



# Financial Stability Report

SVERIGES RIKSBANK



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# Foreword

One of the Riksbank's main objectives is to promote a safe and efficient payment system. The Riksbank's analysis of financial stability concentrates on developments in the four major Swedish banks, as their size means they have crucial significance for the stability of the system.

The starting point for the assessment is external factors – both with regard to developments in the real economy and events on the financial markets – that can affect the risks in the financial system. The report therefore begins with a chapter discussing how the environment in which the banks operate has developed and how this will affect the banks' borrowers.

Developments in the four banking groups are analysed in greater detail in Chapter Two. Profitability trends can indicate whether the banks are exposed to strategic risks. The quality of their assets is assessed to show how credit risks might develop, while the banks' financing capacity can provide a picture of the liquidity risks that could arise. If problems in an individual banking group were to spread to other participants in the system through commitments between the banks, this could have immediate effects on the payment system. The Riksbank therefore analyses the banks' counterparty and settlement exposures in Chapter Three.

The report concludes with three special topics. The first of these discusses the need for a central payment system and the questions that arise in the design of such a system. The second special topic describes the banks' exposure to market risks and how they manage this type of risk. The third studies the efficiency of the Swedish banks in an international perspective.

This report has been discussed at the Executive Board meetings on 25 April and 16 May 2002.

*Stockholm, May 2002*

Urban Bäckström

Governor of Sveriges Riksbank



# Summary and conclusions

## The Riksbank's assessment of stability

The Riksbank's assessment of stability in the financial system is made in the light of assumptions concerning the macroeconomic development. In connection with the most recent decision on its instrumental rate the Riksbank assessed that the global economy will show a gradual recovery this year and that growth will thereafter be relatively high. GDP growth in the OECD area is estimated to amount to between 2.5 and 3 per cent over the coming years. Most of the Swedish banks' borrowers abroad are in Germany and the other Nordic countries. An upturn in economic activity is expected to occur in these countries, too, over the coming two-year period, but the growth profile differs somewhat between these countries. Some recovery is expected this year in the Nordic countries, while developments in Germany appear weaker.

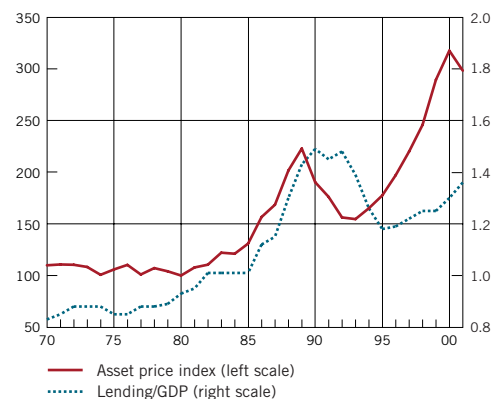
Economic activity is estimated to have passed its lowest point in the Swedish economy, too, and is expected to show an upturn. The Riksbank's assessment is that growth in Sweden will also be in the region of 2.5–3 per cent over the coming years. If this forecast comes true, macroeconomic developments should not comprise any threat to the financial sector over the next few years.

Swedish *non-financial companies* are continuing to increase their indebtedness, which does not appear to be cause for concern in the short term. Statistics show that the number of bankruptcies increased last year. Most of these bankruptcies were among small companies, but an increasing number of larger companies are being declared bankrupt. The Riksbank's estimates, based on the main scenario in the March Inflation Report, show a temporary increase in the number of bankruptcies this year, with a drop next year back to the same levels as last year. Expected default frequencies, based on market information, indicate a reduced bankruptcy risk within the corporate sector in Sweden one year ahead.

The uncertainty regarding the development of the third generation of mobile telephony systems still comprises some cause for concern over developments in the telecom sector. However, the Swedish banks have relatively modest exposure to the telecom sector, which means that problems in this sector should not lead to a worrying increase in loan losses. On the other hand, the situation could become more serious if telecom companies were to experience great difficulty financing themselves on the securities markets and turn to the banks for funding to an increased extent.

Statistics on lending and bankruptcies in the Nordic countries and Germany show that the banks' credit risks with regard to non-financial companies in Denmark and Germany may increase.

**Figure 1. Lending as a percentage of GDP and real asset prices.**  
Percentage of GDP and index: 1980=100



Note. The assets included in the index are shares, single-family dwellings and commercial property.

Sources: BIS, Statistics Sweden and the Riksbank.





Despite the slowdown in economic activity, *the Swedish property companies* are continuing to show good profitability. One reason for this is that the companies' rental income and operating profit have not yet been affected to any great extent by the lower rents on the market, as the current rental contracts are still being signed at higher levels than those that have expired, due to the long fixed periods in the contracts. The degree of indebtedness – debt in relation to equity – remains largely unchanged, while the interest coverage ratio – operating profit/loss plus financial income in relation to interest rate expenditure – has declined somewhat. All in all, however, the property companies' ability to pay appears good.

Property prices have fallen since the peaks noted in 2000. The recent decline in prices is due to lower rents and higher vacancy rates. Prices are expected to remain subdued during the near future, but not to seriously deteriorate the value of collateral.

*Swedish households* have continued to increase their borrowing during the second half of 2001. Optimism regarding their own economy, low interest rates and rising disposable income are some factors contributing to households' propensity to increase their debts. The debt ratio, measured as households' debts in relation to their disposable income, amounted to just over 110 per cent at the end of the first quarter. There is also reason to believe that the debt ratio will continue to rise over the coming years, although at a slower rate. This is partly due to households' optimism, but also to the fact that activity in the property market is estimated to remain relatively high.

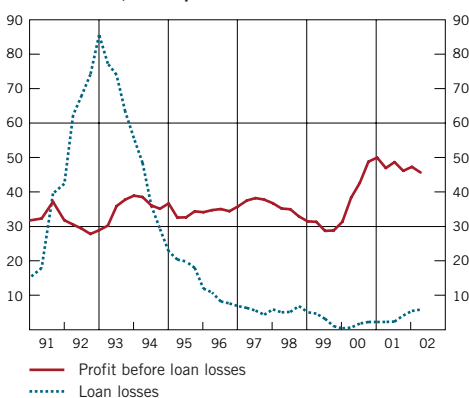
At the same time as the debt ratio has increased, however, households' interest ratio – interest expenditure after taxes in relation to disposable income – has remained relatively constant. The interest ratio is currently at an historically low level, which means that households' ability to pay would not deteriorate markedly if the interest ratio were to rise slightly over the next few years. However, the risk that households might experience payment problems has increased marginally, although this could cause problems for individual households rather than lead to considerable loan losses for the banks.

In the Nordic countries and Germany households' borrowing as a percentage of GDP is increasing, but is still at a relatively low level in all of these countries.

During the last reporting period, that is the most recent four quarters until the end of March 2002, the banks' profitability deteriorated as a result of declining earnings and higher loan losses. Although profitability, measured as return on equity, varies considerably between the four major Swedish banks, altogether it is at the lowest level since the years following the bank crisis at the beginning of the 1990s. The major banks' income was largely unchanged during the last reporting period, while costs increased by 5 per cent.

The banks' largest income item – net interest income – showed strong growth although this growth was somewhat weakened during the last quarter. However, the other major income items – net commission income and net transaction income – declined relatively severely over the reporting period. Net interest income's percentage of the banks' income thereby increased, after having de-

Figure 2. Profit before loan losses and loan losses in the major banks, aggregate over four quarters. SEK billion, 2002 prices



Sources: The banks' reports and the Riksbank.



clined for a number of years in a row.

The high rate of growth in net interest income is explained by the fact that lending and deposit volumes have increased, but also because the banks' lending margins – the lending rate in relation to the treasury bill rate – have expanded slightly over the past quarter. The fact that lending margins have increased during a period when general interest rates have remained unchanged could indicate that the risk premiums in the banks' lending have increased.

Given the developments in the main scenario of the Inflation Report – with gradually rising interest rates and a continued positive growth in lending – the banks' profitability should pass its lowest level during the first half of 2002 and then gradually strengthen as economic activity shows an upturn.

The banks continued to increase their lending during 2001 at the same rate as in the previous report period. Although the growth in lending does not constitute a problem in the short term, it can be questioned in the long term. Loan losses increased slightly, but not to the extent that might have been indicated by the weak economy and increased number of bankruptcies. When seen from both a historical and an international perspective, loan losses in the Swedish banks are currently low.

The major Swedish banks have increased their borrowing from abroad and thereby their exposure to the international capital markets. Net borrowing from foreign banks is back at the levels prevailing in the early 1990s. The difference now, however, is that the banks are converting their borrowing to Swedish kronor and financing Swedish assets instead of giving loans in foreign currency. This avoids foreign exchange risks for their borrowers. The increased borrowing abroad entails a diversification of the major banks' financing base, which should be positive from a liquidity perspective.

Capital adequacy among the major banks amounted to 10 per cent in March 2002, which is one percentage point or so lower than the average during the past five years. It is also low compared with the levels in banks in other countries. However, the major Swedish banks' current high credit ratings and opportunities to finance themselves on the international capital markets indicate that market participants do not perceive them as undercapitalised. The usual explanations as to why risks are considered low – and thereby capital adequacy is considered sufficient – are that lending is largely against collateral and that loan losses have remained constant since the bank crisis. Given that economic activity is now showing an upswing and that loan losses are expected to remain relatively low, the Riksbank's assessment is that the financial strength of the major banks is satisfactory.

Counterparty and settlement risk among the four major Swedish banks increased last year, primarily as a result of increased settlement exposure in foreign exchange trading. However, the risk of a sudden failure that would entail a risk of contagion effects between the Swedish banks is relatively slight. This is partly because of the good quality of the credit and partly because only extensive losses with a low level of recovery would entail problems spreading from one bank to another. It can be noted that the banks have large



exposures to a number of other participants in the foreign exchange market.

Normally, banks' profits should be at their lowest and their vulnerability at its highest during this stage of the economic cycle. Seen from this perspective, the banks' current profit levels must be considered satisfactory. Neither have any events occurred that could occasion major losses within the banks. The stability of the banking system is therefore satisfactory. Despite the fact that profitability is good, the fact that it has declined over several years could entail continued pressure on bank management to adapt operations and strategies. This means that strategic risk can be said to comprise more than a slight risk in the Swedish banks.

From a stability point of view, it is interesting to examine how a weaker development for the banks would affect the stability of the system.<sup>1</sup>

The Swedish banks themselves have reported loan losses of between 0.2 and 0.4 per cent as being reasonable over an entire economic activity cycle. Over the past five-year period, the average level of loan losses has been 0.15 per cent. If this period is assumed to represent the upward phase in the cycle, an average loan loss level of 0.4 per cent over a cycle would give loan losses of 1.5 per cent of lending during a one-year recession. Loan losses of this size would mean, all else remaining equal, that three of the four major banks would show a total loss. However, these losses would be absorbed by the buffer capital above the statutory capital adequacy requirement the banks currently hold. Thus, the banks' stability should not be threatened even in the event of a strongly negative development of the borrowers ability to pay. However, the bank's vulnerability to other disturbances and to a more prolonged economic downturn would increase in such a situation.

## Special topics

### THE FUTURE PAYMENT SYSTEM IN SWEDEN

Work has been initiated on developing a new system for the central settlement of payments in Sweden. International developments and developments on the financial markets make new demands as to how such a system should be constructed and technological developments provide new opportunities for meeting these requirements. Fundamentally, there is, as always, a balance between safety and cost. The safer the system is, the more liquidity it tends to require and the higher the cost for the use of the liquidity.

When designing a new system, it is very important that it should satisfy both society's need for a stable and efficient payment system and the needs of the users. A new system will also be exposed to

<sup>1</sup> The risk scenarios that are interesting for the Riksbank to study in connection with an assessment of stability in the Swedish payment system are not the same as those discussed in the Inflation Report as potential risks to economic activity. They should not be perceived as new macroeconomic assessments or monetary policy signals, but rather as tests of the Swedish banks' vulnerability given the most risk-filled – although not the most probable – scenarios.



competition in a different way than before, as alternative settlement systems are available. This will apply even more if Sweden chooses to join the Eurosystem.

A new system would not necessarily need to be owned and run by the Riksbank, like the present system. On the other hand, the Riksbank would need to have influence over the construction and use of the system, especially as settlement would be in central bank money and utilise the account structure in the Riksbank's balance sheet.

#### THE MANAGEMENT OF MARKET RISKS

This special topic on market risks, i.e. the risks to which the banks are exposed as a result of price changes on the financial markets, concludes the Riksbank's review of how the banks manage different types of risk. This topic describes where and in what form market risks arise in the banks, their scope and how the banks work to reduce them.

The banks have extensive gross exposures to interest rates and currencies. These entail in themselves considerable market risks, which could threaten the stability of the banks. However, the banks' net exposures are considerably lower, as the banks' liabilities to a large extent match their assets, which works to neutralise the effects of movements in interest rates and exchange rates. The risks are also reduced by the fact that the banks have the opportunity to diversify between different asset positions. The banks also have well-developed methods for measuring, steering and controlling exposure to market risk, which means that this type of risk should not in itself comprise a threat to the banks' stability.

#### THE MAJOR SWEDISH BANKS IN AN INTERNATIONAL COMPARISON

This section discusses how the profitability, efficiency, risk-taking and capital strength among the four major banks in Sweden compare with a selection of European banks. The starting point for this comparison is to identify relative weaknesses in the Swedish banks that could indicate particular vulnerabilities. However, the comparison indicates no such serious weaknesses – Swedish banks normally appear to be in the centre or better half of the scale. One aspect that can be highlighted as poorer than the average is that Swedish banks are valued at a low level. This supports the Riksbank's assessment in Chapter Two that the strategic risk in Swedish banks is relatively high, as there are no evident possibilities that can provide an improvement in profit growth in the near future. Another aspect where Swedish banks differ is that they have a relatively high exposure to the property sector.

Swedish banks have an average profitability, but a lower value on the stock market than the average. Among other things, this can be explained by low margins and uncertainty over whether the low level of loan losses can be sustained. The key figures for employees' efficiency indicate that the Swedish banks have been successful in their rationalisation work. There are a number of key figures that indicate that Swedish banks have a relatively low risk level in their lending.



# PART I. SITUATION REPORT



# Macroeconomic developments and the banks' borrowers

*Non-financial companies and households have increased their indebtedness and their ability to pay has deteriorated slightly. Property companies, on the other hand, still maintain a good ability to pay. However, forecasts of macroeconomic developments over the coming years indicate that companies' ability to pay their debts will improve in future. The fact that households' ability to pay has deteriorated marginally does not constitute any problem for the major Swedish banks.*

To obtain an impression of the stability in the Swedish banking system and to determine at an early stage whether the risk of loan losses has increased, it is useful to analyse the level of indebtedness and the ability to pay of the banks' borrowers. Households and non-financial companies comprise the most important borrower categories. The commercial property sector is studied separately, as this sector is the largest individual borrower category and property is to a considerable extent used as collateral for loans.

The assessment of whether borrowers can cause loan losses is made in the light of the assumptions the Riksbank makes in its assessment of inflation concerning macroeconomic developments in Sweden and abroad. The Swedish banks' increased international operations have meant that around one half of the credit granted to the general public comprises loans to foreign borrowers. The majority of these borrowers are in the Nordic countries and Germany. There are therefore good reasons to make a special study of these countries.

The global economy is showing signs of a recovery. The Riksbank estimates that a gradual recovery will begin this year and that growth will thereafter be relatively high. Over the coming years, growth in the OECD region is expected to be around 2.5–3 per cent.

In the Nordic countries, economic activity is expected to show an upswing this year. The Riksbank assumes that a more expansionary fiscal policy will contribute to the upturn in Denmark and Norway, while the telecom sector is expected to contribute to some recovery in Finland. The situation looks rather different in Germany, where the deficit in central government finances does not leave scope to stimulate the economy through an expansionary fiscal policy. The Riksbank assumes that the German economy will show a weak development this year and that growth in Germany will remain lower than the average for the euro countries over the next two years (see Table 1).



**TABLE 1. INTERNATIONAL DEVELOPMENTS**

<b>GDP growth, annual percentage change</b>					
Country	2000	2001	2002	2003	2004
Denmark	3.0	1.2	1.6	2.2	2.2
Finland	5.6	0.7	1.7	2.7	3.1
Norway	1.7	1.0	1.6	2.2	2.0
Sweden	3.6	1.2	1.6	3.0	2.6
Germany	3.2	0.7	0.8	2.2	2.0
EURO 12	3.4	1.5	1.4	2.5	2.5
Japan	2.2	-0.4	-1.1	0.8	1.5
USA	4.1	1.2	1.6	3.5	3.5

Source: The Riksbank's Inflation Report, March 2002.

In Sweden economic developments have stabilised after the substantial slowdown last autumn. GDP growth here is also expected to amount to between 2.5 and 3 per cent over the next few years.

Given this picture of economic activity, it is difficult to envisage that macroeconomic developments could increase the vulnerability of the Swedish banking system over the next few years. However, to test its stability, it is important to examine more negative scenarios than those described as downside risks in the Riksbank's inflation assessment. In this situation it can be useful to study how the banks would be affected if the expected upturn in economic activity failed to occur and the economy once more entered a recession. Such a development could be brought about if US households and companies failed to react positively to the expansionary economic policy and instead substantially reduced their consumption and investment. If the problems in the Japanese economy should worsen, this could also contribute to a decline in the global economy.

A decline in global demand would result in an increased number of bankruptcies and a rise in unemployment both in the Swedish economy and in the neighbouring countries to which Swedish banks have the largest exposures. This would increase loan losses, and probably also affect the value of the banks' collateral if it led to a fall in property and share prices.

On the basis of this reasoning, the Riksbank makes some rough, partial calculations for how borrowers would be affected if developments were poorer than expected. Corresponding calculations are made for the Swedish banks in Chapter Two.

## HAVE THE FINANCIAL MARKETS BECOME MORE ROBUST?

During 2001 and winter 2001/2002 the financial markets have shown themselves able to withstand several unusually serious events. In a situation where global economic activity weakened and uncertainty over future developments was already considerable, the global economy faced further trials – the terrorist attack in the USA, an accelerating financial crisis in Argentina, and the largest corporate bankruptcy in history, when the US company Enron defaulted. However, none of these events appears to have had any lasting consequences for pricing on the financial markets.

Share prices have recovered to some extent during autumn 2001 and winter 2001/2002 after the decline following on from the IT crises. However, the growth rate for share prices is considerably lower than it was a year previously (see Figure B1).

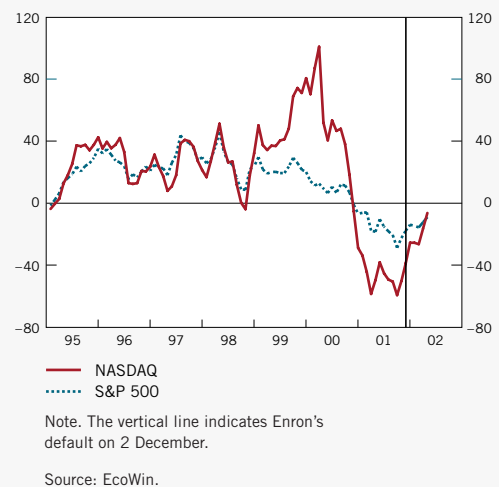
The implicit volatility index for options on Chicago's Board of Options Exchange shows that uncertainty on the financial markets increased in connection with the terrorist attack in the USA, but that it rapidly declined again and is now at a relatively low level (see Figure B2).<sup>2</sup> As implicit volatility reflects market participants' uncertainty regarding the expected return on an underlying asset and the underlying asset in this case comprises the stock index Standard & Poor's 100, a high implicit volatility entails a high degree of uncertainty on the US stock market.

The interest rate spread between corporate bonds and treasury bonds has also shown a declining trend during 2001 and 2002. The events of 11 September made only a small dent in this development. On the other hand, the spread has increased in a longer perspective.

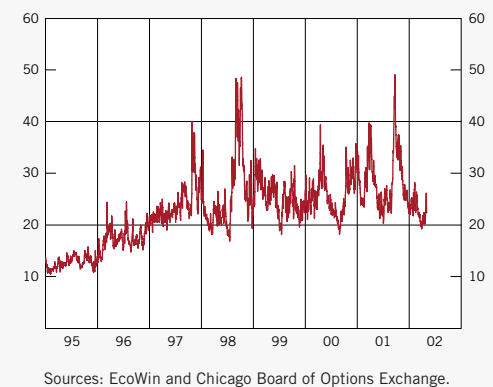
There are probably several reasons why the repercussions from recent disturbances have been so limited. In some cases it is probably due to the nature of the events in themselves. The Enron default was unexpected, but appears to have been firm-specific and the market has

<sup>2</sup> The price of an option is a function of the price of the underlying asset, the strike price of the option, the duration of the option, the risk-free interest rate during the duration and the volatility of the underlying asset. Volatility is the standard deviation for the return on an asset. Implicit volatility is the volatility of the return on the underlying asset that entails the actually observed option prices being equal to the theoretical option price calculated according to Black & Schole's formula (see the article Option prices and market expectations by Javier Aguilár and Peter Hördahl in Sveriges Riksbank Quarterly Review 1999:1). The implicit volatility index used here is VIX, which is obtained from the Chicago Board of Options Exchange and based on options with 30 days' remaining duration.

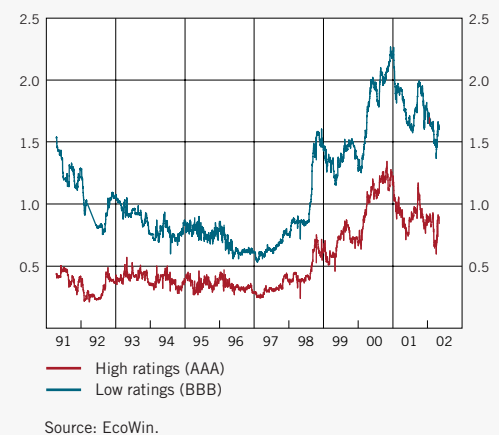
**Figure B1. Twelve-month growth rate in share prices for NASDAQ and S&P 500.**  
Per cent



**Figure B2. Implicit volatility index, VIX, based on S&P 100.**  
Index



**Figure B3. Credit spreads for the companies with high and low credit ratings in the USA.**  
Per cent



had opportunity to diversify away from it.<sup>3</sup> The financial crisis in Argentina was expected when it finally occurred and was primarily caused by domestic problems.

Nevertheless, it is possible that there may be more long-term, structural explanations as to why the markets were not affected more severely. There are arguments implying that the financial system may quite simply have become more robust.

One such argument is that economic policy has become more predictable during the last years. Most countries around the world have successively focused on attaining macroeconomic stability. Sound government finances and price stability entail lower risk and greater predictability for private market participants. This could in turn have made the markets less sensitive to disturbances.

Another conceivable argument is that the banks in the most important economies now have better experience of acting on the financial markets, which were deregulated just over a decade ago. The banks' balance sheets are stronger as a result of ongoing consolidation and improved risk management. More stable banks may have reduced sensitivity to disturbances. However, this does not apply to the banking system in Japan, where problem loans, combined with a long period of deflation have weakened many banks.

At the same time, the financial markets have taken on greater significance. Trading has increased, as has the outstanding volume of financial instruments. New instruments have also been added, some of them complex and difficult to assess for risk. Despite the fact that risks have increased in some aspects, developments are mainly positive. The financial system will have better opportunity to manage its functions as financial markets become more liquid and can offer an increasingly broad range of products for financing, savings and risk management.

The overall impression is that the markets have become more robust, although this does not rule out the possibility of serious financial crisis arising.

3 See the box on the fall of Enron for a more detailed account. In a strictly legal sense, it is not a corporate bankruptcy, as Enron is currently protected by what is known as the Chapter 11 procedure in the USA. This prevents a formal application for bankruptcy.

## The corporate sector

Approximately one half of the Swedish banking system's lending to the Swedish general public constitutes loans to non-financial companies. Historically, the corporate sector has also been responsible for the major part of the banks' loan losses.

By examining how the corporate sector's borrowing is distributed between the different participants in the credit market, it is possible to gain an idea of the extent to which credit risks in the corporate sector are concentrated to the banking sector. Despite the slowdown in economic activity, the corporate sector has continued to increase its total borrowing, albeit at a slower rate. During 2001, this borrowing increased by 7.3 per cent, which can be compared with a rate of increase of 11.4 per cent during 2000 and an annual average of 7.8 per cent over the past fifteen years. Borrowing is increasing, particularly in the banking sector and on the Swedish and foreign bond markets. Companies' borrowing ratio – total borrowing in relation to GDP – is at a relatively high level (see Figure 3). This can be explained by the relatively low growth in GDP during 2001 and by companies' increased need to finance themselves through loans when their profit margins decline.

