower than the expected cost a subsidy arises. This subsidy has to be financed in some way, which often means that a sum corresponding to the subsidy is charged to an appropriation. This means, in turn, that the expenditure for the subsidy needs to be weighed against other expenditure in the central government budget and therefore competes for space under the expenditure ceiling. Consequently, any subsidy

[11] *For loans, there is also the central government interest cost to finance the lending.*

is treated in the same way as any other central government expenditure, the difference being that an appropriation to cover a subsidy does not lead to a net cash flow since it only involves an internal transfer of funds within central government.

A model in which fees – including any subsidy financed via appropriations – equal expected cost builds on an actuarial cost-recovery principle. In the long term, the accumulated fees are expected to correspond to the costs of credit losses and administration. In practice, however, the outcome will vary over time and deviate from the expected outcome – in both a positive and a negative direction. The model has parallels to insurance, where fees from a large number of claim-free commitments are expected to cover the costs related to a small number of claims (credit losses).

In accordance with the fundamental principle in the Budget Act, central government does not charge a risk premium.[12] In theoretical terms, this can be seen as central government being marginally risk-neutral, and therefore does not require extra return to cover the risk that follows from guarantees and lending (deviations from the expected outcome). One significant reason for this is that central government has an extensive and strong balance sheet underpinned by its right of taxation. As a result, central government does not maintain an earmarked risk buffer and does not tie up any capital that requires a return. It should be stressed that central government is only risk neutral at the margin, i.e. for risks in the guarantee and lending portfolio that are not excessive in relation to the entire central government balance sheet.

Outcomes are booked against notional reserve accounts

The design of the guarantee and lending framework means that fees and costs are handled outside the income headings and appropriations in the central government budget. Fee income – including appropriation funding to cover any subsidies – is not entered under an income heading but instead booked against notional reserve accounts.[13] Correspondingly, credit losses and any recoveries are booked against these reserve accounts as well.

An unlimited mandate to raise new debt is linked to each reserve account, addressing the issue of how to finance and report credit losses that temporarily exceed the balance of the reserve. In this way, the reserves can be allowed to be negative from time to time.

It is important to note that the reserves at the Debt Office are only notional accounts. However, there are some exceptions. One example is the fees that the Swedish Export Credits Guarantee Board has invested in real financial assets outside central government. Another example is the deposit guarantee fund.

One reason for mainly having notional reserve accounts instead of assets and liquidity portfolios is that such portfolios might, in many cases, add risks rather than reduce them. Consequently, central government generally does not earmark or accumulate money in an actual fund. Fees booked against the notional reserve accounts are included in the cash flow of central government. The payment of a fee improves the budget balance.

However, the total assets in the guarantee and lending activities do not consist solely of the balance in the notional reserve accounts that the responsible agencies have at the Debt Office. Other assets are the recourse claims that arise when guarantees are called and the remaining value of outstanding claims after confirmed defaults on loans issued. Moreover, the present value of agreed but not paid fees is also an asset. The total value of all these assets should be compared with the expected losses when assessing the actuarial deficit or surplus in the central government guarantee and lending activities.

[12] One exception to the general rule is when international agreements – for example rules on state aid – require the fee (or added interest margin) to be market-based. The justification is to avoid distorting competition between companies in different countries and thus has nothing to do with the central government's view on risk.

[13] Administrative fees are managed in separate accounts.

The effects on central government finances

Central government issues a guarantee for SEK 100

When the guarantee is issued, central government charges a fee corresponding to the expected loss on the guarantee and transfers it to the applicable notional guarantee reserve. Assume the fee is set at SEK 5. The balance in the reserve increases by SEK 5 while the provision in the financial reporting increases by the same amount. Central government's net financial wealth is thus unaffected. Its cash flow increases by SEK 5, decreasing central government debt by the same amount.

A change in the expected loss

If the expected loss of the guarantee increases/decreases, central government must increase/decrease provisioning for the guarantee by the corresponding amount. As a result, central government's net financial wealth decreases/increases.

A default occurs

The guarantee is called and central government makes a payment corresponding to all or part of the guaranteed amount. Like all other cash flows, the payment is financed by the Debt Office, and affects central government debt. Assume that the whole amount under the guarantee, SEK 100, is called. Central government debt increases by SEK 100 and the balance in the guarantee reserve decrease by the same amount in.

When a guarantee is called, central government also gets a recourse claim on the creditor (an asset). If the claim is initially assessed to be worth 50 per cent of the sum paid out, the net effect is a reduction of the central government's net financial wealth by SEK 45.

Central government recovers 60 percent

The balance in the guarantee reserve increases by SEK 60. The payment improves cash flow by SEK 60 and reduces central government debt by the same amount.

In sum, the payment under the guarantee resulted in a reduction in central government's net financial wealth by SEK 35. The net charge in the guarantee reserve is also SEK 35, as is the increase in the central government debt.

Central government lends SEK 100

To finance the loan, central government must borrow, increasing the central government debt by SEK 100. At the same time, central government gets an asset in the form of a loan receivable. However, because of the credit risk in the loan, this asset is worth less than SEK 100. The expected loss is estimated at SEK 5, resulting in a write-down of the loan receivable by SEK 5 to SEK 95.

Central government charges an interest margin on the loan corresponding to the expected loss. The balance in the applicable notional lending reserve increases by SEK 5. At the same time, there is a corresponding decrease in central government debt. The net effect on the balance sheet is a loan receivable of SEK 95 on the asset side and an increase in debt of SEK 95 on the liability side. Central government's net wealth is therefore unaffected.

A change in the expected loss

If the expected loss of the loan increases, the value of the loan receivable decreases, reducing central government’s net wealth, and vice versa.

A default occurs

Central government’s cash flow is reduced by the amount of contracted future payments that are not received. For the sake of simplicity, it is assumed that none of the loan amount is repaid. After the default, the expected recovery is 50 per cent of the claim. The value of the loan receivable is written down to SEK 50. Central government’s net financial wealth has decreased by SEK 45.

Central government recovers 60 per cent

Central government’s cash flow is improved by SEK 60, reducing central government debt by the same amount. In total, central government's net financial wealth is reduced by SEK 35, and central government debt increases by the same amount.

Guarantees and lending regulated separately

Some guarantees and loans are regulated separately, in separate acts or through individual decisions by the Riksdag.

The study support system

The Study Support Act (1999:1395) regulates the handling of student loans. The Act contains provisions on who can receive student loans and grants, interest, repayment and recovery demands. The provisions of the Act differ in several respects from how lending is handled in the guarantee and lending framework. New student loans granted from 2014 are managed in accordance with the guarantee and lending framework in the sense that appropriations corresponding to expected losses are transferred to a notional reserve account. However, for student loans granted prior to 2014, credit losses are financed from appropriations as they arise.

Deposit guarantee scheme and investor compensation scheme

The deposit guarantee scheme is intended to provide consumer protection for deposits by private individuals and to promote the stability of the financial system. The guarantee is regulated in the Deposit Guarantee Act (1995:1571).

The investor compensation scheme provides protection for investors' financial instruments and funds held with a security company, security broker or some other institution. Any costs following a call on the guarantee are recovered through ex-post fees paid by the remaining institutions covered by the scheme.

Lending financed by appropriations

According to Chapter 7, Section 3 of the Budget Act, lending with high expected loss must be financed by appropriations (instead of borrowing). Since such lending is already fully financed by appropriations, there is no need for a reserve account to manage losses on these loans. Amortisation and interest payments are reported under an income heading.

Callable capital for multilateral development banks

Central government has issued guarantees to provide, when required, additional capital – known as callable capital – for a number of multilateral development banks of which Sweden is a member.

Callable capital has been exempted by the Riksdag from the central government guarantee and lending framework. However, to make clear that these guarantees exist, a specialized notional reserve account has been set up at the Debt Office. No fees are transferred to this account. Instead, any charge on this account to cover losses has to be cleared from appropriations.

Public enterprise guarantees

Following decisions by the Riksdag, public enterprise agencies can also issue guarantees and provide loans linked to their activities. At present Luftfartsverket (the Swedish civil aviation administration) has issued such guarantees.

Similarities and differences between credit guarantees and lending

Guarantees and lending are regulated in a similar way since the credit risk, and thus the expected loss, is similar for the two types of exposures. Both guarantees and lending require approval by the Riksdag and they are treated similarly in the central government budget process.

There are however differences which should be taken into consideration when deciding whether to issue a guarantee or a loan.

Lending is more transparent than guarantees

When central government grants a loan this is financed by the government, whereas in the case of a guarantee the financing of the underlying loan is done by a private party. Consequently, lending affects the central government's borrowing need and the size of government debt when the loan is granted. In the case of a guarantee, the government increases its borrowing only if there is a pay-out under the guarantee. Guarantees can thus be seen as contingent government debt.

This difference is reflected also in financial reporting. Increased borrowing affects gross debt, and the loan receivable is accounted for as an asset.

Lending is normally cheaper than guarantees

Under normal circumstances, central government's borrowing cost is lower than that of a private party. Therefore, the total cost to the borrower is higher with a government guarantee compared to borrowing directly from the government.

Lending involves greater restrictions

A difference in the regulation of guarantees and lending respectively is that only lending with low expected loss can be financed with borrowing in the Debt Office.

In practice, this means that lending which involves a high expected loss is financed via appropriations. There is no corresponding regulation for guarantees. Consequently, the Budget Act requires a more conservative treatment of lending with high credit risk, as any losses fall under the expenditure ceiling (in contrast with guarantees and lending financed by borrowing from the Debt Office, where any losses are kept outside the expenditure ceiling).

Another aspect is that a credit guarantee often involves a three party relationship between the central government, the lender and the borrower whereas direct lending involves only two parties. This three party arrangement may potentially give rise to a more complex management in order to avoid risks that arise from e.g. moral hazard.

There are advantages with guarantees which may outweigh the disadvantages

However, there are several examples of situations in which the advantages of a guarantee outweigh the disadvantages.

One argument in favour of using guarantees is that they simplify risk sharing, with the government guarantee covering less than the whole amount of the underlying loan.[14]

In addition, guarantees with an appropriate degree of risk sharing may be more effective in dealing with a limited market failure, enabling borrowing that would otherwise not take place due to the lenders systematically overestimating the risks involved. Guarantees can also be seen as less of a market intervention than lending.

Choosing guarantees may also be justified when the goal is to enable funding to a large number of borrowers. In such a case a bank's existing network, systems and administrative routines might lead to greater efficiency than if the central government engages in direct lending.

[14] *Risk sharing can also be achieved in lending. Whether it is easier to achieve risk sharing with a guarantee or a loan depends on the circumstances.*

Analysis of credit risks

The risk of large losses in the regular portfolio is assessed as low, though somewhat higher than a year ago. This is a result of an increase in name concentrations as well as a higher credit risk in some of these name concentrations. The portfolio is well diversified overall, with a large number of guarantees and loans and counterparties in a number of different geographical and industrial sectors. The sector concentrations that nonetheless exist relate to the telecommunications industry and private individuals in Sweden. Negative shocks to any of these sectors could result in default clustering (due to intra-sector correlations). However, both sectors are assessed as stable and the probability of severe shocks is low. In addition, the guarantee holders and borrowers have some resilience to such shocks. The portfolio also contains name concentrations, i.e. guarantees and loans that are large compared to the rest of the portfolio, where only one or a couple of random defaults could result in large losses in the portfolio. The risk of major losses relating to name concentrations is assessed as moderate. Some individual exposures have a moderate to high credit risk. Otherwise, the largest exposures relate to callable capital commitments to multilateral development banks with strong creditworthiness. In addition to concentrations, default clustering may also occur due to default correlations between counterparties in different industries or geographical regions as a result of changes in the general economic environment. In the assessment of the Debt Office, a severe economic crisis with global spread could lead to such inter-sector correlations in the regular portfolio.

Introduction

This section analyses the risk of large losses – at least some tens of billions of Swedish kronor (SEK) or more – in the regular portfolio of guarantees and lending.

With respect to the delimitations of the analysis, the regular portfolio amounts to SEK 581.8 billion at year-end 2015 (compared with SEK 546.3 billion at the preceding year-end). The portfolio contains more than three thousand guarantees and over a million loans.

The regular portfolio consists of:

- Guarantees and lending managed on the basis of the central government guarantee and lending framework
- Student loans
- Callable capital that central government has issued to multilateral development banks in which Sweden is a member

Analysis of concentrations

A common feature of the risk factors relating to concentrations is that they depend on how diversified the portfolio is.

First, the existence of each type of concentration is assessed by presenting the composition of the portfolio. Then the risk of large losses with respect to any concentrations is analysed.

Default contagion

Relationships between guarantee holders and borrowers that can cause default contagion are limited to a few counterparties. The risk of large losses due to default contagion is therefore assessed as very low.

If there are circumstances, in which the financial problems of one guarantee holder or borrower infect other guarantee holders and borrowers, the probability of default clustering in the portfolio increases. Possible causes of such default contagion are commercial or legal connections. Typical examples are exposures to guarantee holders or borrowers in the same project, supply chain or corporate group.

In the assessment of the Debt Office, the scale of such links in the regular portfolio is small. It relates

to a few legal links – ownership interests and corporate group membership – between individual pairs of guarantee holders or borrowers.

Industry concentrations

The regular portfolio is diversified with respect to the industry affiliation of corporate counterparties. The most prominent, though still modest, industry concentration relates to the telecommunications industry – specifically telecom operators. However, the risk of large losses because of this concentration is assessed as low.

Industry concentration means low diversification with respect to the industry affiliation of corporate counterparties. This can be either because the portfolio is exposed to a small number of industries or because one or a few industries make up a considerable share of the portfolio.

Industry concentrations are a risk factor since negative shocks to an industry can give rise to default clustering. The magnitude of the risk depends both on the probability of a severe and/or surprising shock that affects many corporations in the industry at the same time (intra-sector correlation), as well as the resilience of the specific guarantee holders or borrowers to a negative shock. The stronger the creditworthiness of the counterparties, the better their resilience to negative shocks. [15]

Classification by industry

Table 1 shows that guarantees and lending to corporations are spread across several different industries.[16] The most noticeable, but still modest, concentration is in relation to the telecom industry – specifically telecom operators (SEK 61.5 billion). This concentration accounts for 10.6 per cent of the regular portfolio and consists mostly of export credit guarantees.

