

Sveriges Riksbank

Financial Market Report

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Foreword

The promotion of a secure and efficient payment system is one of the Riksbank's primary functions. The purpose of the Financial Market Report is to present the Riksbank's appraisal of tendencies in the financial system and their implications for stability. The Report is also intended to stimulate a discussion of matters that concern payment system stability.

The theme of this Financial Market Report is counterparty and settlement risks in the banking system. The report is lengthy because it is considered important to provide a fairly detailed description of counterparty and settlement risks, which is done in Chapter 1. These risks are an essential feature of Riksbank analyses of financial stability but less well known elsewhere. Readers who are familiar with them can skip to Chapter 2, which presents the analysis of counterparty and settlement risks in the Swedish banking system; the risks in different markets are described in separate sections, each of which begins with a brief summary. Chapter 3 describes risks to the banks in relation to the macroeconomic situation; as previously, it should be noted that the account is not to be interpreted as a vehicle for monetary policy signals. Chapter 4 contains the Riksbank's appraisal of the financial sector's preparations for the new millennium. Finally, Chapter 5 presents

the Riksbank's assessment of payment system stability. A follow-up of the tendencies that were considered in earlier Reports is contained in an annex.

With this third Financial Market Report, the most important components of the Riksbank's analysis of payment system stability have now been presented. Future issues will therefore concentrate more on updating the main indicators, with shorter sections for in-depth discussion. When different topics are taken up for consideration, reference will be made to the first three Reports for further details.

The work has been undertaken in the Payment System Department of the Riksbank under Kai Barvell, Head of Department, and Martin Andersson from the Financial Systems Division.

This issue of the Financial Market Report served as a foundation for a discussion of payment system stability by the Governing Board of the Riksbank on 29th October 1998. The conclusions from that discussion are presented in Chapter 5.

Stockholm, November 1998

Urban Bäckström
Governor of the Riksbank

Counterparty and settlement risks—an introduction

With the present turbulent state of financial markets, an evaluation of payment system stability requires an analysis of bank exposures to risks in other financial institutions. As the direct exposure of Swedish banks to regions with problems is small, it is relevant in the first place to analyse the indirect risks involved in the banks' operations in the wholesale market. The risks considered here are counterparty and settlement risks. These risks and their management are described in general terms in this chapter.

Why study counterparty and settlement risks?

The Financial Market Reports present the Riksbank's appraisal of financial system stability. This is the third Report in the series; the first was published in November 1997. As the risks in the financial system have not been considered before in a regular Swedish official report, the Riksbank has chosen to introduce each component of the analysis separately and quite thoroughly.

In the first Report the Riksbank appraised its own function in financial system stability, a function that stems from the Riksbank's role as the provider of Sweden's central payment system and—as a consequence of this as well as of the Bank's monetary policy function—the supplier of liquidity to the banking system. It was noted that payment system stability rests on two main foundations. One is a payment system infrastructure—the technical and administrative systems—that is so constructed that it works even though it is subjected to strains, for instance that one or several participants in the system

suspend payments. The work of insuring stability in the other foundation involves minimising the risk of the system being subjected to strains on account of problems among its participants. As the participants in the system are mostly banks, this normally amounts to the evaluation of risks in the bank sector.

The first Report also considered the competitive situation of Swedish banks, since one of the premises of a stable financial system is a banking system that is competitive and sufficiently profitable. A weak earnings potential is liable to induce banks to take increased risks, which can result in substantial losses and a greater danger of bank failures. The risk that has been most relevant to date for Swedish banks—the credit risk in loans to households and firms—was considered in the second Report. The total credit risk in the banking system was assessed in the light of the cyclical economic situation and the solvency of the various borrower categories. A new assessment of the development of credit risks in the bank sector in relation to cyclical activity is presented in Chapter 3 of this Report.

The main theme of the present Report is the banks' counterparty and settlement risks. These risks



arise in connection with transactions between financial enterprises. The approach starts from the question: What happens if a counterparty in a financial market transaction cannot meet its commitments? The other party may incur losses of various kinds, depending on the type of transaction and the stage at which the problem arises. The transactions between financial enterprises constitute the connections between the banks and the payment system. Interbank trading and trading between banks and other financial enterprises give rise to these transactions, as does the fact that payments by other agents in the economy have to be channelled through banks and clearing organisations¹ because it is only these institutions that have access to the payment system infrastructure.

Contagiousness can be reduced if financial enterprises participating in the system have a risk management policy for avoiding a heavy concentration of their counterparty exposures.

It is by analysing counterparty and settlement risks that the two main components of the Riksbank's analysis of financial system stability are combined. To a large extent, the payment system is exposed to risk in that problems for one player may infect others and thereby lead to the entire system being liable to collapse. The system's susceptibility to infection—the propensity for problems for one agent spreading to others—is partly dependent on the construction of the infrastructure. In order to make the system less susceptible, it is therefore important to design the infrastructure in such a way that risks associated with transactions are minimised. Contagiousness can also be reduced if financial enterprises participating in the system have a risk management policy for avoiding a heavy concentration of exposures to just a few counterparties. The size of the banks' exposures to different counterparties is considered in this Report, as well as the extent to which risks can be limited by the existing settlement systems and routines for handling transactions.

It should be underscored that counterparty risk is a natural element of financial operations. Systems can be constructed so as to modify the extent of the risks but the degree to which counterparty exposures are concentrated has to do with the players' routines for managing this type of risk.

This third Report completes the Riksbank's presentation of the three main components of its analysis of bank sector risks: earning risks (strategic risks); credit risks; and counterparty and settlement risks. Banking, however, also involves risks in other respects, for example market risk and operational risk.² The Riksbank considers that its task primarily involves analysing risks that have to do with the financial system as a whole. Problems connected with operational risk, for example, can indeed entail appreciable losses for a bank but the management of these risks by banks is so specific that it cannot be discussed in general terms. Moreover, if these risks were to result in a bank suspending payments, any effect on the entire system would be mediated through the payment system as the link between banks (see above). In other words, the extent to which the financial system as a whole can be harmed by problems in individual banks depends on banks' exposures to counterparty and settlement risks. As the Riksbank is concerned with financial system stability, these problems are taken into account by analysing counterparty and settlement risks.

The ability of individual banks to manage bank-specific risks is primarily a matter for the Financial Supervisory Authority. There is, however, an operational risk that is both highly important for the entire financial system and pertinent simultaneously for all financial market enterprises. This is the turn of the millennium. The Riksbank's work to minimise effects of this event on financial system stability is presented in Chapter 4 of this Report.

The analysis of counterparty and settlement risks is a natural part of the Riksbank's analysis of payment system stability. The global turbulence in financial markets makes these risks particularly



topical. Swedish banks have comparatively small direct exposures in the form of loans to firms and banks in countries where the financial problems appear to be greatest.³ The risk is probably greater of a Swedish bank incurring losses on its exposures to foreign banks in the international interbank market. There may be large international banks with high exposures to firms and banks in problem countries that may involve them in heavy losses; if a Swedish bank has high counterparty and settlement risks in relation to such a foreign bank, the financial problems could spread to the Swedish bank sector.

The global turbulence in financial markets makes counterparty and settlement risks particularly topical.

The Report is arranged as follows. A general account of counterparty and settlement risks is presented in Chapter 1. No such account has been presented earlier in Sweden and its inclusion here makes the Report longer than usual. This is followed, in Chapter 2, by an analysis of the counterparty and settlement risks of the major Swedish banks, based on their presence in different markets. The current situation for some of the macro indicators that were presented in the previous Report is discussed in Chapter 3. Chapter 4 contains the Riksbank's appraisal of financial sector preparations for the turn of the millennium. The Riksbank's conclusions concerning payment system stability are presented, finally, in Chapter 5.

What are counterparty and settlement risks?

Counterparty and settlement risks occur in banks' transactions with other banks and other financial enterprises. Both these types of risk stem from an uncertainty as to whether a counterparty will in fact perform in accordance with the terms of the contract. The consequences of a counterparty's non-performance vary with the type of financial trans-

action and the stage at which the counterparty fails to perform. Here the Riksbank distinguishes between two main risk categories: counterparty risk and settlement risk.⁴

DIFFERENCES BETWEEN COUNTERPARTY AND SETTLEMENT RISK

Settlement risk is present in transactions that can be described as buying and selling. The main financial market transactions of this type are trading in shares, interest-bearing securities and currencies. They involve exchanging a good (usually securities or a specified amount of a currency) for money. There is a time lag, however, between the execution of a transaction and actual delivery and payment. Settlement risk is the risk that, before delivery and/or payment has been made, it is clear that one of the parties will not be able to complete the agreement. A typical feature of settlement risk is that it concerns transactions where a financial asset is exchanged for payment. If the agreement, delivery and payment were all arranged simultaneously, the risk would not arise. It is the lapse of time between these stages that creates the risk. In traditional financial theory, the redistribution of risks is regarded as one of the primary functions of the bank sector but this is not normally taken to refer to settlement risk, which banks have seldom taken into account in the past. It is the need for efficient channels for financial transactions that has given rise to settlement risk, which would not exist if banks invariably exchanged physical securities for cash at the time when the contract is agreed. This would be so costly, however, that financial trans-

1 Clearing organisations and their role for counterparty and settlement risks are described later on in this chapter.

2 Risks in banking are presented more fully in Financial Market Report 1998:I.

3 This is discussed in Chapter 3 of this Report.

4 While our distinction largely follows a well-established terminology, we have systematised it somewhat differently in order to clarify how different risks are inter-related. Settlement risk is used here in a somewhat wider sense than usual.



actions would only be feasible on a very small scale and seldom over national borders. Settlement risk has tended to be overlooked and the relationship between the size of the risk and the gain in efficiency is unclear.

Settlement risk is the risk that, before delivery and/or payment has been made, it is clear that one of the parties will not be able to complete the agreement.

Counterparty risk concerns financial market transactions other than those involving buying and selling. It arises in contracts that give one party a claim in some form on the other party. An ordinary loan is the most typical example but the risk also occurs in other contracts that involve some form of credit. One example is a forward contract, in which one of the parties agrees to buy or sell an asset at a specified price on some future date. Prior to that date, the contract has a positive market value for one of the parties and this value will be lost if the other party defaults. It can therefore be said that the party for which the market value is positive has extended credit equivalent to this value to the other party.

In the securities market there is a form of counterparty risk that has to do with the banks' securities portfolios. If the credit standing of the issuer of a security weakens, the bank risks incurring losses on this holding. In such cases the relationship of the bank to the issuer of the security is not that of a counterparty in the sense used above. To distinguish between these two types of counterparty risk, the term *issuer risk* is used in this Report to refer to the counterparty risk associated with securities portfolios.

Unlike settlement risk, counterparty risk is something that a bank consciously accepts in connection with certain transactions because it intends to establish a counterparty relationship that lasts for some time. The origins of settlement risk, on the other hand, are purely practical: contract, delivery and payment cannot normally be arranged simultaneously. Counterparty risk arises in that banks take *posi-*

tions with counterparties, while settlement risk arises in connection with *transactions* or *flows*. The positions appear as assets or liabilities in the bank's balance sheet, whereas transactions are not normally visible there.

Counterparty risk arises in that banks take *positions* with counterparties, while settlement risk arises in connection with *transactions* or *flows*.

Counterparty risk does not differ in principle from other types of credit risk. For a bank, the effects of a financial market counterparty suspending payments are the same, in principle, as when an ordinary borrower defaults. The bank risks being unable to recover the full value of the loan or position. In practice, however, counterparty risk differs from other credit risk in a number of respects that have to do with how loans or positions are formed with financial market counterparties compared with other borrowers.

In the first place, credit to financial market counterparties has to be decided at very short notice. The positions are taken during bank trading in financial instruments and the management of liquidity; the bank's traders have to make contracts continuously and it is therefore impossible to commit the resources that would be needed to approve credit for each loan in the way that is done in other forms of lending. It is a matter, instead, of imposing limits on the size of the positions that the individual traders and the bank as a whole may take with different counterparties. The fact that in most cases the positions are held for a considerably shorter time than other loans means, moreover, that longer-term risks need not be considered in the credit assessment to the same extent as for other loans.

Another difference is that, compared with other lending, it may be more difficult to spread risk by diversifying positions across counterparties. The positions are often a result of a particular trading requirement. It is natural both to take a position with a *single* counterparty and to choose the position with



the best price rather than the least counterparty risk. In many markets, moreover, the number of conceivable counterparties may be relatively limited. There are not all that many agents who quote prices for Swedish housing bonds, for example. Compared with the large number of counterparties in an ordinary loan stock, positions accordingly tend to be more concentrated to a limited number of counterparties. The authorities can be said to have accepted this to some extent in that the regulations for large exposures allow larger positions with financial enterprises than with other borrowers.