The banks' lending to the corporate sector has increased by an average of 13 per cent on an annual rate during 2001, which can be compared with an average annual rate of increase of around 8 per cent over the past fifteen years. Lending to companies via mortgage institutions and other credit market companies, on the other hand, remained largely unchanged over the year.

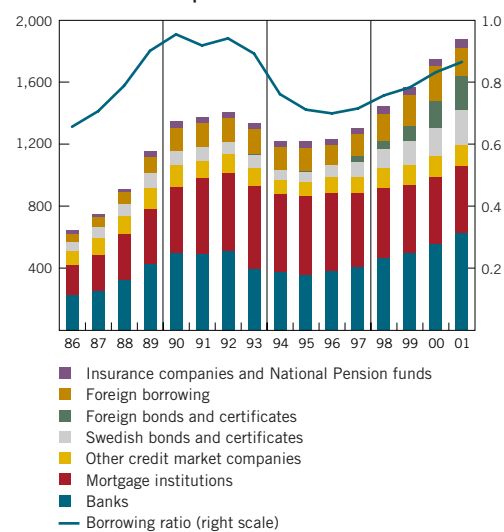
A critical factor in whether the rate of increase in borrowing is sustainable is companies' capacity to bear their debts. The Riksbank therefore examines companies' financial position and ability to pay. It was asserted in the previous Financial Stability Report that the corporate sector should have a good resistance to rising financial costs and a relatively good capacity to withstand declining profit margins. Data from financial statements for 2000 showed a high interest cover ratio and a low debt/equity ratio.<sup>4</sup> However, the picture for newly-started companies was slightly different. Although the debt/equity ratio was low in these companies, falling interest cover ratios indicated a somewhat weaker financial position. Since then, profit development in the corporate sector has deteriorated, which indicates that companies' financial positions have weakened during 2001. The total profit level for companies listed on the Swedish stock exchange fell by 74 per cent over the past year.<sup>5</sup>

As a result of the terrorist attack against the USA on 11 September last year, the Riksbank drew attention in the previous Financial Stability Report to the banks' exposures to companies in the aviation, transport, travel and insurance businesses. According to the banks' own information, lending to these companies is relatively

4 The interest cover ratio is defined as operating profit/loss plus financial income divided by financial costs, while the debt/equity ratio is defined as debts divided by equity.

5 This information is based on annual reports for 2001 for 359 companies listed on the stock exchange. Prior to this these companies' total profit levels increased by between 2 and 38 per cent over the past four years.

Figure 3. Corporate borrowing and borrowing ratio. SEK billion and per cent



Source: The Riksbank.

modest. However, these sectors have developed better than expected, which has been reflected in rising share prices.

The telecommunications sector and the uncertainty regarding the development of the third generation of mobile telephone systems were also emphasised in the previous report. It was concluded then that the banks' lending to the telecom sector (operators and manufacturers) comprised around 1.5 to 2 per cent of their total lending and thus did not constitute any serious threat to the stability of the banks. Exposure to the telecom sector remains largely unchanged at present.

Nevertheless, the telecom sector still comprises a worrying factor. The development of the third generation of mobile systems will be delayed further and the telecom company Ericsson has reported a loss for the first quarter of 2002. The company estimates that with continued cost savings it can achieve a profit at some point during 2003. However, the increased use of mobile telephones creates, as mentioned in the previous report, a pent-up need to increase the capacity of the existing mobile network. While waiting for the new technology to become available, operators are investing in the old GSM technology to extend the capacity of the system. Income from sales of systems based on the old GSM technology will help system suppliers to survive until the development of the third generation of mobile telephone systems gets underway.

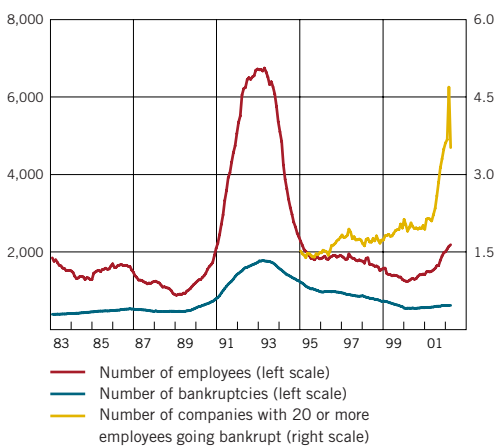
Although the telecom sector is facing continued problems, the Swedish banks' relatively modest exposures to the telecom sector do not constitute any direct threat to stability. However, the situation could become more serious if the telecom companies meet with difficulties in financing themselves on the securities markets and turn to the banks for funding.

The Riksbank has pointed out in earlier Financial Stability Reports that there is a risk of banks' credit exposures increasing in periods when credit risk increases. Companies that partly finance themselves on the credit market may experience difficulties in renewing their loans as a result of deteriorating credit ratings and then turn to the banks instead of issuing new bonds. One reason for this could be that many new issue programmes entail a right to receive financing from the banks if the new issue does not receive sufficient cover. Another reason is that banks, which already have outstanding loans to companies experiencing problems with new loans may thus find themselves in a form of hostage situation. The bank would be forced to provide new loans instead of the failed new bond issue to avoid loan losses caused by acute financing problems within the company.

One example of how large credit volumes can move from the bond market into the banks is the ABB corporation. As a result of problems in meeting its short-term liquidity requirement and difficulties in renewing loans, ABB was forced to renegotiate the terms for credit facilities in some large foreign banks. These renegotiations resulted in a number of banks (Barclays, Citigroup and Credit Suisse First Boston) undertaking to provide ABB with a credit facility equivalent to USD 3 billion.

The development in the number of bankruptcies in the corpo-

**Figure 4. Number of company bankruptcies, number of employees in companies going bankrupt and percentage of companies with 20 or more employees going bankrupt. 12-month moving average and per cent**



Source: Statistics Sweden.

rate sector provides a rough estimate of the development of credit risks in the banks. During 2001, the number of company bankruptcies increased by an average of 10 per cent. As from December 2001, the annual rate in the number of bankruptcies has remained largely unchanged. The number of larger companies going bankrupt has increased over the year. Compared with a year ago, the number of bankruptcies among companies with twenty or more employees has doubled. However, most bankruptcies comprise companies with less than twenty employees. This category accounts for around 95 per cent of all company bankruptcies. As larger companies normally have larger loans in the banks, the increase in bankruptcies among these companies, if this trend continues, could lead to increased loan losses for the banks.

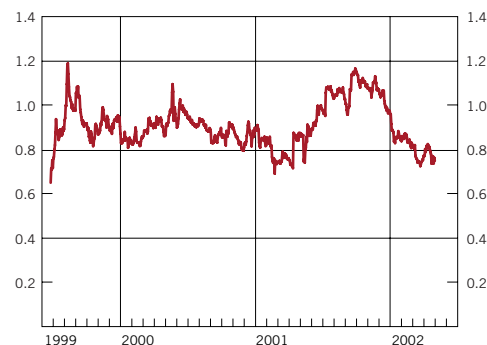
However, a simple econometric model, where the percentage of company bankruptcies is explained by a set of macroeconomic variables, indicates that the number of companies going bankrupt will increase temporarily during 2002 and then in 2003 return to the same level as in 2001.<sup>6</sup> These estimates are based on a development in economic activity as described in the main scenario of the March Inflation Report and on the market participants' expectations of interest rates and exchange rates. A temporary slowdown in economic activity, where GDP falls by 1.5 per cent over one year's time with effect from the third quarter of 2002 would mean, according to this model, that the percentage of companies going bankrupt increased by around 25 per cent during the corresponding period.

The spread between the interest rates on corporate bonds and treasury bonds respectively reflects the market's expectations regarding the bankruptcy risk in the corporate sector. A decline in earnings capacity and weaker financial position in the corporate sector could lead to an increased bankruptcy risk, which should result in increased financing costs on the corporate bond market. The interest rate spread between corporate bonds and treasury bonds indicates that the financing cost for companies increased temporarily in connection with the unease regarding the terrorist attack on 11 September (see Figure 5). Since then the interest rate differences have declined once again. The Enron default on 2 December 2001 does not appear to have had any repercussions on the financing costs for Swedish companies.

Implied volatilities calculated for options with the OMX index as underlying asset also indicate that the Enron fall had no lasting effect on the Swedish financial market. The implicit volatility indicates that uncertainty in the Swedish financial market is relatively low and that investors expect fairly bright prospects with regard to Swedish companies' profit development three months ahead (see Figure 6).

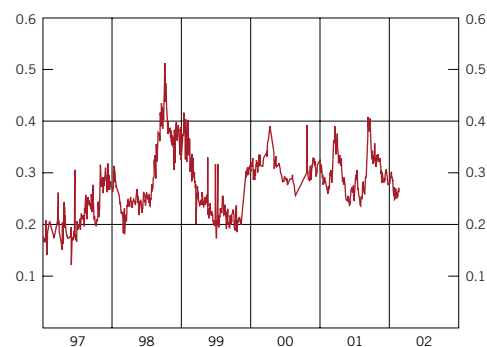
The expected default frequencies for Swedish non-financial companies listed on the stock exchange, calculated on the basis of stock prices and data from financial statements, shows that the risk of

**Figure 5. Interest rate spreads between corporate bonds and treasury bonds. Percentage points**



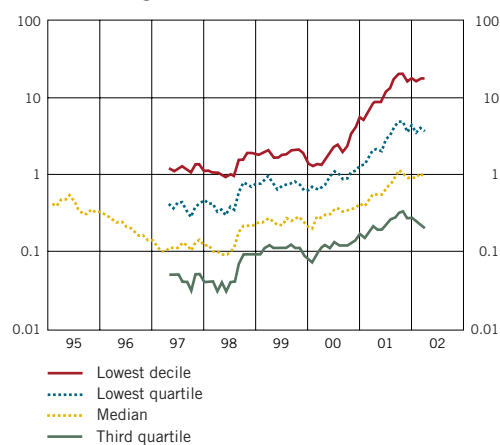
Sources: Ecowin and Handelsbanken Markets.

**Figure 6. Implicit volatilities for options with a three-month maturity and with the OMX index as underlying asset. Index**



Sources: Bloomberg and the Riksbank.

**Figure 7. Expected default frequency (EDF) for non-financial listed companies. Per cent (logarithmic scale)**

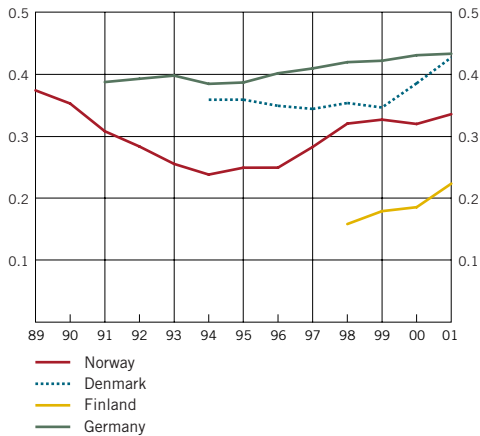


Note. The lowest decile refers to the 10 per cent least creditworthy companies. The lowest quartile refers to the 25 per cent least creditworthy companies.

Source: KMV Corporation.

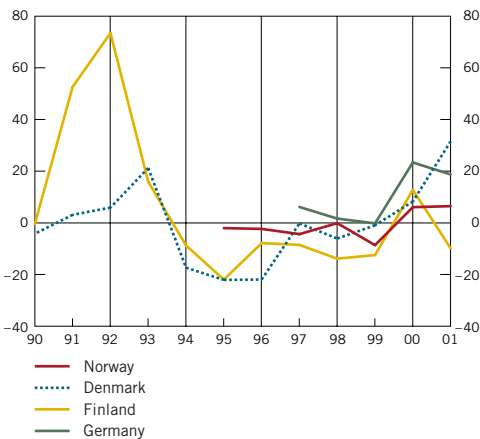
6 The model on which the estimates are based is reported in the article "Credit rating and the business cycle: can bankruptcies be forecasted?" by Jacobson and Lindé, Sveriges Riksbank Economic Review 2000:4.

**Figure 8. Borrowing ratio for non-financial companies in the Nordic countries and Germany, percentage of GDP. Ratio**



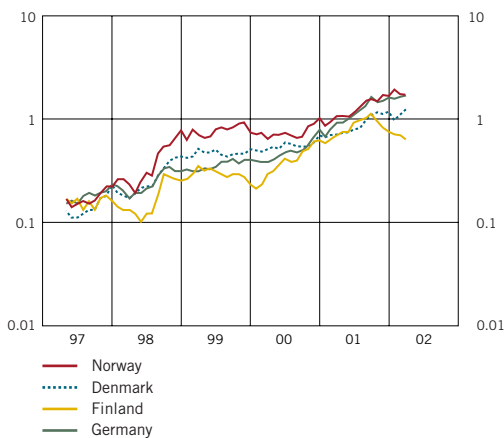
Sources: The Nordic central banks and the Bundesbank.

**Figure 9. Company bankruptcies in the Nordic countries and Germany. Percentage change**



Sources: The Nordic central banks, the Bundesbank and UC AB.

**Figure 10. Expected default frequency (EDF) for non-financial companies in the Nordic countries and Germany. Per cent (logarithmic scale)**



Source: KMV Corporation.

bankruptcy has increased steadily since August 2000, and was at its highest during September last year (see Figure 7)<sup>7</sup>. Since then, the aggregate bankruptcy risk in the corporate sector one year ahead has declined, but it is still around 60 per cent higher than one year ago. The fact that the expected bankruptcy risk has declined recently shows that the market participants expect profit development in the corporate sector to improve over the coming year. This supports the picture outlined by the interest rate spreads.

The majority of the Swedish banks' borrowers abroad are in Germany and the Nordic countries. Corporate sector borrowing as a percentage of GDP has increased relatively strongly in Denmark and Finland (see Figure 8). The fact that lending has continued to increase while these countries have experienced a slowdown in economic activity may mean that there has been some build-up of risk in credit granting to the corporate sector in Denmark and Finland.

The bankruptcy statistics modulate the picture somewhat with regard to credit risks in the Finnish economy. In Finland, company bankruptcies have declined over the past six years, with the exception of 2000. In Denmark, the bankruptcy statistics reinforce the picture outlined by the borrowing statistics. Company bankruptcies have increased over the past two years there. In both Norway and Germany, the number of company bankruptcies has levelled off.

Computed expected default frequencies show that bankruptcy risk has increased steadily in Denmark, Norway and Germany since October 2000. Although the default frequency has declined in Norway this year, it is still at a higher level than in September 2001. This indicates that market participants are still pessimistic with regard to profit development in the corporate sector in these countries and that positive effects on the bankruptcy rate from a potential economic upswing may take some time. The total picture with regard to lending and bankruptcy statistics indicates that the risks in granting credit to Danish and German companies have probably increased somewhat.

SUMMARY COMMENTS

Companies are increasing their indebtedness. Bankruptcies are encompassing larger companies to a greater extent. The number of bankruptcies is expected to increase slightly during 2002, and then fall back to the same level as during 2001, assuming that economic activity shows an upswing in 2002. The expected default frequency, based on market information, indicates a lower bankruptcy risk within the Swedish corporate sector one year ahead.

The uncertainty over the development of the third generation of mobile telephone systems still constitutes a worrying factor with regard to developments in the telecom sector. However, the banks' exposure to this sector is not sufficiently large to increase loan losses to a worrying extent, as long as the telecom companies do not experience difficulties in financing themselves on the securities markets and turn to the banks for financing.

7 KMV Corporation calculates the probability of bankruptcy in limited companies within a given time horizon – Expected Default Frequency (EDF) – on the basis of share prices and data from financial statements. By calculating the probability of the market value of a company's assets falling below the size of its debts at the time of maturity of the debts, EDF shows the risk of a company listed on the stock exchange being unable to meet its payments. The market value of the company's assets is in turn derived from the company's market value with the use of option pricing methods.

## THE FALL OF ENRON

In December 2001 the US energy company Enron defaulted, despite the fact that, as recently as summer 2001, it was regarded as one of the USA's largest and most respected companies. The developments at Enron illustrate how quickly even a very large company can go under, but also show that this need not have a drastic effect on the markets. In addition, the circumstances regarding Enron raise issues with regard to the roles played by the board of directors, the auditors and the share analysts as well as the shaping of the regulatory framework.

Enron was a traditional energy company that began to offer various forms of IT and financial services in the late 1990s through a subsidiary, EnronOnline. Enron Online traded in derivative instruments concerning, for instance, gas, weather and energy, and offered trading in emission allowances and broadband services. Enron's transformation was appreciated by the stock market, which at that time had great faith in the "new economy", and the value of the Enron share rose from around 30 dollars at the beginning of 1999 to around 90 dollars at its peak in August 2000 (see Figure B4).

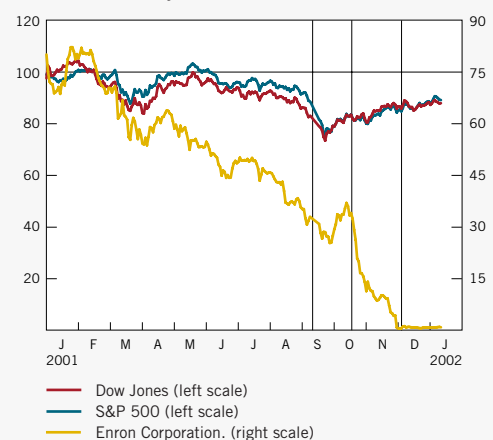
With the benefit of hindsight, it is clear that the assessment of Enron on the stock market was based on incorrect or incomplete information in the company's accounts. By using various types of financial techniques, the Enron management was able to appear to increase the corporation's profits and reduce the size of the balance sheet. US accounting legislation made it possible to keep the various companies in the Enron circle outside of the company's balance sheet and income statements. By applying the accounting principles in a way advantageous to the company, the Enron management probably followed the letter of the law, but still gave an incorrect and excessively positive picture of the company's results and financial position.

Certain factors in the Enron fall are specific to the USA. However, it is not possible to completely disregard a suspicion that a comparable bankruptcy could happen even in Sweden.<sup>8</sup>

### ENRON'S EFFECT ON THE FINANCIAL MARKETS

Following its peak noted price, the Enron share fell more or less continuously until the company filed for Chapter 11 on 2 December 2001. However, the fall of the Enron share did not affect the general development of the stock

**Figure B4. Development of the Dow Jones Composite, S&P 500 and Enron.**  
Index 1 January 2001 = 100 and USD



Note. The three vertical lines represent the terrorist attack on 11 September, Enron's revised financial statement data on 16 October and Enron's default on 2 December.

Source: EcoWin.

<sup>8</sup> Cf. cases such as the Kreuger group, Fermenta or Prosovia.



market. While the Enron share fell rapidly during autumn 2001, the broad share index rose slightly.

Nor did the stock markets react significantly either to Enron's presentation of revised financial statements on 16 October or to its application for Chapter 11 on 2 December. However, there was some concern on the markets that other companies were applying similar accounting routines to Enron. This affected stock prices for a period, particularly those in companies with non-transparent financial structures.

However, the credit analysts who followed Enron were not as positive as the stock market. The company had never had a credit rating above BBB+ during the late 1990s. The interest rate spreads between corporate bonds and treasury bonds remained relatively unaffected by the problems at Enron during the autumn. The spreads increased as a result of the events on 11 September, but then showed a declining trend from the end of September/beginning of October and onwards (Figure B5).

When Enron fell, it soon became clear that the banks did not have exposures to the company of a size that would threaten their financial position, which meant that there were no contagious effects into the financial system.

The reactions to Enron's fall indicate that participants in the financial markets realised that the majority of Enron's problems were company-specific and did not entail any major risk of contagion to other companies or banks.

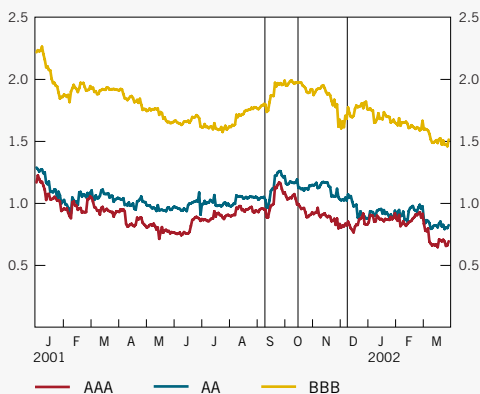
#### PROBLEMS BROUGHT TO THE FORE BY THE ENRON COLLAPSE

The problems illustrated by the Enron fall are actually all familiar problems. What is unique is that they appear to have been gathered together here and that they have led to a collapse of this scale.

The base of Enron's problems appears to have been issues regarding steering, management, allocation of responsibility and incentive structures; all classical corporate governance issues. The Enron fall shows how important it is to separate internal auditing and risk management from other operations, both in financial and non-financial companies. It is also important that remuneration programmes for management and personnel do not create incentives to hide failures and problems. Naturally, the board of directors must also be in such a position that it can credibly call into question the actions of the company management – and have an incentive to actually do so.

Enron took with it in its fall one of the world's largest accounting firms, Arthur Andersen. The auditors' dou-

**Figure B5. Credit spreads over US treasury bonds for bonds with AAA, AA and BBB ratings. Per cent**



Note. The three vertical lines represent the terrorist attack on 11 September, Enron's revised financial statement data on 16 October and Enron's default on 2 December.

Source: EcoWin.

ble role as consultants and auditors has been discussed in many contexts. However, the problem highlighted in the debate is that most accounting firms provide advice on financial matters to the companies they audit. The role of the accounting firms as independent examiners of the company's accounts and business at the same time as they receive their income from these companies has not been as widely discussed. The question is whether the latter problem is not at least as complex.

Accounting should provide a true and fair view of the company's financial position, its profits and cash flow. However, both European and US legislation on accounting provides scope for individual interpretation. From what is currently known of Enron's accounting, it appears as though the company has followed the letter of the law, but scarcely provided a true and fair view of the company in its accounts. The problem of utilising accounting to appear in a more favourable light than is reasonable exists in all countries and on all stock markets at some point in time. One solution that has been chosen, for instance in the USA, is to manage in detail how the accounting is carried out. However, this did not prevent Enron's default. It is probably impossible to create an accounting standard that completely rules out abuse of the spirit of the accounting regulations in individual companies.

The analysts who monitored and evaluated Enron naturally experienced problems in correctly assessing the company with the information provided. Something that may have made analysis of Enron even more difficult is the large intangible assets within EnronOnline. The difficulty in assessing intangible assets and reporting them correctly may have been exacerbated as this type of asset became increasingly important for the company's operations. This would also have made the analysts' work more difficult. However, analysts also often play a double role, as they work in investment banks and stockbroking firms and can benefit from positive results for the companies they evaluate.

Enron collapsed rapidly from mid-2000 to the end of 2001, when its owners and financiers gradually lost faith in the company management and in the figures they presented. This loss of faith probably contributed strongly to Enron's fall, as it became impossible to refinance the loans that fell due, despite the fact that the company probably had substantial real assets in its original business. The problem was worsened by the fact that a number of bond loans fell due for payment when the company was downgraded by several credit rating agencies, as the loan contracts contained this type of covenant.

Common to the aspects illustrated here is that they all concern the difficulties faced by outside observers in gaining insight into, or having control over, what happens in a large corporation. This applies regardless of whether the observer is an authority or a shareholder. When company management wants to hide the reality, it is difficult to penetrate their defences unless the company maintains strict regulations on the allocation of responsibility. No regulatory framework is sufficient to completely prevent dishonest behaviour.

The Enron case is a reminder that issues concerning company management, accounting regulations and the role of auditors are important, but that there are no quick, easy solutions to deal with them. When a default of this scale occurs, it is up to the legislators to call for measures to prevent similar cases in the future. This is exactly what is happening now in many parts of the world. However, it is far from certain that measures such as more stringent regulations or extended supervision will actually reduce the risk of similar events occurring again. The problems of principles illustrated in the Enron case have long been known and discussed. It is difficult to find simple solutions to them. There is therefore reason to show some caution when changing regulatory framework on the basis of what happened to Enron.

## The commercial property sector<sup>9</sup>

The Riksbank studies and monitors the commercial property sector for two main reasons. The first is that property companies comprise the largest individual borrowers from the banks. The property companies' share of total bank lending is approximately 15 per cent. The second reason is that property is to a large extent used as collateral in borrowing. Loans with property as collateral comprise 49 per cent of the banks' lending against collateral. This type of lending has increased in recent years and the banks' exposure to the property sector has also risen (see Figure 11). The relationship between the property sector and the banks has meant that problems in the property sector have been a contributing factor in many financial sector crises around the world. This applied in particular during the Swedish bank crisis in the early 1990s.