TABLE 1 GUARANTEES AND LENDING BY INDUSTRY AS OF 31 DECEMBER 2015[1]

(SEK billion)	*Amount*	*Share[2]*	
Telecommunications	61.5	10.6 %	(13.2 %)
Transportation	37.9	6.5 %	(5.4 %)
Industrials[3]	25.5	4.4 %	(5.3 %)
Utilities	14.7	2.5 %	(2.9 %)
Finance[4]	11.0	1.9 %	(0.7 %)
Real estate	9.9	1.7 %	(1.9 %)
Forest and building products	5.8	1.7 %	(1.6 %)
Insurance	5.7	1.0 %	(1.0 %)
Energy and natural resources	3.7	0.6 %	(0.7 %)
Health care and chemicals	1.1	0.2 %	(0.1 %)
Consumer and service sector	0.7	0.1 %	(0.1 %)
Sum	**177.5**	**30.5 %**	**(32.9 %)**

[1] Based on the Global Industry Classification Standard (GICS) published by Morgan Stanley Capital International (MSCI) and Standard & Poor's.

[2] The numbers in the brackets are the corresponding exposures as on 31 December 2014.

[3] Industrials includes Aerospace, Automotive, Capital goods and Metal.

[4] Excluding the deposit guarantee (SEK 1 500.7 billion), which is analysed separately (see pages 38-46).

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

The remainder of the regular portfolio consists of mainly of student loans (SEK 204.3 billion), callable capital (SEK 121.2 billion) and guarantees and loans to other sovereigns (SEK 73.3 billion). These cannot be categorized by industry in a meaningful way.

Analysis of the concentration in relation to telecom operators

The telecommunications industry includes both equipment manufacturers and operators, but the concentration in the regular portfolio relates to the latter.

The risk of large losses from the concentration in relation to telecom operators is assessed as low. The industry is stable with a low probability of negative shocks that could result in default

[15] There are considerable differences between industries regarding the degree of intra-sector correlation. Cyclical industries – where profitability varies strongly over the business cycle – are more risky than stable industries. In addition to high degree of cyclicality, structural shifts or substitution in an industry are changes that hit most players in an industry at the same time.

[16] Since only the regular portfolio is studied here, no attention is paid to the industry concentration that central government has in relation to the financial sector with respect to the deposit guarantee.

clustering. The following factors have been taken into consideration in the assessment:

- Telecom operators belong to one of the least cyclical industries, with stable revenue and profitability
- The networks, both terrestrial and mobile, of telecom operators make up a considerable part of the infrastructure of a country and access to communication services is seen as important in raising people's living standards
- The industry is characterised by high barriers to entry in the form of capital intensity, licensing and regulation
- Competition is local with a limited number of players in each market. Consolidation in mature markets reduces competition
- Given high capital intensity there are considerable economies of scale (thus size and market position significantly impact profitability)
- The geographical distribution of central government exposure is favourable in terms of growth prospects in the industry, with an emphasis on emerging markets
- In combination with economies of scale, weaker growth in mature markets is driving consolidation in the industry. Debt-financed acquisitions can increase the financial risk in these corporations, but in general this is balanced by their strong profitability

The creditworthiness of many of the guarantee holders is weak (under the industry average). This is in part explained by the fact that many of the guarantee holders operate in regions where the country risk is high. However, the guarantee holders are generally established businesses, with a strong position in their home market, which raises the assessment of their resilience to negative shocks in the industry.

Another factor that influences the Debt Office's risk assessment is the assumption that the probability that outstanding guarantees will be called is lower than the probability of a default on the underlying loan.[17]

In the event of guarantees being called, central government's recovery prospects are assessed as average (about 50 per cents expected recovery rate). However, there is an uncertainty regarding the expected recovery rate, where the actual recovery rate could be both lower and higher than average.

Geographical concentrations

The regular portfolio is geographically dispersed. However, counterparties in Sweden account for more than 40 per cent of the portfolio – largely via student loans to private individuals. A severe downturn in the Swedish economy – resulting in higher unemployment – is assumed to give rise to a reduction in income for many student loan borrowers at the same time. Such a scenario could lead to a clustering of reduced payments from the borrowers. However, the risk of large losses is believed to be limited. The small size of individual loans calls for a large number of private individuals having financial problems at the same time in order for large losses to arise from student loans. The educational level of student loan borrowers is generally high which decreases the risk of unemployment. In addition, the existence of both public and private insurance against loss of income mitigates the effect of unemployment on borrowers' incomes.

A geographical concentration, like an industry concentration, is a sector-based risk factor. Guarantee holders and borrowers in the same geographical region are likely to be affected at the same time by changes in the economic environment, such as changes in economic growth, exchange rates and interest rates for the specific region (intra-sector correlation). In the same way as with industry concentrations, negative shocks can lead to default clustering.

Classification by geographical region

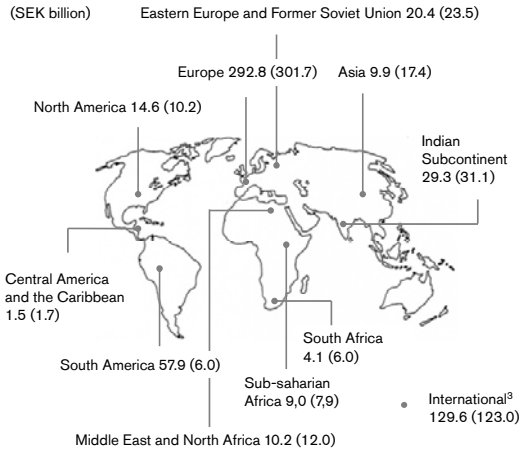
The guarantees and loans in the regular portfolio are spread over more than 180 countries. This geographical dispersion is a risk-reducing factor that is mainly attributable to the export guarantees issued by the Swedish Export Credits Guarantee Board and central government's undertakings to multilateral development banks. However, more than 40 per cent of the portfolio volume relates to

[17] *This assessment is based on the terms and conditions in the guarantee agreements.*

guarantees and lending in Sweden. This constitutes a clear geographical concentration.

Figure 1 and table 2 present the composition of the regular portfolio in terms of geographical areas, showing both regions and individual countries.

CHART 1 GUARANTEES AND LENDING BY GEOGRAPHICAL REGION[1] AS OF 31 DECEMBER 2015[2]



[1] Moody's Investors Service (2015). Moody's Approach to Rating Corporate Synthetic Collateralized Debt Obligations. Exhibit 9: Classification of Countries by Contagion Region.

[2] The numbers in the brackets are the corresponding exposures as on 31 December 2014.

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

The geographical composition of the regular portfolio is more or less unchanged from last year-end. The most significant change is the increase in guarantees to South America.

The aggregate picture in chart 1 is supplemented in table 2 with the ten largest exposures to individual countries.

TABLE 2 THE 10 LARGEST CONTRY EXPOSURES AS OF 31 DECEMBER 2015

(SEK billion)	*Country risk class*[1]	*Credit rating*[2]	*Amount*	*Share*
Sweden	0	AAA/AAA/Aaa	242.9	41.8 %
Brazil	4	BB+/BB+/Baa3	54.2	9.3 %
India	3	BBB-/BBB-/Baa3	17.0	2.9 %
Russia	4	BB+/BBB-/Ba1	13.5	2.3 %
Spain	0	BBB+/BBB+/Baa	12.7	2.2 %
USA	0	AA+/AAA/Aaa	12.3	2.1 %
Denmark	0	AAA/AAA/Aaa	10.1	1.7 %
Pakistan	7	B-/B/B3	10.1	1.7 %
Ireland	0	A+/A-/Baa1	5.6	1.0 %
Italy	0	BBB-/BBB+/Baa2	5.0	0.9 %

[1] The country risk classes have been complied by the Swedish Export Credits Guarantee Board. Country risk classes one to seven measure country risk from the lowest to the highest risk. Country risk class zero consists of high-income countries for which the pricing of export credit guarantees is based on market pricing and not the OECD-agreed premiums (see OECD's website at the address http://www.oecd.org/tad/xcred/crc.htm).

[2] Public rating from one or more of the international credit rating agencies, Standard & Poor's, Fitch Ratings and Moody's Investors Service.

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning and the Debt Office.

Table 2 shows that there is a clear geographical concentration to Sweden. However, one factor limiting the risk is that Sweden is a country with a high degree of economic and political stability, a robust business climate and legal system etc.

Analysis of student loans to private individuals in Sweden

In the assessment of the Debt Office, the risk of large losses due to the concentration to Sweden is low. The major part (78 per cent) of the concentration consists of student loans, which are individually small loans to a large number of borrowers. This granularity means that the correlation between individual borrowers must be high in order for large losses to occur.

Student loans to Swedish residents amounted to SEK 188.4 billion on 31 December 2015.[18] These loans have been issued in two different systems; firstly, so called student loans (granted in the

[18] *In addition, there are loans totaling SEK 15.9 billion to student loan borrowers resident abroad.*

period1989–2001), where the repayment is directly linked to the borrower's income and, secondly, so called annuity loans (granted since 2001) for which an amortisation plan is set on the basis of the borrower's age and the size of the loan. Despite some differences in lending terms, in practice both types of loans have similar features. The loans have long repayment terms (on average 25 years or longer). They also have soft conditions that allow for reduced annual repayments if the borrowers' income deteriorates.[19]

In accordance with the regulation on student loans, a credit loss is deemed to occur only when a loan receivable is written off. However, no loan receivables are written off until a borrower reaches 65 or 67 years of age (depending on the type of loan), unless a borrower dies prior to reaching such age.[20]

However, a reduction in repayments, whether related to the soft conditions on the loans or due to non-payment of amounts owed, results in a financial loss for central government, at least in the medium term, even before any write-off and even if the whole loan is eventually repaid. When repayments fall, central government's net financial wealth decreases as the write-down of loans receivables increases (due to a higher risk of future write-offs). Lower annual repayments also reduce central government's cash flow, leading to a higher borrowing requirement. For the purpose of this report, any reduction in repayments – whether allowed under the terms of the loans or not – is therefore viewed as a credit loss for central government.

The Debt Office, together with the Swedish Board for Study Support, has identified the following risk factors with respect to student loans issued to borrowers resident in Sweden:

1. An economic downturn in Sweden with higher unemployment and a lower rate of income growth that results in loss of income for many borrowers simultaneously
2. A negative supply shock that combines higher unemployment with a lower rate of income growth, as well as high interest rates

The assessment of the Debt Office is that a substantial clustering of reduced payments with respect to student loans would require a severe economic crisis. Such crises are rare events, which is an important consideration in the assessment that the risk of large losses on student loans is low. Even given a recession or a negative supply shock in the Swedish economy, the Debt Office makes the assessment that the borrowers generally have a good resilience against such shocks.

A majority of the student loans (at least 75 per cent) relate to borrowers with post-secondary education.[21] Historic experiences indicate that this group generally runs a lower risk of being hit by unemployment. Additionally, the existence of various insurance systems (such as unemployment insurance funds, the state social security system and private income insurance) mitigates the effect of unemployment on borrowers' incomes.[22]

One factor that – in the event of an economic crisis in Sweden – points in the opposite direction is the risk of reduced loan repayments, over and above what is allowed under the soft terms of the loans due to loss of income, from highly indebted borrowers.

The overall assessment of the Debt Office is that there is a low risk of large losses from student loans.

Name concentrations

The portfolio contains name concentrations, i.e. guarantees and loans that are large compared to the rest of the portfolio, where only one or a couple of random defaults could result in large losses in the portfolio. The risk of major losses relating to such name concentrations is assessed as moderate. Some individual exposures have a moderate to high credit risk. Otherwise, the largest exposures relate to callable capital commitments to multilateral development banks with strong creditworthiness. Moreover, the correlation between the guarantee holders and borrowers representing the largest exposures is judged to be limited.

[19] *Student loans can therefore be seen as loans with conditional repayment, where the repayment to central government depends on the development of the borrower's income.*

[20] *In some cases, student loans may also be written of an account of exceptional grounds.*

[21] *The specific borrowers' educational level is unknown.*

[22] *Statistics Sweden (2015). http://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START_AM_AM0401_AM401A/NAKUBefolkningAr/?rxid=dbfceae2-eb58-49a2-9b4c-b430d6e3959. The Swedish Unemployment Insurance Board (2015). http://externastat.iaf.se/report.aspx?ID=111.*

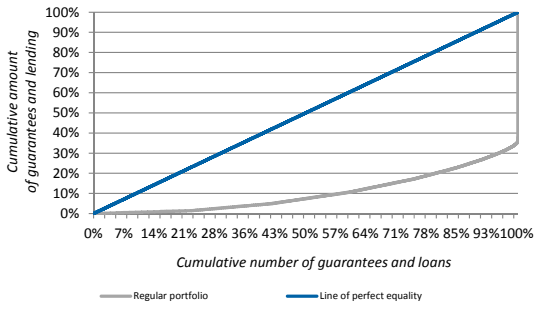
Name concentration means low diversification – or put differently, low granularity – either because a portfolio contains a small number of guarantees or loans (referred to as portfolio name concentration), or because there are exposures to individual guarantee holders or borrowers that are large in relation to the size of the portfolio (referred to as individual name concentration). For the regular portfolio, only the latter type of name concentration is relevant to consider for analysis.

An important feature of name concentrations is that no correlations are required for large losses to occur. Instead, a few defaults explained by idiosyncratic circumstances can be enough. This distinguishes the analysis of name concentrations from the rest of the portfolio risk analysis (which focuses on correlations).

The distribution of individual exposures in the regular portfolio

The regular portfolio's granularity is reduced due to a few large exposures to individual guarantee holders and borrowers. This is shown by the Lorenz curve in chart 2.[23]

CHART 2 **LORENZ CURVE SHOWING THE DISTRIBUTION OF INDIVUDUAL EXPOSRUES AS OF 31 DECEMBER 2015[1]**



[1] Excluding the deposit guarantee (SEK 1 500.7 billion), which is analysed separately (see pages 38-46).

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

The greater the deviation from the line of perfect equality, the less diversified the portfolio is with respect to name concentrations.