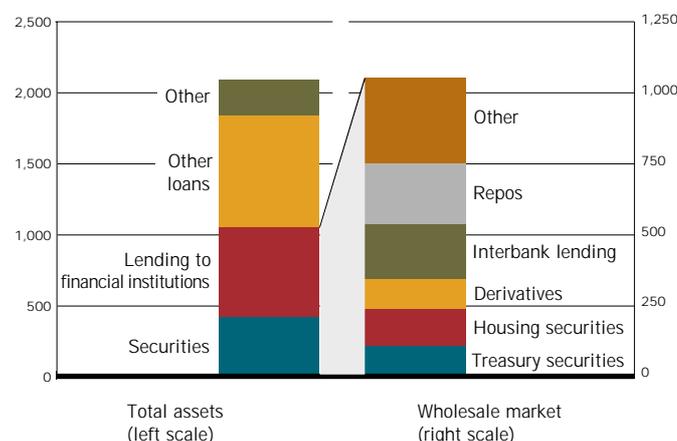
In the third place, it has often been considered that financial agents need particular protection and they are therefore subjected to separate regulations and supervision. One reason for this is that failures among financial agents have been perceived as having more serious consequences than other business closures. In the light of the specific supervision, for capital adequacy purposes claims on most categories of financial enterprise are weighted for risk at 20 per cent of the value of the position, compared with 100 per cent for most other types of claim.

The differences discussed here between lending to households and firms on the one hand and the taking of positions with financial market counterparties on the other warrant a distinction between these activities when discussing risks. It should be noted, however, that some non-financial firms also act as financial market counterparties; such firms have become comparatively active in the repo market, for instance. As counterparties, however, they are treated more restrictively. Collateral for their positions, for example, is often required in situations where this would not be done for a financial institution.

COUNTERPARTY AND SETTLEMENT RISKS IN BANKING OPERATIONS

Five areas that involve counterparty and settlement risks to banks are described in the Report; they are the *markets for interbank deposits and loans, foreign exchange,*

Figure 1:1.
Aggregate balance sheet: the four major banks.
SEK billion



The breakdown of the total stock of loans to financial institutions into repo and interbank market loans has been estimated by the Riksbank because it cannot be deduced from the statistics.

*securities, derivatives and repos, respectively*⁵. Trading in these markets involves both a counterparty relationship, which lasts a certain time by reason of the purposes of the transactions, and, in certain cases at least, an exchange of assets for money that may entail a settlement risk.

In the discussion of banking risks in the previous Report, a breakdown of the aggregate assets of the four major banks was presented, together with the risk categories that were relevant for each type of asset. It was noted that counterparty and settlement risks occur in operations that are represented in the balance sheet by loans to financial institutions

⁵ In the Report, these five markets are referred to collectively as the wholesale markets, that is to say the market for transactions of substantial amounts among professional investors and traders, primarily banks.

and securities, including derivatives. The settlement risks are not normally visible in the balance sheet but the positions that make counterparty risk pertinent are to be found there in some form. The positions can be classified mainly as lending in the interbank market, lending in the repo market, securities portfolios and derivative positions.⁶

The size of the different positions as reported in the balance sheet is shown in Fig. 1:1. Note, however, that counterparty risk is not necessarily equivalent to the size of a position presented as a balance-sheet asset. There is an essential difference, for instance, between unsecured lending in the interbank market and collateralised lending in the repo market. Another example is derivative positions, which are booked at a market value that is normally appreciably smaller than the underlying amount. Neither does the balance sheet show whether or not the bank has positions under liabilities with the same counterparties as those on which it has claims. In the event of a counterparty failure, under certain circumstances claims on and liabilities to a counterparty can be netted out. To the extent that such balancing positions exist and can be netted out, the position as presented under assets is not a good indicator of counterparty risk. In the survey of counterparty and settlement risks in the different markets in

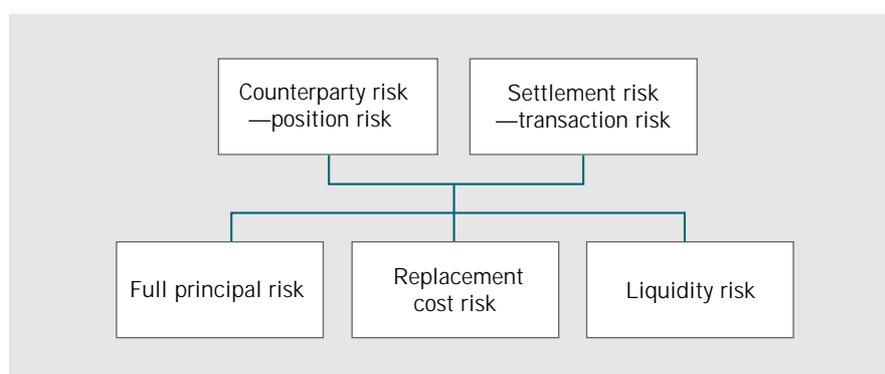
Chapter 2, an attempt is made to measure the risks more adequately than by taking them directly from the balance sheet.

TYPES OF COUNTERPARTY AND SETTLEMENT RISK

Counterparty risk and settlement risk constitute two main risk categories; three sub-categories can be identified: *full principal risk*, *replacement cost risk* and *liquidity risk*⁷ (Fig. 1:2).

Full principal risk refers to a situation where the bank risks losing the whole of the underlying value of a transaction if the counterparty cannot fulfil the contract. Under counterparty risk, this means that the full value of the position may be lost. In the case of the simplest position, a straight loan, full principal risk pertains if no collateral has been provided for the loan; in the worst case, failure of the counterparty may lead to the total value of the loan being lost. Under settlement risk, full principal risk obtains in the absence of delivery versus payment (DvP), that is, if the delivery of securities or foreign exchange and payment for them are not arranged simultaneously. Without DvP, a party that fulfils its obligation without being certain that the counterparty will do the same is exposed to full principal risk. If delivery is made before receipt of the payment, failure of the

Figure 1:2.
Counterparty and settlement risks





counterparty means that the deliverer risks losing the full value of the asset; in the opposite situation—payment without delivery—there is a similar risk.

Full principal risk refers to a situation where the bank risks losing the whole of the underlying value of a transaction if the counterparty cannot fulfil the contract.

Another important risk in the settlement process is replacement cost risk. When a financial contract has been arranged to sell securities, for example, there is a risk of one of the parties defaulting prior to delivery or payment. Neither of the parties would then lose the full value of the underlying asset but a loss may be incurred if the non-defaulting party is dependent on the transaction being completed and is obliged to replace it with a new contract. The purchaser of a security, for example, may have already sold it to a third party and will then have to obtain the security elsewhere in order to complete that transaction.⁸ The occurrence of a loss in this situation depends on how the value of the security has changed in the meantime; if its market price has risen, the party will lose the difference between the initial and the new price. Replacement cost risk accordingly depends on movements in the market value of the underlying asset.

Replacement cost risk depends on movements in the market value of the underlying asset.

Replacement cost risk is not confined to counterparty failure in the sense of payments being suspended as a prelude to bankruptcy. Delivery of an asset may be precluded for other reasons, for instance because the asset is not in the party's possession for some reason or an operational problem blocks delivery; in these cases, however, it should be possible to settle the cost at a later date.

Under counterparty risk, replacement cost risk applies to collateralised loans. The collateral is intended to protect the creditor from losses even if the counterparty defaults. However, there is still a

risk of a fall in the value of the collateral so that the loan is no longer fully covered. The usual form of collateral in financial markets is securities. The value of such collateral can fall as a result of market movements. If the counterparty defaults, the bank is left with a holding of securities instead of a loan and may have to sell the securities in order to recover the principal; a loss is then incurred in the same way as with settlement risk, for example. A loss accordingly presupposes both that the counterparty defaults and that the price of the collateral falls. It can also be noted that in the Swedish financial market the most common collateralised position is a repo position and the replacement cost risk for repos is more transparent than for other collateralised credits (see the section on the repo market in Chapter 2, pp. 39-43).

Much financial market trading—in positions as well as transactions—is undertaken to obtain liquid funds. A party may choose, for example, to procure funds by obtaining a loan, which amounts to creating a position in the form of a liability, or by selling portfolio securities, which amounts to a transaction that converts an asset into cash. If a counterparty in such a case defaults, the bank may encounter problems because, lacking the liquid assets on which it had counted, it faces a liquidity shortage. Liquidity risk exists because it takes time for the bank to transform the securities it holds as collateral for liquid assets. Moreover, if the bank has provided an unsecured loan, it has no collateral to convert into liquid assets and must obtain liquidity some other way.

⁶ Foreign exchange (FX) market positions are taken in the form of FX lending in the interbank market and as FX derivatives in the derivatives market.

⁷ These terms are used here in senses that differ somewhat from their use in other contexts such as G-10 reports on these matters.

⁸ Such situations may arise because the market-maker function requires market makers to set two-way prices and undertake to trade at these prices irrespective of their own needs.

Liquidity risk is a particular concern for the Riksbank in its function as a supplier of bank liquidity, in monetary policy operations as well as through the management of the payment system. Above all, the Riksbank has to assess liquidity requirements and possibly provide liquidity support in special forms in the event of a crisis in the Swedish payment system. The Riksbank's operational function primarily applies in cases where bank liquidity problems threaten financial system stability. The Riksbank does not have this operational function when one bank has problems with solvency.

The main reason for distinguishing between the three sub-categories of risk is that they differ in nature as well as in the gravity of their effects. Replacement cost risk normally involves a small proportion of a transaction's underlying value, whereas full principal risk concerns the underlying value in full. Transactions are often measured in terms of the underlying value. When comparing different types of transaction, it is therefore important to consider whether or not their values represent full principal risk. This information is needed for the valuation of counterparty and settlement risks.

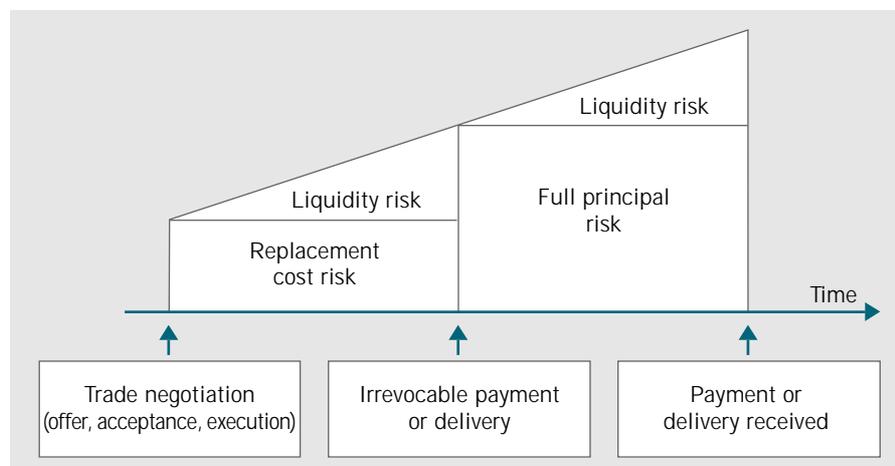
The gravity of liquidity risk for a bank largely depends on the bank's overall liquidity and financing situation when the problem arises.

Liquidity risk differs to some extent from the risks described above. The gravity of liquidity risk for a bank largely depends on the bank's overall liquidity and financing situation when the problem arises. This makes it much more difficult to reach conclusions about liquidity risk simply by studying the positions with financial enterprises. An aggregate assessment of liquidity risks will therefore not be made in this Report, which will only consider how the liquidity risks in financial transactions arise. But in view of the Riksbank's particular concern for liquidity risk (see above), this matter will be dealt with in a more comprehensive way in another context.

WHEN DO THE RISKS ARISE?

To illustrate settlement risk in a financial transaction which constitutes payment for and delivery of a financial instrument, consider a time axis on which the stages of the transaction from trade to settlement are plotted, along with the risks that apply in each

Figure 1:3.
Settlement risks in the stages of a transaction





stage (Fig 1:3). The present example has been chosen to illustrate the principles; trades can be arranged differently so that the stages of the transaction occur in different forms and may include other important events besides those shown here. Diagrams of this type will be used in future to show when and how the various risks arise in the different markets that are described in Chapter 2, as well as when risk management is discussed later in this chapter.

A financial market transaction is initiated when two parties agree on a trade, which is then executed. The trading may take place on an exchange, which in Sweden means either the stock exchange or OM (for certain derivatives), or in some form of direct trading between parties, usually by telephone.⁹ The trade is then transferred from the buyer's and the seller's dealing desk to their back offices, where the administration of the trade is undertaken. When the trade has been registered by both parties and all the details have been reconciled, the trade is said to be matched. If the parties fail to agree on the terms of the contract after the preliminary agreement, the transaction may be recalled, in which case the buyer may have to purchase the asset from some other counterparty instead. Such a replacement trade exposes the buyer to the risk of a market movement in the meantime that raises the price of the asset in question. This is one component of replacement cost risk. It follows that exposure to replacement cost risk begins when a trade is executed.