It is therefore relevant to study both the property companies' earnings capacity and ability to pay, as well as the value of property used as collateral. There is also a strong connection between property companies' ability to pay and collateral value. As the property companies' business involves investing in property, it is the same factors that govern earnings within the companies that influence the value of the collateral. Earnings are primarily dependent on rental levels, vacancies and operating costs. The value of the properties is governed by the same factors. If a property company goes bankrupt, it is very probable that this bankruptcy is connected with a fall in the value of the property it owns. This means that there is a considerable risk that the property pledged as collateral for its bank loans will not suffice and the bank will suffer major losses.

This section first studies the profitability and indebtedness of the property companies, followed by a discussion of price trends on the property market and thus the value of the collateral.

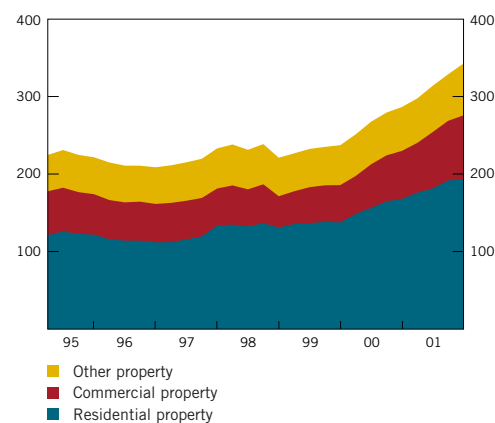
### THE PROPERTY COMPANIES' ABILITY TO PAY AND LEVEL OF INDEBTEDNESS

Despite the slowdown in economic activity, the property companies are still showing a good level of profitability. During 2001, the operating profit – rental income minus operating costs – increased by 15 per cent in current prices among the Riksbank's sample of property companies.<sup>10</sup> The good level of profitability is due to the fact that rental contracts were signed for long-term periods, and today's contracts are therefore still being signed at higher levels than the expiring contracts, although the rental levels for new contracts are lower now than they were a year ago. The interest cover ratio has gradually risen since 1992 and has remained largely unchanged since

9 This section deals with the commercial property sector, while single-family dwellings and tenant-owner apartments are discussed in the section on the household sector. Commercial property is defined here as property rented out as accommodation and offices. Some commercial property companies work with several different segments, such as apartment blocks, shops, single-family dwellings, industrial premises, warehouses, garages, hotels, business premises and offices, but this section only deals with the markets for apartment blocks and offices. In the text the term commercial premises refers to offices.

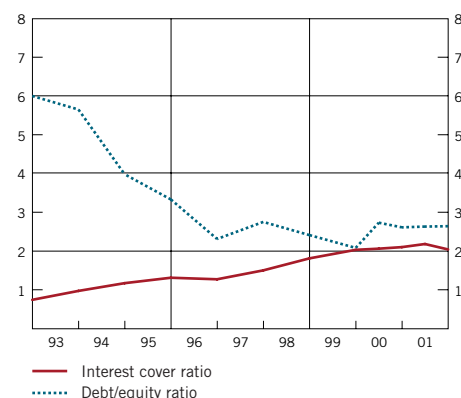
10 This sample consists of property companies listed on the stock exchange and covers approximately 26 million square metres, which corresponds to just under SEK 200 billion in book value assets.

**Figure 11. The banks' lending against collateral in property. SEK million**



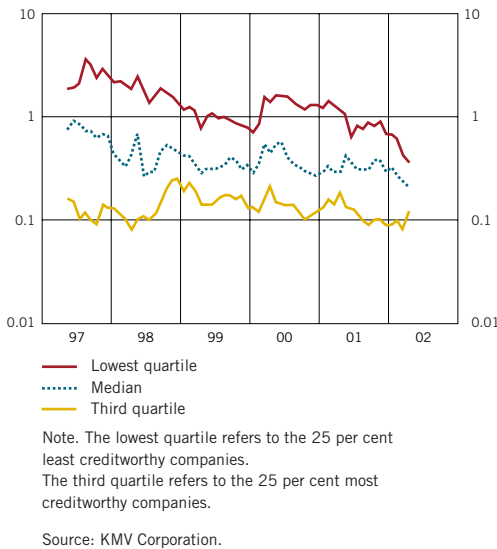
Source: The Swedish Financial Supervisory Authority.

**Figure 12. Interest cover ratio and debt/equity ratio in property companies listed on the stock exchange, weighted average. Per cent**



Sources: UC AB (up to the end of 1999) and annual reports.

**Figure 13. Expected default frequency for property companies listed on the stock exchange.**  
Per cent (logarithmic scale)

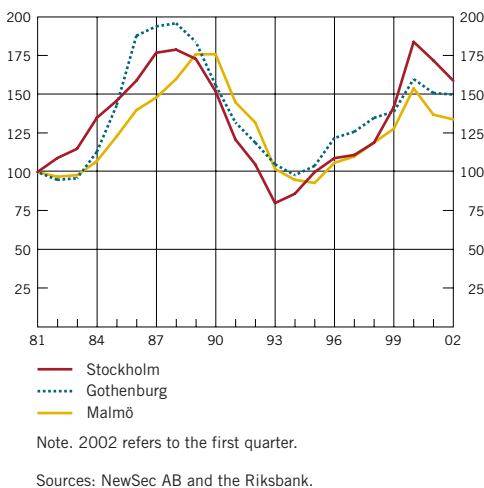


1999 (see Figure 12). The debt/equity ratio has increased slightly since 1999, but is clearly lower than during the first half of the 1990s.<sup>11</sup>

An additional picture of the financial position of the property companies listed on the stock exchange is provided by KMV's calculations of the estimated default frequency within a given time horizon (Figure 13). These calculations show that the default frequency for property companies listed on the stock exchange has declined since October 2001, with the exception of a small rise in March 2002 for the companies with the highest creditworthiness. The development of the property companies contrasts with that of other companies, where the likelihood of bankruptcy has risen over a long period of time (see the section on the corporate sector). The main explanation for the lower estimated default frequency in the model is that property companies have developed strongly on the stock market in recent times.

*The rental market for commercial premises* slackened during 2001 and early 2002 (see Figure 14). Rents on newly-signed rental contracts for commercial premises in Stockholm's central business district have fallen five quarters in a row, from SEK 6,000 per square metre to approximately SEK 4,200 per square metre in the first quarter of 2002. In Gothenburg and Malmö rents have remained largely unchanged over the past few quarters.

**Figure 14. Developments in real rents for commercial property in Stockholm, Gothenburg and Malmö.**  
Index 1981=100



The decline in rent levels coincides with a general reduction in economic activity, in a period when there is also considerable uncertainty over future economic developments. Now the economic slowdown is estimated to have passed its lowest point and signs of a recovery can be seen. The question is whether rents for commercial premises have also passed their lowest point and will begin to rise again in connection with the general economic recovery. To find the answer, it is necessary to make an assessment of how supply and demand for premises may develop.

An indication of the *supply* of premises is the volume of investment in property in relation to GDP (the gross investment ratio).<sup>12</sup> During the 1980s and 1990s, this ratio has gradually declined. For the whole year 2001 the level was approximately 4 per cent of GDP (see Figure 15). The gross investment ratio shows that investment in other property has developed in line with the economy as a whole since 1999, but that the level of investment is low compared with previous levels during the past twenty years.

**Figure 15. Gross investments in other property in relation to GDP.**  
Per cent



Forecasts for construction are useful in estimating the future supply of premises. According to forecasts for projects regarding commercial office premises that are planned or have been started, it is estimated that just over 320,000 square metres of office space will be completed in the Stockholm region during 2002, which corresponds to 3.1 per cent of the total amount (see Figure 16). Expected construction in Gothenburg and Malmö corresponds to 2.7 per cent and 7 per cent respectively of the total amount of premises. It is

<sup>11</sup> Interest cover ratio is defined as the operating profit plus financial income divided by financial expenditure.

<sup>12</sup> This ratio is a rough measure of investment in commercial office premises, as it contains more than just office premises. Industrial buildings, warehouses and shops are also included.

interesting to see to what extent office space is built without contracts for rental, as this should indicate the size of the risk that newly-built premises will not be filled with tenants. A comparison with earlier forecasts of completed square metres for the period 2002–2003 indicates that construction projects with unleased space have declined. This implies that building contractors are putting projects on hold until demand increases again.

The number of building permits granted for office premises confirms this picture. Following four quarters with a strong increase in building permits in terms of number of square metres involved, the number of building permits fell dramatically from the second quarter of 2001 and this decline has continued. The weaker level of economic activity has probably contributed to this severe decline.

There are several different variables that affect the *demand side*. During the second half of the 1990s, the number of office employees increased steadily and these now comprise almost one quarter of all persons employed. On an annual basis the number of employees in office industries increased by 6.5 per cent during the first quarter of 2002 (see Figure 17).<sup>13</sup> A further indicator of demand on the office premises market is the number of workplaces with at least 5 employees in office-intensive industries. During 2001 there was a decline in this figure in Stockholm and Malmö. The reduction in the number of workplaces was modest but broke an upward trend since 1993. At the same time, Statistics Sweden's bankruptcy statistics indicate an increase in bankruptcies in businesses renting offices on the open market. The downturn in economic activity may also have led to a development towards fewer square metres per employee. Despite these signs of a slowdown, the demand for commercial office premises must be regarded as remaining high.

As the supply of premises is slow to change, supply and demand are balanced through changes in the vacancy rate. Increased demand and little new production over a long period of time have led to falling vacancy rates (see Figure 18). However, during 2001 and the beginning of 2002 the vacancy rate increased in the Stockholm City region, from 1 per cent in 2000 to 5 per cent this year. In Gothenburg and Malmö the vacancy rates have remained unchanged. Higher vacancy rates contribute to a deterioration in net operating income for property companies.

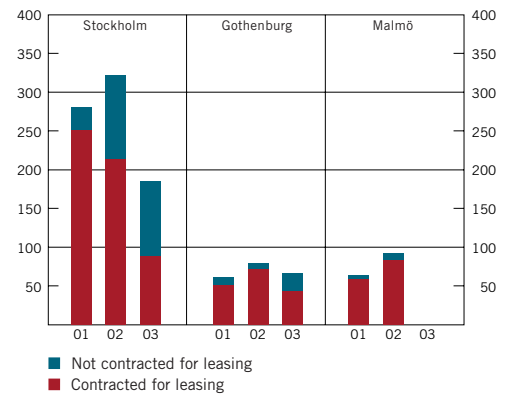
With regard to *apartment blocks*, developments in both rents and vacancy rates are very stable. However, rents could be affected by drastic changes in conditions in the form of a large increase in new production or a fall in demand. There are no signs to indicate any such changes at present.

#### PROPERTY PRICE TRENDS

The fundamental value of *commercial property* can be calculated according to the cash flow method. This method usually forecasts cash

13 Office businesses are defined here as banks and other credit institutions, insurance companies, service companies for financial operations, property companies and property management companies, computer consultants and computer services offices, R&D institutions, other company services firms, civil authorities, professional and industrial organisations.

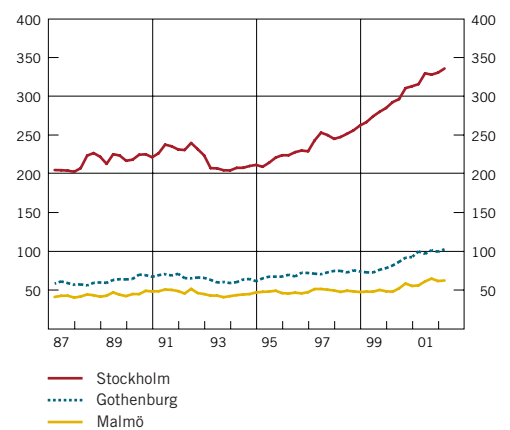
Figure 16. Estimated supply of commercial office space. 1,000 square metres



Note. There is no forecast for Malmö for 2003.

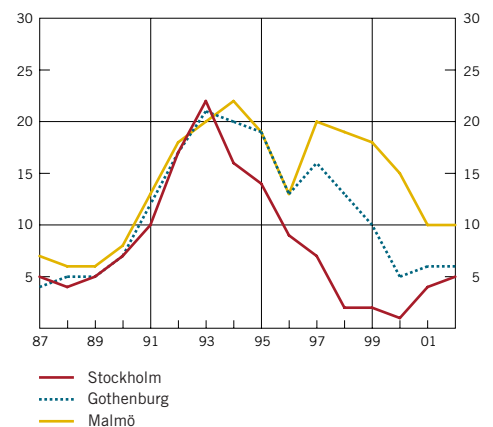
Source: Jones Lang Lasalle.

Figure 17. Number of office employees in local labour markets in Stockholm, Gothenburg and Malmö. Thousands



Source: AKU; Statistics Sweden.

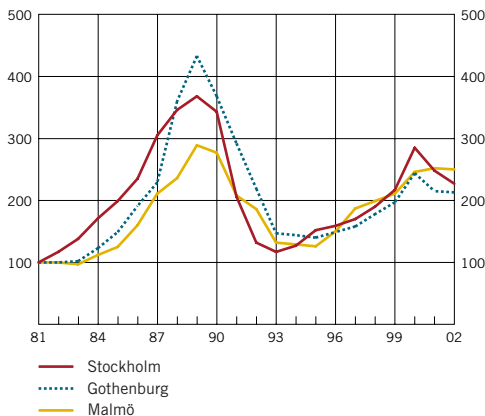
Figure 18. Vacancy rates for commercial property in metropolitan areas. Per cent



Note. 2002 refers to the first quarter.

Source: NewSec AB.

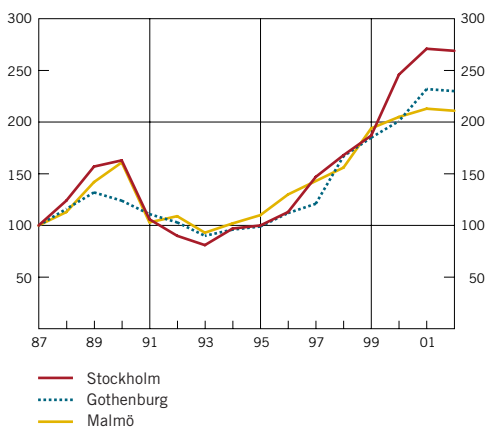
**Figure 19. Developments in real prices of commercial property in Stockholm, Gothenburg and Malmö. Index 1981 = 100**



Note. 2002 refers to the first quarter.

Sources: NewSec AB and the Riksbank.

**Figure 20. Developments in real prices of apartment blocks in central locations. Index 1987 = 100**



Note. 2002 refers to the first quarter.

Sources: NewSec AB and the Riksbank.

flows in detail for the immediately following period, approximately five to ten years ahead, while a more standardised cash flow is assumed after the end of this period. The cash flow is discounted at a calculation rate determined by the investors' requirements for return on investment. An increase in the price of the property today can thus be caused by an observed increase in net operating income, which means that expected future cash flows will increase or there will be a decline in the real yield requirement.

Prices have fallen by approximately 20 per cent in Stockholm and around 13 per cent in Gothenburg since the top prices in 2000. In Malmö prices have remained unchanged. The decline during 2001 in Stockholm and Gothenburg broke an upward trend that had continued since the mid-1990s (see Figure 19). The change in prices is explained by lower rents today and expectations of lower future income from rents, as well as higher vacancy rates. Another reason for the decline is the increased yield requirement on investments, which is in turn connected with a rather more uncertain rent market and a situation with slightly higher interest rates. Investors require a higher risk premium for investment in property. Property investors' average yield requirement on investment is currently around 6.75 per cent, which is an increase from the figure of approximately 6 per cent during 2000.

Prices of *apartment blocks* are primarily governed by regulations such as those on utility value and the system for central rent negotiations. Both of these factors influence cash flows, and thereby the value of the property. In metropolitan areas, where apartment blocks are now mainly sold in connection with change-overs from rental to tenant-owner apartments, prices on apartment blocks are strongly influenced by prices for tenant-owner apartments. However, the increase in prices on tenant-owner apartments has come to a halt, which has caused prices of apartment blocks to level off (see Figure 20).

#### SUMMARY COMMENTS

Despite a poorer economic situation, pressure on rents and higher vacancy rates for commercial premises, the financial position of the property companies appears stable. Neither the developments on the commercial premises market nor those on the accommodation market appear likely to lead to serious losses among property companies that would result in loan losses for the banks.

An increasingly positive picture of the economy, as well as a higher level of economic activity will probably lead to lower vacancy rates and to customers seeking better locations and larger premises. This will result in a greater return on investment for the property companies. However, the recovery may take some time the activity on the property market is in a wait-and-see phase and the number of transactions registered on the market is lower than before.

## The household sector

### HOUSEHOLDS' INDEBTEDNESS AND ABILITY TO PAY

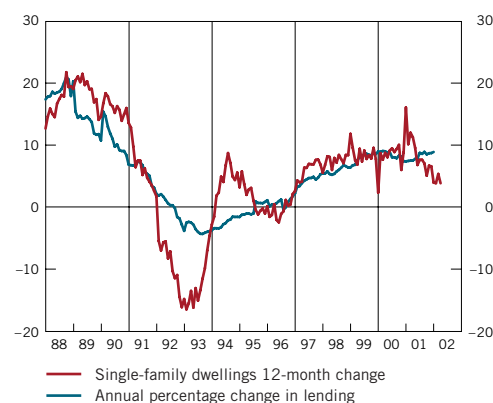
Households are continuing to increase their indebtedness. The credit institutions' total lending to households had increased by approximately 9 per cent on an annual basis in December 2001, compared with 7 per cent in December 2000. Households' optimism regarding their own private economies and the Swedish economy as a whole, increased disposable incomes and relatively low real and nominal interest rates are some conceivable explanations as to why households are continuing to borrow. In addition, activity on the property market is still at a relatively high level, although it has slowed down somewhat. Preliminary statistics regarding the turnover in single-family dwellings indicate that the number of sales has fallen by approximately 10 per cent during the first quarter of 2002. The lower turnover indicates that the lending rate to households will probably fall in future. The rate of price increase for single-family dwellings has also slackened, although prices rose slightly during the first quarter of this year. In March 2002 prices for single-family dwellings increased by around 4 per cent on an annual basis, which can be compared with an annual rate of price increase of just over 11 per cent in March 2001 (see Figure 21).

At the end of the first quarter, households' debt ratio, i.e. debts in relation to disposable income, amounted to just over 110 per cent (see Figure 22). The debt ratio is thus approaching the levels prevailing prior to the bank crisis in the early 1990s. The Riksbank's assessment is that this ratio will continue to increase slightly over the coming two years, although at a slower rate. This development is indicated by households' optimism, as well as expectations of a continued relatively high level of activity on the property market, with rising prices on tenant-owned apartments and single-family dwellings.<sup>14</sup>

However, while the debt ratio has increased, households' interest ratio – interest expenditure after tax deductions in relation to disposable income – remained relatively constant. The interest ratio will probably rise slightly during 2002 and 2003 as a result of an increase in debts, but also based on market participants' expectations of rising interest rates.<sup>15</sup> This is despite the fact that disposable income is expected to increase slightly in coming years as a result of income tax reductions, increased transfers and a continued high level of employment.

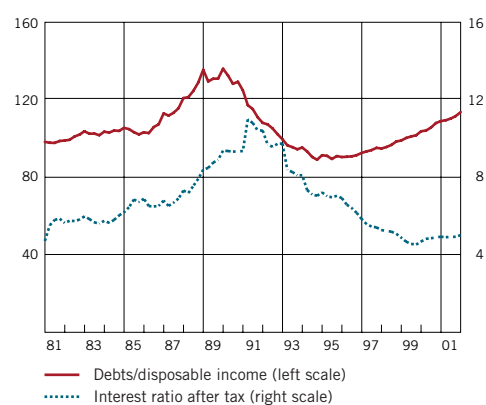
The interest ratio is currently at a historically low level, which means that households' ability to pay should not deteriorate significantly if the ratio rises somewhat during the coming years. If households' disposable income rises by 5 per cent in nominal terms over the coming year and lending remains unchanged, it would require an increase of more than 5 percentage points in the general interest rate level for the interest ratio after tax deductions to be on a par with households' interest ratio during the build-up to the bank cri-

**Figure 21. Rate of change in credit institutions' lending to households and prices of single-family dwellings. Per cent**



Source: Statistics Sweden and the Riksbank.

**Figure 22. Households' debts in relation to disposable income and households' interest ratio. Per cent**



Note. The interest ratio is defined as interest expenditure after tax relief divided by disposable income.

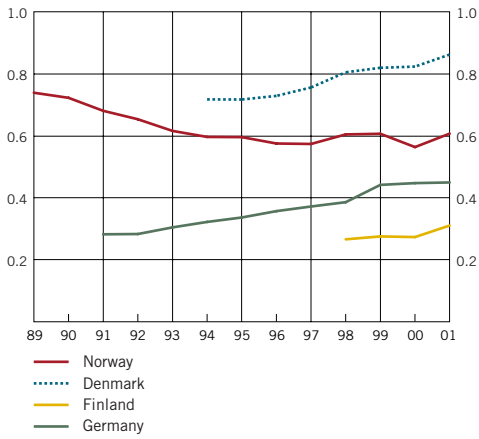
Sources: Statistics Sweden and the Riksbank.

<sup>14</sup> Households' purchasing plans, March 2002, National Institute of Economic Research.

<sup>15</sup> See the Riksbank's Inflation Report, March 2002.



**Figure 23. Households' borrowing ratio in the Nordic countries and Germany, percentage of GDP. Ratio**



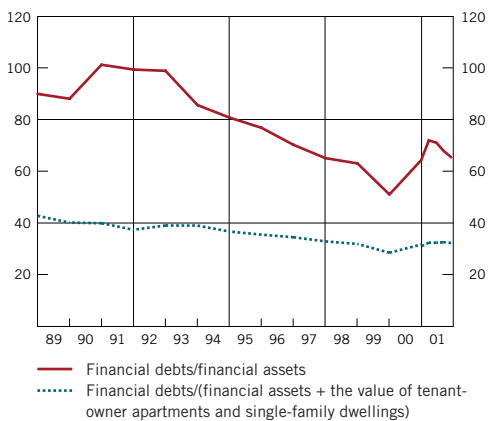
Sources: The Nordic central banks and the Bundesbank.

**Figure 24. Households' holdings of financial assets and tenant-owner apartments or single-family dwellings respectively. SEK billion**



Sources: Statistics Sweden and the Ministry of Finance.

**Figure 25. Households' debts in relation to their assets. Per cent**



Sources: Statistics Sweden and the Ministry of Finance.

sis in the early 1990s. If the upturn in economic activity fails to materialise and households' disposable income remains unchanged over the year, an increase in the general interest rate level of around 4 percentage points would be required for households' interest ratio to reach the levels prevailing at the beginning of the 1990s.

In the Nordic countries and Germany, the borrowing ratio – granting credit to households as a percentage of GDP – shows that households' indebtedness is rising, but is at a relatively low level in all countries.

HOUSEHOLDS' WEALTH

If payment problems were to arise, households could realise their savings in financial and real assets in order to meet interest and mortgage payments. One indicator of households' ability to repay in the short term is their debts in relation to financial assets. Households' financial assets – which consist of approximately 30 per cent share-related assets – declined in value in connection with the fall on the stock exchange during 2000 and the first half of 2001. Since the second quarter of 2001, households' financial assets have increased in value. This development is expected to continue, albeit at a weaker rate, in 2002.<sup>16</sup> Today the value of households' financial assets is well in line with the level in 1999.

An indicator of households' ability to pay in the long term is their debts in relation to assets, including the value of single-family dwellings and tenant-owner apartments. In the event of increasing interest expenditure, a household has the possibility of reducing its loan costs in the longer term by choosing cheaper housing. This indicator has also strengthened during the second half of 2001 and is expected to strengthen further during 2002, although the growth in prices of tenant-owner apartments and single-family dwellings has declined and the growth in wealth will be modest. However, it is important to note that there are regional differences in the question of rate of price increase on single-family dwellings and tenant-owner apartments. The rate of price increase is in general higher in metropolitan areas with regard to both single-family dwellings and tenant-owned apartments.

SUMMARY CONCLUSIONS

Households' ability to pay, when measured according to these two variables, thus indicates some improvement in households' financial position and ability to pay during 2002. However, the fact that the debt ratio and interest ratio will probably increase over the coming year means that the risk of payment problems for households has increased marginally. Nevertheless, this is more likely to cause problems for individual households than to lead to considerable loan losses for the banks.