[23] *Hibbeln, Martin (2010): Risk Management in Credit Portfolios. Springer-Verlag. Heidelberg. Pages 68–69. ISBN 978-3-7908-2607-4.*

The fifteen largest exposures in the regular portfolio account for more than 40 per cent of the size of the portfolio. These name concentrations are presented in table 3 below. To give a fair picture, the amounts of guarantees or loans issued to the same counterparty have been added together since problems for a guarantee holder or borrower in meeting their undertakings generally result in a default on all of the counterparty's commitments at the same time.

TABLE 3 **THE 15 LARGEST INDIVIDUAL EXPOSURES AS OF 31 DECEMBER 2015[1]**

(SEK billion)	Amount	Number of guarantees or loans	Share
Callable capital	60.0	1	10.3 %
Callable capital	50.6	1	8.7 %
Credit guarantee[2]	18.5	97	3.2 %
Callable capital	18.0	1	3.1 %
Callable capital	17.9	1	3.1 %
Callable capital	10.8	1	1.9 %
Credit guarantee	8.4	4	1.5 %
Credit guarantee	8.4	2	1.4 %
Credit guarantee	8.1	5	1.4 %
Credit guarantee	7.3	1	1.2 %
Credit guarantee	6.7	3	1.2 %
Credit guarantee	6.3	1	1.1 %
Credit guarantee	5.6	1	1.0 %
Lending	5.5	1	0.9 %
Lending	5.4	1	0.9 %
Sum	**237.4**		**40.8 %**

[1] Excluding the deposit guarantee scheme (SEK 1 500.7 billion), which is analysed separately (see pages 38-46).

[2] Sweden guarantees all the Øresundsbro Consortium's debt along with Denmark. It is therefore not obvious whether the size of Sweden's undertaking should be reported as the entire outstanding amount or 50 per cent of it. A strict formal assessment has been made in the table, so the entire amount is reported.

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

The name concentrations in the portfolio have increased since the preceding year-end. On 31 December 2014, the 15 largest individual exposures accounted for about 35 per cent of the regular portfolio.

To assess the extent to which name concentrations imply a risk of large losses, the probability default and the loss given default of the individual guarantee holders and borrowers concerned is analysed. Any correlations between the guarantee holders and borrowers concerned are also analysed.

Analysis of credit guarantees and lending
Table 4 shows the assessed creditworthiness of individually large credit guarantees and loans in the regular portfolio (including callable capital, which is analysed separately in the next subsection).

TABLE 4 CREDITWORTHINESS OF INDIVIDUALLY LARGE CREDIT GUARANTEES AND LENDING AS OF 31 DECEMBER 2015[1]

(SEK billion)	*High expected recovery rate (≥ 60 %)*	*Normal expected recovery rate (25–60 %)*	*Low expected recovery rate (≤ 25 %)*
Investment grade issuer rating (AAA/Aa – BBB-/Baa3)	6.3 (31.5)	46.2 (12.5)	13.6 (5.9)
Speculative grade issuer rating (BB+/Ba1 – C/C)	- (16.5)	64.6 (21.3)	- (-)

[1] The numbers in the brackets are the corresponding exposures as on 31 December 2014.

Source: Data from the Swedish Export Credits Guarantee Board and the Debt Office.

A couple of individual guarantee holders and borrowers are subject to substantial credit risk (corresponding to a speculative grade issuer rating), although the expected recovery rates given default are normal. The remaining name concentrations have a creditworthiness corresponding to an investment grade issuer rating, with varying expected recovery rates given default. Taken together, the risk of large losses due to individually large guarantees and loans has increased since the preceding year-end.

Analysis of callable capital
Sweden is a member of several multilateral development banks (see table 5 below). The membership in the banks can be viewed as a co-ownership. Each member country pays a share to the equity of the bank (*paid-in capital*), which is subject to the same leveraging mechanism that is applied by ordinary banks. In addition to the paid-in capital, the member countries guarantee to contribute additional capital when required in order to secure the jointly agreed objectives for the activities of the bank. The willingness to stand behind this commitment is explicitly manifested by the *callable capital* issued by each member country.

TABLE 5 SWEDEN'S MEMBERSHIP IN MULTILATERAL DEVELOPMENT BANKS AS OF 31 DECEMBER 2015[1]

(SEK billion)	*Callable capital*	*Paid-in capital*
European Investment Bank	60.0	5.9
Nordic Investment Bank	17.9	1.5
World Bank Group	18.1	1.4
African Development Bank	10.8	0.7
Inter-American Development Bank	4.1	0.2
European Bank of Reconstruction and Development	4.9	1.3
Council of Europe Development Bank	1.1	0.1
Asian Development Bank	4.2	0.2
Sum	**121.2**	**11.2**

[1] Excluding Eurofima.

Source: Data from the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

The size of the callable capital last year.

So far, no callable capital has ever been called. Instead, capital increases in the banks have been made gradually in the form of smaller payments and adjustments of the callable capital. However, if a bank would be subject to severe financial stress – for example on account of large credit losses – an extensive need for capital could arise.

Therefore, central government's real undertaking is not unambiguously defined, and this makes it problematic to limit a risk analysis to the reported amounts of callable capital. This is why incremental capital contributions and potential extraordinary capital contributions are analysed separately – as expressions of different ways of meeting central government's undertaking (irrespective of whether or not the callable capital is formally called or not).

For incremental capital contributions the assessment of the Debt Office is that the risk of large losses is low. While such contributions are not unlikely, they involve relatively small amounts. This follows from the fact that these payments are usually linked to fairly undramatic events such as the expansion of lending or credit losses that weaken the ability of a bank to fund itself at a low cost (but without any threat of financial stress). An adjustment of the guarantee capital is generally also made in connection with such payments.

Table 6 sets out historical data that supports the assessment made.

TABLE 6 HISTORICAL DATA ON SWEDEN'S INCREMENTAL PAYMENTS TO MULTILATERAL DEVELOPMENT BANKS IN 1998–2015[1]

(SEK billion)	*AfDB*	*AsDB*	*EBRD*	*IADB*	*EIB*	*IBRD*
1998			57.3			
1999			56.5			
2000	11.5	2.2	54.2			
2001	9.8	2.3	59.3			
2002	11.2	2.5	58.8			
2003	10.0		58.5			
2004	8.6		58.5	5.5		
2005	9.0		59.5			
2006	8.6			41.4		
2007	7.6			3.1		
2008						
2009						
2010						
2011	50.6	14.9		8.9		
2012	52.5	14.8		8.9		49.5
2013	51.2	14.4		7.2	2 572.3	46.9
2014	54.6	14.3		8.9		49.6
2015	59.7	19.6		9.4		61.5
Sum	**344.9**	**85.1**	**462.6**	**93.2**	**2 572.3**	**207.5**

[1]Only actual payments (i.e. not taking account of internal transfers of earnings within the banks). However, debt relief as part of the Multilateral Debt Relief Initiative (MDRI) – which is also a charge on appropriations – has been excluded from the table.

Source: Data from the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

Between 1998 and 2014 central government has made capital contributions to the African Development Bank (AfDB), the Asian Development Bank (AsDB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), the European Investment Bank (EIB) and the World Bank (IBRD). At most these payments have totalled a couple of SEK billion, and have often been much smaller, even though the time period studied includes various economic crises.[24]

The risk that central government will need to provide large capital contributions – because one or more banks run into severe financial stress – is assessed as low. This is based on the observation that all the banks of which Sweden is a member of have a strong creditworthiness.

Table 7 shows the stand-alone credit profile (SCAP) of these banks (which excludes the callable capital but takes account on-going support) and their credit rating (which includes all forms of support) – where the SCAP is the most relevant measure when assessing the probability of large capital contributions.

TABLE 7 CREDITWORTHINESS OF MULTILATERAL DEVELOPMENT BANKS OF WHICH SWEDEN IS A MEMBER AS OF 31 DECEMBER 2015[1]

	SCAP	*Credit rating*
European Investment Bank	aa+	AAA
Nordic Investment Bank	aaa	AAA
World Bank (IBRD)	aaa	AAA
African Development Bank	aa+	AAA
Inter-American Development Bank	aa+	AAA
European Bank for Reconstruction and Development	aaa	AAA
Council of Europe Development Bank	aa	AA+
Asian Development Bank	aaa	AAA

[1] Based on Standard & Poor's rating methodology. Standard & Poor's (2012). Multilateral Lending Institutions and Other Supranational Institutions Ratings Methodology.

The SCAP is in the interval aa+ to aaa for all these banks. There are fundamental, and probably enduring, explanations for the consistently high creditworthiness of this type of banks, including:

- In general they have preferred creditor status, which reduces their credit losses

[24] However, it should be noted that the period that is studied in table 6 is rather short. Hence, it is not possible to rule out events that result in incremental contributions that are larger than the ones observed in the historical data.

- High capital adequacy is central to their business models, even without taking the guarantee capital into account
- They seldom pay dividends, and this strengthens both their capital and their liquidity[25]
- The governance of their business is prudent and the control is strict since public funds are involved

The overall picture indicates low probability that these banks will be subject to severe financial stress that require large capital contributions.

Correlations between large individual exposures

If large individual exposures are correlated, there is an increased risk of large losses. In the assessment of the Debt Office, such correlations are limited.

The risk of default contagion among the fifteen largest guarantee holders and borrowers is limited to a legal relationship between one guarantee holder (SEK 18.5 billion) and one borrower (SEK 5.4 billion). Concentrations relate to two guarantee holders in the same industry (corresponding to a total exposure of SEK 15.1 billion).

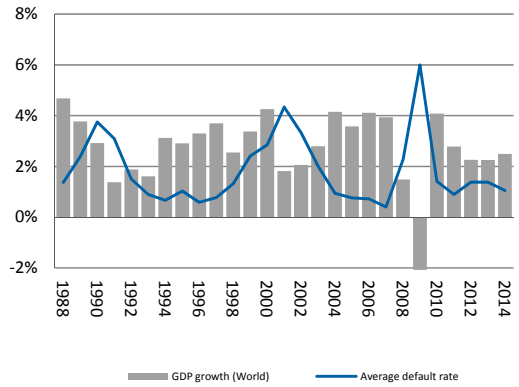
Changes in the general economic conditions

Concentrations are the single most important cause of large losses in a portfolio. However, even in a perfectly diversified portfolio, with no concentrations, there is still a risk of default clustering. This is because adverse changes in the general economic conditions – such as severe economic crises – enables inter-sector correlations between guarantee holders and borrowers in different industries or geographical regions. In the assessment of the Debt Office an economic crisis with global spread would be required for such inter-sector correlations to arise in the regular portfolio.

There is a risk of default clustering even in a perfectly diversified portfolio, as a result of adverse changes in the general economic conditions. This is a factor that no guarantee holder or borrower is immune to. However, the degree of sensitivity to such changes differs.

Chart 3 illustrates that, in general, the (average) aggregated default rate is (negatively) correlated to changes in general economic conditions, with the default rate rising in recessions and falling in boom periods.[26]

CHART 3 **VARIATIONS IN THE AVERAGE DEFAULT RATE AND IN GROWTH IN THE WORLD ECONOMY 1988–2014**



Source: Moody's Investors Service (2015). Corporate Default and Recovery Rates, 1920-2014 - Excel data, Exhibit 31 - Annual Issuer-Weighted Corporate Default Rates by Alphanumeric Rating, 1983-2014. World Bank (2015). http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries?display=graph.

Factors affecting the degree of inter-sector correlation

For a portfolio of loans to private individuals there is both intuitive and empirical support for a negative relationship between creditworthiness and the degree of inter-sector correlation with respect to adverse changes in the general economic conditions. The greater the share of guarantee holders or borrowers with weak creditworthiness, the greater the probability of default clustering due to systematic risk.

For corporates, the relationship between creditworthiness and inter-sector correlations is not as clear. The relationship also varies depending on the size of the corporates.[27] The inter-sector

[25] *With the exception of the Nordic Investment Bank. They make an annual dividend payment to the member countries of 25 per cent of profits.*

[26] *The same systematic effect also applies to recovery rates given default. For example, in a deep and prolonged recession – with a higher than normal frequency of defaults – there are generally more sellers of assets than there are buyers. This forces asset prices down, thus reducing the recovery rate.*

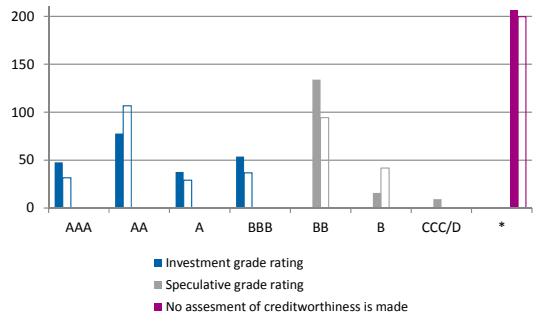
[27] *See, for instance Lee, Joseph et al. (2009): The Relationship between Average Asset Correlation and Default Probability. Moody's KMV.*

correlation is assumed to be greater for large corporates than for small and medium-sized corporations. The rationale for this is that large corporates are affected to a greater degree by changes in the global economic conditions, while small and medium-sized corporations usually have more of a local or regional focus. Therefore, on the one hand, the risk of inter-sector correlations in a widespread economic crisis is higher for large corporations. On the other hand, large corporations often have a stronger creditworthiness than small corporations do, making them more resilient to negative shocks.

Creditworthiness of guarantee holders and borrowers

Chart 4 below illustrates the assessed creditworthiness of the guarantee holders and borrowers in the regular portfolio based on volume.

CHART 4 **GUARANTEE HOLDERS AND BORROWERS CREDITWORTHINESS AS OF 31 DECEMBER 2015[1]**



[1] The filled bars refer to the year-end of 2015, while the transparent bars refer to the year-end of 2014.

* The category where no assessment of creditworthiness is made mainly consists of student loans to private individuals.

Source: Assessments of creditworthiness are based on the expected losses in the financial reporting made by the Swedish Export Credits Guarantee Board, Sida, the National Board of Housing, Building and Planning and the Debt Office in their annual reports.

A considerable share of the regular portfolio consists of guarantee holders and borrowers with strong creditworthiness (such as the multilateral development banks). However, there is also a material share of guarantee holders and borrowers with weak creditworthiness. This mainly relates to export credit guarantees and guarantees in the development aid area, where the weak creditworthiness can be explained to a great extent by high country risk in the countries where these guarantee holders and borrowers operate.