The way in which a trade is arranged is not necessarily significant for the associated settlement risks. Electronic exchange trading may simplify the matching process compared with telephone trading in that the latter entails more risk of confusion about the trade. Unsuccessful matching processes, however, are not the main source of replacement cost risk. Failure to deliver for other reasons is probably a greater hazard. Another difference is that exchange trading almost invariably involves payment intermediaries in the form of clearing houses. This is less common in telephone trading except in the bond

market and, in Sweden, segments of the derivatives market. As discussed further on this chapter, clearing house participation tends to reduce settlement risks.

In the interval before a matched trade is finally settled there is still a risk of the transaction not being completed because one of the parties fails to meet its obligations. Replacement cost risk therefore lasts until the trade has been settled.

On top of this, the seller is exposed to liquidity risk in that, if the counterparty defaults, the anticipated payment on the trade will not be received. The interval between a trade agreement and settlement is often up to two days. Liquidity risk can be said to grow as the time for settlement approaches because the seller then has less time in which to procure the expected liquid assets elsewhere. As mentioned earlier, the gravity of liquidity risk is largely determined by the liquidity situation of the individual bank.

Liquidity risk differs from replacement cost risk in that the probability of default is greater for delivery than for payment. This is because, while liquidity or technical problems can lead to default on payment as well as delivery, default on delivery can also occur because the seller does not possess the asset in question. On the other hand, default on payment may be more serious in that a liquidity shortage can normally cause greater problems for a counterparty than failure to deliver. A liquidity shortage may mean that the counterparty in turn is unable to pay its counterparties and this may be perceived as payment difficulties connected with problems of solvency, which may undermine the counterparty's market reputation. Default on delivery may likewise prevent the counterparty in turn from making an agreed delivery to a third party but this should not normally lead to the first counterparty's solvency being questioned. In the case of default on delivery, the Riksbank does not have a function that is equivalent to its role in liquidity problems.

⁹ Such direct trades are commonly called "over the counter" (OTC).

Settlement involves payment for and delivery of an asset. It can be arranged directly between the parties or through a clearing organisation. With DvP settlement, settlement risk ceases when payment and delivery are made. In other settlement systems, the parties' exposure to full principal risk continues after payment or delivery has been arranged irrevocably and until the delivery or payment has been received. Replacement cost risk can also be said to continue in the interval between the dispatch and receipt of delivery and payment, respectively. But as it involves losing just a small proportion of the amount that is at full principal risk, it can be regarded as marginal in this context and is therefore not shown in Fig. 1:3.

With DvP settlement, settlement risk ceases when payment and delivery are made.

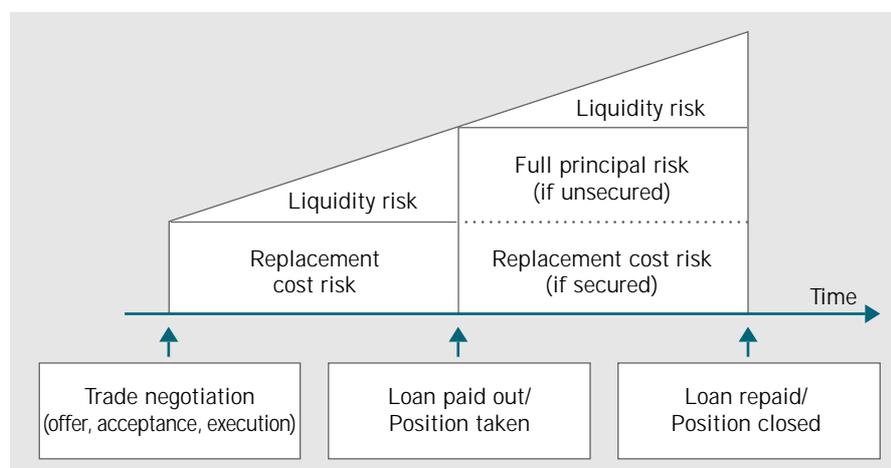
Liquidity risk, on the other hand, can be said to continue until payment has been received. Besides the credit loss the bank is liable to incur if the counterparty defaults between the dispatch and receipt of a payment or delivery, non-receipt of payment exposes the bank to the risk of liquidity problems. Such problems are acute, whereas credit losses are a problem in the longer run. It also happens that payment is received after the date on which it was due. As this,

too, may lead to liquidity problems, liquidity risk lasts until the settlement of the trade has been completed.

Counterparty risk can be illustrated along the same lines as settlement risk (Fig. 1:4). Certain positions, such as a conventional loan, are taken in practice, not at the time of the agreement but first when a payment is made. Before the loan is paid out to the borrower, there is therefore settlement risk in the form of a liquidity and a replacement cost risk, just as there is between a trade agreement and payment/delivery for transactions. There is no proper credit risk to a bank until the loan is paid out. Other positions, a forward position, for instance, can be agreed without any payment being made, in which case there is no settlement risk; it is only final confirmation of the trade that is needed for the contract to be binding.

When the loan has been paid out, full principal risk applies if the loan or the position is unsecured. If collateral has been provided, replacement cost risk applies instead. A defaulting counterparty leaves the bank with the collateral instead of the claim on the borrower. Provided the value of the collateral exceeds that of the claim or the position, the bank will not incur a loss. A loss arises, however, if the value of the collateral falls below that of the claim.

Figure 1:4.
Counterparty risks in taking a position





In the case of forward and swap positions, the market value is normally zero when the trade is agreed but then becomes positive or negative for one of the parties, depending on how the market moves. Although the nature of such positions differs from that of collateralised loans, the sources of the risk are the same—a combination of default and negative market movements. That is why replacement cost risk is also applicable in this context.

Liquidity risk as a component of counterparty risk arises in the same way as for settlement risk. When a loan is due for repayment or a position for closure, one of the parties anticipates the receipt of liquid funds. If this does not happen, there may be strains on liquidity. As mentioned earlier and shown in Fig. 1:4, liquidity risk grows as the repayment or closure date approaches.

Internal risk management

Banks take large risks in their financial market activities and need to manage them internally. Risk management mechanisms are available for the markets in which banks are active and are used to varying degrees. The methods employed by banks to manage risks are reviewed below in fairly general terms. The risk management mechanisms in each market are considered in Chapter 2.

LIMIT SYSTEMS

A limit system is the most common way in which banks manage counterparty risks. The large majority of banks have some form of internal system for limits. In the case of traditional lending to a firm or a household, the bank assesses the borrower's credit standing before granting the loan. In interbank trading, however, it would not be feasible to make a credit assessment for each trade. Instead, each bank assesses its counterparties in advance so that when a trade is to be agreed, a limit has been set and with it the risk the bank is prepared to take. The material

for these assessments includes generally available information such as ratings from international rating companies, external statistics from various institutions¹⁰ and the counterparties' annual reports. The macroeconomic background is also analysed, as well as the general state of financial market stability in the counterparties' home countries. In addition, banks use their internal information about earlier relationships with counterparties as well as information supplied by their branches. In the light of all this, a limit is set for each counterparty, representing the maximum risk the bank is prepared to take. Normally, moreover, aggregate limits are set for the total exposure to individual countries, based on the bank's country analyses. Limits are decided at a high level in the bank, often in a credit committee. In the case of the large counterparties, limits are decided by the board of directors or a delegation consisting of directors and senior officers on the credit committee.

The most common way in which banks manage counterparty risks is with a limit system.

Limits are normally revised annually but can be reassessed at short notice in the event of shocks such as financial problems in the country or the bank in question. When limits have been set for each counterparty, a proportion of the total is assigned to the bank's various functions. If one of the functions is in need of a larger proportion of the total limit, this can be arranged in certain cases, either by reassessing the total limit or by "borrowing" from another function that is not utilising its full share.

Monitoring is an important component of limit systems. Banks should continuously ensure that limits are not exceeded because that would mean that they have taken risks with a counterparty that are

¹⁰ Some examples are the Economist Intelligence Unit (EIU), the International Institute of Finance (IIF) and the Bank for International Settlements (BIS).

larger than was decided in the credit assessment. A problem in this context is that market movements may increase the size of an exposure so that it exceeds the limit. It is therefore important to have a margin as a safeguard against the limit being exceeded. The size of this margin may be based, for example, on historical market movements or on a worst-case scenario for market movements.

COLLATERAL

Another method for risk management is to require collateral from the counterparty. Collateral can be provided in the form of a pledge or a repurchase agreement (repo). The collateral can consist of securities (treasury paper, for example), guarantees or cash. If the counterparty defaults on its contractual obligations, the collateral can be liquidised. The proportion of the exposure for which the bank requires collateral varies with the credit standing of the counterparty.

The management of collateral is a heavy burden on technical and administrative systems. The market value of collateral should be recalculated frequently and regularly to determine whether it covers the exposures. It is crucial, moreover, that the collateral is provided in such a way that the holder's right to the collateral is legally enforceable. This is particularly important in cross-border trading; determining the legal requirements of different jurisdictions can be a complex matter. If a holder of collateral is not legally entitled to the value of pledged securities, the collateral arrangement does not function. Besides taking the full principal risk in that event, the holder may have taken larger positions than the limit would have allowed without collateral. If a collateral arrangement is not known to be legally enforceable, the use of collateral may therefore lead by itself to increased risk-taking.

If a collateral arrangement is not known to be legally enforceable, the use of collateral may lead by itself to increased risk-taking.

A distinction is usually made between initial and additional collateral. Initial collateral is provided at the start of a contract and is intended to provide a margin against changes in value if the counterparty defaults on the contract. Additional collateral is the extra provisions that are needed for an increased position or because the value of the existing collateral declines as a result of market movements.

BILATERAL NETTING

Bilateral netting is an arrangement whereby two parties net their mutual claims and obligations and thereby reduce the size of the exposure. As banks' exposures tend to be concentrated to a relatively small number of major counterparties, netting exposures often has a large effect. This mechanism for risk management can be linked to collateral requirements as well as to limit systems. If the exposure to a counterparty can be netted to result in a lower net exposure, this exposure can be covered with less collateral. Netting can also reduce the risks in the actual settlement of a trade in that the amounts that have to be exchanged are lowered in a similar manner.

The robustness of netting in a competitive environment depends on its legal foundation. Bilateral netting is normally based on agreements between the banks. In international markets there are standardised agreements that banks can use to net their mutual exposures. Examples are the ISDA and ISMA agreements.¹¹ These standardised agreements have been subjected to a thorough legal scrutiny to avoid situations in which collateral can be questioned. The agreements are constructed so that all transactions between the parties in the activity or activities concerned can be netted out. Such agreements are therefore known as master agreements.

In the Swedish bank market there is a master agreement that has broadly the same content as the ISDA agreement but is constructed with Swedish conditions in mind. This agreement applied initially to swaps but has been extended to include derivatives contracts of other types.

Risk management through intermediaries

In order to achieve a further reduction of risks, banks can use an intermediary to manage their financial transactions with other banks. Such intermediaries are usually referred to as clearing houses or clearing organisations. The services provided by a clearing house include matching, clearing and settling agreed transactions. Clearing involves combining the transactions of each participant. For the subsequent settlement procedure, the clearing house either has an account with the central bank or accounts with a number of commercial banks. By performing various functions, the clearing house takes over a part of a bank's risks with its counterparties. Other central services that a clearing house can provide to reduce the participants' risks are outlined below.

MULTILATERAL NETTING

With a clearing house as a common intermediary, all of the claims and liabilities which each participant has can be netted out. As a result of this multilateral netting, each participant is left with a single claim on or liability with other participants or the clearing house. As netting is arranged with all the other participants, the effect of multilateral netting is greater than that of bilateral netting.

Multilateral netting, like bilateral netting, needs to be legally enforceable, which often hinges on a country's bankruptcy laws. In some countries it is possible under certain circumstances for a receiver to recall the payments that the defaulter makes in a period before the bankruptcy. If the payments have been netted multilaterally, this means that the clearing house has to unwind the netting process and run it again. This is clearly a cumbersome procedure and one that not all clearing houses are in a position to perform. It is highly important that completed payments are final. To ensure this, the matter has been regulated in an EU directive.¹²

Clearing houses can also ensure that settlement involves simultaneous payment and delivery, thereby eliminating the participants' full principal risk. In some cases, however, full principal risk continues to apply through arrangements whereby the other participants share the costs if one participant defaults.

CENTRAL COUNTERPARTY

Clearing houses often function as a central counterparty for all transactions. This means that the original trade is replaced by two new trades, with the clearing house as a counterparty to each of the parties to the original contract. As the clearing house accordingly takes over the participants' counterparty risks, the construction of its risk management system is highly important. A fundamental aspect here is the clearing house's standards for the financial strength and the technical and administrative capacity of its participants. The other major mechanism for the clearing house is to demand collateral for the risks that are taken over from the participants. The collateral has to cover the risk to the clearing house of having to repeat the trade at a disadvantageous price, that is, the replacement cost risk.

Additional collateral plays an important function in this context. Clearing houses regularly revalue confirmed contracts and demand the additional collateral that may be needed to hold risk at the level they consider acceptable. This is normally done on a daily basis or more frequently if the market is volatile.