<sup>16</sup> See the Riksbank's Inflation Report, March 2002.

# Developments in the banks

*Profits before loan losses in the major Swedish banks have shown a weak development since the first half of 2000. The slowdown in economic activity and prolonged downturn on the stock market that began at that point have resulted in lower net commission income and higher loan losses. Although earnings are still at a historically high level in absolute terms, profitability in the major banks is now at the lowest level since the bank crisis in the early 1990s.*

The Riksbank's analysis of the systematically important banks is aimed at the risks connected with developments in profitability, quality of assets and financing strength. The strategic risk related to the banks' conditions for long-term survival on the market are discussed in the section on profitability and earnings. The analysis of assets is primarily aimed at assessing the credit risk in the banks' lending portfolios seen in the light of the macroeconomic developments reported in the previous chapter. The liquidity risk in the banks' balance sheets, or the risk that a bank will be unable to finance its commitments, is discussed in the section on financing. In the same section there is also an assessment of the resilience to financial problems provided by the banks' capital. Finally, there is a summary assessment of the development of risks in the banking system.

## Profitability – strategic risk

The underlying earnings of the Swedish major banks, measured as profit before loan losses, were in March 2002 somewhat lower than at the same time last year (see Figure 26). However, in a slightly longer term perspective, earnings have now stabilised at a level around 30 per cent higher than the average during the 1990s, measured in fixed prices.

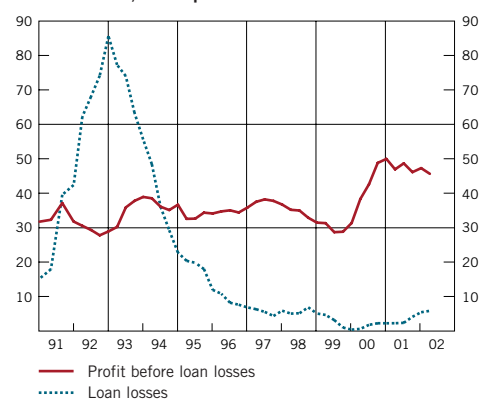
The decline in earnings in recent years and higher loan losses have led to profitability, measured as return on equity, decreasing by 2 percentage points to 12 per cent (see Figure 27).<sup>17</sup> Although there are considerable differences between the banks, profitability is currently at its lowest since 1994, when it was burdened by substantial loan losses in the aftermath of the bank crisis.

The declining profitability is a consequence of the banks' assets and capital having grown more rapidly than their earnings. From an international perspective, it can be noted that the profitability of

<sup>17</sup> The reporting period comprises the most recent four quarters until the end of March 2002.

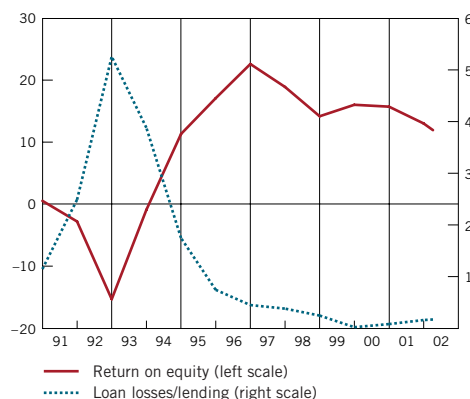
All comparisons are with the four previous quarters, unless otherwise stated.

**Figure 26. Profit before loan losses and loan losses (net) in the major banks, aggregate over four quarters. SEK billion, 2002 prices**



Sources: The banks' reports and the Riksbank.

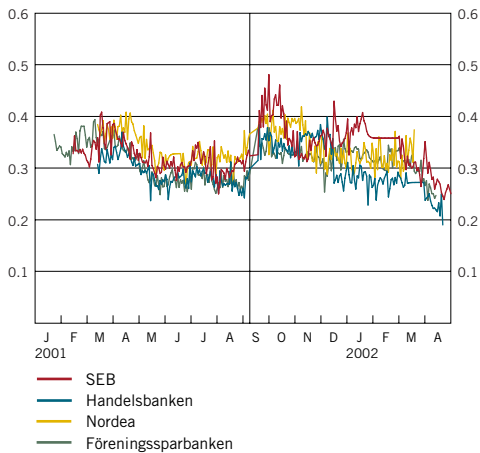
**Figure 27. Return on equity after tax and loan losses as a percentage of lending in the major banks. Per cent**



Note. The data for 2002 refers to the most recent report period (the four most recent quarters).

Sources: The banks' reports and the Riksbank.

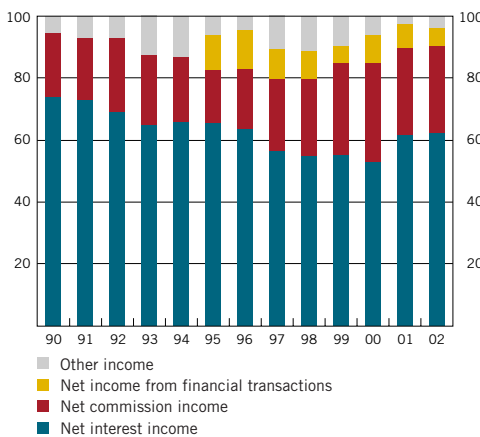
**Figure 28. Implied volatilities in bank options.**  
Per cent



Note. The vertical line indicates the time of the terrorist attack on 11 September.

Source: The Riksbank.

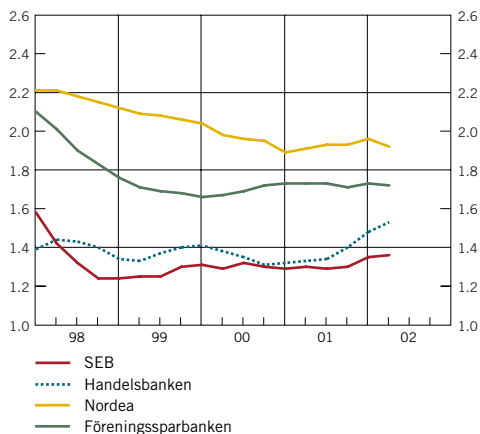
**Figure 29. Breakdown of income in the major banks.**  
Per cent



Note. The data for 2002 refers to the most recent report period (the four most recent quarters).

Sources: The banks' reports and the Riksbank.

**Figure 30. Net interest income margin in the major banks, aggregate over four quarters.**  
Per cent



Note. The net interest income margin is defined as net interest income divided by interest bearing assets.

Sources: The banks' reports and the Riksbank.

the major Swedish banks is middling, despite low loan losses. Loan losses on a par with the European average would reduce profitability in the major Swedish banks to the lower half among European banks.<sup>18</sup>

According to the implicit volatilities derived from bank stock options, market participants' uncertainty over the banks' profits appears to have declined once again, following the terrorist attacks in the USA (see Figure 28).<sup>19</sup> Given a development in line with the main scenario described in the most recent Inflation Report, profitability should reach its lowest level during the first half of 2002 and then gradually strengthen as economic activity begins to rise.

INCOME

The major banks' income were more or less unchanged during the most recent reporting period, compared with the previous one. Net interest income was the only income item to show a positive development, with the result that its share of income has now risen to more than 60 per cent, after having declined several years in a row (see Figure 29). Net commission income has declined as a percentage of income since the fall on the stock market began and now amounts to 28 per cent. Net income from financial transactions and other income declined considerably.

Net interest income increased by 11 per cent. The high rate of growth is explained by the fact that both lending and deposits increased by around 8 per cent on an annual basis and the for lending margins rose. Deposit margins, on the other hand, have continued to decline.<sup>20</sup> In principle the size of the lending margin is determined by three factors: competitive pressure, risk levels in lending and to some extent the general interest rate level.<sup>21</sup> As interest rates have in general remained unchanged during the period, while competition pressure has hardly declined, the higher lending margin could indicate that the risk premium in the banks' lending has increased. There is thus a possibility that the increase in net interest income is partly an expression of a greater risk in the banks' loan portfolios.

However, in a slightly longer term perspective, margins have declined considerably. Since 1995 the margins on lending and deposits to the general public in Sweden have declined by almost 30 per cent (see Figure 30). Although, corporate margins appear to have stabilised over the past three years, household margins have continued to fall (see Figure 31). This development has considerable effects on the banks' net interest income and consequently on their profitability. If today's net interest margins had been in line

18 See also the special topic on the Swedish banks in an international comparison.

19 For an explanation of the implicit volatilities of options, please see footnote 3.

20 The margins refer to the difference between the banks' average lending and deposit rates and the interest on a six-month treasury bill.

21 Historically, it has been easier for banks to maintain high margins in a generally higher interest rate situation. The explanation could be that higher interest rates are often connected with higher volatility, which reduces transparency in pricing and thus improves the banks' possibilities for having higher margins.

with what applied in 1995, the major banks' profitability would, all else being equal, have been roughly twice as high.<sup>22</sup>

A development in line with the main scenario in the Inflation Report, with gradually rising interest rates and a continued growth in lending should result in a continued, albeit modest, strengthening of net interest income.

Net commission income declined by 7 per cent during the most recent period. Securities-related commission income, which comprises approximately one half of net commission income, fell by almost 20 per cent as a result of the weak stock market during the period, with falling prices and a declining turnover. Activity was also low with regard to corporate business and stock market introductions, where the major banks often act as advisers. The other parts of net commission income, such as payments and credit cards, have continued to develop well despite the economic downturn.

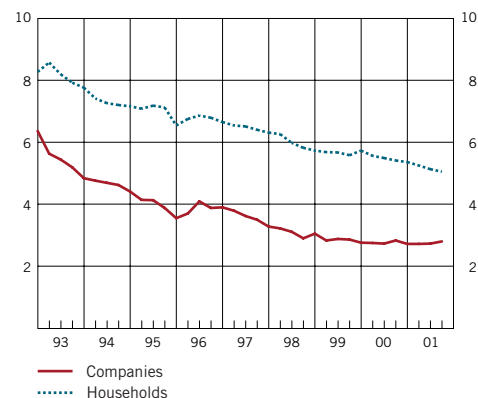
Despite the fact that over the past two years the stock market has swung from an almost decade-long rise to a prolonged decline, net commission income has proved to be a relatively stable source of income. During the fourth quarter, net commission income was close to 20 per cent lower than the record level in the first quarter of 2000, which must be regarded as a modest decline considering the fact that prices and turnover on Stockholmsbörsen have fallen by 40 and 20 per cent respectively during that period (see Figure 32). Following the stock market decline of the past two years, net commission income is still at a higher level than during the third quarter of 1999, immediately prior to the beginning of the IT related boom.

This development confirms that the strong growth in net commission income during the second half of the 1990s is only partly explained by the positive developments on the stock market. Other important factors were that saving in shares and mutual funds became widely popular and that an increasing percentage of saving and credit granting took place directly in the financial markets. The latter means that interest income is being substituted by commission income from advising, asset management and mediation services. These changes were of a more structural nature and can be assumed to have enduring effects, although they were of course strengthened by the protracted rise on the stock market. Another reason for the relative stability of net commission income is the inertia in customer behaviour inherent to the financial market as a whole.

In the short term, a development in line with the main scenario in the March Inflation Report, where economic activity shows a turnaround during the second half of 2002, and the stock market recovers somewhat, would lead to a slight rise in net commission income. As mentioned in the previous Financial Stability Report, the decline on the stock market may have a greater effect on net commission income in the long term. The decline should possibly increase investors' awareness of what they pay for the banks' asset management and advisory services. In the long term, prices of sim-

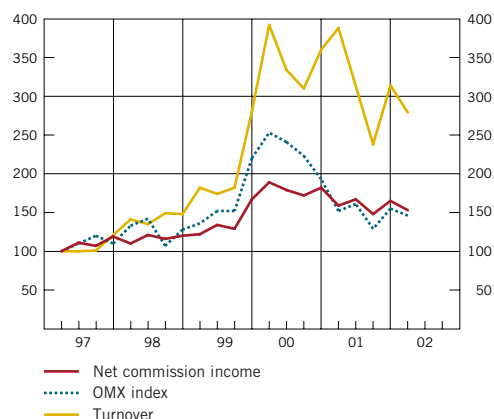
<sup>22</sup> The net interest margin is defined as net interest income divided by interest-bearing assets.

**Figure 31. Total margin on lending to and deposits from Swedish households and companies. Percentage points**



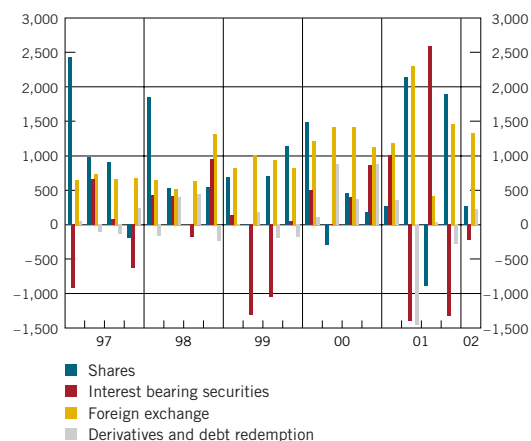
Source: The Riksbank.

**Figure 32. Net commission income in the major banks plus share prices and turnover on the Stockholm Stock Exchange. Index: 1997 = 100**



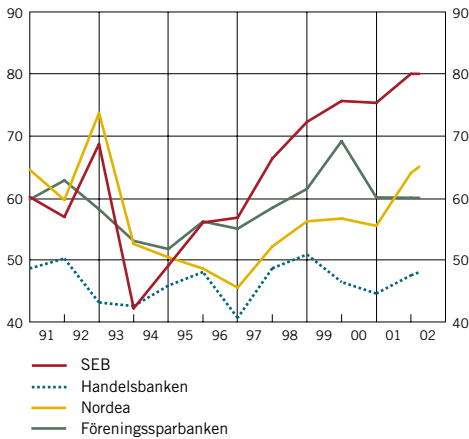
Sources: The banks' reports, the Stockholm Stock Exchange and the Riksbank.

**Figure 33. Net income from financial transactions in the major banks. SEK million**



Sources: The banks' reports and the Riksbank.

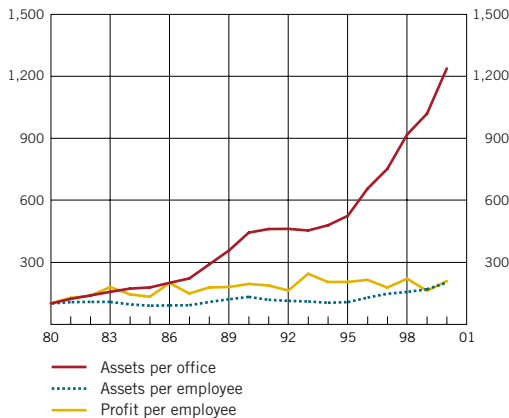
**Figure 34. Costs before loan losses as a percentage of income (C/I ratio). Per cent**



Note. The data for 2002 refers to the most recent report period (the four most recent quarters).

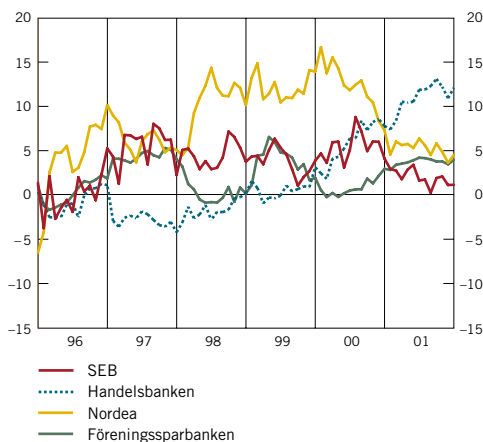
Sources: The banks' reports and the Riksbank.

**Figure 35. Assets per branch and assets and underlying earnings per employee in the Swedish banks. Index 1980=10, fixed prices**



Sources: Statistics Sweden and the Riksbank.

**Figure 36. Lending to the Swedish general public in the major banks. Annual percentage change**



Note. The data refers to lending in banks and mortgage institutions adjusted for securitisation.

Source: The Riksbank.

pler investment products will probably come under competitive pressure and their margins will decline in a similar way to margins in lending and deposits.

The net income from financial transactions declined by more than a third over the past reporting period, mainly as a result of lower income from interest and negative value changes of derivative instruments (see Figure 33). The uncertainty that characterised the capital markets during the most recent reporting period is clearly reflected in the unusually large fluctuations between the quarters.

COSTS

Costs increased by approximately 5 per cent during the most recent reporting period. As income stagnated during the same period, this means that cost efficiency, measured as C/I ratios, deteriorated somewhat (see Figure 34). A comparison of cost development in the major banks divides them into two distinct pairs. On the one side are the most cost-effective major banks in recent years, Handelsbanken and Nordea. These two banks have expanded considerably over the past year, which has resulted in relatively large cost increases of 11–12 per cent. On the other side stand SEB and Föreningssparbanken (Swedbank), which have both followed more defensive strategies – partly as a consequence of earlier higher costs – and therefore now report unchanged or even lower costs.

The economic slowdown and the bearish stock market have led to many of the banks now concentrating on rationalisation to benefit from the synergy effects of the mergers and acquisitions of recent years. This is hardly something new in a mature industry, where growth potential is considered to be limited. The extensive consolidation that the banking sector has undergone during the 1990s was largely brought about by the belief that there are considerable economies of scale to be achieved in banking. However, during the same period, squeezed business margins meant that cost reductions ensuing from rationalisations have not led to any improvement in profitability. In addition, banking as such has changed. While the banks have improved the efficiency of their branch networks, other business areas have expanded. Costs related to branch staff and premises have been replaced by costs for systems and personnel in asset management, share trading and IT. The banking sector's assets per branch are now more than double what they were in 1990, but when calculated as assets per employee the increase is less than 30 per cent. During the same period profit per employee has remained more or less unchanged (see Figure 35). While profit per employee improved during the 1980s, this was due more to the expansion in income starting in connection with deregulation rather than to increased cost efficiency. Developments show clearly that the consolidation and ensuing rationalisation in the banking sector during the 1990s was mainly of a defensive nature. It is probable that, without this rationalisation process, profitability would have deteriorated dramatically as a result of falling margins.

## Assets – credit risk

The major banks' assets amounted to just over SEK 5,650 billion in December, which is almost 5 per cent higher than one year ago. The increase is explained mainly by a high growth in lending, but also by some minor acquisitions.

### LENDING

Historically, credit problems in the banking sector have often been preceded by a rapid expansion in lending. Accelerating lending growth is therefore often used as an indicator of whether the banks are taking greater risks. The major banks' lending to the Swedish general public increased by an average annual rate of just over 6 per cent during 2001 (see Figure 36). However, the growth rate slowed down somewhat towards the end of the year. Handelsbanken reported the fastest expansion – a rate of almost 11 per cent – while the other major banks reported rates of between 2 and 5 per cent. As the total growth for the financial sector as a whole was just under 7 per cent, all of the major banks but Handelsbanken experienced decreasing market shares.

The major banks' lending to the general public in Sweden and abroad increased by just over 10 per cent on an annual basis. All of the major banks have actually reported a higher rate of growth in lending abroad than in Sweden. This is partly due to some of the banks' foreign markets, e.g. the Baltic states, having a higher demand for credit. In other foreign markets, for instance in the neighbouring Nordic countries, Swedish banks are marginal players in many cases. They are thus willing to price compete in an initial stage to win market shares.

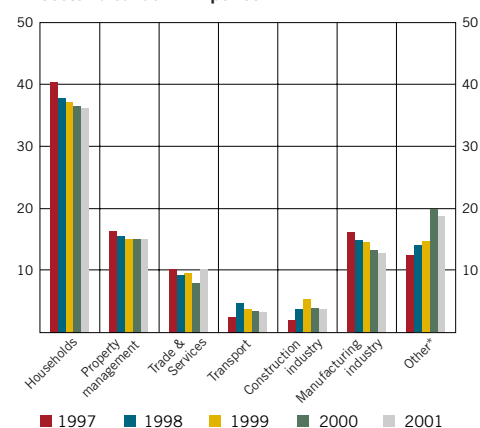
It is possible to use the sector breakdown of a loan portfolio as a rough measure of the degree of diversification. At the end of 2001, households accounted for 36 per cent of the major banks' lending (see Figure 37). The direct exposure to the property market, i.e. property management and the construction industry, comprised 19 per cent. The high level of exposure to the property market is characteristic of the Swedish major banks. Although property companies are normally regarded as comprising a low credit risk as a result of the stable earnings and considerable collateral, this type of exposure is hardly desirable.

### ASSET QUALITY

The percentage of problem loans and loan losses with respect to total lending are indicative measures of the credit quality in a bank.<sup>23</sup> Both of these measures refer to a deterioration in credit quality that has already occurred and thus contain no information on the probability of further losses. On the other hand, the measures can be used to illustrate the historical impact of changes in the macroeconomy and therefore provide an indication of how credit quality in the banks could develop.

<sup>23</sup> Problem loans are the total bad debts after provisions and reduced interest rate claims. Loan losses, net, is the sum of provisions for incurred and probable losses less recoveries/reversals from earlier provisions.

Figure 37. Lending in the major banks.  
Sector breakdown in per cent

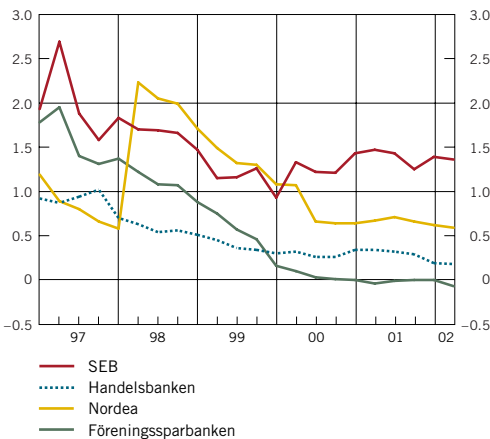


Note. Excluding Handelsbanken for which there are no comparable figures.

\*Includes, for instance, forestry and agriculture, finance excl. banking, shipping and public sector.

Source: The banks' reports.

**Figure 38. Problem loans.**  
Per cent of total lending

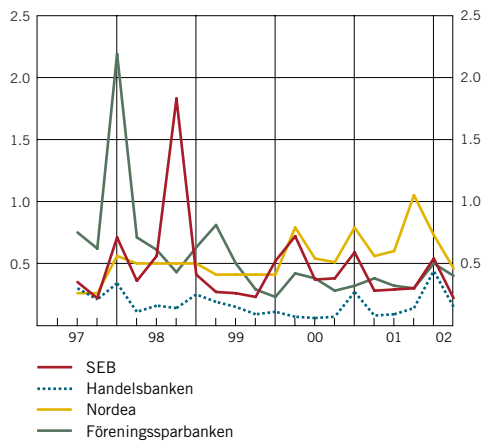


Sources: The banks' reports and the Riksbank.

The percentage of problem loans in the major banks' lending was largely unchanged in the most recent reporting period (see Figure 38). However, there are large differences between the major banks.

During the same period, provisions for incurred and probable loan losses increased by just over 40 per cent (see Figure 39). However, this increase was from a low starting level and was not particularly remarkable, given that the economy weakened and the number of bankruptcies increased during the period. Owing to lower recoveries and reversals, loan losses increased more than provisions during the most recent reporting period. Still, seen from both an historical and an international perspective, Swedish loan losses are currently at a very low level.<sup>24</sup> The major banks themselves state that a net loan loss level of between 0.2 and 0.4 per cent of lending is reasonable over an economic cycle. During the most recent five-year period, the average loan loss level has been 0.15 per cent. Assuming this period represents the growth phase in an economic cycle, an average loan loss of 0.4 per cent over a cycle implies that the loan losses during a one-year recession could amount to 1.5 per cent over a cycle of lending. Loan losses of this order could, all else being equal, entail overall losses for the major banks. However, the losses would be absorbed by the buffer capital the banks maintain above the statutory capital adequacy requirement. Given these relatively negative assumptions an economic downturn would comprise no direct threat to financial stability. On the other hand, the resilience to further shocks and to a more prolonged downturn would evidently be limited in such a situation.

**Figure 39. Provisions for incurred and probable loan losses.**  
Per cent of lending to the general public



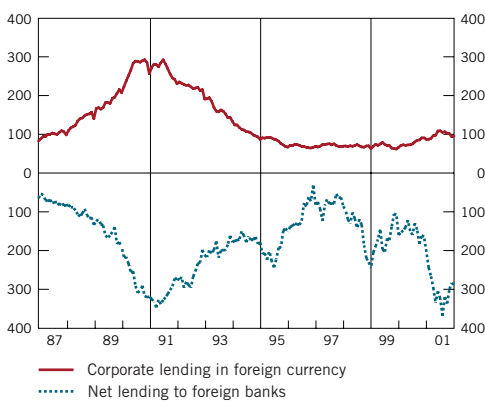
Note. for Nordea 1997–1999 refer to results for the whole year.