Finally, student loans make up a relatively large share of the regular portfolio. For student loans, there is no assessment of the creditworthiness of the individual borrowers (only study-based criteria apply to the lending). However, as stated in the sub-section on the geographical concentration in Sweden (see pages 19-21), the resilience to negative shocks in this part of the portfolio is generally assessed as good.

Clusters of losses in the central government guarantee portfolio in the 1980s

The fact that extensive economic crises can lead to correlations between guarantee holders and borrowers in different sectors – in turn leading to default clustering – is something that the central government has experienced.

In the 1980s, the Swedish Export Credits Guarantee Board's guarantees were hit by the debt crisis that hit the world in the wake of the oil crisis of the 1970s. The debt crisis affected countries in Latin America and Africa, when central government debt in these countries soared as a result of rising oil bills. For public creditors, the subsequent debt renegotiations were handled through the Paris Club.

The solutions to the debt problems changed over time, but in broad terms, the debt relief came in two forms: debt write-downs for low-income countries and extended repayment terms for middle-income countries.

Central government – through the Swedish Export Credits Guarantee Board – wrote off its claims on low-income countries, mainly African countries. However, countries like Poland were also granted debt write-downs for political reasons (though only 50 per cent). Other middle-income countries were granted modified repayment profiles. For these countries the whole of the outstanding debt owed, including interest, was ultimately paid.

One country that received debt relief in the form of a modified repayment profile was Brazil. The country suspended payments in 1983. This was followed by a renegotiation process in which maturities were restructured each year, with an interest-only period (normally five years) followed by an amortisation period of the same length. There were several renegotiations, which achieved a smoothing out of the debt maturity profile the country was facing, and a more stable payment situation was established. The operation was successful, and in 2006, Brazil had repaid the whole of its debt (including interest) to the Swedish Export Credits Guarantee Board. Consequently, it took 23 years to go from the suspension of payments to a final solution. Although this is a long time, the operation must be described as a success, especially as Brazil took itself out of its debt trap while at the same time its creditors suffered no loss. The same goes for countries like Mexico, Panama and Peru was similar.

For the Swedish Export Credits Guarantee Board, the debt crisis meant large pay-outs of claims in the 1980s, around SEK 0.8–1 billion per year with a peak of SEK 1.7 billion in 1987. However, in the early 1990s, there was a turnaround and from 1995, recoveries began to exceed claims settlements.

Calculations of unexpected losses

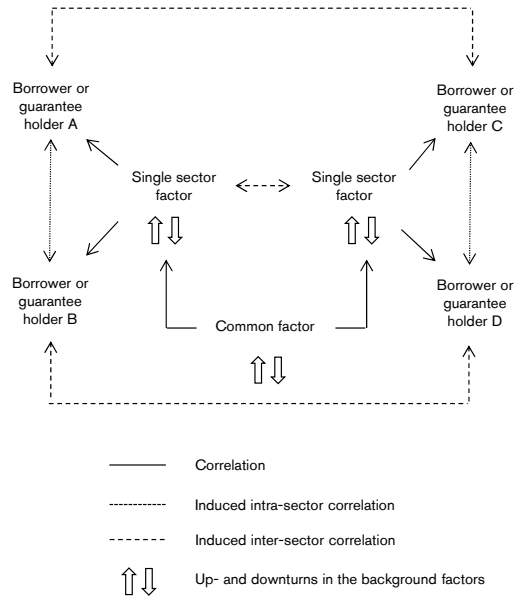
Losses that would occur with less than 1 per cent probability over a three-year time horizon have been estimated at 19 per cent of the portfolio net of recoveries and 21 per cent of the portfolio excluding recoveries. When stressing these calculations with respect to model uncertainty, the corresponding results are 21 and 22 per cent of the portfolio respectively. However, such 'tail risk' calculations are, as always, subject to important limitations. Hence, the results should be interpreted and used with caution.

Quantitative analysis using a credit portfolio model can be used to supplement the fundamental, qualitative analysis of the central government portfolio of guarantees and lending. The model developed by the Debt Office is based on a methodology for credit portfolio modelling that is well established with both academics and practitioners in the field. It was also seen as important that the model is stringent, easy to use and can be described in a simple way.

A key factor when calculating unexpected losses is default correlation.[28] The approach chosen by the Debt Office is to model default correlations indirectly by using default rate volatilities instead of using default correlations as a direct input when estimating portfolio losses. The basic assumption is that there are sector specific and general background factors that influence individual borrowers' and guarantee holder's default rates simultaneously, causing correlated defaults (figure 2 below illustrates this approach). For example, when the economy is in recession the rate of default is above t average (representing default clustering). Conversely, when the economy is growing there are fewer defaults than average.

Please see the info box on page 32 for a brief description of the model.

FIGURE 2 **DEFAULT CORRELATION INDUCED BY BACKGROUND FACTORS**



The model's usefulness and basic limitations

It is important that central assumptions and limitations that influence any quantitative model are disclosed and well understood. Without such an understanding, the exact numbers coming out of the model can give the appearance of false accuracy.

The portfolio model that the Debt Office has developed provides quantitative information on important risk factors with respect to large losses. Hence, the results from the model contribute to further transparency regarding the portfolio's risk profile. It is also the Debt Office's view that the portfolio model provides an indication on the probabilities of large losses in the portfolio.

However, credit portfolio models are limited in their capacity to capture 'tail risk'. Firstly, it is difficult to formalise mathematically the dynamic and complex forces that explain large portfolio losses. Secondly, joint defaults that lead to large losses are rare events, which results in the problem of data paucity. Due to these general shortcomings, the results from credit portfolio models rely on theoretical concepts and assumptions to compensate for insufficient empirical data. In addition, there are no reliable methods of validating the model.

[28] *Note that default correlation per se does not influence the expected loss at all.*

In summary, portfolio model calculations provide value added to the qualitative analysis of large losses in the central government portfolio of guarantees and lending, but the results from the model should be interpreted and used with caution.

Unexpected loss

Unexpected loss refers to the deviation from expected loss in the portfolio (usually with respect to losses that are larger than the expected loss). However, unexpected loss can be measured in many different ways. The Debt Office has chosen to calculate unexpected loss as the (unconditional) expected loss subtracted from the (conditional) expected loss when the portfolio loss exceeds Value-at-Risk (VaR) for a specific degree of confidence (called conditional VaR, CVaR).[29] Hence, the chosen risk measure describes the 'tail' of the loss distribution.

Unexpected loss = CVaR – Expected loss

Delimitations and simplifications

Student loans are not included in the model

For the time being, it is not possible to include student loans (which account for more than 35 per cent of the regular portfolio) in the model. This is because probability of default and loss given default are not estimated for student loans, and therefore essential inputs to the portfolio model are missing. .

Default contagion is handled outside the model

Modelling of default contagion is mathematically very complicated. One simple, though conservative, solution is to add together any guarantees and loans to parties that have commercial or legal dependencies.

Focus on name and industry concentrations

The quantitative analysis of concentrations is limited to name and industry concentrations in the portfolio. Ideally, geographical concentrations should be analysed as well. However, this is not possible due to lack of relevant data.

Fundamental approach

In order to incorporate the effect of industry specific factors on the default rate of individual borrowers or guarantee holders, factor weights needs to be determined. Due to data scarcity the factor weights in the model have been determined such that the borrowers or guarantee holders in the portfolio are subject to one industry sector only, and booms and recessions in this industry sector are the only sources of volatility in the borrower's or guarantee holder's default rate.[30]

Static portfolio

Information on exposures and credit worthiness is taken from the data compiled by the respective government agencies when they prepare their annual reports. The portfolio is assumed to be static with respect to these parameters for each (cumulative) time horizon that the calculations are made for – irrespective of the actual terms of the guarantees and loans.

Miscellaneous specifications

Calculations of unexpected losses build on a number of specifications in the model.

- The calculations are carried out for a forward-looking time horizon of one and three years respectively.
- The losses calculated in the model are based solely on defaults.[31]
- Establishing the ultimate recovery given default can take several years, but full or partial recoveries can also be made in the short term. Given fixed time horizons of one and three years, both gross losses (excluding recoveries) and net losses (including recoveries) are calculated.

Implementation

The portfolio

The calculations are based on an accumulated portfolio of SEK 375.7 billion, distributed just over 2 900 guarantees and loans.[32] After adding together guarantees and loans to the same

[29] *VaR is the level of loss that, for a given time horizon, will only be exceeded with a certain probability.*

[30] *This is of course a simplification. In practise there are borrowers and guarantee holders whose fortunes are affected by more than one industry sector and by different degrees.*

[31] *Accordingly, increases in the expected loss are not treated as losses in the portfolio model (as they only result in an accounting effect – not actual losses).*

[32] *In addition to student loans, housing guarantees with indefinite maturities (SEK 0.6 billion) and loans with conditional repayments that are managed by the Debt Office (SEK 1.2 billion) are, for practical reasons, excluded from the portfolio model.*

counterparty or to counterparties with connections that enable default contagion the number of guarantees and loans has been reduced to just over 1700 (though the total amount is unchanged).

Data

Input data to the portfolio model has been obtained from the leading credit rating agencies' databases and methodology reports.

- For each industry sector in table 1 on page 18, a time series has been compiled using the aggregate default rate for the industry over the period 1981–2014.[33]

- Default rates for different rating categories have been matched against the assessment of individual borrowers' and guarantee holders' creditworthiness. These assessments have been made by the responsible government agencies when calculating expected losses in their annual reports.[34]

- Recovery rates for individual guarantees and loans, estimated by the responsible agencies when calculating expected losses in their annual report have been divided into three categories; high, normal and low recovery rate.[35]

- The correlation between the average default rate (for a wide variety of rated issuers) and the average recovery rate (for a wide variety of bonds with different priorities of claim) has been used as a crude estimate of the systematic dependence between default rates and recovery rates in the model.[36]

Monte Carlo simulation

The Debt office has used Monte Carlo simulation to generate a distribution of hypothetical portfolio losses, from which the unexpected loss is estimated. This computational technique is very useful when it is difficult to achieve a closed-form distribution, as is the case here.

One advantage of this approach is that it is flexible and easy to implement. The disadvantage is that Monte Carlo simulation introduces sampling error, where the approximation of the loss distribution becomes imprecise at very high loss levels (i.e. underestimation of the 'tail' of the loss distribution).

For each model calculation, 250 000 portfolio scenarios have been simulated.

Model uncertainty

The portfolio model is subject to model uncertainty. In other words, the calculations are sensitive to the choice of model and the parametrization of the model.

One simple way of addressing this model uncertainty, at least to some degree, is to carry out additional calculations where key parameters in the model are stressed to illustrate adverse conditions not captured by the historical data. This results in more defaults and larger losses in the model.

Following this, the Debt Office has chosen to:

- Increase the intra-sector correlations in the model by increasing the standard deviation of all industry-based background factors

- Assume a high level of inter-sector correlation between all industries

- Increase the standard deviation of the recovery rates

- Assume a high correlation between the default and recovery rates in the model

Results

The results from the portfolio model calculations are summarized in table 8 below. Losses excluding recoveries are presented in brackets.

[33] Standard & Poor's (2014). CreditPro® - Custom table for Riksgäldskontoret (Swedish National Debt Office).

[34] Moody's Investors Service (2015). Moody's Annual Default Study Corporate Default and Recovery Rates 1920-2014. Exhibit 35 - Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1983-2014). The empirical default rates have then been adjusted using a smoothing algorithm developed by the Debt Office to produce idealized default rates – i.e. default rates that are monotonically increasing (decreasing) for stronger (weaker) ratings.

[35] Moody's Investors Service (2015). Moody's Approach to Rating Corporate Synthetic Collateralized Debt Obligations. Exhibit 3: Mean and Standard Deviation Assumptions by Asset Type, Seniority and Security.

[36] Moody's Investors Service (2015). Moody's Annual Default Study Corporate Default and Recovery Rates 1920-2014. Exhibit 31 - Annual Issuer-Weighted Corporate Default Rates by Alphanumeric Rating, 1983-2014 (All rated) och Exhibit 20 - Annual Defaulted Corporate Bond and Loan Recoveries (All Bonds).

TABLE 8 **CALCULATIONS OF EXPECTED AND UNEXPECTED LOSS AS OF 31 DECEMBER 2015**

(SEK billion)	*Expected loss*	*Unexpected loss*		
Confidence level	-	*90 %*	*95 %*	*99 %*
1 year time horizon	6 (9)	8 (9)	13 (12)	25 (31)
3 year time horizon	13 (19)	26 (30)	36 (44)	58 (60)
Stressed calculations				
1 year time horizon	6 (9)	10 (10)	16 (15)	32 (36)
3 year time horizon	13 (19)	34 (34)	45 (46)	67 (65)

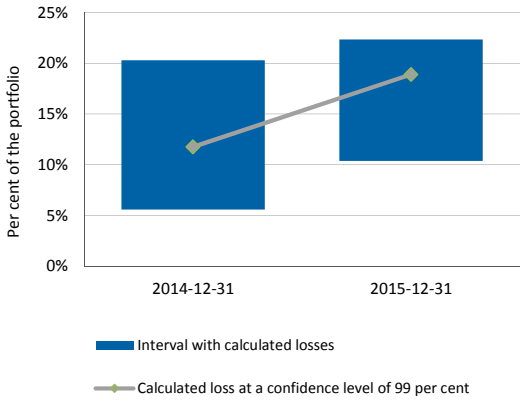
[1] The higher the confidence level, the lower the probability of losses that exceeds those losses that are calculated for the chosen confidence level.

The simulated losses are in the order of SEK 14–71 billion when unexpected and expected losses are added. This corresponds to 4–19 per cent of the portfolio included in the model. The broad interval reflects the fact that the longer the time horizon and the higher the confidence level, the larger the simulated losses, and vice versa.

Losses excluding recoveries are in the order of SEK 18–79 billion, corresponding to 5–21 per cent of the portfolio.

In chart 5 below, the results for a forward-looking time horizon of three years, starting at year-end 2015, are compared to the corresponding results at the preceding year-end.