In that the clearing house intervenes as a central counterparty, it normally takes over the participants' counterparty risks. This reduces the need for a thorough scrutiny of the original counterparty, which is particularly relevant in exchange trading, where the identity of the counterparty is not always

11 International Swaps and Derivatives Association and International Securities Market Association.

12 Directive 98/26/EC on Settlement Finality in Payment and Securities Settlement Systems. The implementation of the Directive in the national jurisdictions is scheduled for 1999.



known before the trade has been settled. While the banks have fewer counterparties to analyse, it is highly important to assess the credit standing and risk management system of the clearing house because all counterparty risk is transferred to it.

In that the clearing house intervenes as a central counterparty, it normally takes over the participants' counterparty risks.

Multilateral netting through a clearing house accordingly reduces the participants' liquidity risk. With

DvP settlement, moreover, full principal risk is eliminated. Counterparty risk is transferred from the original counterparty to the clearing house, which in turn has to manage the remaining replacement cost risk.

Counterparty and settlement risks have been defined in this chapter, together with a description of the principles for managing these risks. A more detailed analysis of these risks and their management is presented in Chapter 2, based on the markets in which the banks are active.

Counterparty and settlement risks to Swedish banks

The exposure of Swedish banks to counterparty and settlement risks is greatest in the markets for foreign exchange and interbank deposits and loans, in that they are exposed there to full principal risk. Their securities portfolios also involve sizeable risk exposures to individual issuers. Work on risk reduction should focus on the markets where exposures are largest.

Counterparty and settlement risks have been considered in general terms in Chapter 1, together with an account of the various mechanisms for risk management that can be used to reduce these risks. The Riksbank has identified five activities of the banks that entail counterparty and settlement risks; these are the markets for interbank deposits and lending, foreign exchange, securities, derivatives and repos. The extent of counterparty and settlement risks varies between these activities and the risks occur at different stages of the transactions. These five activities are surveyed in this chapter in order to identify the risks that are involved and their magnitude.

The purpose of this survey is to identify the largest sources of counterparty and settlement risks in banking activities. In order to gauge the magnitude of these risks, in August 1998 the Riksbank distributed a questionnaire to the four major Swedish banks; their responses constitute the basis for the numbers presented here. The survey was restricted to each bank's trading activities in Sweden. Thus, the figures and calculations presented in this Report do not include trading undertaken by these banks' branches abroad.¹³ The estimates of the banks' exposures are therefore on the lower side of each bank's total exposures to its counterparties. Moreover, as

the Riksbank has not collected information from the smaller players in the Swedish market, the quantitative data presented here are not representative of the Swedish bank market as a whole. In general, however, the smaller players are not particularly active in the markets that are considered in this Report.

In order to preserve the anonymity of the individual banks, in describing exposures the survey data are consistently presented as the average for the four banks. To be meaningful, moreover, the outstanding positions need to be related to other general indicators. We have chosen four such indicators. *Firstly*, the balance-sheet total, which is relevant in particular as a measure of an activity's importance for a bank. *Secondly*, the capital base, which is an appropriate indicator for risks in individual positions. The relationship between individual positions and the capital base illustrates the bank's financial resilience if a counterparty were to default. If an appreciable proportion of the capital base would be used up if a single counterparty suspends payments, the bank is highly vulnerable.

¹³ In some cases the figures have been taken instead from the Riksbank's statistics on the banks' balance sheets, which means that the positions of branches are then included.

The relationship between individual positions and the capital base illustrates the bank's financial resilience if a counterparty were to default.

Thirdly, an indicator to show the magnitude of the risk of a bank incurring such a large loss that it ceases to fulfil the capital adequacy standard. This standard requires a bank to maintain a capital base that is equivalent to at least 8 per cent of its risk-weighted assets. If the capital base shrinks so that capital cover falls below 8 per cent, in principle the bank is required to discontinue its operations. It may therefore be relevant to assess each bank's exposures in relation to the margin that its capital base provides before a loss brings its capital cover below 8 per cent.

Relating individual exposures to the capital base illustrates vulnerability in terms of the risk of a defaulting counterparty depriving the bank of the whole of its claim. It is hardly likely, however, that the total claim will be lost; a certain proportion should be recoverable from the counterparty's receiver. Bankruptcy proceedings take a long time, however, and there may be considerable uncertainty about the final size of the loss. In the examples of what the failure of a counterparty would imply for a bank, it is assumed here that the bank's lending loss provision amounts to 50 per cent of the principal and that this also constitutes the actual loss. Measuring 50 per cent of an exposure in relation to the difference between the current capital base and the minimum capital base that complies with the capital adequacy standard provides a simplified value-at-risk index of the effects of a defaulting counterparty. A value above 100 per cent implies that, in the event of the counterparty defaulting, the exposure would immediately reduce the bank's capital cover to less than 8 per cent. This indicator, which is used in the analysis to relate to the banks' individual exposures, is referred to as the *capital margin*.

Fourthly, the degree of concentration is used in this Report to compare the concentration of exposures in each market. This indicator, expressed as a percentage of the total exposure, is intended to show

the distribution of the total exposure across counterparties. Starting with the exposure to the largest counterparty, the exposures (calculated as a percentage of the total) are accumulated successively up to the tenth largest counterparty.

An analysis along the following lines is presented for each market. A brief presentation of the main conclusions is followed by a discussion of the market's function for the banks. The risks associated with the activity are then considered, using the diagram of the stages in a transaction that was presented in Chapter 1 (Fig 1:3, p. 12). The data collected by the Riksbank are then used to quantify the risk with the aid of the indicators described above. Each section concludes with a presentation of the risk-management mechanisms that are used in the market in question. The final section of this chapter contains an assessment of the different risks' relative magnitude. Conclusions that are applicable to all of these wholesale markets are also presented there.

Interbank market

The banks' exposures to counterparties in the interbank market are considerable. The occurrence of full principal risk makes the risks particularly large. As credit positions for each transaction are not feasible, limit systems are used to manage counterparty risks in the interbank market. Limit systems have the disadvantage that, being constructed so that all lending to a counterparty up to a specified level is allowed, they seldom promote a diversification of lending. Another shortcoming is that, as limit systems seldom distinguish between counterparties (given that they have been accepted) on the basis of their creditworthiness, they lack mechanisms where particularly sound counterparties are preferred to others.

The interbank market is used for lending and deposits primarily among banks, though other large firms also participate to some extent. The market players participate in this and other markets in order to adjust their fluctuating liquidity requirements. Banks with surplus liquidity can place this for a specific period as an interbank loan to banks that

need additional liquidity. The interbank market comprises overnight loans, with which banks adjust day-to-day liquidity, as well as loans with maturities up to two years. Interbank market loans are denominated in Swedish as well as foreign currency and are provided without collateral. An alternative to the interbank market is the repo market, except that collateral is required for the latter.

FUNCTION OF THE INTERBANK MARKET IN BANKING

Besides managing their own liquidity in the interbank market, banks arrange investments on behalf of customers. A bank customer with access to the interbank market can place the funds in one bank, which then lends them to another market participant. Access to the interbank market enables the customer to obtain favourable deposit terms. Deposits can often be made in a foreign currency, whereupon the bank invests the funds in the same currency to avoid exchange risk. Banks can also use the interbank market to finance foreign currency positions, for example. As in the case of core banking operations (deposits and lending), there is a variety of customer transactions that result in the bank taking deposit or lending positions. Even when a deposit by one customer is simply transformed directly by the bank into a loan to another counterparty, the transaction adds a liability and a claim to the bank's balance sheet. The loan to a counterparty means that the bank takes a counterparty risk. This arrangement accordingly differs from other transactions by which customers invest through a bank. If a customer purchases securities or shares in a mutual fund, no such position is taken by the bank and thereby no counterparty risk.

Even when a deposit by one customer is simply transformed directly by the bank into a loan to another counterparty, a liability and a claim are added to the bank's balance sheet.

The banks continuously hold comparatively large stocks of interbank market claims as well as liabilities. The simultaneous occurrence of lending and borrowing positions is explained by the business with customers, together with differences in maturities and the positions in different currencies. If a bank simply used the interbank market to manage its own liquidity in the domestic currency, at any given time there would be a single position under either balance-sheet assets or liabilities.

In the measurement period,¹⁴ the average loan stock of the Swedish banks in the interbank market amounted to 3.8 per cent of the balance-sheet total. The average level of their borrowing was 8.3 per cent. Thus, the interbank market is more important as a source of financing for the banks than as an alternative for investment.

Loans to Swedish banks amount to a comparatively small proportion of the total stock of interbank market loans in the Swedish banks, 16 per cent. Loans to Swedish banks generally have shorter maturities than loans to foreign banks (Table 2:1, p. 22). This is because interbank lending within the Swedish system mainly is driven by short-time liquidity smoothing. The banks therefore have no cause to maintain a large stock of loans.

In the context of risk, the predominance of overnight loans can be regarded as positive in that short maturities reduce counterparty risk. There is more reason to hold a substantial stock of loans with foreign counterparties, where customer-driven positions are more common. This can also explain the longer maturities with foreign counterparties. The pattern for borrowing is broadly the same as for lending.

INTERBANK MARKET RISKS

Both the volume of trading and the size of loans in the interbank market are large. As the loans are

¹⁴ The survey was undertaken in August 1998 and the quantitative figures used in this Report refer to the period 10–21 August 1998.

unsecured, counterparty risk is considerable. Banks providing loans are exposed to full principal risk from the time a loan is paid out until it is repaid (Fig. 2:1).

As the loans are unsecured, counterparty risk is considerable.

A replacement cost risk arises even in the interbank market if there is an interval between the lending agreement and the time when the loan is paid out. If the counterparty fails to fulfil the agreement, a new agreement may have to be reached at less favourable terms. Loans with a maturity of a single day are paid out on the day of the agreement and the replace-

ment cost risk is then virtually negligible. Loans with longer maturities tend to be paid out later, in the typical case about two days after the agreement, which means that the replacement cost risk is somewhat larger.¹⁵ In that the replacement cost risk normally concerns a loss equivalent to just a few per cent of the loan's underlying value, whereas once the loan has been paid out there is a risk of losing the whole of the underlying amount, replacement cost risk is of secondary importance in the interbank market. It is therefore not discussed any further here.

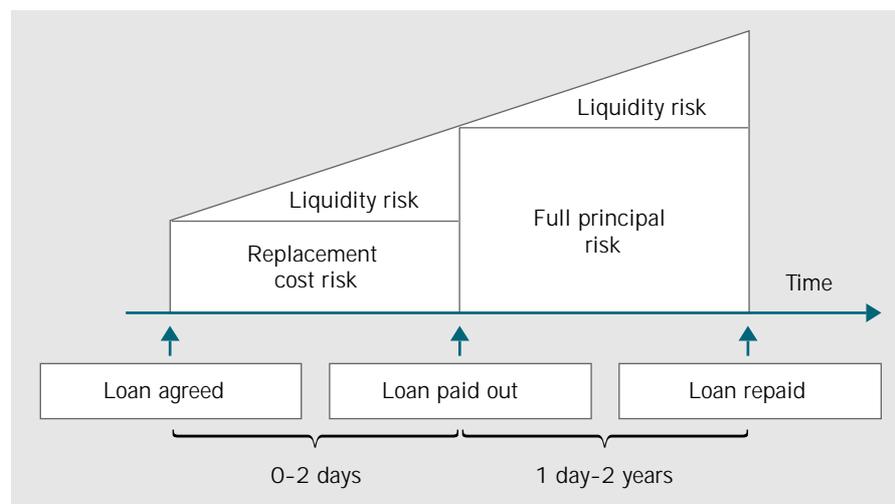
The purpose of borrowing in the interbank market is to obtain cash from the counterparty. If the

Table 2:1.
Maturity composition of the banks' interbank market positions.
Average for the four major banks in the measurement period, per cent

Lending	Overnight/open	2-30 days	>1 month
To Swedish banks (16%)	74	15	11
To foreign banks (84%)	48	21	31
Borrowing	Overnight/open	2-30 days	>1 month
From Swedish banks (14%)	75	13	12
From foreign banks (86%)	24	22	54

Source: The Riksbank.

Figure 2:1.
Risks in interbank lending





counterparty fails to perform on its obligations, the borrower is deprived of these funds. The risk of this is a liquidity risk. As mentioned earlier, the interbank market enables banks to smooth their liquidity. It is also a facility for quick financing when alternative financing arrangements are not available. Borrowing is typically arranged more quickly than in other markets; overnight loans can be paid out in a matter of minutes. A liquidity shortage in this market may therefore be more serious than in other markets, which makes the liquidity risk particularly important.

The largest single exposure in any one day during the two-week measurement period amounted, as an average for the four banks, to 18 per cent of the average capital base. If the largest counterparty on that particular day had defaulted, a substantial share of the capital base would therefore have been lost. Given a 50 per cent provision for losses, loan losses on each of the banks' largest counterparty would have used up 45 per cent of the capital margin. In other words, almost half of the banks' margin to the capital adequacy standard would have disappeared.