Sources: The banks' reports and the Riksbank.

### Financing – liquidity risk

It is important, from a stability perspective, to be able to identify potential financing problems at an early stage. A typical dilemma in all banking operations is that assets (long-term lending) are illiquid, while liabilities (short-term deposits and borrowing) are liquid. In a way, the international interbank market can be assumed to be the most liquid source of financing for the banks. Financing on this market is by short maturities and the participants are sensitive to changes in credit ratings and creditworthiness. If a bank's solvency strength should be questioned for some reason, this is probably the first source of financing that would be lost. It was noted in the previous Financial Stability Report that the major banks' net borrowing from foreign banks was as high as it had been in 1990 (see Figure 40). However, this form of borrowing is no longer used to finance loans in foreign currency. Instead, the major banks use swap agreements to convert borrowing in foreign currency to Swedish kronor that can then be used to finance Swedish assets. This means that neither the banks nor their Swedish borrowers are taking any foreign exchange risk. The international market is also becoming increasingly important for securities financing. Over the past four-

**Figure 40. Lending to companies in foreign currency and net lending to foreign banks.**  
SEK billion



Källa: Riksbanken.

24 See Figure 27 and the special topic regarding Swedish banks in an international comparison.

year period, foreign investors purchases of certificates issued by the major banks have quadrupled. This development is indirectly explained by the fact that the Swedish banks have become larger, but the direct causes are price and availability. The financing cost for the major banks, after currency hedging, on for instance the US certificate market, may be lower than the equivalent form of financing in Sweden. This is because the US market discriminates more between different rating classes, which increases the value of a strong rating. In addition, the availability on the US market is much more stable than in Sweden. The investors are greater in number and size, which facilitates the banks' liquidity planning. The increased borrowing abroad leads to an increased exposure to international capital markets and to a counterparty risk arising in derivative contracts. At the same time, the increased foreign borrowing entails a diversification of the major banks' financing base, which should be positive from the perspective of liquidity risk.

#### CAPITAL

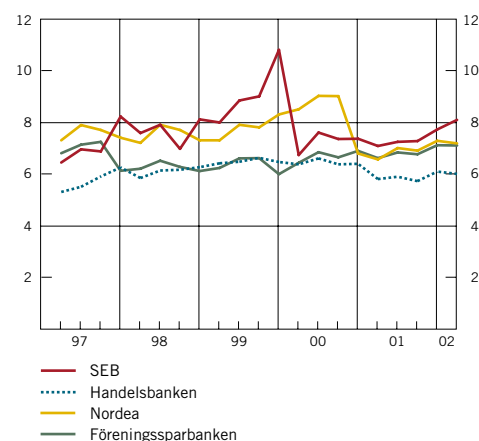
Capital adequacy in the major banks amounted to 10.0 per cent in December 2001, which is one percentage point or so lower than the average level for the past five-year period. The Tier 1 capital ratio in the major banks amounted at the same time to 6.6 per cent, which is also slightly lower than the average for the past five-year period (see Figure 41). All in all, capital levels have not changed significantly since the declines at SEB and Nordea in connection with the mergers during 1999–2000.

In an international comparison the Swedish capital adequacy levels are quite low. However, this need not mean that the Swedish banks are insufficiently capitalised. A bank's capital shall function as a buffer against unexpected losses and should therefore reflect the risks in the bank's operations. If a bank is assessed to be insufficiently capitalised in relation to the risk level, this will result in lower credit ratings from the ratings institutes and higher financing costs on the market. The major Swedish banks' current credit ratings and good opportunities for financing on the international capital market indicate that they are probably not undercapitalised. Two common explanations as to why the credit rating agencies assess Swedish banks as having a low risk is that lending, to a much greater extent than in many other countries, is against collateral and that loan loss levels have been consistently low since the bank crisis. Given the current economic situation and the level of the banks' earnings and loan losses, the Riksbank considers that the major banks' financial strength is satisfactory.

### Summary assessment

The profitability of the major banks is currently good, but has fallen and is now at its lowest level since the recovery from the bank crisis at the beginning of the 1990s. This is mainly explained by the continuous deterioration in the banks' margins that has taken place since then. In addition, the slowdown in economic activity and con-

Figure 41. Tier 1 capital ratio.  
Per cent



Sources: The banks' reports and the Riksbank.



tinuing weak stock market have led to a stagnation in income and slightly higher loan losses. As economic activity is not expected to improve until the second half of 2002, profitability is unlikely to show a tangible improvement in the near future. This could put continued pressure on bank management to adapt operations and strategies. From a stability perspective, it is necessary to point out the risk that banks in this situation can make strategic choices that entail increased risk taking for the purpose of increasing profitability and satisfying shareholders. On the other hand, difficulties in improving profitability can be met in the same way as in many other sectors – with defensive strategies resulting in a low, but stable level of profitability.

# Counterparty and foreign exchange settlement exposures in the banking sector<sup>25</sup>

*Counterparty and settlement exposures in the Swedish banking sector increased during 2001. However, the Riksbank's assessment is that the risks of contagion effects in the banking system are moderate. At the same time, the Riksbank once again wishes to emphasise that reduced exposures would be desirable. These exposures continued to increase during 2001 and there are still some large concentrations between the Swedish banks.*

Counterparty and settlement risks arise in all areas of financial trading. From a stability perspective, this type of risk is of particular interest in the cases where the counterparties are banks or other financial institutions. The risk of a suspension of payments is lower than for households and companies, but if it were to occur would have serious consequences for the stability of the system. This is because of the large exposures and the small number of counterparties involved. If one Swedish bank experiences problems, there is a risk these will spread to one or more of the other major Swedish banks.

One of the starting points for the Riksbank is that the major Swedish banks ought to be able to manage the sudden default of one of their most important Swedish or foreign counterparties, without experiencing such large losses that the bank's own survival were threatened. The consequences of a sudden default would be considerable, as the banks would not have time to reduce their exposures to the counterparty concerned.

With effect from June 1999, the Riksbank has regularly gathered information from the four major banks regarding their fifteen largest individual exposures involving unsecured loans. These include derivative exposures, holdings of securities issued by private issuers, deposits and settlement exposures in foreign exchange trading. The exposures in the first three areas are added to achieve a total exposure per counterparty, and the fifteen largest are then listed. In addition, the banks' total exposures in the respective field are stated. The fifteen largest exposures to settlement in foreign exchange trading have also been reported separately, with a specification of which currency pair is involved in each case.

The remainder of the chapter is set out as follows. First there is an account of the development in size of the exposures during 2001. Then follows a discussion of the creditworthiness of the Swedish

<sup>25</sup> For a more detailed description of the Riksbank's work regarding counterparty and foreign exchange settlement exposures, see also "Inter-bank exposures and systemic risk", Sveriges Riksbank Economic Review, no. 2, 2002.

banks' counterparties, followed by a presentation of the concentration of exposures between the banks. Finally, there is an assessment of the recovery required to prevent losses suffered in the event of a default from having contagion effects.

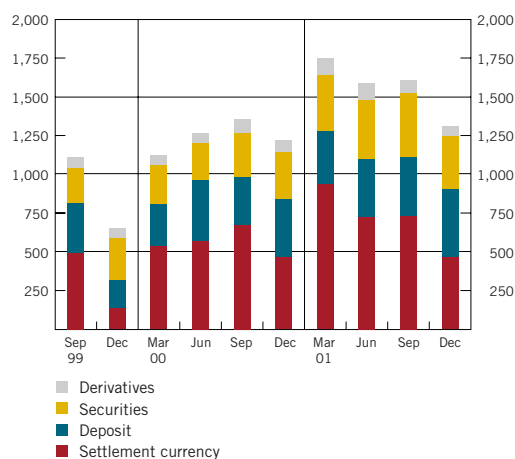
### The Swedish banks' counterparty exposures

Counterparty and settlement exposures in the four major Swedish banks increased during 2001, seen across the year as a whole (see Figure 42). The size of the exposures can largely be explained by increased settlement exposures in foreign exchange trading, but to some extent also by a rise in exposures in privately issued securities and derivatives.

Exposures in foreign exchange settlement amounted at their highest level to just over SEK 900 billion last year, from a highest point of just under SEK 700 billion during 2000. This means that foreign exchange exposures have accounted for around one half of the banks' exposures. The currency distribution in the exposures remains largely unchanged, compared with the previous year.

With regard to securities, exposures have increased from a level around SEK 250 billion during 1999 to approximately SEK 370 billion last year. The increase was sharpest in 2001. Derivatives exposures comprise only a small percentage of total exposures. However they increased slightly last year, while exposures in deposits have remained relatively constant at around SEK 300 to 400 billion since the measurements began in mid 1999. Figure 42 shows that the banks have reduced their counterparty and settlement exposures at year-ends in relation to other points during the year. This was particularly pronounced at the new millennium.

Figure 42. Counterparty and settlement exposures. SEK billion



Source: The Riksbank.

TABLE 2. THE SWEDISH MAJOR BANKS' CREDIT RATINGS

	Moody's	Standard&Poor's
Föreningsparbanken		
(Swedbank)	Aa3	A
Nordea		
(all banks in the group)	Aa3	A+
S E B	A2	A-
Handelsbanken	Aa2	A+

Source: Moody's and Standard&Poor's.

#### THE SWEDISH BANKS' COUNTERPARTIES

The banks can limit their counterparty risks by choosing counterparties with a high credit standing. One method of assessing this is to study Moody's and Standard & Poor's credit ratings for each individual counterparty.

The Swedish major banks' counterparties have a high credit standing according to the statistics. At the end of the year, they had an average rating of A1/A+, which roughly corresponds to the Swedish major banks' own ratings (see Table 2 and Figure 43).

The credit ratings of the banks' fifteen largest counterparties have remained at the same level since 1999. The reported counterparties that do not have credit ratings need not comprise greater credit risks than those with credit ratings – the lack of credit rating could simply mean that they do not borrow directly in the bond or certificates markets, where ratings are required.

The counterparties not included among the fifteen largest should on average have a lower credit rating, but on the other hand these exposures are small in terms of amounts. At the end of 2000, none of the banks had an individual exposure greater than SEK 1.25 billion towards the counterparties ranked fifteen or lower.

The banks can also reduce their counterparty risks by limiting their exposures. The largest concentration of exposures exists between the Swedish market participants. Statistics show that there are clear differences in the size of the exposures the banks allow themselves against one another. The risks of contagion effects therefore vary, depending on which of the four major Swedish banks were to experience problems. The Riksbank assesses that the risk of problems that arose in one of the smaller Swedish banks spreading to one of the major Swedish banks via counterparty exposures is very slight. This is because these do not comprise large counterparties for the major banks. If the banks chose foreign counterparties, the direct exposures between the Swedish banks would decline and thereby the risk to the banking system.

A particular problem arises if the Swedish banks use the same counterparties to an excessive degree. The banks then run the risk of being affected both directly and indirectly by problems experienced by the common counterparty. Indirect problems arise in that other counterparties are affected by losses from the common counterparty, which can spread back to this bank. The banks are not aware of their competitors' choice of counterparties and thereby which counterparties could potentially pose a threat to the stability of the Swedish banking system.

Given that the Riksbank receives statistics on the 15 largest counterparties for each respective major bank, the total here must be at most 60 and at least 15 counterparties. The actual number has varied between 38 and 44 (see Figure 43).

The difference between the maximum number of counterparties and the number of counterparties in Figure 44 comprises counterparties to which more than one Swedish bank was exposed at the time of the survey. The number can vary from one to all four of the Swedish banks being exposed to the same counterparty at any survey point.

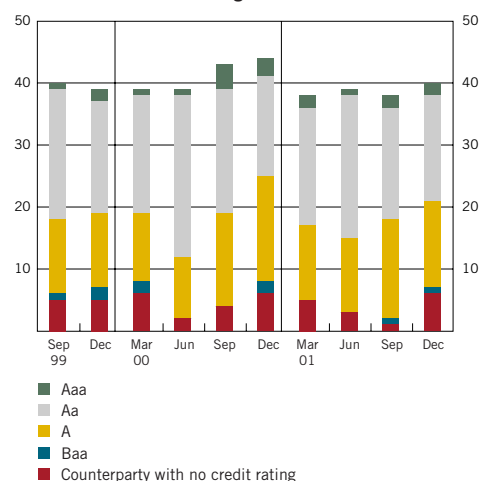
Since the first quarter of 2000, the four major banks have only been exposed to one counterparty at the same time (see Figure 44). However, the large number of counterparties shared by three of the Swedish banks gives some cause for concern, particularly as this category normally contains two or three of the other Swedish banks. In addition to the Swedish banks, the common counterparties include foreign banks and a number of large, non-financial companies.

### Risk of contagion effects between the banks

If one of the Swedish banks' larger counterparties were to default, there is some risk of a sequence default occurring. A sequence default could occur if one or more Swedish banks suffered such large losses that the size of their capital was reduced below the statutory levels.<sup>26</sup>

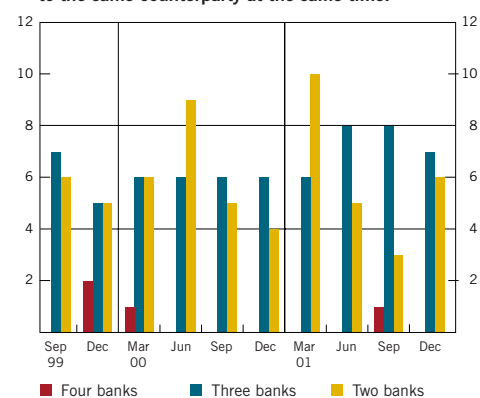
<sup>26</sup> The assumption is that the banks' Tier 1 capital ratio must be below 4 per cent in order for contagion to actually take place from one bank to another.

**Figure 43. The major Swedish banks' counterparties. Number and credit rating**



Source: The Riksbank.

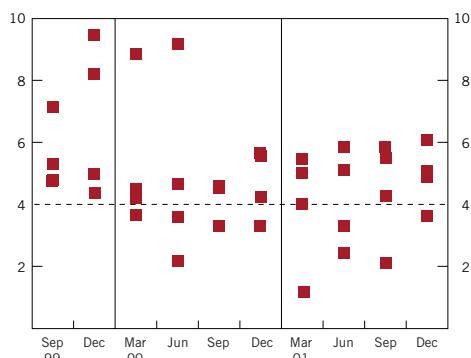
**Figure 44. Number of major Swedish banks exposed to the same counterparty at the same time.**



Note. As an example, in December 1999 there were two counterparties to which all four major Swedish banks were exposed. In March 2000 there was only one counterparty to which all four banks were exposed.

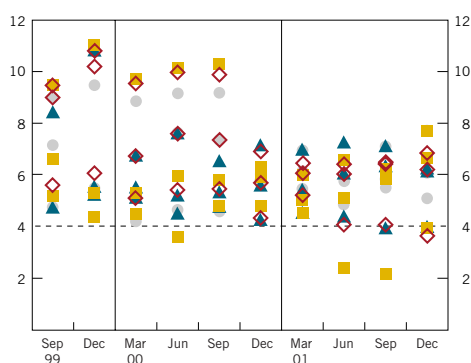
Source: The Riksbank.

**Figure 45. Tier 1 capital ratio in the four major Swedish banks after their largest counterparty defaults. Recovery 25 per cent. Per cent**



Source: The Riksbank.

**Figure 46. Tier 1 capital ratio in the four major Swedish banks after one Swedish bank defaults. Recovery 25 per cent. Per cent**



◇ Bank A fails  
 ■ Bank B fails  
 ▲ Bank C fails  
 ● Bank D fails

Note. Given that Bank A fails, the Tier 1 capital ratio is calculated for banks B, C and D at the end of each quarter. Thus, it is possible to observe the Tier 1 capital ratio of the three surviving banks in each period after a specific bank has defaulted.

Source: The Riksbank.

In the event of one of the Swedish banks losing the entire exposure to its largest counterparty, this could often give rise to solvency problems. If the banks only lose 35 per cent of their exposures, none of the banks would at any point have a Tier 1 capital ratio below 4 per cent at any point. Figure 45 shows the Tier 1 capital ratio in the Swedish banks if they had lost 75 per cent of their exposure to their largest counterparty. In 10 of 40 cases observed, such an event would reduce Tier 1 capital below the statutory requirement of four per cent.

The banks' largest exposures often include settlement exposures from foreign exchange trading. Foreign exchange settlement can involve very large exposures to participants in the foreign exchange market that could lead to contagion effects in the Swedish banking system. However, some of the foreign exchange exposures will soon disappear with the introduction of *payment-versus-payment* in foreign exchange settlement through CLS bank.<sup>27</sup>

There is a risk of contagion effects between the four major Swedish banks, although this must be regarded as modest. Only a few of the reported exposures would lead to losses that reduced the exposed bank's Tier 1 capital below four per cent in the event of a default, where recovery was assumed to be 25 per cent (see Figure 46). It can be noted that the Tier 1 capital in the Swedish banks declined during 2001 and this, combined with larger exposures than before, leads to potentially lower Tier 1 capital ratios if a larger counterparty defaults.

An important restriction when interpreting the calculations above is that the risk of contagion effects between the banks is probably greater between quarter ends, when exposures are probably larger than those reported in the quarterly accounts.

Losses as a result of counterparty and settlement exposures have an impact on the exposed bank's own capital. The Riksbank considers that credit losses resulting from counterparty and settlement exposures are no different from other credit losses in the bank's operations. If the Riksbank were to receive an application for emergency liquidity assistance as the result of the loss of a large counterparty, its first consideration would be whether these were credit losses and not primarily liquidity problems.

The Riksbank's analysis of counterparty exposures has been focused on how solidity would be affected if one of the Swedish banks' larger counterparties were to default. Such a default would of course also have liquidity effects on the bank exposed. However, the Riksbank estimates that solvency would be more severely affected than liquidity in the event of a large counterparty defaulting. The effect on the bank's liquidity requirement should be less, as the bank usually has a relatively good capacity to create liquidity from its balance sheet. On the other hand, the bank's capacity to create new capital following a major loss is slight. It is only if the bank is counting on a high recovery on the exposures in question that the liquid-

27 For a more detailed description of CLS Bank, please see CLS Bank – improved risk management in the foreign exchange market, Financial Stability Report 2:2001.

ity effect would be greater than the solvency effect, and this is rather unlikely given that the exposure would become a low-priority, uncollateralised claim following a default.

Greater openness with regard to the size of counterparty and settlement exposures and how the banks view the risks in these exposures could lead to a change in the way market operators view the risk of contagion effects between the banks.

The counterparties' relatively good credit standing indicates a low probability of a sudden default among one of the counterparties. In the event of a default occurring, it is only major losses with a low degree of recovery that would lead to contagion from one Swedish bank to another. The risk of contagion effects between the Swedish banks is thus relatively slight. It can be noted that the banks have large exposures to a number of other participants in the foreign exchange market.



## PART II. SPECIAL TOPICS







# The future payment system in Sweden

The RIX system, a system owned and run by the Riksbank, has constituted the hub of the Swedish central payment system since the early 1990s. The RIX system enables large value payments to be transferred, mainly between the banks. Simply stated, the RIX system can be said to be designed to enable banks and certain other financial operators to hold accounts with the Riksbank through which payments can be made. A central concept with regard to payments is *settlement*, which involves the final discharge of a debt situation arising from a payment being made between two parties. In practice, settlement is the actual transfer of money between the two parties' accounts with the Riksbank.

The volume of large value payments has increased rapidly all around the world. Turnover in Sweden has almost doubled during the past seven years.<sup>28</sup> One institution's incapacity to pay could rapidly spread to other banks in the form of liquidity problems. Payment system issues have therefore attracted increasing attention from banks and central banks, both nationally and internationally.

In recent years, central banks have been working on defining the significance of a safe and efficient payment system in order to clarify and systematise the central bank's oversight function.<sup>29</sup> This oversight function also includes an active involvement in the development of the financial infrastructure.

Continued processes of consolidation and internationalisation within the financial sector, combined with new functional requirements, have changed both the conditions for, and the demands made of, central settlement of payments. As with other technical systems, the RIX system has a limited lifetime and this is one reason why there is currently a project underway to investigate how to replace the current system. A new system could lead to both functional and organisational changes. It is essential for the design of a good future system that the participants who are to use it should take part in the work on identifying requirements. A working group that consists of representatives of the Riksbank, the commercial banks and other financial companies that comprise important parts of the financial infrastructure is currently discussing these issues.<sup>30</sup>

28 During 2000 the annual transaction value in the RIX system corresponded to 51 times GDP.

This can be compared with the annual transaction value in RIX during 1998, which corresponded to 27 times GDP.

29 For a description of the Riksbank's oversight of the financial infrastructure, please see *Sveriges Riksbank Economic Review*, Sveriges Riksbank, no. 3 2001.

30 Other financial operators refers to VPC AB and Bankgirocentralen BGC AB.



The purpose of this special topic is to illustrate the fundamental need for a central system to settle large value payments and to take up the questions that arise in the design of such a system. Firstly, there is a discussion of the need for central settlement and of the fundamental considerations for balancing cost and risk that always need to be taken into account when constructing new settlement systems. There is a presentation of the central bank's role in the payment system and of the current system, RIX, as well as a description of the problems in the current structure. The Chapter concludes with a discussion on the future central payment system.

## Central settlement

### WHY DO WE NEED CENTRAL SETTLEMENT?

The payment system for large value payments is a central and critical part of the national economy. All payments not made in cash between two parties need in principle to be mediated through one or more banks acting as intermediaries. The primary task of a payment system for large value payments is to settle payments between these banks.

Traditionally, these payments are divided into two sub-groups; *large value payments and retail payments*. Large value payments comprise payments of large amounts that are mainly made between banks or participants in the financial markets. These are few in number but large in value. Retail payments comprise all other payments, often between households and companies. These are much larger in number, but comprise lower values. Retail payments are therefore often aggregated, e.g. within the scope of bankgiro payments, and subsequently give rise to large value payments between the banks. Large value payments must be made within a short period of time, because they will otherwise comprise a credit risk for the banks.

### FUNDAMENTAL BALANCE PROBLEMS

The settlement of payments involves risks and costs for the parties involved. Settlement risks arise primarily because it takes a certain amount of time between the initiation of a payment and its settlement. The risk lies in the possibility of one participant becoming temporarily or permanently unable to meet its payment obligations. The settlement risks grow in proportion to the size of the exposures, but also increase the longer the period between initiation and settlement. The settlement of payments involves costs, as the individual participant must hold sufficient liquidity in the settlement account to have room for manoeuvre with regard to payment orders. Regardless of whether liquidity consists of paying out of its own funds or from a loan with the central bank or other banks, possibly against collateral, it entails costs for the banks. The two alternative settlement principles, gross settlement and net settlement, should be regarded in the light of these risks and costs.



*Gross settlement* means that payments are settled individually, according to a pre-determined order of priority. The institution sending the payment must always have sufficient liquidity in its account to be able to meet its payment obligations. Gross settlement usually takes place in real time, i.e. the payments are settled as they come in to the settlement system (RTGS<sup>31</sup>). The advantages of gross settlement are that payments are not linked to one another and, in the case of real time settlement, the settlement cycle is as short as possible. The disadvantage is that gross settlement requires substantial liquidity, as each payment is settled individually and there is no offsetting against other participants' payments. The maximum liquidity requirement for a single settlement day corresponds to the total of the paying participant's gross payments, while the minimum liquidity requirement is equal to the size of the largest individual gross payment in the system. The result depends on whether the participants co-operate to even out payment flows. Willingness to co-operate depends on the participants' underlying payment pattern and the cost of the liquidity tied up through the payment.

*Net settlement*, on the other hand, involves payments being gathered together and netted against one another in a predetermined manner before settlement occurs. Following calculation of the participants' net positions against one another, each participating institution pays one or more net sums to the participant(s) to which it has a net debt. As this method is based on payments being collected, settlement does not occur as soon as a payment has been initiated. The disadvantages are that the settlement cycle is prolonged and that payments are linked to one another through the netting procedure. This form of settlement also means that banks implicitly grant credit to one another during the course of the settlement cycle. This means that if one participant defaults, the entire settlement process comes to a halt and new positions have to be calculated according to a predetermined method. This is known as unwinding and involves excluding the defaulting bank when the new net positions are calculated. The advantage is that this method requires less liquidity. The total liquidity required at the time of net settlement corresponds to the total net payments, which is normally a much lower figure than for the gross system.