CHART 5 **COMPARISONS OVER TIME REGARDING CALCULATED LOSSES FOR A FORWARD-LOOKING TIME HORIZON OF THREE YEARS**



As illustrated by the results in chart 5, the calculated losses have increased since the preceding year-end. This increase is explained by:

- Somewhat higher risk in the portfolio, primarily with reference to the increase in name concentrations as well as a higher credit risk in some of these name concentrations.
- Changes in the portfolio model. More prudent assumptions have been made regarding expected recovery rates. Additionally, dependency between default and recovery rates has been added to the model.
- The reporting includes SEK 7 billion of guarantees on defaulted loans, for which the guarantees have not yet been called. This implies certain default, only the size of the loss is uncertain, and this has a significant effect on the calculation of both expected and unexpected loss

Modelling of default correlations using a multi-factor model

The Debt Office has chosen to develop a multi-factor model based on the established portfolio model CreditRisk+.[37] In technical terms, the specific model chosen is a Compound Gamma Model.[38]

Indirect estimations of default correlation based on background factors

One generally accepted approach to modelling default correlations is to use a factor model, which provides a simple way of mapping the dependence structure in a credit portfolio. The basic idea is that default correlations can be explained by treating the default rates of guarantee holders and borrowers as random variables (allowing default rates to differ from the long-term average used when calculating expected losses). Further, these default rates are modelled as a function of a set of background factors common to multiple guarantee holders and borrowers. To the extent that the default rate – or in other words, the creditworthiness – of individual guarantee holders and borrowers depends on changes in the same underlying background factor(s), there is an indirect correlation between their default rates.

Once the default correlation between different guarantee holders and borrowers has been decomposed and factored indirectly through their relative dependence on one or more common background factors, it is possible to analyse them as if they were independent. This approach is common to most credit portfolio models, as it significantly simplifies the calculation of joint defaults.[39]

Aggregated default rates as background factors

The choice of background factors to explain indirect default correlations between individual guarantee holders and borrowers differs between different types of factor models. However, most models build on the same generalized framework.[40] Therefore, the choice of a specific factor model has less to do with theoretical concepts and more to do with what is practical and feasible. The Debt Office has chosen a factor model in which the background factors consist of the aggregated default rate for different industry sectors, and the economy at large.

Intra-sector and inter-sector correlations

In the portfolio model, the degree of default correlation between different guarantee holders and borrowers depends on whether they belong to the same industry sector of different industry sectors.

For guarantee holders and borrowers that belongs to the same industry sector, the larger the volatility in the aggregated default rate for the industry, the greater the intra-sector correlation between guarantee holders and borrowers in the industry. Hence, a sector concentration to an industry with a highly volatile default rate means a higher risk of default clustering than a corresponding concentration to an industry with a less volatile default rate.

Inter-sector correlations between guarantee holders and borrowers in different industry sectors are modelled by taking account of the correlations between the aggregated default rates in different industries. In simple terms, the more correlated different industry sectors are, the greater the inter-sector correlation due to changes in the general economic conditions (which affect all sectors simultaneously, though to a different degree).

Since the model takes account of both industry-specific and general sources of default correlations, the results differ for portfolios with different compositions – and therefore different risk profiles.

[37] CreditRisk+ was developed by Credit Suisse First Boston International (see CreditRisk+ A Credit Risk Management Framework (1997) at the web address http://www.csfb.com/institutional/research/assets/creditrisk.pdf). The model has never been commercialised, and the idea from the outset was that that the model could be modified by the user.

[38] Gundlach, Matthias och Lehrbass, Frank (2004): CreditRisk+ in the Banking Industry. Springer-Verlag. Berlin Heidelberg New York. Pages 153–165. ISBN 3-540-20738-4.

[39] This means a basic assumption of conditional independence.

[40] Hickman, Andrew och Koyluoglu H. Ugur (1998): Reconcilable Differences. Risk, Volume 11, Number 10. Pages 56–62.

Conclusions

In the view of the Debt Office, there is a low risk of large credit losses in the regular guarantee and lending portfolio. This is based on the assessment that the portfolio is well diversified overall, and the existing name and sector concentrations pose only a low risk of large losses. A deep recession with global spread would be required for correlations to arise also between guarantee holders and borrowers in different industries or geographical regions.

However, the overall low risk in the portfolio is due to more factors than those considered in the risk analysis. One factor of at least equal importance is the sound principles and clear rules on which the central government guarantee and lending framework is based. The day to day operations of the guarantee and lending agencies in analysing, limiting, monitoring and reporting the credit risk in outstanding guarantees and loans also plays an important part. Providing that there is a robust and transparent system in which the credit risk is disclosed and pro-actively managed, the provision of guarantees and lending is essentially a low-risk activity.

The risk is also contained by the limit on the size and maturity of any guarantees and lending, that the expected cost of a guarantee or loan is disclosed and financed up-front, that the financial position of guarantee holders and borrowers is analysed and appropriate covenants are attached to the guarantees and loans. This mitigates the risk that the central government portfolio of guarantees and lending becomes too big, or that the portfolio contains excessive or unmanageable risks.

The conclusion is that the existing framework is central when it comes to controlling and mitigating the risks in the central government's guarantee and lending activities.

Having said this, the risk further increases transparency, providing a complement to existing risk management and reporting. This helps political decision-makers to demonstrate good control as well as to assess whether any further actions are required to manage or contain the risk.

Analysis of liquidity risks

The liquidity risks in the regular portfolio are low. The central government's liquidity management can accommodate greater amounts and a greater need for financial flexibility than can reasonably be required on account of the central government guarantees and lending portfolio. In addition, the risk of higher cost of borrowing relates specifically to financing of payments on guarantees or loan commitments – not to the central government debt as a whole – and any increase in the government's cost of borrowing is likely to be short term.

Introduction

If a central government guarantee is called – or if a loan commitment is used – this leads to a payment, which, in turn, generally results in an increased borrowing requirement for central government.[41]

An analysis of possible liquidity risks in the regular portfolio aims to identify and assess circumstances that may entail a risk that central government borrowing costs increase due to payments on guarantees or loan commitments. The analysis is carried out by comparing the flexibility in central government liquidity management with the size and speed of payments that the central government guarantee and lending portfolio may give rise to.

Flexibility of central government liquidity management

The Debt Office's assessment is that central government liquidity management is well adapted to handling large fluctuations in central governments cash flow – both on individual days and within months. Financial flexibility is thus good.

In central government liquidity management there is good preparedness to handle large unexpected payments, such as payments on central government guarantees or loan commitments.

The strength of central government liquidity management can be illustrated by the volume of the Debt Office's borrowing and placements in the overnight market, as well as the Debt Office's international commercial paper programme.

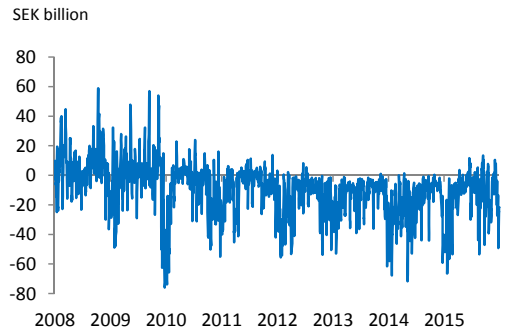
[41] *Central government guarantees issued in foreign currency – mainly export guarantees from the Swedish Export Credits Guarantee Board (but also guarantees managed by Sida) – are generally the exception. For these guarantees, special reserves have been set up in the form of holdings in a currency account in a bank or in foreign currency denominated securities. Payments to honour such guarantees are charged to these specific reserves in the first instance.*

The overnight market

The Debt Office borrows in the overnight market to cover short-term liquidity deficits (or invests short-term surpluses). Since the overnight market is a closed system the Debt Office can always borrow to cover any deficits there. This is true also in stressed market situations.

Chart 6 illustrates the variations in the daily flows that the Debt Office handles in this market.

CHART 6 **CENTRAL GOVERNMENT BORROWING AND PLACEMENTS IN THE OVERNIGHT MARKET[1]**



[1] Negative numbers correspond to deficits (loans) while positive numbers correspond to surpluses (investments).

Source: Data from the Debt Office's business system in debt management.

The Debt Office thus covers large deficits in the overnight market with no difficulty.

The international money market

Another important source of financing in the liquidity management is the international money market. This financing is predominantly raised under a commercial paper programme. Since 2013, the programme has no upper limit.

The market for commercial paper is deep. During 2015 the Debt Office issued the equivalent of SEK 228 billion in this market (often issuance on a single occasion would amount to USD 2 billion, corresponding to approximately SEK 17 billion). Most of the issuance is in US dollars, but the Debt Office is also able to borrow in several other currencies including euros and British pounds.

The Debt Offices ability to borrow in the commercial paper market need not be negatively affected by a higher central government debt level than the present one. A larger central government debt might even make borrowing in the commercial paper market easier, as the Debt Office would then be able to sell certificates with a slightly longer maturity and continuously meet the demand from investors to replace maturing certificates. Even a temporary increase in the borrowing requirement could lead to better continuity in commercial paper borrowing.

Summary

Central government has access to several instruments to handle short-term borrowing requirements in its liquidity management. The most appropriate measure depends on the circumstances in each situation. Consequently, there is considerable flexibility to handle unexpected payments.

A more in-depth description of the capacity of central government liquidity management is provided in the info box on page 37.

Potential liquidity strain arising from the regular portfolio

Considering the strength of central government liquidity management, the Debt Office makes the assessment that there is no appreciable risk of higher than normal borrowing costs as a result of payments relating to the guarantee and lending portfolio. If low probability outcomes should nonetheless occur, the consequences would be isolated and limited in time. Only the borrowing for the specific payment would be affected and the more expensive borrowing would shortly be refinanced within the regular central government debt.

An analysis of potential liquidity strain from guarantees and loan commitments is mainly concerned with identifying and assessing circumstances that could give rise to an unforeseen borrowing need resulting in a higher funding cost than normal.

The analysis focuses on the size of possible payments and how quickly– in accordance with agreements entered into – central government needs to raise funds to make the payment. In both cases this depends on the terms and conditions of the government's commitment. A further consideration is whether central government may need to make large currency conversions in a short time period to currencies that are less liquid and have small transaction volumes.

There are few guarantees and loan commitments that if called would involve *both* large amounts *and* a very short period of time in which to make the payment. In addition, at present the largest commitments in the portfolio do not involve any exposures to small currencies.

Size of the undertaking

The larger the guarantee or loan commitment, the greater the payments and the resulting short-term borrowing requirement might be.

The ten largest commitments in the regular portfolio are shown in table 9 below.

TABLE 9 **THE TEN LARGEST GUARANTEES AND LOAN COMMITMENTS IN THE REGULAR PORTFOLIO AS OF 31 DECEMBER 2015**

(SEK billion)	*Amount*
Callable capital	60.0
Credit guarantee	50.6
Loan commitment	25.0
Credit guarantee[1]	18.5
Callable capital	18.0
Callable capital	17.9
Callable capital	10.9
Credit guarantee	8.4
Credit guarantee	8.4
Credit guarantee	7.3
Total	**225.0**

[1] Sweden provides a joint and several guarantee for all the loans of the Øresundsbro Consortium along with the Kingdom of Denmark. It is therefore a matter of judgement whether Sweden should recognise in its accounts the entire outstanding amount under the guarantee or only 50 per cent. The figure in table is based on a strict formal assessment, so the entire amount is recognised.

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning and the Debt Office.

The size of potential payments is small in relation to the amounts that central government's liquidity management is set to accommodate, and therefore the Debt Office sees no appreciable risk of an increased cost of borrowing as a result.

Only a scenario where several large guarantees or loan commitments need to be honoured within a very short period of time – for example a month or less – would result in large amounts in this context. Such a scenario is however so unlikely that it cannot be assessed in a meaningful way.

Conditions for how a large payment may be demanded

A description of liquidity risks with respect to guarantees and loan commitments is not complete if confined to a study of the size of the undertakings entered into by central government. The associated conditions, in terms of how quickly central government is obliged to pay and whether the whole amount must be paid at once, must also be analysed to avoid exaggerating the risks from a liquidity perspective.

The Debt Office has therefore reviewed the conditions for the commitments shown in Table 9. The possible liquidity strain is assessed as low from this perspective as well.

Either the central government is not obliged to honour the whole commitment at once, or there is in practice some period within which central government can plan and execute payments in an orderly way.

Only in exceptional cases does the whole of the central government commitment need to be honoured in full in a short time span. This applies mainly to callable capital. There are no contracted terms for callable capital payments. However, in a couple of cases the central government has communicated that payments will be made within a week if needed, though this is somewhat dependent on the size of the payment.

Currency

When the payment relates to a guarantee or loan commitment in a currency other than Swedish kronor, borrowing takes place in the same way as it otherwise does. The exception is those foreign currency guarantees for which special currency denominated reserves have been set up outside central government (see the earlier footnote on page 34). When the payment is to be made, the Swedish kronor, euros or US dollars in which the borrowing took place are converted into the currency of the payment.

If a large sum should need to be converted into a small currency, there is a risk that the transaction could be slightly more expensive than normal. However, there are no large commitments in such currencies, so this aspect can be disregarded.[42]

[42] *In some cases, the Swedish Export Credits Guarantee Board has contracts in small currencies. However, payments are always made in the equivalent value of the currency in one of the following currencies: SEK, USD, EUR, CHF and JPY. This entails a component of market risk since the amount that may potentially have to be paid to meet the undertaking may change due to currency fluctuations. But the Swedish Export Credits Guarantee Board has at the same time, designed a product that is of assistance to Swedish exporters and is geared to their needs that does not contribute to a risk of greater costs in central government liquidity management on account of currency.*

An overview of central government liquidity management

The Debt Office handles central government liquidity management. This involves responsibility for ensuring that central government payments can be made on time. All central government cash flows in Swedish kronor are consolidated in the Government central account at the Riksbank (the Swedish central bank). Only the net amount of all cash flows is financed or invested in the liquidity management.

Large variations are completely normal

From one day to the next consolidated central government cash flows can range between an investment need of SEK 30 to 40 billion and a borrowing need of SEK 50 to 70 billion. In exceptional cases the short-term borrowing requirement can be as large as SEK 100 billion.

In order to handle payments as effectively as possible, forecasts are made of the size of the borrowing or investment requirement for each day. Naturally, the real outcome can differ from the forecast. However, deviations due to unforeseen events are usually limited to some few billions per day, though they can also be as high as SEK 10 to 20 billion, which the Debt Office handles without any problems in the overnight market.