The default of the largest counterparty just on the day of the largest exposure is a worst-case scenario. It is more relevant to consider the level of the average exposures to the large counterparties. For the single largest counterparty, the average exposure of the four banks during the measurement period was 8 per cent of the capital base. Given the same level of loss provisions as above, the average loss on loans to the largest counterparty would deprive the banks of 20 per cent of their capital margin.

Neither the worst-case scenario nor the average scenario would bring the banks' capital base below the stipulated capital adequacy standard. This suggests that, at the time of the survey, the banks were in a comparatively good position to cope with losses even if their largest counterparty defaulted. The failure of additional counterparties would be needed to create more serious problems. It should be under-

scored, however, that this refers to the risk in only one of the banks' activities. They also have other positions. To assess the full effect when a large counterparty defaults it is necessary to consider the bank's total exposure to that counterparty.

To assess the full effect when a large counterparty defaults it is necessary to consider the bank's total exposure to that counterparty.

In the context of systemic risk it is important to analyse how the failure of a single bank would affect other banks. The risk of effects spreading through the banking system are greater if a large proportion of lending is concentrated to a limited number of counterparties. The higher the degree of concentration, the larger the banks' mutual exposures will tend to be and the effect of a counterparty failure will spread more quickly through the system. The proportion of the banks' total stock of interbank market loans that has been paid out to the ten largest counterparties is shown in Fig. 2:2 (p. 24). The degree of concentration is comparatively high: the ten largest counterparties have almost 50 per cent of the loan stock.

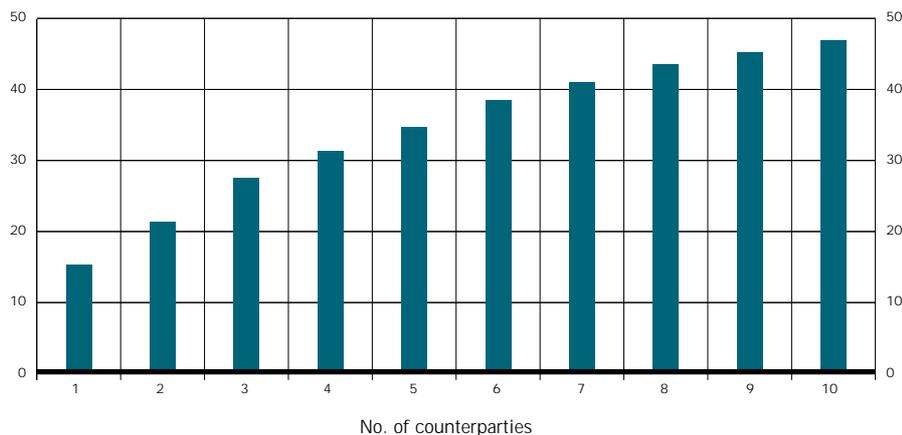
RISK MANAGEMENT IN THE INTERBANK MARKET

As the total loan is at risk when an interbank market counterparty defaults, the most important mechanism for managing risk is the assessment of creditworthiness. The creditworthiness of each counterparty is assessed when the maximum exposure to that counterparty—the limit—is set.

An important aspect of limit systems is the extent to which they refer to all of the bank's positions with the counterparty. Positions taken at different geographical locations, as well as positions taken in the various branches of the bank's activities, need

15 The 2-day lag before a loan is paid out, which is a consequence of market conventions rather than technical limitations, means that all trades are in some sense forward transactions. An exception to this convention is tom/next (tomorrow/next) contracts, which are paid out the following day.

Figure 2:2.
 Concentration in interbank lending: no. of counterparties needed to reach a given percentage of total stock of deposit market loans. Average for the four major banks, measured in August 1998, per cent



to be taken into account. Banks normally manage this by distributing the total limit across its activities and branches. For counterparties with a wide range of activities, the limit then needs to be relatively generous so that all activities and branches can have an adequate share. Limit allocations tend to be influenced by the prices that counterparties offer, without consideration for the fact that risks might be reduced by a more uniform distribution over counterparties.

Another important aspect is the frequency with which the limit system is updated as regards the aggregate exposure to a counterparty. The ideal solution would be for all trades to be registered as soon as they are fed into a real-time system to which all the bank's activities are connected. There would then be less risk of large exposures to a counterparty arising as a result of simultaneous risk-taking by the various activities. It would also permit a more prudent selection of counterparties in the light of earlier exposures to them.

Many limit systems are formulated for yes/no decisions—a trade either exceeds the limit or it does not. A more calibrated system could make a better contribution to the reduction of counterparty risk. The best way of achieving this would be to price the utilisation of credit up to the limit. Systems should

provide incentives to choose the sounder of two counterparties, given that both the trades are acceptable. There should also be an incentive to choose counterparties so that the one to which the current exposure is smallest is preferred. The limit systems used by the Swedish banks seldom fulfil these conditions.

More calibrated limit systems could make a better contribution to the reduction of counterparty risk.

Netting as a risk-management mechanism in the interbank market is not as important as in the repo and derivatives markets, for example, because two-way exposures are less frequent in the interbank market. However, as mentioned in the introduction, two-way exposures do occur, so netting should still be used as far as possible even in the interbank market. In the case of two-way exposures in different currencies, however, there is some uncertainty as to whether netting is enforceable under Sweden's bankruptcy laws. With foreign counterparties, moreover, the enforceability of netting has to be determined in the light of the legal system that is applicable in relation to each counterparty.

The large-exposure rules are not an obstacle in practice to the size of exposures to individual counterparties in these markets.

In order to prevent banks and other financial institutions from taking excessively large exposures to individual counterparties, the Act (1994:2004) on Capital Cover and Large Exposures of Credit Institutions and Securities Companies imposes a statutory limit, the main rule being that the exposure to a single customer is not to exceed 25 per cent of the capital base. In this context, a parent company and all its subsidiaries constitute a single customer. However, the large-exposure rules do not apply to exposure to other credit institutions in the OECD area for maturities up to one year; for maturities between one and three years, exposures are to be measured at 20 per cent of the value of the claim.¹⁶ As the maturity of interbank market loans is usually less than one year and virtually never more than two years, in practice the large-exposure rules are not an obstacle to the size of exposures to individual counterparties in this market. The same applies to exposures in the other markets that are discussed in this Report. The Riksbank considers that the large-exposure rules should be revised so that they constitute a restriction on large exposures in all these markets, while taking into account the special need of exposures of a certain size in financial trading.

Foreign exchange market

On account of the scale of foreign exchange (FX) trading and settlement, banks take large counterparty risks every day. Much could be done to bring these risks down to considerably lower levels. The reduction of full principal risk—the primary risk to banks in the settlement of FX transactions—is most important. One way of doing this would be to shorten the duration of exposures by improving internal routines and renegotiating correspondent banking agreements. Another would be to reduce payment flows by utilising existing bilateral and multilateral netting services. The only way of eliminating risk entirely, however, is to use the PVP settlement principle.

Global FX trading has become vastly larger in recent decades. Daily turnover has been estimated

to total USD 1,200 billion,¹⁷ which means that FX trades make up a large proportion of bank trading. Moreover, as FX trading is relatively concentrated to a comparatively small number of players, a single failure can have considerable consequences for a bank. In the past decade the central banks have therefore devoted increased attention to the risks associated with FX trading and settlement. The bank sector's exposure to FX settlement risk came into focus in connection with the 1974 failure of Bankhaus Herstatt. When this German bank was closed down in the afternoon (European time), its inward and outward payments in German marks had already been settled, including payments for currencies that the bank had sold. That evening (New York time), Herstatt's correspondent bank in the United States was to have made payments in dollars but as Herstatt had already been closed, no dollar payments were made to Herstatt's counterparties. This occasioned losses and liquidity problems for these banks which led to disruptions in the United States' payment system. This event gave rise to the concept of "Herstatt risk".

FUNCTION OF FOREIGN EXCHANGE TRADING IN BANKING

Banks conduct FX trading for several reasons. One is customer demand for foreign currencies. Another is that large customers require cover for exchange risks. Banks also take internal positions in the FX market in order to make a profit. The dominant activity varies from bank to bank. Positions for the bank's own account differ clearly from the other activities, however, in that the bank is not actually dependent on the purchased currency being delivered in the sense that the trade is made to take a position and not to provide for a payment.

¹⁶ These exemptions follow from the Financial Supervisory Authority's instructions (FFFS 1995:60 §§8–9).

¹⁷ *Central Bank Survey of Foreign Exchange and Derivatives Market Activity*, BIS, May 1996.

The banks' counterparties include a growing number of large non-financial firms.

FX trading has been a prominent activity in the wholesale market and many banks have a large number of counterparties. These counterparties are mainly other Swedish and foreign banks but they do include a growing number of large non-financial firms.

FOREIGN EXCHANGE TRADING RISKS

Counterparty risks exist in the FX market, just as they do in the other markets considered in this Report. In certain cases, FX trades give rise to inter-bank market positions in the form of FX deposits and loans. Trading in FX derivatives also results in positions that entail counterparty risk. The counterparty risks in FX trading are considered in the sections on the deposit and derivative markets. It is only the settlement risks in FX trading that are analysed here.

In order to make FX payments, banks commonly use banks in other countries. For USD payments, for example, a Swedish bank will have what is known as a *nostro* account with an American bank. These accounts resemble a conventional transaction account for making deposits and withdrawals. The American bank, which functions here as a correspondent bank, is a participant in United States' payment system and transmits the payments through this to the final recipient. In this way, large banks participate in a network of *correspondent banks* in many countries. On behalf of foreign banks, Swedish banks accordingly hold what are known as *loro* accounts in Swedish kronor and execute the formers' SEK payments from these accounts. In order to make a USD payment on its own or a customer's behalf, a Swedish bank sends a payment instruction to the American correspondent bank, specifying the amount and final recipient. The American bank then withdraws the specified amount in dollars from the Swedish bank's account. If the final recipient has

an account in the same bank as the Swedish bank, the amount is deposited directly in that account. If the recipient either is or has its account in another American bank, the payment must then be sent through the United States' payment system.

Banks routinely use their correspondent banks in the settlement of FX trades. More than 96 per cent of the value of the Swedish banks' FX transactions are settled in this way. Clearing houses are used for the remaining transactions. This settlement procedure for FX trades results in risks that are specific for the FX market. An FX trade amounts to selling one currency and being paid in another. A *time lag* occurs in the transfer of the two currencies. The banks' payment instruction in the relevant currency is usually sent to the correspondent bank one day before the settlement date. The instruction can be recalled up to a time that is specified in the correspondent banking agreement. On the settlement day the two currencies are transferred between the seller and the buyer. The bank then receives a statement from the correspondent bank and can check that the expected payment has been received; this statement usually arrives on the day after the settlement date.¹⁸ With this procedure, the time lag between an irrevocable payment and definite receipt—the duration of the bank's exposure—is around two days. The duration of the lag varies with the terms in the correspondent banking agreement as well as with time-zone differences, which in turn means that the duration of exposures also varies with the currencies that are being traded.¹⁹

Compared with traditional bank lending to households and firms, FX trading is much more concentrated. The banks' counterparties in FX trades are other banks and large non-financial companies. While the probability of these counterparties defaulting is small, the fact that exposures are spread over a comparatively small number of counterparties means that the consequences of a single failure could be serious for the bank. The percentage distribution of FX settlement exposures over the ten largest



counterparties is shown in Fig 2:3. In the measurement period, the average degree of concentration in the FX market was lower than in the interbank market.

In that exposures are spread over a comparatively small number of counterparties, the consequences of a single failure could be serious for the bank.

In an FX trade, the bank purchases one currency and pays in another. In this transaction between two parties there is a time lag between the execution of the trade and the ensuing delivery and payment and the bank cannot be certain that the counterparty will honour the agreement. There is therefore a settlement risk that lasts from the time of the agreement to trade until the time of payment and delivery.

Both the nature and the extent of the settlement risk change in the course of the transaction. The agreement to trade creates a risk that the counterparty will not honour the agreement, which could mean that replacement trades have to be executed at a less favourable price (*replacement cost risk*). When the transaction then reaches the settlement stage, there is a risk of the bank delivering the currency it has sold but not receiving the currency it has bought. The bank's exposure to the counterparty lasts

throughout this stage at the full value of the amount (*full principal risk*). This stage of the transaction is thus associated with the largest and thereby the most serious risk for the parties in an FX trade. In addition, the possibility of the purchased currency not being delivered on time constitutes a *liquidity risk*.