The way in which large value payments are implemented and finally settled has developed from net settlement towards real time gross settlement. The deregulation of the financial sectors in many countries, together with a growing GDP, has led to large increases in volume. This in turn has brought about a discussion on how payment flows would be affected by the fact that banks actually could, and if there was good reason should, fail. This also illustrated the fact that there is an element of credit risk in net settlement systems that arises in connection with the implicit granting of credit between the banks. This led to a requirement for faster payments, which in turn increased the need for liquidity. However, it was not until developments in IT enabled real time settlement that gross settlement became a realistic alternative, as gross settlement in real

31 Real Time Gross Settlement



time requires a high capacity with regard to communication and data systems. Most industrialised nations introduced RTGS systems that reduced the settlement risks but increased the liquidity requirement. Liquidity was then supplied in that the central bank offered intra day credit against collateral.<sup>32</sup> There thus arose a new cost for liquidity during the day that had not existed with the net settlement systems.

A fundamental problem when constructing a central settlement system is thus achieving a balance between risks and costs. Solutions based on real-time gross settlement are more secure, but require more liquidity, than systems based on netting. In recent years, hybrid systems have been developed with the aim of making use of the advantages of both gross and net settlement and avoiding their disadvantages. A central part of the hybrid systems is automated queue management. This entails payments arriving at the settlement system, being placed in a queue and a selection function in the system identifying individual or groups of payments that can offset one another completely or to a great extent. These are given priority and settled immediately. Different priorities can be set for the settlement queue and selection function, and the queue also provides the right conditions for co-operation between the participants, which can provide protection against an individual participant trying to benefit at the cost of others. There are different varieties of queuing systems and selection functions. Common to all of the systems is that they are constantly trying to pair together payments and settle them simultaneously. The hybrid method requires more liquidity than net settlement, but less than gross settlement and the settlement cycle is short.

Today's discussions with regard to the design of future systems mainly concern how to achieve a balance between settlement risks and an efficient use of liquidity. Both central banks and private banks have successively invested substantial resources in understanding and managing issues concerning risks and costs in payment systems and how pricing and regulations can be used to create suitable incentives for efficient solutions.

#### THE ROLE OF THE CENTRAL BANK

An efficiently functioning payment system plays a decisive role in a modern, money-based economy. If payments are unnecessarily complicated, expensive or slow, they may comprise an obstacle to economic growth. Actively working to achieve an efficient payment system is therefore one of the central bank's most important tasks.

To minimise the risks connected with the failure of a bank, settlement has traditionally been through transfers between accounts held by the payment system participants in the central bank. Settlement is then said to be with central bank money. Central banks supply participants with accounts and generally also provide access to credit to facilitate payment flows. Central bank money is considered to be a secure settlement asset carrying little liquidity risk. Central banks' assets are normally invested safely and central banks directly

<sup>32</sup> In the USA the central bank supplies intra day credit and charges interest on it.



or indirectly hold government guarantees. In addition, central banks, unlike private banks, can also supply unlimited amounts of liquidity in their own currency at an interest rate or against collateral.

Central banks thus often play an operational role in the payment system. This operational role to some extent has a functional base, but its scope is often due to historical factors. In some countries, for instance, the central bank owns and runs the central payment system, while in others it does not. However, the central bank's role as overseer of the infrastructure of the payment system has come under increasing focus during the past 10–15 years.

Central banks co-operate internationally to define and compile objectives, roles and standards for systematically important payment systems. These standards focus on safety, stability and efficiency and are currently the primary assessment criteria for many central banks in exercising their oversight of the systems.<sup>33</sup>

Regardless of who owns and runs the central settlement system, the central bank must be able to exercise authority with regard to regulations, pricing, criteria for participation, etc. This is due to the fact that settlement will be made in central bank money and based on an account structure in the central bank's balance sheet. In countries such as the UK and Switzerland the central bank maintains considerable authority over the central payment system, although the participants in the system are the formal owners.

The distribution of roles and responsibilities among the different participants will be an important issue in constructing a new central settlement system. A formal commitment from the participants may facilitate the co-operation motivated from an overall perspective. This can be achieved through the participants agreeing on codes of conduct that supplement regulatory frameworks and pricing as steering instruments.<sup>34</sup> By delegating operational tasks and limiting its authority to issues central to society, the central bank can indirectly, and yet efficiently, oversee and direct the payment system.

## The Swedish central payment system, RIX

### THE CURRENT RIX SYSTEM

The Riksbank has been given the task, pursuant to the Sveriges Riksbank Act, of “...promoting a safe and efficient payment system”. The Riksbank fulfils this duty by playing both an operational role and an overseer role. The operational role consists of the Riksbank operating the central settlement system, RIX, and the overseer role concerns oversight of both the banking sector and the financial infrastructure. The Riksbank has solved the question of a

<sup>33</sup> The Riksbank has contributed, within the framework of the Bank for International Settlement (BIS) to the compilation of a number of standards applying to both central settlement systems and other payment systems of systemic importance. For further information, please see the previous Financial Stability Report.

<sup>34</sup> Formal or informal agreements as to how the participants in a settlement system shall process payments, for instance.



potential conflict between these roles by making a clear organisational division, which keeps the two roles separate.

Today's RIX system is based on the principle of real-time gross settlement (RTGS) and consists of two parts; K-RIX, which settles payments in Swedish krona, and E-RIX, which settles payments in euro. E-RIX is in turn connected to the joint European payment system, TARGET<sup>35</sup>, which links together the national payment systems in the fifteen current member states of the EU. The participants in the RIX system consist of institutions with an intermediary role regarding payments in Sweden; Swedish banks, branches of foreign-owned banks and foreign banks with no representation in Sweden, as well as clearing houses. In addition, the Swedish National Debt Office, which is responsible for central government payments, is a participant in the system.

The central "settlement system" up to the mid-1980s comprised bank representatives exchanging written information on mutual liabilities and claims at the Riksbank's premises in the middle of the day. These were then settled in the banks' accounts with the Riksbank. At the initiative of the Riksbank, the earlier manual processing of these transactions and the state's large payments was automated to improve efficiency. This work resulted during the latter part of the 1980s in the creation of the RIX system, one of the first gross settlement systems in Europe to settle in real time.

#### NEED FOR CHANGES IN THE PRESENT RIX SYSTEM

Why is a new system for settlement of large payments needed to replace RIX? One reason is that it is now technologically out-of-date. There are limited conditions for continuing to run the system on the existing technical platform. A more fundamental reason is related to developments on the financial markets throughout Europe. Mergers of banks have led to a declining number of companies participating in settlement, which means there are fewer participants to bear the costs of developing and running the system. In addition, continued financial integration, particularly within the EU area, makes new demands on the infrastructure, for instance with regard to cross-border trading and pledging of securities.

The uncertainty with regard to Sweden's possible future participation in the third stage of EMU means that the future requirements for the financial infrastructure are not clear-cut. At the same time, it is clear that a decision on the design of the future settlement system should take into account both a scenario where Sweden takes part in Stage Three of EMU and one where Sweden remains outside. For the Riksbank, participation in the Eurosystem would mean that greater demands were made of the financial infrastructure with regard to functionality and efficiency, as the Swedish participants would be able to choose which system to use. The establishment of the European TARGET system, which links together the co-operating central banks' national payment systems, has created an actual competition situation between national central bank systems within

<sup>35</sup> Trans-European Automated Real-time Gross settlement Express Transfer system.



the euro area. It has also led to the creation of private alternatives for settlement of payments in Europe.

Within the European System of Central Banks (ESCB), cost coverage has become a requirement in principle for payment systems run by central banks. However, high investment costs and high fixed costs make it difficult to achieve full cost coverage through charges, particularly for small countries with a high degree of market concentration, such as Sweden. With regard to the RIX system, the costs of the system are not covered by its income, which means that the Riksbank currently subsidises the RIX system, by an amount equivalent to approximately half of its costs.<sup>36</sup> This problem will not decline in importance in the future, given that future systems may require extensive investment. The question of how costs for investment in and running of a new system should be distributed is thus an important object for future consideration.

With regard to pricing, the cost of sending a payment through the system should reflect the marginal costs. Otherwise, there is a risk that the system will be underutilised from a welfare point of view. As the marginal cost of a transaction will be low once the system has been established, it will be difficult to use variable charges to finance running and depreciation of the investment made. The issue of distribution of these costs should therefore be decided prior to investing in a new system.

## Costs and efficiency

### TODAY'S INEFFICIENT USE OF LIQUIDITY

Given that the RIX system is a gross settlement system, some form of liquidity supply is required as a “lubricant” for the system. In order to even out the payment flows, the Riksbank offers credit against collateral during the day, i.e. intraday liquidity. However, the Swedish RIX participants have chosen to use a large amount of liquidity, compared with participants in central payment systems in other countries. At present, banks’ pledging accounts for between 12 and 15 per cent of the total value of payments settled.<sup>37</sup> This can be compared with the UK, for instance, where banks manage on less than half of this. Although the major Swedish banks differ to some extent, the average pledging per bank can be estimated at between SEK 15 billion and SEK 18 billion. The alternative cost of this pledging can be conservatively calculated at 10 base points, which means SEK 15 million for pledging SEK 15 billion. This can be compared with the direct costs for participation and settlement in RIX comprising approximately SEK 700 000 (fixed and variable charges).

It is the RIX participants’ use of the system, rather than the design of the system, that leads to a higher requirement for liquid-

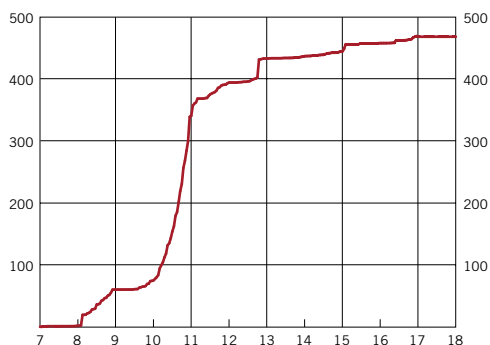
<sup>36</sup> The TARGET system faces a similar problem, and there are currently discussions within the ESCB on whether the current linking together of national systems is sufficient or whether there should be a centralisation.

<sup>37</sup> Pledging approximately SEK 67.5 billion, total turnover approximately SEK 450 billion.





Figure 47. Aggregated payments in the RIX system during a day. SEK billions



Source: The Riksbank.

ity in the RIX system than is the case in comparable central payment systems. The participants in the system have agreed between themselves on a timetable as to when different types of payments shall be settled in the RIX system. This means that a certain type of payment is made at a certain time of day in the system and leads in turn to a very large part of the payments being made during a limited time period. At present, up to 30 per cent of the payments are settled during a 15-minute period. In practice, this means that RTGS is only used to a limited extent.

In May 1999 a project was started to reduce the level of liquidity in the RIX system and to bring about, if possible, intra day trading in liquidity between the banks. During this period, pledging declined from approximately SEK 100 billion per day to, at its lowest point, SEK 50 billion per day. This meant that in relation to total turnover, pledging declined from approximately 20 per cent to a lowest point of 10 per cent. However, pledging increased again in connection with the changeover to the new millennium and has not since returned to the lower level.

Figure 47 shows how this *timetable* affects the distribution of the value of transactions settled.

The participants' use of the system in accordance with the timetable means that during a limited period there arises a capacity shortage with regard to the number of transactions. The payments are then put in a queue and the use of liquidity becomes particularly high during this period.

The timetable was created when the new system of continuous settlement during the day was introduced, in order to facilitate the banks' administrative processing of payments. However, the timetable currently plays a different role. In order to avoid any institution abusing the situation and utilising other participants' liquidity, the participants have agreed on a common code of conduct that is maintained through the timetable. To "avoid" creating expensive liquidity, the participants in a gross settlement system have an incentive to wait until other participants have paid them before making their own payments.<sup>38</sup> This means that risks build up during the day, as payments are not settled, and that the liquidity requirement for the institutions that make their payments first becomes unnecessarily high, as they cannot benefit from liquidity from incoming payments.

Whether this timetable acts to save liquidity or whether it has the opposite effect remains unclear and is more a question for the banks themselves to discuss. However, from a welfare point of view and prior to constructing a new system, there is reason to investigate this issue. It might be possible to use pricing in a new system to steer settlement across the day, if this were motivated.

38 Here there is a "prisoner's dilemma" situation.



## The future central payment system

Work has been initiated on developing a new system for the central settlement of payments in Sweden. International developments and developments on the financial markets make new demands as to how such a system should be constructed and technological developments provide new opportunities for meeting these requirements. Fundamentally, there is, as always, a balance between safety and cost.

It has been concluded earlier that the major part of the costs connected with participation in the central payment system currently comprises the costs for the liquidity provided in the system by the participants. It is important that one does not merely look at the direct costs of participating in the system when trying to find a cost effective solution. Consideration must also be given to the costs for liquidity and administration of payments among the individual participants. Another important issue to discuss is the distribution of the direct costs in the system. It is very important that the new system be constructed to satisfy both the interests from a social welfare point of view, as well as the needs of the users of the system. A new system will also be exposed to competition in a different way than before, as alternative settlement systems are available. This will apply even more if Sweden chooses to join the Eurosystem.

A working group has been formed to plan the joint development of the system. This consists of representatives of the Riksbank, the commercial banks and other central financial institutions. The group is currently working on producing a specification of requirements for the new system.

A new system would not necessarily need to be owned and run by the Riksbank, like the present system. On the other hand, the Riksbank would need to have influence over the construction and use of the system, especially as settlement would be in central bank money and utilise the account structure in the Riksbank's balance sheet. There are several alternative solutions that could fulfil the requirements. Outsourcing of the system; transferring its operation to a party other than the central bank is one possibility and sharing the system with another party in Sweden or abroad is another possibility. It is too early yet to say which solution best meets the requirements and will be finally implemented.





# The management of market risks

Prices on the financial markets are constantly changing. Major changes and financial crises can arise suddenly and without warning. At the same time, almost all of the banks' assets and liabilities are exposed in some way to the prices on these markets. This means that the banks risk losing large sums in a short period of time if they do not have efficiently functioning systems for managing these risks, known as market risks. The management of market risks as part of the banks' risk management has come under increasing focus over the past few decades. It is currently the most well-developed form of risk management and the banks have considerable scope for measuring, managing and controlling these risks.

The Riksbank has discussed the Swedish banking groups' management of credit risks, counterparty and settlement risks, operational risks and liquidity risks in earlier Financial Stability Reports.

This special topic concludes the mapping of the different types of risk faced by the banks. It describes first of all where and in what forms market risks arise within the banks. This is followed by a description of the models used to measure risks and how the banks work to control and limit them. Finally, there is a discussion of the extent of market risks in the Swedish banking system and of whether this could comprise a threat to financial stability.

## Channels for market risk within the banks

Market risk is the risk of loss as a result of unprofitable developments on the financial markets, primarily those for interest rates, shares and foreign currency. All assets and liabilities are sensitive to changes in market prices. Market risk can be expressed as either *value risk* or *earnings risk*. The value risk is most evident in the cases where the banks hold market-valued assets and liabilities. Here a change in market variables has a direct effect on the value of the assets and liabilities in the balance sheet. In the cases where the positions are not market valued, a change in market prices will not be reflected in the accounts until the positions are realised, i.e. in the form of earnings. Regardless of the form of accounting, however, the effect on the actual value of the asset or liability, and thereby the bank's actual value, is the same. Earnings risks also include risks that depend on changes in demand for the bank's services as a result of changes in market variables, e.g. the demand for share-related services.

VALUE RISK – EXPOSURE VIA THE BALANCE SHEET

A bank's assets can generally be divided into a banking book and a trading book, as illustrated in Table 3. The *banking book* comprises the bank's lending to the general public. The value of this lending is dependent on several factors, for instance, the borrowers' credit standing, interest rates and also exchange rates, if the loans are in foreign currency. When these factors change, the actual value of the banking book is also affected. Changes in the exchange rate are directly reflected in the accounts, while changes in the interest rate are not shown immediately. Instead, they are expressed in the form of a change in earnings over time and are thus not a value risk in terms of accounting. In addition to the direct effect of changing interest rates and exchange rates on the value of the banking book, changes in market prices can also have an indirect effect on the *credit risk* in the banking book, as borrowers and the value of collateral are affected by changed market prices.

The *trading book* is the part of the bank's assets used for setting prices on financial assets within the bank's regular operations, i.e. in the form of bid rates and offer rates to customers and for the bank's internal transactions, as well as liquidity management. This means that it is also used to some extent for taking positions. The trading book consists of various forms of traded assets, such as bonds, shares, currencies and different types of derivative instruments. If their market prices develop in a direction that is not beneficial to the bank, the value of the trading book falls. These changes in value are reflected directly in the balance sheet. The market risk in the trading book is thus a value risk, both actual and from an accounting perspective.

On top of these two main asset classes, the banks also have a limited holding of bonds and shares outside of the trading book. These are primarily a long-term holding.

The bank's liabilities consist in principle of deposits and issued securities. The value of the liabilities depends on the interest rate and also the exchange rate, if the liability is in a foreign currency. When these factors change, the value of the liabilities is affected in the same way as the value of the assets.

TABLE 3. ILLUSTRATIVE BALANCE SHEET

Assets		Liabilities and equity	
Banking book	75 %	Deposits and borrowing	45 %
Trading book	10 %	Issued securities	35 %
Other financial assets	2 %	Other liabilities*	16 %
Other assets*	13 %	Equity	4 %

\* These consist mainly of assets and liabilities that offset one another, which results in a lower net value. For instance, assets in insurance activities, where the insured party bears the risk of a corresponding value on the liability side, and values in derivative contracts.

Exposures to market risk in assets and liabilities to some extent offset one another in the balance sheet, which results in the banks' net exposure being considerably lower than their gross exposure. If the assets decline in value as the result of, for instance, higher interest rates or a change in the exchange rate, then the liabilities usually



follow the same pattern. The risks are also reduced by the diversification effects between different asset positions. There are well-developed methods for measuring net exposure and the effect of diversification. This is discussed below under methods to quantify market risk. In addition to the reduction in market risk that stems from the bank itself holding both assets and liabilities, the banks use various forms of instruments and limits to control their exposure to market risk. This is discussed below under risk organisation, limits and control.

#### EARNINGS RISK – EXPOSURE VIA THE INCOME STATEMENT

Expressed in simple terms, a bank's income consists of net interest income, net commission income and net transaction income. The value of each of these items is partly dependent on developments in market prices.

*Net interest income* is the difference between the bank's interest income and interest expenditure, which in traditional banking operations is the most important income item. Changes in interest rates affect net interest income. The effect on this item of a change in interest rates, and the time taken until this change is reflected, are mainly determined by two factors; the difference in volume between interest-bearing assets and liabilities and in their interest rate adjustment periods.<sup>39</sup>

The net income from the financial transactions in the trading book, known as *net transaction income*, comprises the total of both realised and unrealised profits and losses during the period. Net transaction income thus directly reflects the change in value that arises as a result of changes in market variables in the balance sheet, unlike net interest income, which in time transfers the effect of changed interest rates on non-market valued assets to the balance sheets.

*Net commission income* comprises income from charges, brokerage, commission, etc. It is not traditionally included in the discussions of market risk. However, as net commission income is strongly connected to developments on the stock markets, it is appropriate to include it in these discussions. The relationship to developments on the stock market is explained by the fact that approximately one half of commission income stems from brokerage and charges for management of securities and mutual funds, which are taken out as a percentage of their value. Lower share prices lead to a lower turnover and thereby lower income from brokerage, and also to lower values for the assets managed and thereby lower management income. The banks often exact charges in foreign exchange and interest rate transactions in the form of margins on the price, which is reflected in the net transaction income.

Table 4 provides a summary of the channels and mechanisms through which market risks can influence the banks' balance sheets

<sup>39</sup> As a rule these two have directly opposite effects in the banks. Normally, the value of interest-bearing assets is higher than the value of interest-bearing liabilities, which means that higher interest rates have a positive effect on net interest income. However, the assets' interest rates are normally fixed for a longer time period than the liabilities', which means that higher interest rates have a negative effect on net interest income.

and income statements. The three main types of market risk; interest rate risk, currency risk and equity risk, are described below.

**TABLE 4. CHANNELS FOR MARKET PRICES**

A change in: <b>Interest rates</b> affects:	<b>Exchange rates</b> affects:	<b>Share prices</b> affects:	Leads to a change in:
<b>Value risk</b>			
The value of assets and liabilities.	The value of assets and liabilities calculated in SEK.	The value of shareholdings.	<b>The values of assets and liabilities.</b>
The interest coverage ratio among borrowers. The value of collateral pledged. The counterparty exposure in derivative contracts.	Borrowers' foreign exchange exposure. The counterparty exposure in derivative contracts.	Borrowers' exposure to the stock market. Borrowers' market value. The value of collateral pledged. The counterparty exposure in derivative contracts.	<b>Credit risk</b> (indirect effect on the value of assets)
<b>Earnings risk</b>			
The interest income and expenditure.	The value in SEK of interest rates in foreign currency.	–	<b>Net interest income</b>
The value of interest-bearing assets and liabilities.	The value of assets and liabilities in SEK.	The value of shareholdings.	<b>Net transaction income</b>
–	The value in SEK of commission income in foreign currency.	The demand for share-related services. The value of assets under management.	<b>Net commission income</b>

#### INTEREST RATE RISK, CURRENCY RISK AND EQUITY RISK

The interest rate risk is the most complex market risk and that which dominates in Swedish banks, both in terms of gross exposure and net exposure, as well as from an earnings risk perspective. One reason for the high level of gross exposure is that the values of all assets and liabilities are sensitive to changes in the interest rate. This is because the value of an asset, or a liability, is equal to the value of its discounted expected future cash flow. A situation with higher interest rates thus entails a lower value for the asset or liability, given that other conditions remain the same. Another reason for the high level of gross exposure is that interest-bearing assets and liabilities comprise the majority of the bank's assets and liabilities, which means that interest income and expenditure account for the greater part of a bank's income and cost flows.

An institution is liable to interest rate risk if the interest sensitivity of its assets and liabilities is not matched. Interest rate risk arises primarily because the bank's interest-bearing assets and liabilities have different interest rate adjustment periods. This risk is called the *repricing risk* and is both a market value risk and an earnings risk.<sup>40</sup>

Even if the repricing risk were eliminated, there could still be

<sup>40</sup> If the interest rate adjustment period for the liabilities is shorter than that for the assets, the bank is forced, when interest rates rise, to pay the higher rate on the liabilities before it can begin to benefit from the higher interest income from the assets. See also the previous footnote.



interest rate risks in the form of yield curve risk and basis risk. *The yield curve risk* is the risk of changes in the slope and shape of the yield curve. When the relationship between long and short rates changes, there is a risk that any matches between interest rates with different maturities will cease to exist and thereby pave the way for new interest rate risks.

*The basis risk* is the risk that interest rates on assets and liabilities with the same repricing profile are not perfectly correlated, in other words, an interest rate change can have a different impact on different interest-bearing positions with the same repricing profile. However, the basis risk often works to the banks' advantage. When interest rates rise, for instance, the banks are usually able to raise their deposit rates less and more slowly than their lending rates.

*The currency risk* is the risk of loss when the exchange rate for foreign currencies changes. The bank's net exposure to currency risk is quite simply its open position in foreign currency. The banks have a substantial gross exposure to currency risk, although net exposure is usually low.

*The equity risk* is the least significant market risk in Swedish banks in terms of gross exposure. The equity risk is the risk of loss when share prices change. This risk can be either specific, which means that it comes from an individual share, or related to the risk of loss from price changes on the market as a whole.

## Methods for quantifying market risk

Market risk is mostly measured from value risk perspective, regardless of whether the positions in the balance sheet are market-valued or not. Almost all assets and liabilities are usually included in this measure. However, an exception is normally made for strategic shareholdings, as these are assets that are not meant to be realised. Most methods used by the banks to calculate market risk are based on a value risk perspective, with only a few being based on an earnings risk perspective.


The simplest methods for quantifying market risk are sensitivity measures that monitor any impact in the value of a position if the market price of an underlying variable changes. The more developed methods, especially Value-at-Risk (VaR), allow the banks to observe changes in a number of market variables at the same time and thereby also capture any correlation and diversification effects between the types of risk.

### SENSITIVITY MEASURES

Sensitivity measures calculate how much the value of assets and liabilities is affected by a particular change in an underlying market variable, e.g. an interest rate change of  $\pm 50$  points, a change in the exchange rate of  $\pm 5$  per cents or a change in the share index of  $\pm 5$  per cent, while other variables remain constant.