Several different instruments in liquidity management

In its liquidity management, the Debt Office uses a number of different instruments to deal with central government's short-term borrowing requirement. The Debt Office can finance large amounts short-term through the issuance of commercial paper in foreign currencies. This instrument provides access to the international money market, which is deeper than the Swedish market. When combined with a currency derivative it is equivalent to borrowing in Swedish kronor.

Since the middle of 2013, there is no upper limit on the Debt Office's commercial paper programme. Previously the programme was limited to USD 25 billion.

In recent years, ever-increasing use has been made of this facility. In 2014, the Debt Office issued commercial paper for the equivalent of SEK 296 billion.

The Debt Office uses Treasury bills not only in its regular debt management but also in its liquidity management. In this context the two Treasury bills with the shortest maturity are issued continuously (through 'on tap' sales). Moreover, the Debt Office supplements this borrowing with customised maturities (known as liquidity bills). Here the volumes are smaller, normally a few billion Swedish kronor.

Deficits (or surpluses) that remain after commercial paper and Treasury bills have been used are handled through deposits in the overnight market. This is the market where banks (and the Debt Office) handle surpluses or deficits in the accounts in the RIX payment system.

The payment system in Swedish kronor is a closed system. This means that if the Debt Office has a large need for short-term borrowing – for example because a guarantee has been called – there are one or more counterparties in the bank system with a corresponding surplus. The banks may also borrowing at short maturities directly from the Riksbank if there is insufficient liquidity in the system. This facility makes it possible to borrow large sums in the overnight market.

Short-term loans are refinanced in the regular debt management

An increased borrowing requirement, due to unforeseen events, is initially handled in the liquidity management. If the debt increase is permanent, the Debt Office then increases its long-term borrowing, gradually replacing short-term funding raised in the liquidity management.

Analysis of the deposit guarantee

The probability of large losses linked to the deposit guarantee is assessed as low. Large losses arising from pay-outs to depositors (in case of bankruptcy or after decision by Finansinspektionen) would require independent failures of several non-systemic institutions. Systemic institutions, which in case of failure will be subject to resolution, would need to incur large losses for the deposit guarantee to be required to contribute to the financing of resolution. For institutions with own funds and eligible liabilities in excess of regulatory requirements (MREL) even larger losses would be required.

The deposit guarantee covers deposits in all types of accounts in banks, securities companies and some other institutions with a license to take deposits. [43] The guarantee covers deposits up to EUR 100 000 per person and institution. By protecting consumers' savings the guarantee reduces the risk of bank runs, thereby contributing to the stability of the financial system.

The deposit guarantee is the largest guarantee in the central government portfolio. As of 31 December 2014, covered deposits amounted to SEK 1 501 billion, spread over 110 institutions.[44] However, the five institutions with the largest volumes of covered deposits accounted for 70 per cent of the total amount.

The functioning of the deposit guarantee

As already stated, the purpose of the deposit guarantee is to protect depositors. However, the way the guarantee functions, in terms of who compensation is paid to when a deposit taking institution fails, varies depending on how an institution that is failing is handled. Either a failing institution can become subject to a normal insolvency proceeding in the form of bankruptcy, or it can be dealt with through a special procedure called resolution.

If a deposit taking institution goes bankrupt, the deposit guarantee pays out compensation to depositors in the failed institution. A pay-out to depositors can also be triggered through a decision made by Finansinspektionen (the Swedish Financial Services Authority).[45] The deposit guarantee takes over the depositors' claim on the institution. This is illustrated in figure 3 on the next page.

Resolution on the other hand is a tool for restructuring failing institutions that cannot be wound up through bankruptcy due to the risk of a serious disruption to the financial system. Government takes control (but not ownership) of the institution in order to reorganise it or wind it up in an orderly way. In resolution, the critical functions of the failed institution (accounts, processing payments, providing credit, etc.) are maintained.

The institution is recapitalised and restructured without cost to the taxpayers. Losses on the balance sheet are covered through a so called bail-in, whereby the claims of shareholders and creditors are written down and/or converted into equity according to the same priority of claims as in bankruptcy.

However, covered deposits are excluded from bail-in. In this way, depositors enjoy the same protection as in bankruptcy. Any losses or recapitalisation needs that depositors would have been liable for if they had not been exempt are instead covered by the deposit guarantee. This is done through a contribution of funds to the institution in resolution, increasing the asset side, as opposed to reducing the liability side, of the balance sheet. This is illustrated in figure 4 on the next page.

In view of the two alternative ways in which the deposit guarantee functions the risk analysis is divided into two parts: (i) pay-outs to depositors under the guarantee and (ii) contributions to institutions in resolution.

[43] Most institutions that accept deposits from the public are covered by the deposit guarantee. There are, however, some exceptions. For example, "deposit companies" are not covered by the guarantee.

[44] Covered deposits are reported annually by the institutions, but the data are as of 31 December of the previous year.

[45] Section 8 of the Deposit Insurance Act (1995:1571) states that the basis for the decision of Finansinspektionen is that a deposit that was due for payment has not been repaid by the institution and that the inability to pay is due to the institution's financial situation and is not only temporary.

Illustration of the functioning of the deposit guarantee

The two different functions of the deposit guarantee upon the failure of a deposit taking institution (i) pay-out to depositors, and (ii) contributions from the deposit guarantee to an institution in resolution, are illustrated below. In both cases the illustration relates to a hypothetical institution with a simplified capital structure in which covered deposits is the only debt class.

FIGURE 3 PAY-OUT TO DEPOSITORS FROM THE DEPOSIT GUARANTEE

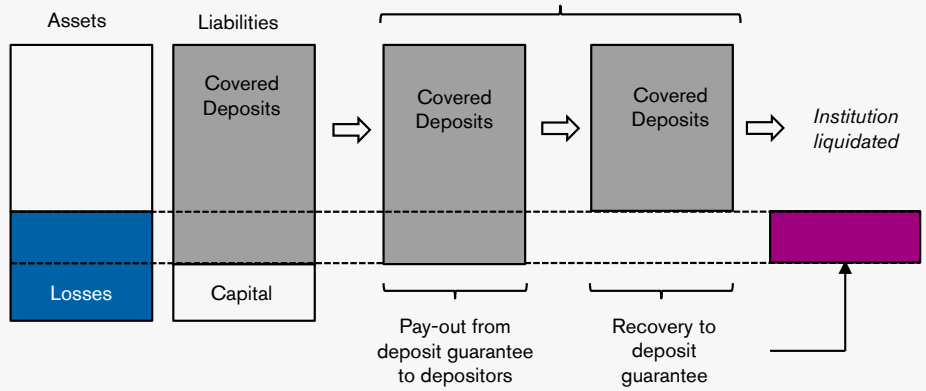
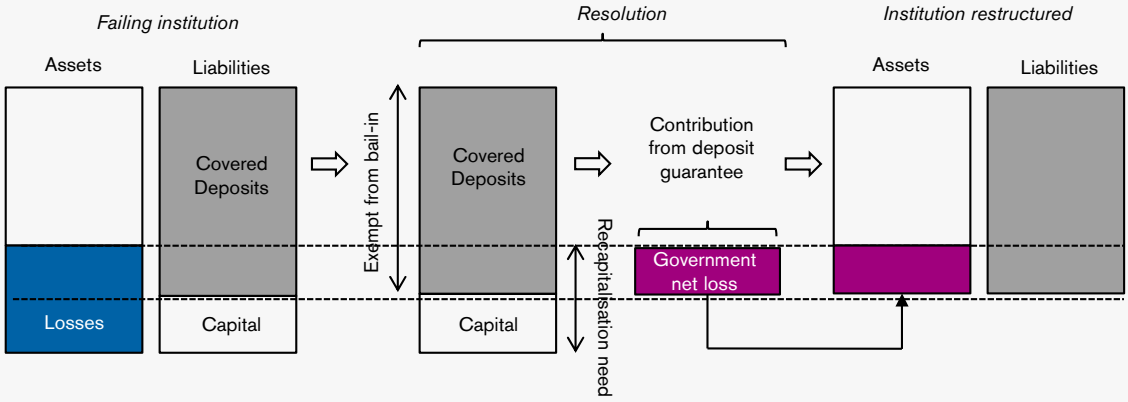


Figure 4, which illustrates bail-in in resolution, is simplified in the sense that it assumes the whole institution is reorganised. A further simplification is that the contribution of the deposit guarantee in resolution is limited to covering losses (without taking account of the institution's need to restore its capital so that it can continue its operation post resolution).

FIGURE 4 CONTRIBUTION FROM THE DEPOSIT GUARANTEE IN RESOLUTION



Analysis of pay-outs to depositors

The risk of large losses from pay-outs to depositors due to bankruptcies is assessed as low. Large losses would require the independent failure of several institutions. Furthermore, the Debt Office assesses the probability of bankruptcy, resulting in a pay-out to depositors, to be lower than the probability of an institution failing. The average recovery to the deposit guarantee is assessed to be relatively low, although individual cases might display significant differences in recovery rate.

In this section, the Debt Office analyses the risk of large losses – defined as tens of billion Swedish kronor or more – due to bankruptcies in deposit taking institutions, resulting in pay-outs to depositors. The analysis focuses on a scenario in which one or a small number of institutions with covered deposits of around SEK 15 billion each are failing. The analysis covers only institutions whose failure is not deemed to threaten financial stability.

The probability of pay-outs that can lead to large losses

The probability of pay-outs to depositors that can lead to large losses is assessed as low. The basis for this assessment is that several institutions would have to fail because of idiosyncratic problems and that the probability of pay-outs to depositors is lower than the probability of the institutions failing.

The probability of the failure (generally referred to as default) of an institution can be estimated with a credit rating.[46] For institutions that have a public rating, this rating has been used. In the case of institutions that do not have a public rating, the Debt Office has carried out its own internal rating assessment based on the rating methodologies published by the international credit rating agencies.[47]

TABLE 10 CREDIT WORTHINESS OF INSTITUTIONS WHERE PAY-OUTS TO DEPOSITORS COULD RESULT IN LARGE LOSSES

	Probability of failure (for individual institutions)[1]
Minimal to moderate credit risk[2]	1–2,5 %
Material to high credit risk[3]	4–15 %

[1] For a three- to five-year time horizon.

[2] *"Investment grade"* rating.

[3] *"Speculative grade"* rating.

Source: Moody's Annual Default Study Corporate Default and Recovery Rates 1920-2014, Exhibit 35 - Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1983-2014.

According to the Debt Office, there are institutions with a low rating, meaning that the probability of such institutions failing is not insignificant (see table 10). However, given the relatively modest volume of the covered deposits in each institution, several institutions would have to fail in order for the deposit guarantee to suffer large losses. Furthermore, the failures must be due to idiosyncratic causes, i.e. problems must be isolated to the specific institution.

If, on the other hand, the institutions run into problems for the same underlying reasons or at a point in time when there is a serious disruption in the financial system, the systemic implications of a bankruptcy would possibly be too great. In that case, the institution would become subject to resolution action and any losses to the deposit guarantee would instead arise via the contribution by the deposit guarantee to resolving the institution (see the next section). However, such losses may not exceed the losses that would have been incurred in bankruptcy.[48]

According to the Debt Office, the probability of an institution failing is higher than the probability of an institution going bankrupt, resulting in a pay-out to depositors from the deposit guarantee. The main reason for the difference is that an institution that runs into problems (such as having its license revoked on account of material deficiencies in

[46] Default events include delayed or missed payment of interest or repayment on a loan, distressed exchanges (converting a loan into shares or some other subordinated claim) or bankruptcy.

[47] Moody's Investors Service (2016). Rating Methodology: Banks. Standard & Poor's (2011). Banks: Rating Methodology and Assumptions.

[48] The principle of 'no creditor worse off' than in bankruptcy is central to the bail-in tool in the new resolution framework.

internal control) may be taken over by another institution.[49]

Finally, the probability of several independent failures is significantly lower than the probability of any individual institutions failing. This is another factor supporting the assessment of low risk of large losses due to pay-outs to depositors.

The loss given a pay-out to depositors

The ultimate loss resulting from a pay-out to depositors under the guarantee depends both on the size of the total losses in the institution and on the relative ranking of covered deposits in the institution's capital structure, i.e. its priority of claim.

The average recovery to the deposit guarantee in case of a pay-out to depositors is estimated to be relatively low, although individual cases might display significant differences in recovery rate.

The assessment is based on the following:

- The overall loss rate is assessed as being higher in bankruptcy than in other types of failures.[50]

- Institutions whose assets and franchise have a substantial value have a good chance of being taken over by a competitor if they run into problems. This implies adverse selection, meaning that (on average) institutions that go bankrupt *and trigger a pay-out to depositors* under the guarantee have weaker recovery prospects.

- The effect of the improved priority of claim for covered deposits is judged to be limited (see below).

The deposit guarantee's priority of claim

With the implementation of the resolution framework in Sweden, depositor preference was introduced. Covered deposits now rank above all unsecured claims in insolvency.[51] However, it is not clear if the improved priority of claim will in fact have a significant effect on the recovery prospects in a pay-out.

Those institutions that could go bankrupt and cause a pay-out to depositors have a high share of deposit funding in the capital structure, most of which is covered by the deposit guarantee.[52] There is a limited amount of liabilities that rank junior in a bankruptcy. Consequently, the effect of depositor preference on the recovery prospects of the deposit guarantee in pay-outs is generally expected to be limited.

[49] This happened, for example, in 2010 when HQ Bank lost its license and was acquired by Carnegie.

[50] Events seen as default events include delayed or missed payment of interest or repayment on a loan, distressed exchanges (converting a loan into shares or some other subordinated claim) or bankruptcy.

[51] Section 13 a of the Rights of Priority Act (1970:979). The amendment entered into force on 1 February 2016.

[52] According to the institutes' annual accounts for 2014, about 80 per cent or more of the financing of the institutions concerned consist of deposits by the public.

The deposit guarantee fund

Pay-outs from the deposit guarantee are financed with money from the deposit guarantee fund.