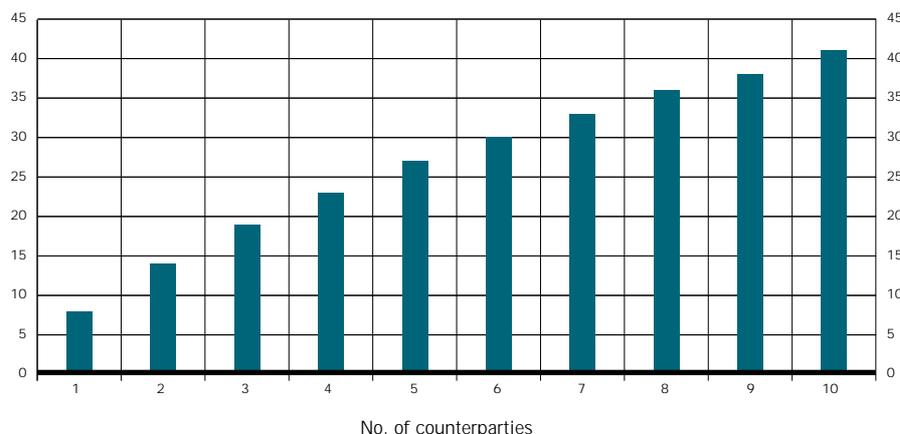
The size of the replacement cost risk depends on the state of the market at the time of a replacement trade. This makes it difficult to calculate the amount of exposures to replacement cost risk. The same applies to liquidity risk in that the problems which non-delivery of a currency may pose for a bank depend on the bank's access to liquidity at that particular time. In the case of credit risk, on the other hand, it is possible to estimate the size of FX settlement exposures.

FX settlement risk is a major risk in the banks' activities.

18 A detailed description of the settlement process for FX transactions will be found in *Settlement Risk in Foreign Exchange Transactions*, BIS, March 1996.

19 Estimated exposure times for different currency pairs will be found in *Reducing Foreign Exchange Settlement Risk: A Progress Report*, BIS, July 1998.

Figure 2:3.
Concentration in FX market:
no. of counterparties needed
to reach a given percentage
of total FX market exposure.
Average for the four major
banks, measured in August
1998, per cent



The total exposure—the level of full principal risk to the bank in transactions with counterparties—is obtained by aggregating all the bank’s exposures, reckoning that the exposures have a duration of two days. For the measurement period in the Riksbank’s survey, the average total exposure was 212 per cent of the capital base. It is improbable, however, that all of a bank’s counterparties would default. Instead one can consider the effect of the largest counterparty defaulting. In the measurement period the level of the banks’ exposures to their largest counterparty averaged 17 per cent of the capital base. In terms of the capital margin (the risk of a bank incurring a loss that brings its capital base below the statutory standard), the survey showed that the failure of the largest counterparty would deprive the banks of an average of 41 per cent of their capital margin. Compared with the corresponding result for the inter-bank market, the banks are thus more vulnerable on average to the failure of their largest counterparty in the FX market. As this survey did not include the banks’ foreign branches, these exposure figures underestimate the level in practice. Earlier Riksbank surveys show that, on average, the foreign branches undertake one-third of the banks’ total activities in

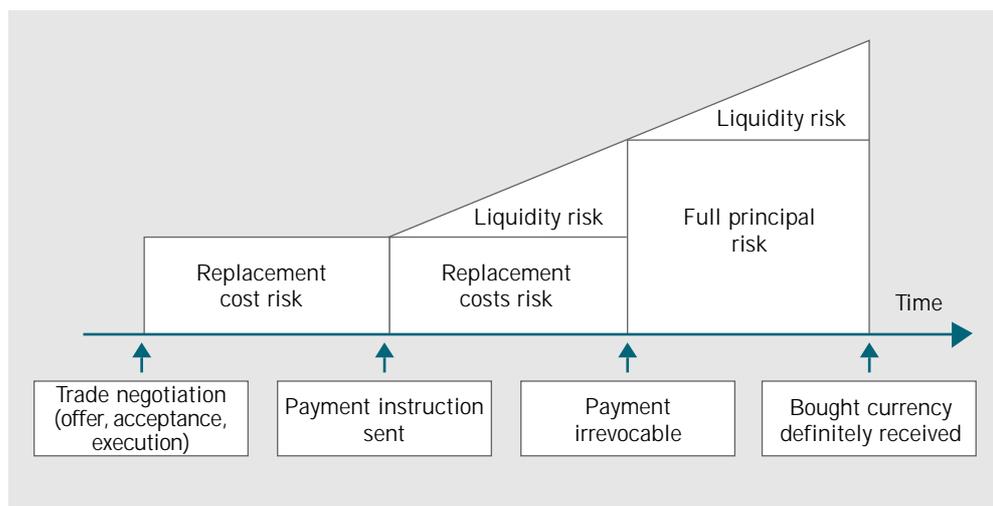
the FX market. This implies that the calculations presented above underestimate the exposure to FX market risks by about 50 per cent, which further emphasises that FX settlement risk is a major risk in the banks’ activities.

INTERNAL RISK MANAGEMENT IN THE FOREIGN EXCHANGE MARKET

There are two ways in principle in which a bank can reduce settlement risk. *Firstly*, the bank can shorten the duration of exposures by improving its internal routines or negotiating better correspondent banking agreements. To shorten exposure durations, the agreements could include a later deadline for cancelling payments and earlier confirmation that payments have been received. *Secondly*, the size of outstanding amounts can be reduced by using various forms of netting. The risk management mechanisms that banks are using at present are described in the following sections.

FX trading is one of the activities where internal limit systems are of major importance for keeping the bank’s exposures to counterparties at the level specified in the credit process. However, the limit systems that are currently in use focus on the amounts

Figure 2:4.
Risks in the stages of an FX transaction



that are traded with each counterparty. An alternative would be to impose a limit on a bank's exposure to each of its counterparties, expressed instead in terms of settlement risks. This would amount to a bank deciding on a maximum exposure to settlement risk. When the maximum exposure has been reached, before executing new trades with that counterparty the bank must either raise the limit or wait until payments have been received from that counterparty. Limit systems of this type are more sophisticated, however, because they require the integration of back-office and front-office functions. Today there are probably few, if any, limit systems of this kind.

In order to reduce the flow of payments and thereby its exposure, a bank can use bilateral netting. Settlement is still arranged, as described earlier, by using correspondent banks but the amounts are smaller. In that bilateral netting reduces the level of exposures, the bank takes a smaller settlement risk. Bilateral netting services are provided by FXNET, Valunet and S.W.I.F.T Accord. Standardised contracts are also available for interbank netting agreements. In the Swedish bank market, moreover, a form of bilateral netting is used for DEM, USD and SEK transactions that are arranged directly between the back offices of two banks. In such cases the parties have an oral rather than a formal agreement. With a view to reducing risks, the parties should therefore have a written record of such arrangements.

The proportion of the flow of payments that is netted bilaterally in the Swedish banks is just under 7 per cent, which is relatively low. The bilateral netting procedure reduces the total flow of payments by 2.5 per cent. An international comparison shows that, on average, banks in the G-10 countries net 29 per cent of the total flow of payments bilaterally, which reduces the flow by 15 per cent.²⁰ By using the bilateral netting services that are available in the market, the Swedish banks could thus achieve a further reduction of the risks in the outstanding amounts.

Swedish banks could reduce risks in the outstanding amounts by using the bilateral netting services that are available in the market.

Another way of reducing the outstanding amounts would be to exchange only net cash liabilities when settling contracts. This would be feasible for position-taking trades that do not require that the currency is actually delivered.

FOREIGN EXCHANGE SETTLEMENT THROUGH INTERMEDIARIES

In principle, the use of an *intermediary* could reduce both the duration of exposures and the outstanding amounts. The establishment and use of intermediaries could thus be an effective way of reducing FX settlement risk. In order to achieve a substantial reduction of the outstanding amounts, payment flows need to be netted multilaterally. Measurements have shown that such a procedure cuts the flow of payments and thereby the settlement risk by around 70 per cent.

Today the foreign exchange market has one multilateral clearing house, the London-based Exchange Clearing House (ECHO). ECHO administers FX trades from matching to clearance and settlement in nineteen different currencies. ECHO participants provide collateral for their positions and the value of pledged securities is recalculated regularly by ECHO. If the value of the collateral has fallen, ECHO calls in additional collateral from the participant.

The multilateral netting lowers the liquidity risk compared with bilateral gross settlement. The clearing house has to take the risks connected with a participant's failure but there is an arrangement for covering losses that leaves the original players with a certain element of credit risk. For several reasons, however, multilateral netting of FX trades is still li-

²⁰ *Reducing Foreign Exchange Settlement Risk: A Progress Report*, BIS, July 1998, p. 16.

mitted. Besides the existence of only one multilateral clearing house for the FX market (ECHO), there are players in the FX market who are not ECHO participants. Moreover, ECHO does not accept every traded currency, though its system does include most of the currencies that are relevant in the FX market. For multilateral netting to have a fuller impact it is therefore necessary that more banks participate in ECHO and that the participants transfer more of their trades to ECHO for netting and settlement. In the case of the Swedish banks, an average of 3.5 per cent of the flow of payments is netted multilaterally. Studies by banks in the G-10 countries show that just over 1 per cent of the gross flow of payments is settled by multilateral netting. The Swedish banks accordingly use multilateral netting through ECHO to a greater extent than the G-10 average. But the proportion of the total flow that is settled in this way is still very small.

Full principal risk in FX transactions can be eliminated by linking payment for the foreign currency to its delivery, a procedure known as Payment versus Payment (PvP). This settlement procedure differs from netting because the transactions are settled on a gross basis, with each leg of the FX trade dependent on the other. In this way, full principal risk is eliminated.

Full principal risk in FX transactions can be eliminated by linking payment for the foreign currency to its delivery (PvP).

No intermediary is currently in a position to settle FX transactions on a PvP basis. Hopefully, however, matters will be different when the planned Continuous Linked Settlement Bank (CLS Bank) starts to operate in about two years time. Parties in the FX market will then be able to use the CLS Bank as an intermediary. PvP will be achieved with the aid of multicurrency accounts and simultaneous payment and delivery. That would eliminate full principal risk. It is unlikely, however, that all FX transactions will be settled through the CLS Bank, partly because all

players and all currencies would then need to participate in the system, which will not be the case. Moreover, a bank always has to weigh its counterparty risks against the cost of reducing them.

Securities market

As security transactions are settled in Sweden in accordance with DvP, the banks are not exposed to counterparty risk in the form of full principal risk. Settlement risks in securities trading are therefore comparatively small. On the other hand, the element of risk in the banks' securities portfolio is considerable. In particular, the banks' large exposures to housing credit institutions heighten the risk that effects of financial problems spread through the Swedish financial system.

Trading in securities by Swedish banks mainly concerns equity and sovereign as well as housing interest-bearing securities. All the banks have a substantial market share of equity trading on the Stockholm Stock Exchange and this activity is important for their income. In the present context, however, equity trading is less important because the risks associated with the settlement of equity transactions are considerably smaller than those for transactions in fixed income securities, mainly because the amounts involved are smaller. Equity and fixed income trades are both settled through the central system operated by the Central Securities Register (VPC). An indication of the difference in magnitude is that, while the daily turnover for each bank in equity trading is approximately SEK 1.5 billion in VPC, the settlement of interest-bearing securities is approximately 50 times larger. In view of the relatively smaller importance of equity transactions for banking risks, the settlement of these transactions will be described only briefly in this section, with some discussion of the banks' own equity positions. Otherwise the section centres on activities in the fixed income market.

The description of securities trading in this section refers to spot trading, where the transactions

amount to conventional buying and selling. With one exception, trading in derivatives and repos is therefore not considered here. The way in which spot transactions in interest-bearing securities are settled is also applicable to repo trades. In principle, the settlement of a straight spot trade in VPC is indistinguishable from the settlement of securities connected with a repo agreement. The description in this respect therefore applies to the repo market as well.

FUNCTION OF SECURITIES TRADING IN BANKING

Banks operate in the securities market either to buy and sell securities on their own account or as an intermediary on behalf of two other parties. These two types of transaction cannot always be distinguished. If a bank simply brings two parties together and the latter arrive at a mutual agreement to trade, in many cases the bank does not take either a counterparty or a settlement risk. This applies to many equity market transactions involving customers that are not members of the stock exchange. The banks then generally ensure that both the relevant securities and the liquid funds are available to them before executing a trade. For this service the banks receive a commission on the trade.

In the fixed income market, however, the banks seldom act as intermediaries. Their function instead is that of a counterparty. This has to do with the banks' role here as market makers, which means that they undertake to set prices for the interest-bearing securities.²¹ The bank quotes a price to anyone wishing to buy or sell a security and the transaction is arranged with the bank as the counterparty. A security which the bank does not wish to hold is sold to a third party. In order to trade in the fixed income market, banks therefore need to hold a stock of securities for this purpose. Even if the bank only acts as an intermediary, in most cases it does this on its own account.²² Banks also hold a trading stock of equity and can therefore arrange some transactions on their own account in this market too. Markets in which

all the parties function as counterparties (the fixed income market) differ in principle from those where trades are arranged by intermediaries who are not counterparties (the equity market) in that the income from the former, instead of coming from commissions, is generated by the difference between buying and selling prices.

Most of the security market trades by banks are customer driven in the sense that they are undertaken in response to customer demand. But even the transactions that banks make on their own account are seldom undertaken to speculate in price movements for the security in question. In the context of risk, however, there is an essential difference between a bank buying a security and selling it to a third party as opposed to retaining it in its trading stock. In the former case there is only a settlement risk, whereas in the latter the bank is exposed to all changes in the value of the security, whether these stem from market movements or changes in the creditworthiness of the issuer. In the following, these two situations are therefore considered separately.