Option risks are often measured by means of *risk matrices*. The value of the option instrument is not solely dependent on the value of the underlying market price, but also on the volatility of the market





price. Risk matrices are similar to ordinary sensitivity measures, with the difference that both the market price and its volatility change. These two variables comprise the axes of the matrix. It is then possible to see in the matrix the change in value that arises from different combinations of changes in these two variables.

#### *Sensitivity measures for interest rate risks*

The banks' standard measure for calculating interest rate risk is *delta-1*. Delta-1 measures the change in the value of assets and liabilities in a parallel upward shift of one percentage point of the yield curve. A duration calculation is normally used for this. An asset's modified duration is its sensitivity to a small change in the interest rate. If the assets' duration is longer than that of the liabilities, which is most often the case for banks, a higher interest rate will result in the assets falling more in value, in terms of per cent, than the liabilities. As the change in value of a position sensitive to interest rates is not linearly related to changes in the interest rate, this calculation is normally supplemented with an adjustment to the convexity of the yield curve.

When interest rate risk is calculated according to delta-1, only the repricing risk is captured, not the yield curve risk or the basis risk. The banks can gain some impression of the yield curve risk by measuring the change in value on certain hypothetical changes in the slope of the curve, or through using VaR calculations.

A further measure of interest rate risk is the effect of a parallel shift of the yield curve on *net interest income* over a period of one year. This measure is based on the restrictive assumptions that the change will continue for a year and that there will be no change in the composition of the portfolio during that time. Nor does the measure take into account, for instance, how savers would act if the interest rate was lower. It is possible that they would move money from their savings accounts to other forms of saving, such as mutual funds or shares. This would force the banks to find other, more expensive financing.

#### VALUE-AT-RISK

VaR is a statistical risk measure that has become widely used among the banks and other financial market participants since the early 1990s. This method is based on calculations of possible future changes in value based on historical experiences. Different methods of calculating VaR are discussed in-depth in a special box.

The advantage of this method over other risk measures is that it can measure all market risks in the same way, i.e. interest rate risk, currency risk and equity risk, and also aggregate them. This makes it possible to use one figure to summarise the total market risk of a portfolio. Another advantage is that it is easy to understand the content of the measure and to communicate it. As VaR is a probability-based risk measure, it is also possible to verify the accuracy of the model.

VaR provides the information that the losses with an x per cent probability do not exceed SEK y during a period of z days, if the composition of the portfolio remains unchanged. A VaR value of



SEK 50 million for a portfolio thus means that there is a 99 per cent probability that the portfolio will fall by a maximum of SEK 50 million in one day if VaR is measured with a one-day holding period and a confidence level of 99 per cent. One day of 100, i.e. two to three days a year, the decline in value is expected to be greater than in the VaR value in the example above. The VaR value thus states the highest normal change in value, but says nothing with regard to extreme changes in value.

Under normal market conditions the VaR models' prediction capacity is good and as long as the users are aware of the models' limitations, VaR models can increase the understanding of the risks involved in various operations.

In addition to the models' limitation of only measuring normal losses, they are based on two assumptions that can weaken the models' usability in connection with larger disturbances and changes on the markets. Firstly, the models normally assume that the markets are liquid even during substantial changes in market variables and that it is thus possible to implement large transactions without any effect on the price.<sup>41</sup> Secondly, the models predict future developments on the basis of historical events and relationships, which means that they cannot correctly describe the risks during periods when events deviate from earlier patterns. It is thus important to supplement the VaR measure with other risk measures that also take into account loss risks hidden by these two assumptions. This is mainly done by means of stress tests.

#### STRESS TESTS

Stress tests are a collective name for methods of measuring the size of losses that would arise if an improbable, but conceivable, event occurred. These improbable events are not captured in the normal measuring methods. They can involve, for instance, sizeable losses that occur less often than every 99<sup>th</sup> day and are thus not included in the VaR measure, or changes in prices and volatility above those measured by sensitivity measures, or that the correlations used in other risk measures cease to exist. There are different types of stress test. The most common are stressed sensitivity tests and historical and hypothetical scenario analyses.

*Stressed sensitivity tests* entail the banks making larger, more improbable assumptions of changes in market prices than in the traditional use of sensitivity measures. A further development of the stressed sensitivity tests is what are known as *mechanical tests*, which compute a large number of possible changes in prices or market variables to find the most unprofitable result for the portfolio. These mechanical tests can in certain cases provide an indication of the probability of the events. The simplest form of mechanical test is what is known as the *factor push analysis*. The idea here is to push the price of each instrument in the portfolio in the most unprofitable direction and calculate the combined effect of this movement of all instruments in the portfolio. The first step is to determine a confidence level and then move the prices of the instruments as many

<sup>41</sup> See also the box on market risk management and self-reinforcing sales spirals.



standard deviations as correspond to the confidence level. The least profitable price change (up or down) for each instrument is totalled to obtain the effect for the portfolio as a whole. The advantage of this method is that it generates the worst possible outcome and emphasises the vulnerable areas in the portfolio, as well as enabling various assumptions on correlations to be included. In these cases it is also possible to obtain an understanding of the probability of such an outcome. The disadvantage is that the information on actual market price movements in extreme events and correlations is limited, which means that the test could show an incorrect picture of the risks.

In the case of *scenario analyses*, either a historical or a hypothetical crisis scenario is applied to the current positions. With scenarios based on historical crises, the assumptions on changes in prices and correlations are based on actual data, which helps make the scenario realistic. The disadvantage is that it looks back in time and may have lost relevance in that markets and institutional structures change and participants may have learnt from previous experiences. Hypothetical scenarios have the advantage of allowing greater flexibility in the design of possible events and they can be adapted to perceived threats. The disadvantage, however, is that it is difficult to know whether the events one is testing for are relevant and how the relationships would look in a crisis.

Stress tests are a necessary complement to the traditional risk measures, as they help the banks to test events and scenarios that could perhaps threaten their solvency and are not captured by the traditional measures. The banks thereby gain an increased understanding of the potential threats and under what conditions these could materialise, which increases their capacity to protect themselves against them.

As with the use of other measures, it is important to be aware of the models' limitations to be able to interpret the results correctly and utilise them as a basis for decision making. Stress tests do not provide any, or at least only limited, information on the probability of the various stress scenarios. It is also difficult to determine whether the tests are relevant to the prevailing portfolio and whether they test for the correct risk factors. The uncertainty above all concerns whether the test disregards an event that risks occurring and if it correctly takes into account the risks of contagion effects between different risk types. A poorly specified stress test can give rise to a false sense of security by underestimating the risks, which could in the worst case lead to increased risk-taking.

## THREE VALUE-AT-RISK MODELS

There are three main types of VaR models; variance/covariance models, historical simulation models and Monte Carlo models, which all have their advantages and disadvantages. It is not unusual for them to be used parallel with one another or in combination with one another.


**Variance/covariance models** are based on the assumption of normal distribution of changes in market prices and portfolio value. A linear relationship (delta) is used to approximate the change in value of the portfolio as a function of the change in market prices.<sup>42</sup> The normal distribution assumption means that when market prices' variance and covariance are estimated, and thereby the portfolio value's variance, it is easy to calculate the probability levels for the outcome over different time horizons. The variance/covariance model is best suited to a portfolio that contains direct positions in currencies, shares and bonds, or positions that have a linear dependence on underlying market variables, such as currency forwards and interest rate swaps.

The main advantage of the variance/covariance approach is the speed of the calculations, as the normal distribution assumption enables the desired confidence level to be derived as soon as the standard deviation of the portfolio is known. The speed and simplicity facilitate sensitivity analyses and continuous updating of the VaR values.

The weaknesses with this model are that it has difficulty capturing the risks that arise from options holdings and that the assumption that market price changes have normal distribution has proved to underestimate the probability of extreme outcomes. In reality, the tails of the probability curve are fatter than with normal distribution, which means that the model generally underestimates the risk in the portfolio. However, it can be concluded in brief that as long as the portfolio does not contain large options holdings it is possible to use the variance/covariance approach.

**Historical simulation models** use historical price changes to calculate the probability of price changes in the current portfolio. To deduce a probability distribu-

<sup>42</sup> The value of a portfolio's interest-bearing assets does not have a linear relationship to changes in the interest rate. An adjustment for this can be made by including a Taylor expansion in the model. Another alternative is to base the model on changes in artificial bond prices (derived from changes in the interest rate).



tion of possible outcomes for the current portfolio, the change in value of the portfolio is calculated at the same percentage price change in positions as each day in an historical sample, e.g. the three previous years. In order to obtain the value that the portfolio will not fall below with a certain probability, the desired percentile in the simulated portfolio results is studied. In other words, a level of 95 per cent is read as the value above which 95 per cent of the cases came out.

The advantage of the historical approach is that it correctly reproduces the historical probability distribution for the market variables and thereby takes into account options risks, fat tails, etc. In addition, it generates a complete probability distribution for the portfolio's yield, which facilitates analysis. This method is instinctively very appealing and the results are easily communicated. However, it does have a number of weaknesses. For instance, it is not possible to make more simulations than there are days in the database, making sensitivity analyses is complicated as the calculation for the entire portfolio has to be redone, and it can be difficult to use this method for market variables when there is a lack of historical data.

**Monte Carlo models** randomly produce possible values for positions in the portfolio on the basis of historical fluctuations. Like the historical simulations, the Monte Carlo models are full valuation models, i.e. they calculate the actual portfolio value given different scenarios, and thereby produce a complete probability distribution for possible portfolio outcomes.

The model can include options, even the most complex forms of derivative instrument, and the random formulae can be adapted to other assumptions on the development of prices than normal distribution. In principle, however, the same variances and covariances can be used as in the variance/covariance approach, and the results should then be identical if the portfolio does not contain options.

The Monte Carlo approach is the most time-consuming and requires the most resources and is thus the most expensive. It is also complex and makes considerable demands of those responsible for its operations. The complexity of the model also leads to a lower transparency and understanding of the model's results.



## Risk organisation, limits and control


The banks have strict internal regulatory frameworks for controlling and limiting market risks. The major Swedish banks all work in similar ways to control how much market risk is allowed to accumulate in different divisions of the bank. The board of directors sets overall limits as to how much market risk the group can accept. These limits are set per risk type, i.e. interest rate risk, currency risk and equity risk. SEB also supplements the separate limits with an aggregate limit for all market risk. The banks use different methods to define the group limits. Nordea uses a VaR measure as its main method, while FöreningsSparbanken (Swedbank) and Handelsbanken use sensitivity measures. SEB uses sensitivity measures for the separate limits and a VaR measure for the aggregate limit.

A central risk management division then distributes the risk scope under the limits among the different divisions within the bank. In principle there are two divisions that receive the entire scope; the internal bank (interest rate and currency risk) and the trading department (interest rate, currency and equity risk). The other divisions are given only minor limits. They instead let these two central divisions implement the transactions that result in market risks and thus bear the risks. If a local branch office needs to borrow money in dollars, for example, it will take out a loan for the corresponding amount via the internal bank and thus neutralise its own dollar and interest rate exposure.

The internal bank can in turn choose to either neutralise the risk completely or partly by making a matching transaction on the market or to retain the risk if its limits allow this. As the currency limits are usually much lower than the interest rate limit, the currency risk is normally eliminated through, for instance, FX swaps. The greater part of the interest rate risk in the group is reduced in that the interest rate adjustment periods in the lending and borrowing have to be matched as far as possible. However, the limits leave scope for the internal bank to allow the financing to have a shorter interest rate adjustment period than the assets and thus utilise the slope of the yield curve. The bank manages the undesired interest rate risk that remains primarily through interest rate swaps.

The clear exception with regard to limits is the foreign subsidiary banks, which can have substantial limits for market risk. However, the risk for the group as a whole is consolidated daily by a central risk division within the group.

In addition to the central limits, the divisions themselves can decide to work with internal limits, e.g. per trader and product. These limits can be defined in different ways. The limits at, for instance, the trading department are normally set for the portfolio as a whole, for the respective type of exposure and for individual positions. The internal bank and the trading department calculate their risks continually. They primarily use VaR for this, but option risks are normally measured with risk matrices. Various types of sensitivity measure are also used as a complement.



It is primarily the value risks that are limited.<sup>43</sup> The only major Swedish bank that uses limits for earnings risks is Nordea, which has a limit for net interest income exposure based on the sensitivity of net interest income to a parallel shift in the yield curve. The net commission risk linked to developments on the stock markets is something several of the banks follow on an ad hoc basis, but they do not try to limit or reduce it. The most important explanation for the lack of hedging of net commission income levels is that exposure to shares is perceived as the core business providing the commission income. It could also be difficult to hedge for this in terms of accounting, as the outcome of a hedge, e.g. in the form of an OMX put option, would affect net transaction income.

Stress tests have become an increasingly important part of the banks' risk measurement. They are mainly used to identify and communicate vulnerabilities to extraordinary economic and financial events. The results are reported regularly to the central risk management division, but are not used to set limits.

#### CAPITAL ADEQUACY RULES

In addition to the banks' own supervision of market risk exposure, there are internationally agreed rules with regard to how much capital the banks must hold as a buffer against market risks. This is regulated by the Basel Capital Accord, which specifies capital cover for market risk and came into force in 1996. The capital requirement for market risk applies only to risks in the trading book, with the exception of currency risks, for which the bank's entire risk exposure requires capital cover. According to the Basel Capital Accord, banks can choose to calculate their capital requirement either by means of their own VaR calculations after approval by the respective country's supervisory authority or by means of a standardised approach.<sup>44</sup>

The standardised approach is based on simplified sensitivity measures and uses a building block principle. First, the capital requirement for interest rate risk, currency risk and equity risk is determined separately and then the separate values are added to the total capital adequacy requirement. This method does not take into account the diversification effects between the different risk types. Because this method is based on simplified assumptions, it is mainly used for settlement and to a lesser extent for the banks' internal risk management. The capital requirement for market risk comprises only a small part of the Swedish banks' total capital requirement. This is due to their limited market risk exposure in the trading book.

43 VaR limits for the trading book could be seen as an earnings risk limit for net transaction income.

44 At the end of 2001, SEB was the first Swedish bank to receive approval from the Swedish Financial Supervisory Authority to use its own VaR model to calculate the capital adequacy requirement.

## MARKET RISK MANAGEMENT AND SELF-REINFORCING SALES SPIRALS<sup>45</sup>

In recent years, there have been some occasions of extreme price changes on the financial markets, for instance, the stock market crash in 1987, the ERM crisis in 1992 and the Russian crisis in 1998. When these types of financial shocks have occurred there has been discussion as to whether self-reinforcing sales spirals have contributed to worsening problems on the markets concerned.


The methods and control systems developed to manage market risk have become increasingly sophisticated. When these methods are applied by a large number of market participants at once, they can contribute to reinforcing trends on the financial markets and in extreme cases add to the generation of self-reinforcing sales spirals. However, it is important to emphasise that the development and spread of these methods in most cases reduces the risks in the system more than reinforcing them, and that their significance in generating this phenomenon is unclear. Thus, the effects should not be overestimated, particularly under normal circumstances on the markets, but nor should they be ignored.

Below follows a discussion of how the methods for risk management could in theory contribute to the generation of self-reinforcing sales spirals.

**Collateral and margin-calls.** Borrowing against financial assets as collateral is often connected with a requirement that the position be sold or further collateral provided if the value of the asset falls below a certain level. The more a financial market falls, the more demands there may be to close the positions. Each closure will increase the pressure to sell on the market. If prices fall or market volatility increases, financiers may in addition choose to apply a higher collateral margin when valuing collateral to protect themselves against sudden price falls. This higher collateral requirement could also add to the negative market movement as the access to financing declines and the requirement to close positions increases further.

<sup>45</sup> For further information on market risk and self-reinforcing sales spirals, see: A. Persaud, "Sending the herd off the cliff edge: the disturbing interaction between herding and market-sensitive risk management practices", 2000; CFGS, Structural Aspects of Market Liquidity from a Financial Stability Perspective, 2001; CFGS, *A Review of Financial Market Events in Autumn 1998*, 1999; Bank of England, Financial Stability Review. Nov 1999, Risk Management with Interdependent Choice.






**More restrictive risk assessment.** When drastic price falls occur and volatility increases, financiers tend to become more restrictive in their scrutiny of counterparts and amounts. This can have a number of consequences. Apart from a decline in the general access to capital, investors may also be forced to sell positions to pay back loans that cannot be renewed, even if they assess the prices to be unjustifiably low. Banks and insurance companies could, for instance, also be forced to reduce their exposure to market risks, i.e. sell off financial assets, to signal to customers that their savings and premiums were not under threat.

**Stop-loss limits and VaR limits.** Investors can use various forms of limits to reduce their losses in the event of a fall in prices. Stop-loss limits mean that when the loss reaches a certain predetermined level, the position is sold off to avoid further losses. Such strategies reinforce downward price trends. Another form of limits is VaR limits, which comprise the internally set limits for the VaR values. Higher volatility and correlation lead to higher VaR values. To avoid exceeding the VaR limit, it is necessary to sell volatile assets and invest in less volatile assets. This leads to further increased volatility on the already volatile markets, and to correlations between these markets rising, while risk premiums for the stable assets fall, what is known as a *flight to quality*.

**The use of historical relationships.** Historical relationships are easy to measure and therefore used to approximate future relationships. During periods of market stress, there is a risk that these relationships will change. If the historical relationships no longer apply and new correlations arise, earlier diversification effects and hedges may cease to exist. Repositioning of the assets is then required to reduce the increased risk in the portfolio. This usually leads to increased pressure to sell on an already stressed market. A clear example of this is *flight to quality*. If the risk in lower quality papers has been hedged against highly correlated better quality papers (through proxy hedges), the earlier positive correlation is turned into a negative one and to bring down the risk in this position it is necessary to sell the less qualitative (e.g. Danish mortgage bonds – German treasury bonds 1998).

**Similar and relative incentive programmes.** Many managers of market instruments receive compensation in relation to the development of the portfolio relative to some form of index. During periods with a risk of major




losses and high uncertainty, it is a safe strategy from this perspective to follow other participants' behaviour, which strengthens prevailing market movements; "... investors and bankers are more likely to be sacked for being wrong and alone than being wrong and in company."<sup>46</sup>

**Homogenous trading strategies and decision support models.** There is a risk that increasingly standardised risk models will lead to events being assessed in more similar ways and that different participants' behaviour will become more uniform. There is also a tendency towards fashions in trading strategies, which can be partly explained by the design of the incentive programmes. The more similarly the participants in a market behave, the more severe the fluctuations in the market will be. When there is severe market turbulence it is more common to make decisions daily on limits for the following day's trade, based on the day's results. There is a risk that these decisions will become auto-correlated and largely strategic. If trading becomes based on strategic reasoning, less importance is given to fundamental assessments of assets and more to the risk of other participants deciding to sell.

**Capital adequacy requirement.** The capital adequacy requirement for market risk is based on the market price of the assets, which could make it more difficult for investors to wait for what they consider to be an exaggerated price fall before selling. Higher volatility and correlation will result in higher capital adequacy requirements (if the bank uses VaR models for capital cover) and lower market values will lead to less capital to use for capital cover.

*One of the consequences for calculation of market risk when self-reinforcing sales spirals arise is that VaR calculations and other statistical risk models may lose relevance in connection with variance and covariance no longer agreeing with the assumptions in the models. Another consequence is that almost all models are based on the assumption that changes on the market are stated exogenously, which is a reasonable assumption under normal market conditions. In times of self-reinforcing sales spirals, however, the market price depends to a greater extent than usual on the behaviour of individual participants. Their expected behaviour then becomes a decision-making variable for the other participants, whose behaviour in turn affects the other participants' decisions. The individual participant will in this case perceive that the development of market prices*

46 A. Persaud, 2000.



is partly dependent on its own decisions, which makes the uncertainty strategic.

Self-reinforcing sales spirals in the meaning used here are unusual and fall outside of what traditional sensitivity measures and VaR calculations are expected to capture, which have worked well in measuring the risks in the event of more common disturbances and shocks. Participants are obliged to turn to various forms of stress test to capture the effects of these rarer events.

Even if it is possible to demonstrate a number of different mechanisms as to how self-reinforcing sales spirals can arise and be reinforced, it is important to remember that it is difficult to show their actual significance in the financial crises of recent years. The risk that the Swedish banks will be seriously affected by this type of problem is limited by the fact that the major part of their traded financial assets is comprised of Swedish treasury bonds and mortgage bonds. These are very liquid to start with, not least because they can be used as collateral in the Riksbank, which reduces the risk of self-reinforcing sales spirals.

## The scope of the risks

### VALUE RISK

Value risks as a result of market risk in the Swedish banking groups appear to be limited. Interest rate risk is the most extensive market risk in the system. It is, however, far from being a threat to the system, regardless of whether it is measured by the relatively restrictive delta-1 calculation or by the less restrictive VaR measure. Other risks are even more limited.

**TABLE 5. VALUE SENSITIVITY, ALL ASSETS AND LIABILITIES, 31 DECEMBER 2001 (MSEK)**

	Value sensitivity* Yield curve + 100 points (delta-1)	Value sensitivity SEK +/- 5%
SEB	- 2 200	-
Nordea	-	-
Handelsbanken	- 659	- 1
Förenings-sparbanken	- 913	- 89

\* All interest-bearing assets and liabilities. Source: Annual reports for 2001.

**TABLE 6. DAILY VAR (99%/1 DAY), EXCL. OPTION RISKS, 2001 (MSEK)**

	SEB <sup>1</sup>			Nordea <sup>2</sup>			Handelsbanken <sup>3</sup>			Förenings-sparbanken <sup>4</sup>
	(min)	mean	max)	(min)	mean	max)	(min)	mean	max)	
Interest rate risk	21	40	53	141	223	368	19	39	66 <sup>3</sup>	-
Currency risk	4	8	18	1	19	52				-
Equity risk	1	5	8	187	269	364	1	6	16	-
Total (after diversification)	25	42	52	-	-	-	19	37	66	-

<sup>1</sup> SEB only trading portfolio.

<sup>2</sup> All assets, excl. business and credit-related shareholdings.

<sup>3</sup> Only Handelsbanken Markets, combined VaR for interest rate and currency risk. SEB and Nordea state VaR values for 10 days, below they are converted according to  $VaR_{1d} = VaR_{10d} / \sqrt{10}$ ;

Source: Annual reports for 2001.

<sup>4</sup> Not available.

*Equity risk* outside of the trading book is slight, as Swedish banks' right to own shares is limited by law. As shown in Table 7, Nordea has a higher exposure to financial current assets than other banks outside of the trading book because of Finnish legislation and the bank's large shareholdings in its insurance business.

**TABLE 7. SHARES AND PARTICIPATIONS, MSEK (% OF EQUITY), 31 DECEMBER 2001**

	SEB	Nordea	Handelsbanken	Förenings-sparbanken
Trading book	7 389 (17%)	3 665 (3%)	10 785 (22%)	2 391 (6%)
Other financial current assets	1 180 (3%)*	3 507 (3%)	97 (0%)	225 (1%)
Financial fixed assets		493 (0%)	2 887 (6%)	1 946 (5%)
Associated companies	1 658 (4%)	4 446 (4%)	300 (1%)	3 137 (8%)
Total	10 227 (23%)	12 111 (9%)	14 069 (29%)	7 699 (21%)

\* Financial current assets + financial fixed assets. Source: Annual reports for 2001.

A special case of market risk exposure is the banks' ownership of *life insurance companies*. Regardless of whether the life insurance companies are profit distributing companies or mutual insurance companies, the bank can have a higher risk exposure to market risk in

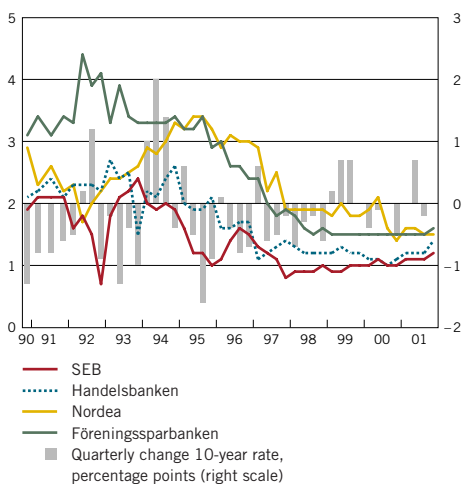


these companies than is reflected in its legal responsibility. This risk exposure consists of the cost the bank would experience by being connected to a failed life insurance company, e.g. in the form of lower confidence from customers and financiers. Thus, if the insurance companies cannot meet the capital adequacy requirements for the guaranteed part of the dividends to insurance policy holders, the banks might feel obliged to provide capital to avoid liquidation of the company. However, it would require extreme price falls on the stock markets over a long period of time, combined with an unfavourable development in interest rates, for this risk to materialise, and for the levels to be significant.