The institutions covered by the deposit guarantee pay an annual statutory fee. The aggregate fee amounts to 0.1 per cent of all covered deposits at the previous year-end.[53] After deductions for the Debt Office's administrative costs, the fees are placed in the deposit guarantee fund.

The fund is managed by Kammarkollegiet (the Swedish Legal, Financial and Administrative Services Agency) on behalf of the Debt Office and amounted to SEK 35.2 billion on 31 December 2015.

Investment of the money in the fund

The money in the fund is invested with the goal of obtaining a good long-term return while maintaining good liquidity and diversification of risk. Permitted investments include nominal Swedish government bonds and deposits in an account at the Debt Office, both of which can quickly be converted into cash if a compensation case occurs. With the exception of situations where the holding must be used, the bonds are held to maturity. In addition to this, the deposit guarantee fund may carry out repo transactions with a maturity of up to 90 days in order to increase the return on the fund.

An unlimited mandate to raise new debt

If the assets of the fund are insufficient to cover a compensation pay-out, the fund has an unlimited mandate to raise new debt from the Debt Office. This means that central government can always discharge the full amount of its undertaking for the deposit guarantee in due time.

Target level of the fund

Amendments to the Directive of the European Parliament and of the Council on deposit guarantee schemes will be incorporated into Swedish law on 1 July 2016.[54] One amendment is the introduction of a target level for the deposit guarantee fund at 0.8 per cent of the aggregate covered deposits.

If the deposit guarantee fund falls to less than two-thirds of the target level, that level must be restored within six years through regular fees from the affiliated institutions. In addition, extraordinary fees of no more than 0.5 per cent of the covered deposits annually shall be charged if the fund balance is negative (triggering the mandate to raise new debt).

On 31 December 2015, the balance in the fund corresponded to about 2.3 per cent of the covered deposits, well above the target level.

According to the new regulatory framework for bank recovery and resolution, the deposit guarantee fund may also have to contribute to institutions in resolution. However, the contribution to any single institution may never exceed 200 per cent of the target level. This means that the deposit guarantee can contribute an amount corresponding to a maximum of 1.6 per cent of covered deposits to a systemic institution in resolution.

[53] *Section 12 of the Deposit Insurance Act (1995:1571).*

[54] *Directive 2014/49/EU of the European Parliament and of the Council on deposit guarantee schemes.*

Analysis of contribution from the deposit guarantee in resolution

The Debt Office's assessment is that the risk of large losses arising from the deposit guarantee's contribution to the resolution of failed institutions is low. Due to the limit on the maximum contribution, the potential liability of the deposit guarantee is considerably smaller than the actual covered deposits in the largest institutions. Moreover, the institutions with the largest covered deposits have a strong credit profile, and thus a low probability of resolution. In resolution, losses must be substantial in order for the deposit guarantee to be required to contribute to the resolution financing. This is especially true for institutions that, when placed in resolution, have equity and eligible liabilities in excess of the minimum regulatory requirements (MREL). Finally, a contribution to institutions in resolution is more likely to relate to recapitalisation through an equity conversion than a write-down to cover losses – which is positive in terms of the recovery prospects.

This section analyses the risk of large losses arising from the contribution of the deposit guarantee during resolution. The analysis focuses on those deposit taking institutions that, if failing, are expected to be placed in resolution.[55] This includes the four largest banks.

The Debt Office analyses the maximum amount that the deposit guarantee could be liable for in resolution, i.e. the exposure. Secondly, the probability that the deposit guarantee will need to contribute to the resolution of an institution is analysed. The final factor of the analysis is the losses that would be incurred if the deposit guarantee contributes in resolution.

Resolution is a new arrangement. The regulatory framework is complex and its application requires extensive planning work that has now been started. In view of this, the risk analysis regarding the contribution of the deposit guarantee in resolution contains some generalisations and simplifications.

The deposit guarantee's maximum contribution in resolution

The contribution from the deposit guarantee to resolution financing of any single institution may never exceed 200 per cent of the target level of the deposit guarantee fund (see the info box on the previous page for a more detailed description).

Based on the volume of covered deposits on 31 December 2015, the maximum contribution would be limited to SEK 24 billion. The maximum liability of the deposit guarantee is therefore considerably smaller than the covered deposits in the largest institutions. The aggregate exposure to the five largest institutions is SEK 120 billion if the cap is applied, to be compared with their reported covered deposits which exceed SEK 1 000 billion.

However, the cap on the contribution of the deposit guarantee to resolution financing does not limit the protection for depositors. Any additional funds (i.e. over and above the SEK 24 billion) needed to maintain depositor protection in resolution will be provided from the resolution reserve in the first instance.[56]

The probability of contributions from the deposit guarantee in resolution

Any contribution from the deposit guarantee in resolution is conditioned on two events: *first*, an institution must have problems that result in it being placed in resolution and, *second*, the losses must be of such a magnitude that the losses and recapitalisation needs exceed the sum of own funds and eligible liabilities ranking below covered deposits in the capital structure.

The probability that the deposit guarantee will have to contribute during resolution is thus lower than the probability of one, or more, institutions, failing and becoming subject to resolution action.

The probability of resolution

The probability of an institution failing is assessed based on its stand-alone credit quality (see table

[55] *There are several institutions that are expected to be placed in resolution if they are failing, but that do not have covered deposits.*

[56] *Similar to the deposit guarantee fund, the resolution reserve is a special financing arrangement, the purpose of which is to finance the resolution measures taken by the Debt Office that are permitted under the regulatory framework for resolution.*

11).[57] Once again, the public rating is used when available. Some smaller institutions do not have a public rating, which explains the absence of assessed credit worthiness.

TABLE 11 CREDIT WORTHINESS OF INSTITUTIONS EXPECTED TO BE PLACED IN RESOLUTION IF FAILING

(SEK billion)	*Exposure (per institution)* [1]	Probability of failure (for individual institutions)[2]
Minimal to moderate credit risk[3]	24	0,5–2 %
Significant to very high credit risk)[4]	–	–
No assessment of credit risk	< 12	–

[1] As on 31 December 2014.

[2] For a three- to five-year time horizon.

[3] *Investment grade* rating.

[4] *Speculative grade* rating.

Source: Moody's Annual Default Study Corporate Default and Recovery Rates 1920-2014, Exhibit 35 - Average Cumulative Issuer-Weighted Global Default Rates by Alphanumeric Rating, 1983-2014.

Probability of a contribution from the deposit guarantee in resolution

The Debt Office's assessment is that, in general, losses must be substantial for the deposit guarantee to need to contribute in resolution. This is due to the senior ranking of covered deposits in the capital structure following the introduction of depositor preference (described in the previous section).

The factors that influence the risk that the deposit guarantee will have to contribute to the resolution of an institution are thus:

- The size of the losses in relation to the equity capital of the institution.
- The size of eligible liabilities ranking below covered deposits in the capital structure.

In order to ensure that an institution can be restored to viability through a bail-in, i.e. without the use of public funds, institutions must at all times meet minimum requirements on own funds and liabilities eligible for write-down and equity conversion. This is referred to as Minimum Requirement for Own Funds and Eligible Liabilities, or MREL. It is set by the Debt Office in its role as resolution authority. All claims that are included in the MREL requirement rank junior to covered deposits in the capital structure, thus providing a cushion against the risk of the deposit guarantee needing to contribute to recapitalisation.

The framework for setting MREL is based on the assumption that losses in resolution will not exceed the regulatory capital requirement. The part of MREL that corresponds to the regulatory capital requirement is thus intended to cover losses, while the remaining part of the requirement is intended to cover the recapitalisation needs.[58]

The Debt Office assesses the probability of losses in excess of the capital requirement as low. Moreover, the probability of the deposit guarantee having to contribute in resolution is lower the greater the volume of eligible liabilities that an institution has over and above the minimum requirement.

The probability is relatively higher for institutions that have a low volume of eligible liabilities over and above the minimum requirement, e.g. institutions that are largely funded by covered deposits or secured debt (such as covered bonds).[59] This is true also for non-systemic institutions that would normally be declared bankrupt if they are failing, but that could also be placed in resolution depending on the situation (see the previous discussion on page 40). The minimum requirements for these institutions are not as extensive.

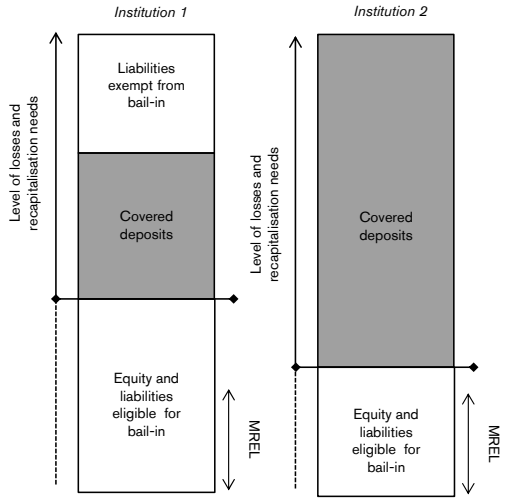
[57] Stand-alone credit quality is assessed on the basis of a so-called Baseline Credit Assessment (BCA) from Moody's Investors Service or Stand-alone Credit Profile (SACP) from Standard & Poor's.

[58] For some institutions that are expected to be placed in resolution there is only a recapitalisation requirement for parts of the business deemed to contain critical operations while the assessment is that the remainder of the business can be separated and wound up through a normal bankruptcy procedure.

[59] Secured debt is exempt from being bailed-in.

Figure 5 illustrates what losses are required for the deposit guarantee to need to contribute in resolution, depending on the amount of own funds and eligible liabilities relative to the minimum requirement.

FIGURE 5 LOSSES REQUIRED FOR THE DEPOSIT GUARANTEE TO NEED TO CONTRIBUTE IN RESOLUTION



For the sake of completeness, it is also necessary to consider the risk of changes to an institution's capital structure, in particular a reduction in the volume of liabilities that rank junior to covered deposits. When the credit worthiness of an institution deteriorates, debt classes with a more junior ranking may shrink or disappear.[60] The risk of this happening increases the shorter the maturity and the more junior the priority of claim of the debt class.[61] Experiences from the US show such capital structure changes before an institution fails.[62] Such changes increase the probability of the deposit guarantee being required to contribute in resolution.

Finally, exceptional circumstances could lead to an unforeseen need to exclude liabilities that are eligible for bail-in. The reason for such discretionary exclusions could be to avoid contagion effects with a negative impact on financial stability.

In conclusion, the overall assessment is that the probability that the deposit guarantee will contribute in resolution is low, given the size of the losses required considering the MREL requirements. The overall losses are judged to be lower in resolution than in bankruptcy.[63]

The size of the loss if the deposit guarantee contributes in resolution

The loss for the deposit guarantee in resolution is equal to the contribution less the value of any recoveries.

To the extent that the contribution from the deposit guarantee is used to recapitalize the institution, the deposit guarantee fund will receive shares in the restructured institution in return. This should result in good recovery prospects, even a potential profit.

However, for contributions used to cover losses, being equal to a write-down, there are no recovery prospects.

In cases where the deposit guarantee has to contribute to resolution financing it is more likely that its contribution will relate to recapitalisation than to covering losses, since the latter requires event greater losses. Figure 6 below illustrates this point. This is a positive factor with regard to central government's recovery prospects.

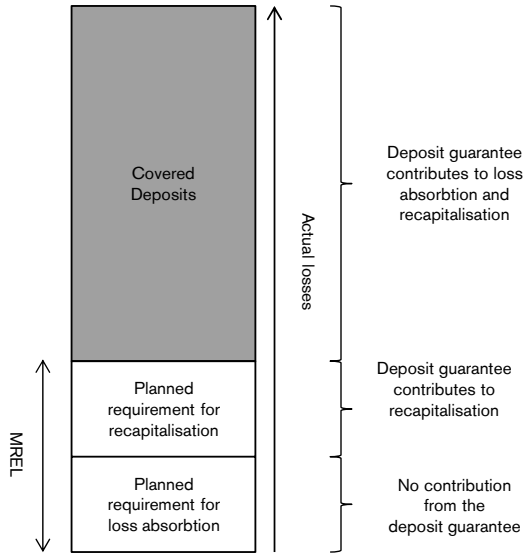
[60] *Changes in the priority of claim that disadvantages a particular debt class can lead to such changes, even before the credit risk of an institution rises.*

[61] *For example, short term funding in the form of commercial paper and unsecured inter-bank deposits may run off or become secured (and thus exempted from a bail-in). Corporate deposits may also be affected, as they remain senior unsecured, ranking pari passu with other senior unsecured debt.*

[62] *Marino, James A. and Bennett, Rosalind L. (1999): The Consequences of National Depositor Preference. FDIC Banking Review, Volume 12, Number 2. pp. 19-38.*

[63] *This is something that the Financial Crisis Committee pointed to in its report Resolution – A new method of dealing with banks in crisis (SOU 2014:52).*

FIGURE 6 **ILLUSTRATION OF THE LOSSES REQUIRED FOR THE DEPOSIT GUARANTEE TO NEED TO CONTRIBUTE TO RECAPITALISATION AND COVERING LOSSES IN RESOLUTION[1]**



[1] The illustration refers to a hypothetical institution that is predominantly funded with covered deposits. Furthermore, the institution is assumed to only just fulfil the minimum requirement for own funds and eligible liabilities (MREL).

The report Central government guarantees and lending – a risk analysis is next published 17 March 2017.

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Previously published reports	Authors	Reg. no.
Statens garantier och utlåning – en riskanalys (2015) (available only in Swedish)	Kristoffer Ekström och Magnus Thor	2015/252
Statens garantier och utlåning – en riskanalys (2014) (available only in Swedish)	Kristoffer Ekström och Ann-Christine Hagelin	2014/356
Statens garantier och utlåning – en riskanalys (2013) (available only in Swedish)	Kristoffer Ekström, Magnus Thor och Daniel Barr	2013/737
Statens garantier och krediter – en riskanalys (2012) (available only in Swedish)	Kristoffer Ekström och Magnus Thor	2012/725
Förslag till en samlad riskanalys av statliga garantier och krediter (available only in Swedish)	Mikael Håkansson och Magnus Thor	2010/1842

Annex – In-depth information on the central government portfolio of guarantees and lending

Introduction

The in-depth disclosure in this annex further increases the transparency concerning central government guarantees and loans with credit risk. The annex constitutes a supplement to both the risk analysis in the report and to the Annual Report for central government 2015.