SETTLEMENT RISK WHEN BANKS MEDIATE SECURITIES TRADES

In that VPC settlement involves the simultaneous transfer of securities and cash (the principle of DvP), there is no full principal risk. Replacement cost risk exists from the time of the agreement to trade (by telephone) until settlement has been completed and the securities and cash have actually changed hands (Fig. 2:6). Liquidity risk exists because, as described in Chapter 1, one of the parties may not receive payment for securities it has sold. In the case of securities

21 To some extent there is also a market-maker function in the equity market.

22 The bank is then one of the *principals* to the transaction, in contrast to its function as a *broker* when it executes a transaction on behalf of a customer without actually owning the traded security. However, even when the bank performs the transaction on its own account, the time lag before delivery enables it to sell the security first and buy or borrow it in time to deliver.

in its own portfolio, the bank is exposed to full principal risk in relation to the issuers of the securities, as discussed in the next section.

The daily settlement of interest-bearing securities on behalf of the four largest banks amounts to around SEK 280 billion. This refers to the settlement of repo as well as spot transactions. As the securities are settled in gross terms and payments are executed net, the daily amount each bank pays or receives is very much smaller, on average less than SEK 3 billion for each bank.

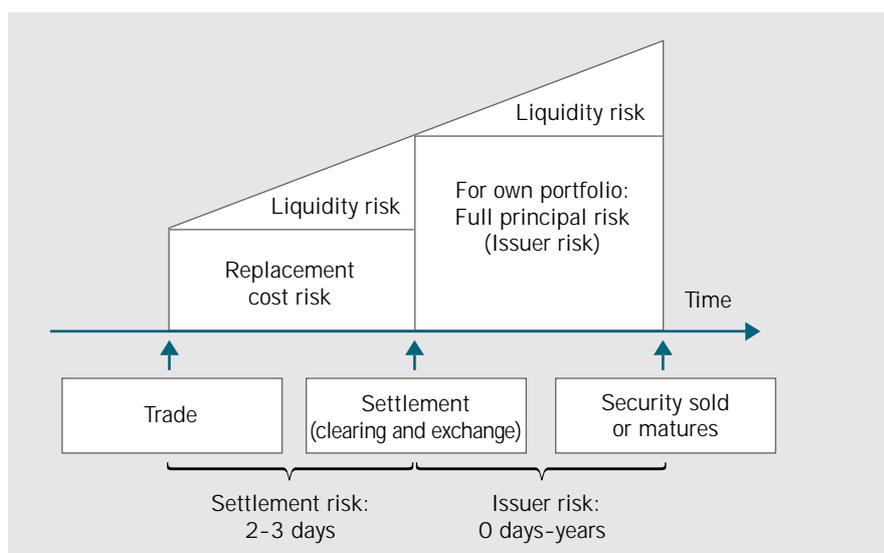
In that VPC settlement involves the simultaneous transfer of securities and cash, there is no full principal risk.

The Riksbank survey confirms that banks predominantly trade with other banks and accordingly have each other as settlement counterparties. The pattern varies somewhat but it can be noted that the largest counterparties of the major Swedish banks are not necessarily other members of this group. These counterparties also include large foreign banks, smaller Swedish banks and Swedish branches of foreign banks. The average size of the banks' largest

exposure to a single counterparty is approximately 20 per cent of the bank's capital base. As acquisitions from and sales to a particular counterparty often total roughly the same amounts, the net exposures per counterparty are normally very much smaller. As the risks are confined to replacement costs, they are small despite the large size of the gross exposures. A very approximate calculation indicates that, if a bank's largest counterparty were to default on the settlement day and an unfavourable interest rate movement of 50 basis points (0.5 percentage points) had occurred between the agreement to trade and the default, the bank would risk losing one-half of one per cent of its capital base.²³ This presupposes the simultaneous occurrence of two events: a sizeable negative interest rate shift together with the failure of the largest counterparty. And even if this were to happen, the potential loss is still appreciably smaller than for the exposures in the interbank and foreign exchange markets, for instance.

VPC is not the only institution for the settlement of Swedish banks' securities transactions. Some transactions in *Swedish* securities with foreign customers are settled in the international clearing insti-

Figure 2:5.
Counterparty and settlement risks in securities trading



tutions, Euroclear and Cedel. For the settlement of their transactions in *foreign* securities, in certain cases the banks also use the international clearing institutions or some other foreign institution, usually a foreign depot bank. The activities of their foreign branches in foreign securities markets means that they also need to settle these transactions, which can be done either through a national settlement system in the country in question or by using a depot bank.

In the present context the Riksbank has not taken a closer look at how the settlement of these types of transaction is arranged. But as the banks' foreign securities trading from Sweden is very limited, the associated risks are probably not particularly large. The low turnover implies small exposures in settlements with depot banks. However, as the Riksbank survey did not cover the foreign branches of Swedish banks and the settlement systems they use have not been assessed, nothing can be said about the risks in these activities.

Euroclear and Cedel perform a function for DvP transactions for their participants in many countries, including Sweden. The risks to Swedish banks from these institutions are therefore comparatively low. The volumes of settlements are also small compared to other exposures in the wholesale market.

COUNTERPARTY RISKS IN BANK'S SECURITIES PORTFOLIOS

As already mentioned, the banks maintain their own trading stocks of securities. They also have long-term holdings of interest-bearing securities that serve other purposes than facilitating their securities trading. These portfolios are used, for example, for pledging in the RIX system. Irrespective of the purpose of the holding, the bank runs a risk of incurring a loss on it because the creditworthiness of the issuer could deteriorate. This risk is referred to here as issuer risk.

The equity portfolios of the banks are small compared with other positions. The average trading stock of equity amounts to approximately 5 per cent of the capital base. The banks could incur compar-

atively large losses on their equity portfolio without this having significant effects on their annual results. The risk of price movements in the equity portfolio is a market risk that can be calculated with value-at-risk procedures. It differs from counterparty risk in that it does not entail a credit risk. As the risk of such losses is comparatively small, it will not be considered in more detail here.

The risk of movements in the value of interest-bearing securities is likewise, in principle, a market risk. However, this risk normally refers to the risk of interest rate movements that have to do with shifts in the general level of interest rates. Models for measuring market risk do not necessarily capture interest rate movements that stem from decreased creditworthiness. This is because they are normally based on historical observations of interest rate movements; if creditworthiness has been good over a comparatively long period, the credit risk will not be reflected in the model. If the credit rating of the issuer deteriorates sharply, the interest rate fluctuations will be considerably larger than they were previously. If the issuer has suspended payments, it may be impossible in principle to sell the security. In the case of interest-bearing securities, counterparty risk and market risk should therefore be assessed separately. The counterparty risk consists of full principal risk with reference to the issuer of the security.

In connection with issuer risk there is a particular risk when the market risk in an interest-bearing security can be neutralised (hedged) by taking a derivatives position in another issuer's securities. In the even of an interest rate movement that stems from a decline in the creditworthiness of the first issuer, a corresponding interest movement will not occur in the other position. This may lead to losses on a position that the bank regards as covered.

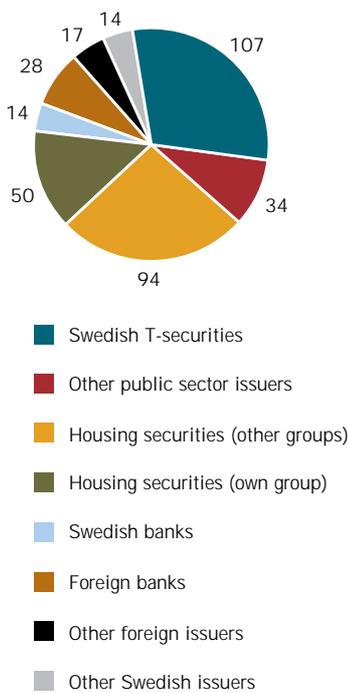
The banks' holdings of interest-bearing securities in August 1998 totalled SEK 358 billion (Fig. 2:6).

23 Assuming that a portfolio of treasury paper has an average maturity of 5 years.

Figure 2:6.

Aggregate securities portfolio: the four major banks.

Total: SEK 358 billion



Approximately 40 per cent of this amount consists of sovereign and local authority securities, for which the issuer risk is virtually nil. The issuers of the remaining securities in these portfolio are thus different types of private institution.

Excluding the sovereign and local authority paper, a large proportion of the bank portfolios of interest-bearing securities consists of bonds and certificates issued by housing intermediaries. The holdings of housing paper total more than SEK 140 billion, which is more than half the value of all the securities that do not have risk-free issuers (Fig. 2:6) and more or less equals the aggregate capital base of these four banks. An appreciable proportion (SEK 50 billion) of the housing portfolio consists of secu-

rities issued by the banks' own housing institutions. As this large exposure means that problems in the housing subsidiary are liable to spread to the parent bank, it is important to consider the risks at group level. Moreover, the large exposures to housing institutions owned by the other banks adds to the risk of effects spreading between the large bank groups.

A large proportion of the banks' portfolios of interest-bearing securities consists of bonds and certificates issued by housing intermediaries.

The remainder of the bank portfolios of private securities is dominated by paper issued by foreign institutions. The largest issuer category here is foreign banks, with SEK 28 billion or 13 per cent of the securities with private issuers.

The management of issuer risk does not differ in principle from the management of counterparty risk in other activities. Exposures to an issuer are included in the limit system as a credit to the issuer. Unlike other exposures, however, the bank is not tied for a certain period because it can sell the security immediately. In that securities are traded, there is a price that should reflect their credit risk. These prices can be used as an indication of the market's credit risk assessment, which supports the bank's internal credit assessment of the counterparty.

Derivatives market

The risks to the banking system from counterparty and settlement risks in the derivatives market are probably somewhat smaller at present than those in the markets that involve full principal risk. Replacement cost risk, on the other hand, is appreciably larger than in the other markets. The concentration of counterparty risks in the Swedish OTC derivatives market is not as high as in other markets. The risks stem from the exacting internal controls that are needed for trading in OTC derivatives, the difficulty in replacing a tailor-made derivatives position in the market when a counterparty defaults and the substantial settlement risk that may exist in certain foreign exchange derivatives.

THE BANK'S ACTIVITIES IN THE
DERIVATIVES MARKET

A derivative instrument is primarily a contract the value of which depends on the price of an underlying asset, such as securities, currencies, commodities materials or indexes. The simplest form of derivative is a forward contract. A firm that sells a product and will be paid in dollars in three months time, takes an exchange risk that the dollar rate will change in the meantime. In order to secure a fixed price for its dollars when they are exchanged three months ahead, the firm can sell dollars in the forward market today. The firm can then be sure of getting the pre-arranged price for its dollars regardless of what the dollar rate happens to be in the future. An alternative is to purchase an option contract, which gives the firm the right to sell at the pre-arranged price but not the obligation to do so if the future dollar rate turns out to be more favourable for the firm.

Most derivatives resemble either forward contracts or options. Swaps can be seen as a sequence of forward transactions, while an interest rate cap is a type of option. The following analysis of the risks will focus on the forward contracts and similar instruments (futures and swaps), as these account for more than 90 per cent of derivatives turnover in the Swedish market.²⁴

Derivatives are used to manage financial risks as well as for speculation. As trading is concerned with changes in value, adjusting positions requires less money than the alternative of trading in the underlying assets. It follows that large positions can be taken with a comparatively small input of cash. Derivatives are therefore said to possess high leverage.

Most derivatives trading by the Swedish banks is either customer driven or a component of internal risk management. Derivatives are used for taking new positions to only a small extent. The trading is undertaken either on exchanges (mainly OM but also LIFFE) or OTC. It is mainly the OTC contracts

that will be discussed here as they tend to be the most risky. The exchange-traded derivatives is discussed in the section on risk management via intermediaries.

Derivatives trading by the Swedish banks is mostly customer driven or a component of internal risk management.

The OTC derivatives can be subdivided in turn into two categories: standardised and tailor-made. The latter are contracts with terms that are agreed in connection with the trade, while the former have standardised terms and only the price is decided at the trade.²⁵ In terms of the number of outstanding contracts, the standardised alternatives clearly predominate but the tailor-made derivatives tend to have the larger value.

The derivatives market has grown very rapidly in recent years. Our contacts in the Swedish banks also perceive the derivatives market as an important source of growth.

DERIVATIVES MARKET RISKS

As in the case of other wholesale markets, counterparty and settlement risks in the derivatives market can be described in terms of the stages of a transaction from the trade to its settlement. It is worth noting that in the derivatives market there are both counterparty and settlement risks.

A factor of major importance in OTC trading is the administrative routines. As most OTC derivatives are negotiated and traded by telephone, all the details in a tailor-made OTC contract—such as time, price and amount—have to be fixed while the trade is being negotiated. This calls for high standard in

24 BIS survey of FX and derivative markets turnover, April 1998.

25 A description of exchange- and OTC-trading in derivatives will be found in *The Micro-structure of Financial Derivatives Markets*, Bank of Canada Technical Report 68, 1994.