The indirect exposure to market risk that exists through credit risk can materialise through several different channels and is difficult to quantify. If the market price of financial assets falls, the banks risk seeing lower solvency levels among their borrowers, e.g. households' savings would decline as a result of a lower value on their share or bond portfolio, or companies' market value would fall. The risk of loan losses may also increase if the value of collateral accepted in connection with loans falls. Higher interest rates lead to companies and households with loans at variable interest rates facing higher interest rate expenditure and their credit standing may deteriorate. Changes in exchange rate affect the credit standing of import and export-oriented companies by influencing their competitiveness. Changes in market prices can also lead to an increase in counterparty exposures in various forms of derivative contracts, which entails greater credit risk.

Higher interest rates or a change in the exchange rate or share prices as isolated incidents should not affect loan losses to such an extent that the stability of the system is threatened. In order to comprise a threat to the system, the loan losses would probably need to be the result of a general economic downturn. In that case, they would involve risks that should be captured in the banks' credit risk management.

**Figure 48. Net interest income in relation to total assets.**  
Per cent and percentage points



Note. The series for Föreningssparbanken (Swedbank) comprises Föreningsbanken up to Q1 1996. The series for Nordea comprises Nordbanken up to Q3 1997, Nordbanken Holding up to Q3 2000.

Sources: The banks' reports and Datastream.

#### EARNINGS RISK

Figure 48 shows that net interest income is relatively stable in relation to interest rate changes, even during the turbulence on the Swedish interest rate market in 1992. This stability can be explained by the fact that the banks can raise the lending rate in advance and postpone raises in the deposit rate. In addition, the banks have a buffer against unforeseen changes in the interest rate in the form of the gap between the deposit and lending rates.

Table 8 reports the sensitivity of the banks' net interest income to changes in the yield curve. According to this measure, net interest income should be affected positively or not at all by higher interest rates. This means that the positive effect of the interest-bearing assets being greater than the interest-bearing liabilities either neutralises or dominates over the negative effect of the interest-bearing assets having a longer interest rate adjustment period than the interest-bearing liabilities.

**TABLE 8. CHANGE IN NET INTEREST INCOME WITH A PARALLEL SHIFT IN THE YIELD CURVE (31 DECEMBER 2001)**

	+ 100 points*
SEB	-
Nordea	0 MSEK
Handelsbanken	Positive
Förenings-sparbanken	0 MSEK

\* One year's holding period. Source: Annual reports for 2001.

The net transaction income of the Swedish banks has varied considerably from one period to another, as shown in Figure 49. However, as it comprises a relatively small part of the total income, developments in this income would not normally comprise any threat to the banks' survival.<sup>47</sup> The risk in net transaction income is also reflected to a large extent by the VaR values in Table 6.

Net commission income's share of total income increased in connection with the rise on the stock markets up to 2000. Since then, it has declined to some extent. Despite the severe deterioration on the stock market, the banks' total net commission income for the final quarter of 2001 was only 11 per cent lower than in the first quarter of 2000. Thus, not even the large decline on the stock market has entailed any serious threat to the major banks' earning capacity.

Any losses generated from net commission income are limited to the cost of running these operations. The total effect on net commission income of a weak stock market thus depends on the banks' capacity to squeeze costs. Bearing in mind the limited loss risk, net commission income is not an isolated factor that can threaten an individual bank's solvency and thus the stability of the financial system.

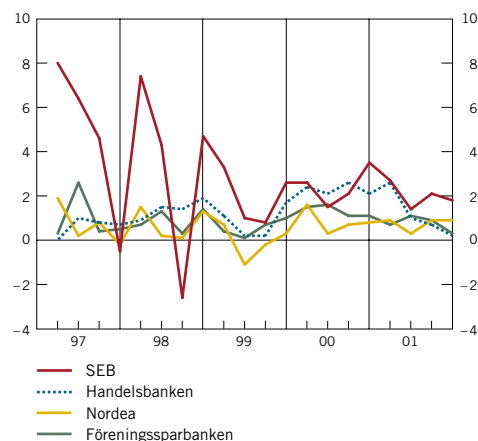
## Conclusions

The banks' management and measurement of market risks is well developed. They regularly monitor the most important forms of market risk and have sophisticated limit systems and control systems for limiting these risks. The measuring methods used to regularly check risk levels and set limits, for instance VaR, are not intended to measure the loss risk in events that occur very rarely and do not follow previous patterns. It is probably just such a rare event that could prove a threat to the system. Measuring and identifying the risk of these requires the use of stress tests, which the banks already use to some extent.

Of all the market risks, only interest rate risk and currency risk could provide a threat to the system, as the banks have substantial exposures in these areas. However, the banks have well-developed methods for managing and reducing direct exposure to these risks and can largely choose their scope, which is also reflected in the fact that the banks' net exposures are limited. This means that they need not comprise any threat to the stability of the system. On the other

47 Financial Stability Report 2001:1

**Figure 49. Net transaction income as a percentage of Tier 1 capital. Per cent**



Sources: The banks' reports and the Riksbank.



hand, it is more difficult for the banks to measure and protect themselves against indirect exposure to these risks, particularly through credit risks. The relationship between the development of exchange rates and interest rates on the one side and loan losses on the other side is not something that banks currently measure or have an overall picture of.

The direct consequences of large rises or falls on the stock market are not sufficient to comprise a threat to the stability of the Swedish banking system. It is only in combination with other negative events that shocks in the stock market would be relevant from a stability point of view.

Although the exposure to market risk could be great, there is a possibility to both calculate and reduce it. In other words, the banks have good opportunities for avoiding major losses from market risk by utilising the available systems and methods.



# The major Swedish banks in an international comparison

In its Financial Stability Report, the Riksbank regularly analyses developments in the systemically important Swedish banks with the aim of assessing the risk of future bank crises. This special topic compares these banks with stock exchange-listed European banks with a similar position on their domestic markets within one or more market segments or with the same strategic aims and direction.<sup>48</sup> The comparison analyses key figures for profitability, income, expenditure, capital and risk.

An international comparison based on accounting data is affected by differences in national accounting regulations and tax regulations which can in some cases make a comparison misleading. Furthermore, differences in the business cycle, competitive situation and regulations also affect comparability. Since the banks in the sample follow the Basel Committee's regulations and the EU's directives, and the business cycle has been relatively similar in the countries selected during the comparison period, it is possible to make a fairly good comparison.<sup>49</sup>

## Profitability and market value

Profit in relation to equity is the measure normally used to define profitability in the banks. The accounting data provides the ROE (Return on Equity) measure of profitability for reported profit after tax, divided by the book value of equity.

In recent years, market based profitability measures, adjusted for limitations in accounting regulations and tax regulations, have begun to be used to an increased extent. Today many companies calculate added shareholder value through EVA<sup>TM</sup> or similar measures.<sup>50</sup> However, there is no standardised measure reported by all the banks or that can be produced in a simple manner from the

<sup>48</sup> Data has been gathered from Bankscope (average figures for the years 1998–2000),

Datastream and from the banks' most recent annual reports. A number of banks do not report data for some of the key figures, which means that certain diagrams do not contain all of the banks. In this context, it should also be pointed out that Bankscope adjusts the banks' reported figures to achieve the highest possible degree of comparability.

<sup>49</sup> By using average figures for three years, the Riksbank reduces the impact of one-off effects, but at the same time limits the possibility to draw conclusions on trends over time.

<sup>50</sup> EVA<sup>TM</sup>, Economic Value Added, was introduced by the company Stern & Stewart. This measure adjusts the profit by a market-calculated capital cost and in addition makes some adjustments to the income statement and balance sheet with the aim of better illustrating the real profit created for shareholders during the period.





Figure 50. Return on equity in per cent and P/E ratio.

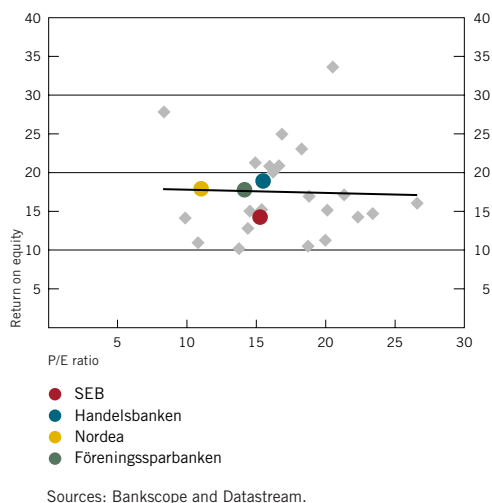


Figure 51. Return on equity and C/I ratio. Per cent

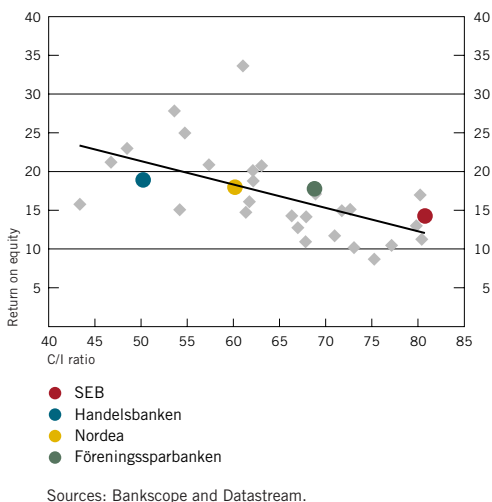
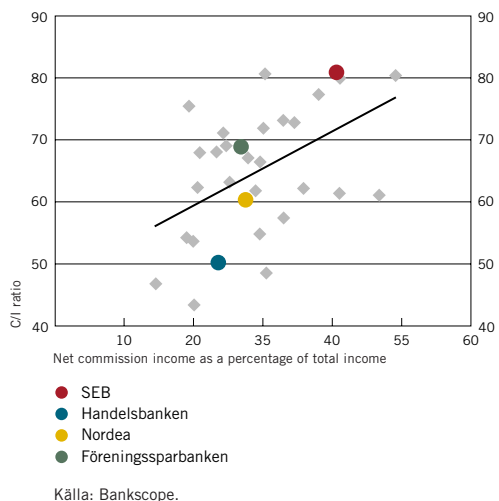


Figure 52. Net commission income as a percentage of total income and C/I ratio. Per cent



reported data. As a market-related complement to ROE, the Riksbank has used P/E ratios (the price of a share divided by earnings per share after tax). These ratios indicate stock market expectation on profit growth.<sup>51</sup>

A correlation analysis does not indicate any connection between profitability now (ROE) and expected growth in profits. Current profitability is thus not regarded by the stock market as a reliable indicator of future profits.

Figure 50 shows that Swedish banks' P/E ratios are lower than the average in the sample, i.e. they are valued lower than other European banks by the stock market. There are many different factors that could explain this. From a European perspective the Swedish bank market is small and characterised by relatively low margins. Swedish banks have to a great extent already implemented the rationalisation process that the large part of the European bank market is expected to undergo in coming years. The potential for improving profits is thus considered lower here than on other markets. Swedish banks have also demonstrated relatively low loan losses since the mid-1990s and there may be investors who question whether these low levels are sustainable in the long term. In principle, this means that the stock market has difficulty seeing possibilities for improved earnings in the Swedish banks in the near future that might motivate a higher share price now. The foreign banks are assessed to have better scope to increase their earnings, although there is a risk that the potential will not be fulfilled. This means that Swedish bank shares are often perceived as lower risk than European bank shares. One consequence of the low valuation is that it may make the Swedish banks attractive acquisition prospects.

## Efficiency

A common measure of efficiency in a bank is the ratio between cost and income, the C/I ratio. Figure 51 illustrates profitability (ROE) and efficiency among the selected banks. According to the Figure, there is a slightly negative correlation between efficiency and profitability, i.e. higher cost per krona earned coincides with lower profitability. The Swedish banks' C/I ratios are spread across the distribution, while their profitability is close to the average of 16.8 per cent.

Figure 52 shows that banks with a high percentage of commission income have higher C/I ratios on average than banks where net interest income dominates.

A high percentage of commission income is often connected with a concentration on investment banking and asset management, where personnel costs are higher and the capital requirement relatively low. Traditional banking operations normally require more capital,

51 The P/E ratio provides an indication of market expectations of future profit growth as the stock-exchange price contains a calculation of future profit discounted by a return on investment requirement.

but are on the other hand less personnel-intensive. In addition, the wages are lower. It is therefore not unreasonable that banks with a high percentage of net commission income also have high costs (for instance, SEB). However, there are also banks with a high percentage of commission income and yet a comparatively low C/I ratio.

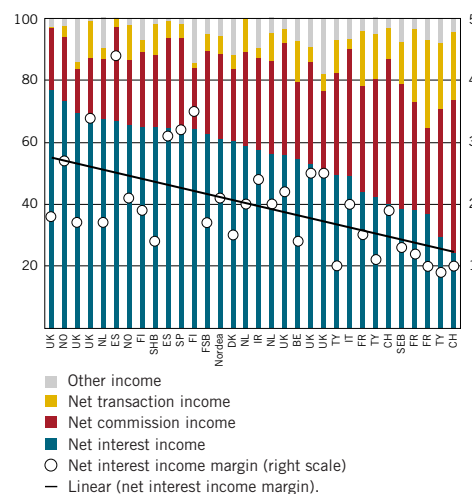
It is interesting to note that Handelsbanken, where both costs and percentage of commission income are low, but where net interest income has great significance, shows a net interest margin lower than that of the European banks with a similar focus. This could mean that net interest income in Swedish bank operations is under greater price pressure than in other European countries and that competition in traditional banking business is correspondingly higher.

Figure 53 shows a breakdown of the banks' income with a falling percentage of net interest income from left to right. The positioning of the banks indicates strategic choices from the typical retail bank on the far left through the universal banks in the middle to banks with extensive operations in investment banking and asset management on the right. The Figure also shows the net interest income margin (as yellow dots) on the right-hand scale.<sup>52</sup> It is clear that the Swedish banks have a lower average net interest income margin. The regression line shows that banks with a lower percentage of net interest income have a lower net interest income margin.

Swedish banks' low net interest income margin can be an indication that competition is relatively good on the Swedish market. An alternative or supplementary interpretation is that the banks' low net interest income margins are due to a lower risk in lending. This could then also explain the Swedish banks' low loan losses (see further the next section on the banks' risk-taking). It is interesting to note that Swedish banks can maintain a relatively good level of profitability despite a low net interest income margin. This indicates a relatively high level of efficiency.

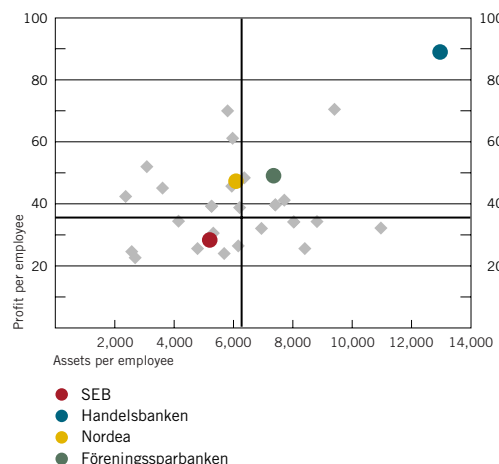
Large parts of the banks' costs are related to the personnel. The personnel-intensity in a bank can be shown relating profits and assets to the number of employees (see Figure 54). The comparison shows that earnings when measured per employee are high and the asset stock large among the Swedish banks.<sup>53</sup> Handelsbanken is the bank with both the highest profits and assets per employee, and it is also the most profitable bank among the major Swedish banks. Nordea and Swedbank show a 30 per cent higher profit per employee than the weighted average of the material. SEB has a slightly lower profit per employee, just over 20 per cent, than the weighted average in the comparison material, which is partly connected with the considerable operations in Germany and the Baltic countries, which are more personnel-intensive than its Swedish operations.

**Figure 53. Net interest income margin and breakdown of income. Per cent**



Source: Bankscope.

**Figure 54. Profit (after tax) per employee and total assets per employee. USD 1,000**



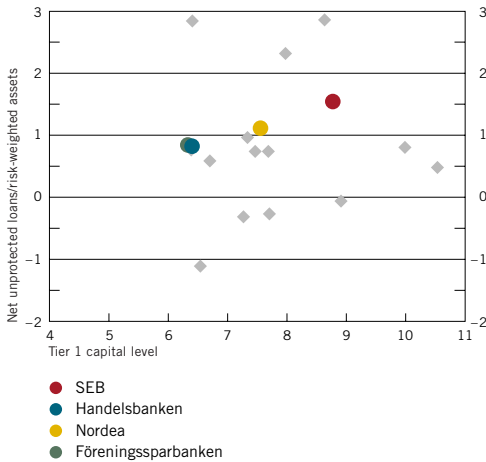
Source: Bankscope.

52 The net interest income margin is defined as net interest income divided by interest-bearing assets.

53 Total assets per employee.

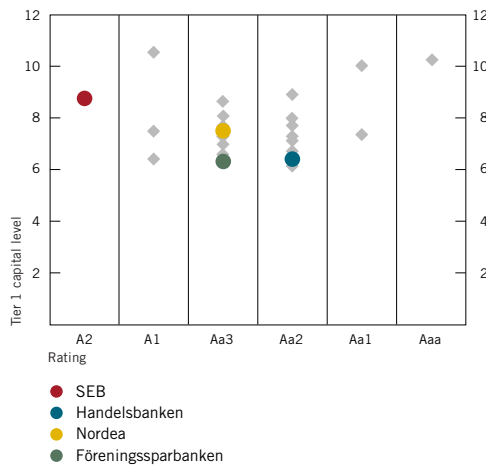


**Figure 55. Net unprotected loans as a percentage of risk-weighted assets and Tier 1 capital level.**  
Per cent



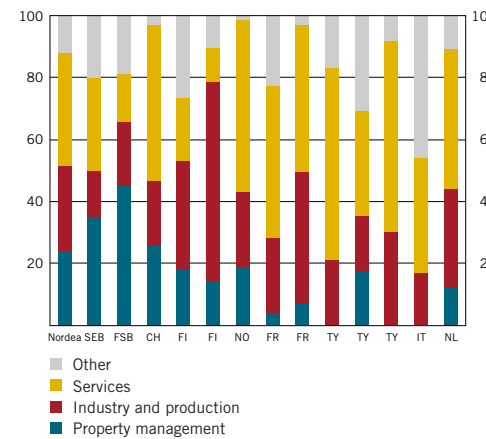
Source: Bankscope.

**Figure 56. Tier 1 capital level in per cent and ratings.**



Source: Bankscope and Moody's.

**Figure 57. Sector breakdown of corporate lending.**  
Per cent



Source: The banks' annual reports.

## Risk-taking and capital adequacy

The quality of a bank's assets, primarily its loan portfolio, affects both the financing cost and the share price. Poorer quality leads to higher risk, lower credit rating and higher financing costs. Everything else equal, higher risk also leads to a lower valuation on the stock market as well as a need for a higher percentage of equity.

Figure 55 relates asset quality measured as the percentage of unprotected loans in the risk-weighted assets to the Tier 1 capital level.<sup>54</sup> It is not possible to distinguish any clear connection to assert that, for instance, higher risk is connected to a larger Tier 1 capital level.<sup>55</sup>

The Tier 1 capital level minus the percentage of unprotected loans shows how large a percentage of equity remains in the bank if it does not receive any money at all from the unprotected loans, which is a measure of the risk in the bank. Using this measure, the risk in the Swedish banks is lower than for the average in the sample. However, the percentage of unprotected loans depends on how the banks calculate them and what provisions are made.

Figure 56 shows the banks' ratings in relation to Tier 1 capital. It is not possible to find any clear relationship between Tier 1 capital and the credit rating agencies' risk assessment from this figure, which indicates that other factors than capital strength also play a role in the assessments. The Swedish banks are represented in three different rating classes and Handelsbanken, which has the next lowest Tier 1 capital level of the Swedish banks, has the highest rating.

The fact that the Swedish banks have a lower Tier 1 capital level than average without this being reflected in the credit rating may indicate that the credit rating agencies assess their earnings to be adequate and stable. This can in turn be a consequence of the Swedish banks having a lower risk in their lending. As pointed out earlier, the fact that the Swedish banks have lower net interest income margins than the average can be interpreted in the same direction. Whether the Swedish banks are more averse to risks than average or have stable corporate clients with a better ability to pay is unclear. In recent years, however, the level of loan losses in the Swedish banks has remained low in relation to losses in comparable European banks.

Figure 57 shows 14 banks' exposure to different sectors. The classification of the sectors is not comparable in every aspect for the various banks, but the figure nevertheless provides an opportunity to draw tentative conclusions. It is evident that the Swedish banks have a large exposure to the property sector compared with the other banks. The risk to the banking system is particularly high in the event of a dominant exposure to one sector. This applies in particular to the property sector, which could incur substantial loss-

54 Unprotected loans are defined as doubtful debts after provisions. The risk-weighted assets are those assets that comprise the common denominator in the capital cover ratio.

55 Nordea's and SEB's average Tier 1 capital levels are a percentage point or so higher than normal during this period because they were preparing to make acquisitions. If an adjustment is made for this, the Swedish banks have a Tier 1 capital level lower than the average in the sample.



es in the event of a fall in property prices, as was the case during the bank crisis in the early 1990s. Under normal circumstances, however, earnings in the property companies are more stable than in other sectors, which can be considered to have a positive effect on risks.

Other banks have a large exposure to other sectors, but these sectors are in themselves more diversified than the homogenous property sector.

The banks' risk-taking does not merely consist of credit risk. Market risk is also one of the types of risk that can be measured and compared between banks through the use of VaR models. These are statistical models, which calculate the amount of money that a portfolio will lose over a specified period with a specified probability, as a result of unfavourable market fluctuations.<sup>56</sup>

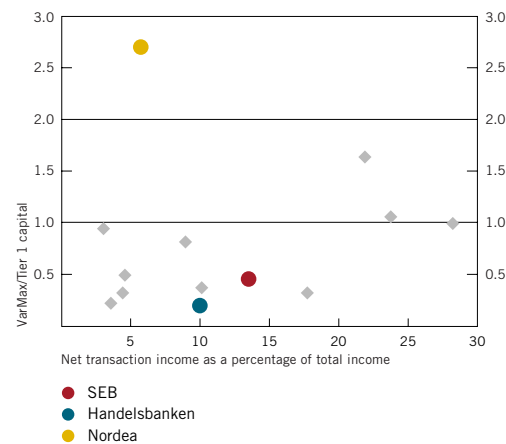
Banks do not all report the results of their VaR calculations in the same way. The Swedish banks, like a number of other banks in the sample, report VaR for a 99-per cent confidence interval and a 10-day holding period.<sup>57</sup> As the design of the models and a number of other factors mean that comparability is incomplete, the figures must be interpreted with some caution. However, they provide an indication of how much market risk the different banks are willing to accept. In Figure 58 the VaR measure has been put in relation to the net income from financial transactions as a percentage of total income.

Nordea differs from the other banks with its high VaR measure of 2.7 per cent of Tier 1 capital. The conclusion for the other banks is that exposure to market risk is low and that those with a high net transaction income have a higher market risk on average. However, the difficulties in comparing different banks' VaR measures mean that the conclusions should be interpreted with caution.

## Summary and conclusions

- The Swedish banks' profitability is average in an international comparison.
- Swedish banks have a comparably low valuation on the stock market, which could be explained by low margins, the rationalisations already implemented and uncertainty over whether the low level of loan losses can be sustained.
- Key figures concerning the employees' efficiency indicate that the Swedish banks have been successful in their rationalisation work.
- The Swedish banks' current level of profitability is not dependent on a high net interest income margin.

**Figure 58. Max VaR 99% confidence interval 10 days divided by Tier 1 capital and net transaction income as a percentage of total income. Per cent**



Source: The banks' annual reports.

<sup>56</sup> For a more detailed description of this measure and market risk management as whole, see the special topic on market risk in this report.

<sup>57</sup> For banks that report corresponding figures for a one-day holding period, a conversion to a 10-day holding period may be made by an adjustment using factor  $\sqrt{10}$ .



- There are indications that Swedish banks have a lower risk level in their lending.
- Swedish banks have a high exposure to the property sector in a European comparison.

In conclusion, the results in this special topic indicate that the Swedish banking sector is not more exposed to risk than the banking sectors in other countries. However, the Swedish banks have a larger exposure to the property sector.



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