The information is in the annex is categorized as follows:

- Portfolio size, both historically and in relation to fiscal quantities and GDP for Sweden.
- Maturities, currencies, as well as how the cost associated with the credit risk is financed.
- The volume of outstanding problem guarantees and loans, where a credit loss is likely to occur.
- The volume of outstanding guarantee and loans with characteristics that make it challenging to determine the expected loss in a reliable way.
- Historical in- and outflows in the guarantee portfolio.

Portfolio size

Current size

Table A.1 presents the regular portfolio at the end of 2015, in both absolute and relative terms.

TABLE A.1 SIZE OF THE GUARANTEE AND LENDING PORTFOLIO AS OF 31 DECEMBER 2015

	SEK billion
Guarantees and lending to companies, private individuals and sovereigns	597.0
Deposit guarantee	1 500.7
Total	**2 097.7**
Share of GDP	50.5 %
Share of central government debt	155.1 %
Share of central government balance sheet	130.8 %

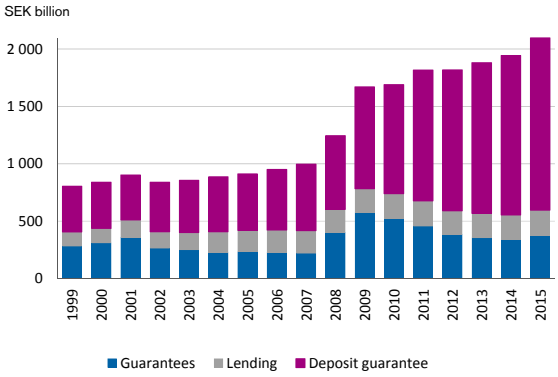
Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs), the National Financial Management Authority (ESV) and own calculations.

It should be noted that the sum in table A.1 includes lending financed by appropriations (SEK 7.2 billion) and export credit guarantees regarding expired loans where the guaranteed amount can be assumed to be repaid but the guarantee is not yet closed (SEK 8.6 billion). These guarantees and loans have been excluded in tables A.2–A.5.

Historical development

The size of the portfolio varies over time. Chart A.1 shows the changes in the portfolio size over the past 17 years.

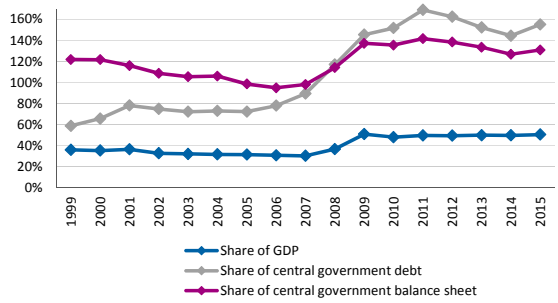
CHART A.1 **HISTORICAL DATA ON THE ABSOLUTE SIZE OF THE GUARANTEES AND LENDING PORTFOLIO 1999–2015**



Source: Annual Report for Central Government, Information for the Annual Report for Central Government 2015 which is compiled by the Debt Office, and own compilations.

Chart A.2 shows the portfolio size in relation to fiscal quantities and GDP for Sweden.

CHART A.2 **HISTORICAL DATA ON THE RELATIVE SIZE OF THE GUARANTEE AND LENDING PORTFOLIO 1999-2015**



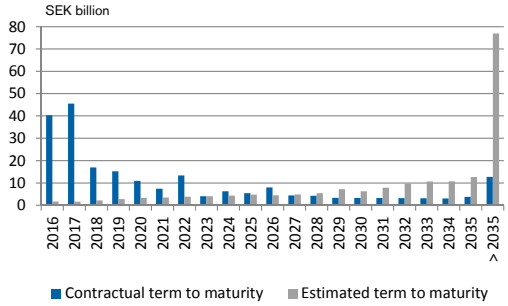
Source: Annual Report for Central Government, Information for the Annual Report for Central Government 2015, which is compiled by the Debt Office, data from the National Financial Management Authority (ESV) and Statistics Sweden (SCB) and own compilations.

Term to maturity

A significant part of the central government portfolio (79.3 percent) consists of guarantees with unlimited term to maturity. This includes the deposit guarantee and callable capital commitments issued to international financial institutions.

In the remaining cases the term to maturity of the guarantee or loan is contractually regulated. Alternatively the term to maturity may be a function of some underlying factor (such as trend in revenues in the case of loans with conditional repayment). In the latter case there is an estimated time to maturity. The maturity structure of guarantees and loans with regulated or estimated term to maturity are shown in figure A.3.

CHART A.3 **MATURITY STRUCTURE OF THE GUARANTEE AND LENDING PORTFOLIO AS OF 31 DECEMBER 2015**



Currencies

The loans that have been granted and the commitments that are guaranteed are in different currencies. Table A.2 shows the corresponding value in SEK for all guarantees and loans in the portfolio.

TABLE A.2 **THE GUARANTEE AND LENDING PORTFOLIO DIVIDED BY CURRENCY AS OF 31 DECEMBER 2015**[1]

Currency	*SEK billion*	*Share*
SEK	1 825.4	87.7 %
EUR	114.7	5.5 %
USD	122.8	5.9 %
JPY	4.0	0.2 %
GBP	0.6	0.0 %
CHF	0.4	0.0 %
DKR	0.5	0.0 %
NOK	3.1	0.1 %
SDR[2]	10.8	0.5 %

[1] Excluding a credit guarantee in RUB amounting to SEK 5 million.

[2] Special drawing rights correspond to a collection of currencies which are used in international trade and finance (EUR, GBP, JPY and USD).

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

Approaches to financing the credit risk of the guarantees and loans

The guarantees and loans in the portfolio are managed differently in terms of cost recovery. Table A.3 below illustrates these differences.

Many of the guarantees and loans are managed on the basis of the central government guarantee and lending framework.[1] One central part of this model is that the expected loss of the guarantee or loan is financed at the time of issuance, generally by charging fees from guarantee holders and borrowers. But in some cases the expected loss is financed by appropriations. The fees are booked against a notional reserve account, to which an unlimited mandate to raise new debt is linked in order to deal with losses that temporarily exceed the size of the reserve.

The management of student loans is regulated separately. For loans issued after 1 January 2014 the expected loss is financed by appropriations when the loan is granted, which is in line with the guarantee and lending framework. For student loans issued prior to that date, actual losses are financed by appropriations when they occur.

The management of the deposit guarantee is also regulated separately. All institutions covered by the guarantee pay an annual statutory fee to the central government. The fees are placed in a fund that is managed separately. Pay-outs are financed with money from the fund. If the fund's assets are insufficient there is an unlimited mandate to raise new debt linked to the fund.

In addition, there are outstanding guarantees and loans with credit risk that are managed separately on the basis of individual decisions.

Among these are callable capital commitments issued by central government to international financial institutions of which Sweden is a member. Payments under these guarantees are financed by appropriations when they arise.

There are also a small number of loans financed by borrowing that were issued before the central government lending framework was introduced. In some cases fees covering at least the expected loss were set at the time when the loans were granted. In other cases no fee has been charged at all. But the common denominator of these loans is that the method of financing actual credit losses has not been established in advance.

TABLE A.3 THE PORTFOLIO DIVIDED BY APPROACH TO FINANCING THE CREDIT RISK OF THE GUARANTEES AND LOANS AS OF 31 DECEMBER 2015

System	*Expected loss*	*Actual loss*	*SEK billion*	*Share*
Guarantee and lending framework	Fees / Appropriations	Reserve	249.7	12.0 %
Deposit guarantee system	Fees[1]	Fund	1 500.7	72.1 %
Student loans:				
New loans	Appropriations	Reserve	32.3	1.5 %
Old loans[2]	-	Appropriations	172.0	8.3 %
Other categories:				
Callable capital	-	Appropriations	121.2	5.8 %
Individual loans	Fees/-	Unknown	6.6	0.3 %

[1] Fees for the deposit guarantee are not set on the basis of expected loss. The statutory fee amounts to of 0.10 percent of total guaranteed deposits in all covered institutions at the previous year-end.

[2] Student loans granted prior to 2014.

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning, the Debt Office and the Government Offices (Ministry of Finance and Ministry for Foreign Affairs).

Problem guarantees and loans

For problem guarantees and loans a credit loss is likely to occur. These are guarantee and loans where a negative credit event – such as delayed payment or non-payment of interest or principal – has already occurred. Alternatively, there are other good reasons to doubt whether a loan issued or guaranteed will be repaid in time.

[1] *The guarantee and lending framework is used as a collective name for the rules stipulated in the Budget Act (2011:203) and the Lending and Guarantees Ordinance (2011:211).*

TABLE A.4 PROBLEM GUARANTEES AND LOANS S OF 31 DECEMBER 2015

	SEK billion	*Share*
Problem guarantees and loans	21.2	1.0%
Performing guarantees and loans	2 061.3	99.0%

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning and the Debt Office.

Guarantees and loans where the expected loss is difficult to determine

Disclosing and financing the expected loss that relates to the credit risk in a guarantee or loan is an important part of the central government's guarantee and lending framework. There are, however, guarantees and loans with characteristics that make it more challenging to estimate the expected loss in a reliable way.

That being said, it is important to stress that such guarantees and loans are not necessarily unjustified or inappropriate. Central government guarantees and loans are political decisions. The objectives that form the basis for the decisions often contain other positive effects that outweigh the difficulties in managing the guarantees and loans. Transparency regarding these guarantees and loans may nevertheless results in greater awareness about the problems they bring.

The data in table A.5 below show that there are guarantees and loans with characteristics that make estimating the expected loss more challenging (for parts of the portfolio where estimation of expected loss is required according to the regulation). This mainly relates to guarantees and loans with very long term to maturity or where the term to maturity is not regulated at all.

Unlimited guarantees or loans

One typical example of guarantees or loans that are difficult to manage is when the term to maturity and/or the amount are unlimited.[2] It is not possible to determine the scope of the central government undertaking unequivocally.

Guarantees or loans with long term to maturity

For guarantees or loans with a very long term – longer than 20 years – it is also difficult to estimate the expected loss for the whole of the term in a non-arbitrary way.

Credit guarantees of uncertain scope

A similar set of problems applies to credit guarantees where the debt instruments to be guaranteed are not known, in part or full, at the time when the guarantee is issued (for example, when central government guarantees a portfolio of loans that are issued gradually up to a maximum amount during the term of the guarantee). Such a design means that the scope of the guarantee is uncertain (although it is limited).

Guarantees or loans to financially weak counterparties

Another difficulty applies to guarantees or loans that are granted to financially weak counterparties, i.e. companies that are in financial difficulties not caused by a market failure (such as prolonged decline in revenues or an unsustainable capital structure).

Issuing a loan or guarantee in favour of such a company increases the asymmetry between risk and reward that already exists between a company's owners and its creditors, and which hampers the possibilities to assess and limit central government's credit risk in a proper way.[3] Determining the expected loss in a reliable way becomes difficult as well.

Guarantees where the role of central government is unclear

A final example of challenging circumstances is when guarantees are issued to companies where central government is also a major shareholder. Such dual roles make it challenging to assess the probability of the guarantee being called since this depends, in practice, on an assessment of how central government in its role as an owner is expected to act if the company gets into trouble. This problem arises mainly with guarantees that entail a pledge to inject new capital.

[2] *If the conditions for a guarantee or loan undertaking mean that it is extended automatically when it expires, it should, in practice, also be regarded as a commitment with an unlimited term.*

[3] *Since the liability of the owners is limited to the capital invested – where in a problematic situation they have, in principle, everything to gain and nothing to lose – this asymmetry creates incentives for high risk-taking at the expense of a guarantor or lender when large parts of the equity capital have been used up.*

TABLE A.5 GUARANTEES AND LOANS WITH CHALLENGING CHARACTERISTICS AS OF 31 DECEMBER 2015

Challenging characteristics	*SEK billion*
Guarantees or loans with unlimited term to maturity[2]	11.7
Guarantees or loans with unlimited term to maturity and amount[3]	18.5
Guarantees with an original term to maturity exceeding 20 years	102.9
Guarantees or loans granted to financially weak counterparties	-
Guarantees where the role of central government is unclear	0.4

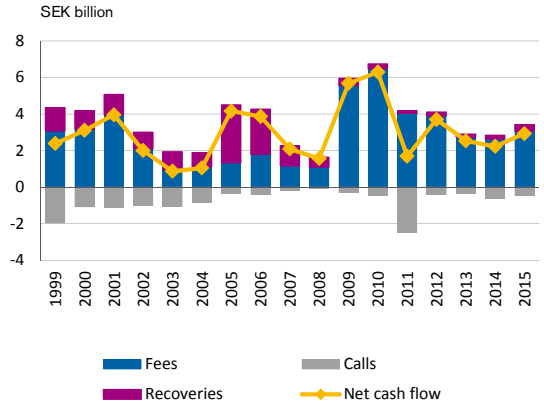
[1] Excluding the deposit guarantee (SEK 1 500.7 billion), callable capital (SEK 121.1 billion), student loans granted prior to 2014 (SEK 172.0 billion) as well as loans with conditional repayment (SEK 1.2 billion) for which expected loss is not calculated.

[2] Outstanding amounts for guarantees with unlimited term to maturity. Mostly relates to guarantees managed by the Debt Office but also the National Board of Housing, Building and Planning.

[3] Outstanding amounts for guarantees with unlimited term to maturity and amount. Relates to guarantees managed by the Debt Office.

Source: Data from the Swedish Export Credits Guarantee Board, Sida, the Swedish Board for Study Support, the National Board of Housing, Building and Planning and the Debt Office.

CHART A.4 HISTORICAL IN- AND OUTFLOWS IN THE GUARANTEE PORTFOLIO 1999–2015



Source: Annual Report for Central Government, Information for the Annual Report for Central Government 2014 which is compiled by the Debt Office, and own compilations.

Historical in- and outflows in the guarantee portfolio

For guarantees, there are mainly three types of in- and outflows; incoming payments of fees, outgoing payments due to calls on guarantees and recoveries.

It is worth pointing out that these in- and outflows vary over time. There may be a time lag of several years from a call on a guarantee and the time when recoveries are made. Consequently it is natural for the size of in- and outflows to differ in individual years.