26 *OTC Derivatives: Settlement Procedures and Counterparty Risk Management*, BIS, September 1998.



traders' routines for documenting and confirming the details of contracts. A BIS report on the activities of banks in the derivatives markets found that contracts had not been completed in a considerable proportion of trades and in many cases it took a long time to obtain confirmation of all the details of a trade.²⁶ In some Swedish banks, the proportion of trades without confirmed contracts has at times been as much as 35 per cent. All such uncertainty is a source of replacement cost risk to the banks.

A factor of major importance in OTC trading is the administrative routines.

Once a trade has been executed, there is a counterparty risk that lasts until the contract has been finally settled. The size of this risk depends on the market value of the derivative. Depending on price movements during the lifetime of the contract, both the buyer and the seller have either a liability (negative market value) or a claim (positive market value). It is the party with a claim that is exposed to counterparty risk, which lies in the possibility that the party with a liability may not be in a position to honour it. The amount at risk can be seen as an accrued, unrealised profit. This liability accumulates during the life of the contract and in certain cases the risk can become substantial, above all in swap contracts with long maturities. As the size of the risk exposure is dependent on changes in the market value of the contract, we have chosen to regard the risk as a replacement cost risk.

The bank's exposure is accordingly represented by the derivatives contract's market value.²⁷ In practice, the exposure amounts to the net of all the positive and negative market values with each counterparty. However, this net figure represents the exposure only if the banks have what is known as close-out netting agreements, whereby all contracts are netted in the event of the counterparty defaulting.

It is generally the case that illiquid positions, perhaps particularly those in tailor-made derivatives,

entail a higher replacement cost risk because it may be difficult to find another counterparty for a replacement trade. The problem is limited in practice, however, in that tailor-made contracts account for a very small proportion of the market.

Finally there is a risk in the settlement of derivatives contracts. At maturity, the outstanding liability or claim has to be regulated. The settlement procedure often resembles the one described for the securities and FX markets, depending on the type of the underlying asset. FX derivatives make up approximately 76 per cent of the turnover in the Swedish derivatives market and, as mentioned earlier, their settlement normally entails the highest risk to the banks.

In August 1998, the balance-sheet statistics for the four major banks show that the derivatives contracts with a positive value for the banks had a total market value of SEK 138 billion, which is equivalent to 6 per cent of the balance-sheet total and 96 per cent of the capital base.

The banks' counterparty exposures to the ten largest counterparties averaged only 23 per cent of the capital base gross and 13 per cent net. The net exposure to the largest counterparty averaged 18 per cent of the bank's capital margin.

INTERNAL RISK MANAGEMENT IN THE DERIVATIVES MARKET

As the value of derivatives varies with that of the underlying asset, the size of the future exposure is uncertain when the trade is executed. This makes the counterparty risks in derivatives more difficult to manage.²⁸ Resources are required for monitoring changes in derivatives values as well as a continuous readiness to take action when such changes occur. This presupposes effective risk management routines as well as administrative routines. Some methods for risk management that are used to a varying extent, above all for uncleared OTC derivatives, are described below.



- High creditworthiness for counterparty access to the market, often combined with counterparty limits.
- Cash settlements periodically or in response to changes in the value of the contract.
- Early termination options (break clauses) whereby the contract can be terminated on a pre-agreed date or dates when the value of the contract reaches a specified limit or counterparty creditworthiness has declined. Such clauses are not particularly common in the Swedish market.
- Close-out netting agreements, whereby all the positions with a particular counterparty can be netted if the latter defaults. This is a common arrangement. The BIS study on the OTC market indicates that netting can reduce counterparty risks by between 20 and 60 per cent. In the period of the Swedish market survey, netting was a common risk procedure between financial institutions and reduced the banks' exposures to the ten largest counterparties from an average of 23

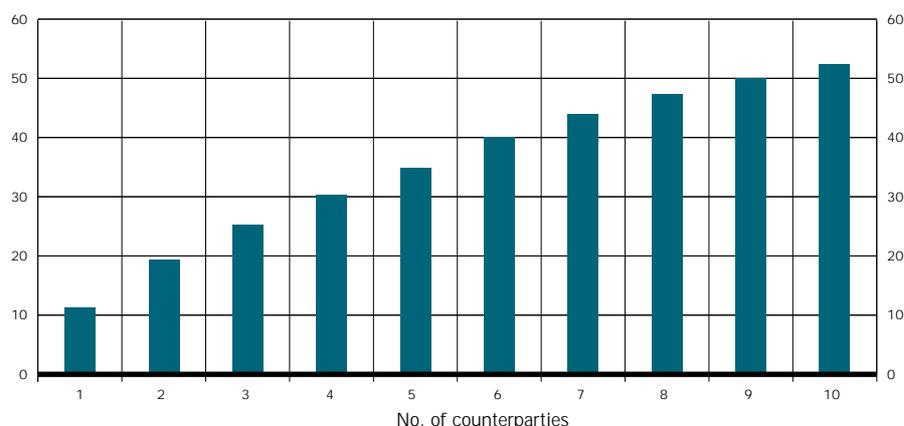
per cent of the capital base to 13 per cent. Netting is normally based on a master agreement.

- Collateral requirements. These have become more widespread in the derivatives market during the past year, a trend that is expected to continue. Collateral is used to reduce exposure to a counterparty as well as to trade with counterparties that would otherwise not have been acceptable. In certain cases, moreover, collateral is used so that the bank can make additional trades with a particular counterparty when the counterparty limit has been reached.

27 The turnover statistics that are often cited show the nominal value of outstanding contracts, which exaggerates derivatives risks to the banks. The size of the international derivatives market is surveyed annually by the International Swaps and Derivatives Association; the surveys cover interest rate swaps, foreign currency swaps and interest rate options. For these instruments the Association estimates that the trading risk is about 2 per cent of gross turnover and 1 per cent net.

28 For a description of OTC counterparty risks, see White, A. (1997), Credit Exposure in OTC Derivatives: A Risk Management Challenge, *Financial Stability Review 2* (Spring), pp. 60–67.

Figure 2:7.
Concentration in uncleared derivatives market: no. of counterparties needed to reach a given percentage of total exposure. Average for the four major banks, measured in August 1998, per cent



The proportion of exposures that are collateralised varies, mainly with counterparty creditworthiness. The banks with the most advanced collateralisation programmes currently have collateral agreements with between 10 and 30 per cent of their counterparties.²⁹ In the Swedish market, collateralisation is less common; it is mainly used by Swedish banks when the counterparty in a derivatives contract is a non-bank. Two-way agreements, requiring both parties to post collateral, are becoming increasingly common internationally but are still infrequent in Sweden.

RISK MANAGEMENT THROUGH INTERMEDIARIES

Counterparty risk in the Swedish derivatives market differs from risks in other derivatives markets in one essential respect. Certain types of derivative that are both traded and cleared bilaterally in other countries are traded bilaterally in Sweden but can then be cleared through a clearing house, OM. Consequently, the traditional division of a derivatives market into two fractions—an established derivatives exchange and OTC trading—does not apply in Sweden. The trades that are sent to OM for clearance are mainly standardised contracts. Up to now, forward interest rate contracts have accounted for the largest share of such OTC clearing through OM. However, as OM introduced an exchange-traded future in September, the development of turnover for these OTC-traded forward interest rate contracts is uncertain.

The use of a clearing house for derivatives has a number of advantages. One is that the clearing house becomes a central counterparty for each of the parties to the original contract. Instead of their mutual obligations, the latter then have a claim on and a liability with the clearing house. The clearing house nets all its obligations and thereby reduces its exposures to a greater extent than an individual trading institution could achieve.

The clearing house nets all its obligations and thereby reduces its exposures to a greater extent than an individual trading institution could achieve.

The counterparty risks to the clearing house are minimised through membership criteria, fixed routines for contract confirmation³⁰ and collateral requirements that cover 95-99 per cent of the expected value of a derivatives contract. The clearing house recalculates the value of contracts on a daily basis and calls for the additional collateral that may be required. Market turbulence may lead to the recalculation of collateral requirements several times a day. The clearing house may also practice periodic cash settlement, often each day for futures contracts. This in turn opens the market to a broader spectrum of customers, which increases liquidity and makes it easier to close positions.

Banks tend to find clearing expensive. Swedish banks are therefore inclined to use their internal risk management routines for counterparty risks with other banks and mainly use clearing for trades with non-bank counterparties. When the market is very turbulent, however, clearing confers a substantial advantage. In a normal market, banks often do not exercise their right to call for collateral on uncleared trades; if collateral is then demanded during market unrest, the counterparties may have problems in providing it because their positions have been built up without allowing for this eventuality and may therefore have become large. In the clearing alternative, collateral is a routine requirement that restricts the size of positions in relation to the party's liquidity.

Repo market

The repo market enhances liquidity in Swedish securities trading and reduces counterparty risks for financing in the wholesale market, mainly because the risks are not as significant as in the interbank market. Repos with Swedish securities, by far

the most common type of repo transaction by the banks, do not entail full principal risk during their life or at settlement. The good mechanisms that are available for managing replacement cost risk in the repo market could be used to a greater extent by the banks. While the repo market is preferable to the interbank market as a source of financing, it cannot replace the latter because the banks can hardly hold security portfolios that are sufficiently large to cover their financing requirement in full.

FUNCTION OF THE REPO MARKET
IN BANKING

A repo, or repurchase agreement, is a financial transaction whereby one party sells a security and simultaneously agrees to buy it back later at the pre-arranged price. The purchaser of the security in the first leg is said to execute a repo, while the seller executes a reverse repo. In that repos are used in Sweden mainly in the money and bond market, it is this repo market that is significant for Swedish banks and it is therefore only this repo market that will be considered here.³¹

Repos can be distinguished by the purpose of the transaction. *Firstly*, a repo can be seen as the spot purchase of a security combined with the simultaneous forward sale of the same security. This instrument is then an alternative to separate spot and forward transactions in securities trading. *Secondly*, a repo can be seen as a way of borrowing a particular security, though the security is actually purchased and sold instead of being lent and returned. Lending securities facilitates the intermediary function in securities trading. As market makers in the interest rate market, for example, banks may need to borrow securities because they are required to set prices and may therefore have to execute trades in securities they do not currently hold. In such a situation, the security they do not possess can be obtained by executing a repo. *Thirdly*, a repo can be seen as a combination of deposit and lending transactions; the seller of the security in the first leg acts as a borrower of cash from the counterparty and then returns the cash when the repo matures and the

security is bought back. The security in this transaction provides the lender with collateral.

Repos can be seen as a combination of deposit and lending transactions.

In the light of this, the banks' repo trading can be said to have two main functions. One involves using repos as an alternative to other instruments for trading in securities. As in the case of securities trading in general, banks largely use repos for customer-driven trades, for example in their role as market makers. Other uses of their trading stock are the financing of spot positions, hedging and taking positions on their own account, though the latter is a limited activity, as are other trading functions.

An important aspect of the repo trading is the opportunities it provides for investors with relatively long-term security holdings to increase the return on their portfolios by offering the securities for which there is a demand in the repo market. This means that long-term investors such as insurance companies can be more active and enhance market liquidity.

Compared with interbank market loans, loans in the form of repos involve considerably lower counterparty risks.

The other main function of repos for the banks is as a supplement to the interbank market. Like the interbank market, the repo market is a forum for short-term loans, with the difference that repo transactions require collateral. Banks can use repos as well as interbank borrowing and lending to finance a liquidity shortage as well as to invest surplus liquidity. Compared with interbank market loans, loans in the form of repos involve considerably lower counter-

29 *OTC Derivatives: Settlement Procedures and Counterparty Risk Management*, BIS, September 1998.

30 In exchange trading of derivatives, confirmation and matching are arranged directly in connection with the execution of the trade, at least if the trades are executed electronically, as they are by OM, for example.

31 For an extensive review of repos as financial instruments and the Swedish repo market, see Ragnartz, C. & Östberg, J. (1997), *Quarterly Review* 3/4, Sveriges Riksbank.

party risks, which means that the borrowing rates can be lower than in the interbank market.

Besides functioning as an alternative to lending and borrowing in the interbank market, the repo market can be used—in that the loans are collateralised—for financing by players that do not qualify as counterparties in the interbank market. This applies, for example, to Swedish non-financial firms, which often have a securities portfolio as a repository for current assets. These portfolios can be used in repos for short-term financing on terms that are more favourable than other financing arrangements.

The repo market and the interbank market both have meaningful functions. In the context of stability, the repo market is to be preferred. For financing, however, it presupposes a holding of appropriate securities. The present size of the banks' securities portfolios would not enable them to cover their liquidity requirements in the repo market alone.

In order to promote the development of the repo market, since 1992 the Riksbank offers its primary dealers a repo facility in treasury and housing paper with the Riksbank as the counterparty. These “market-facilitating” repos give the banks guaranteed access to securities and this has tended to enhance repo market liquidity.

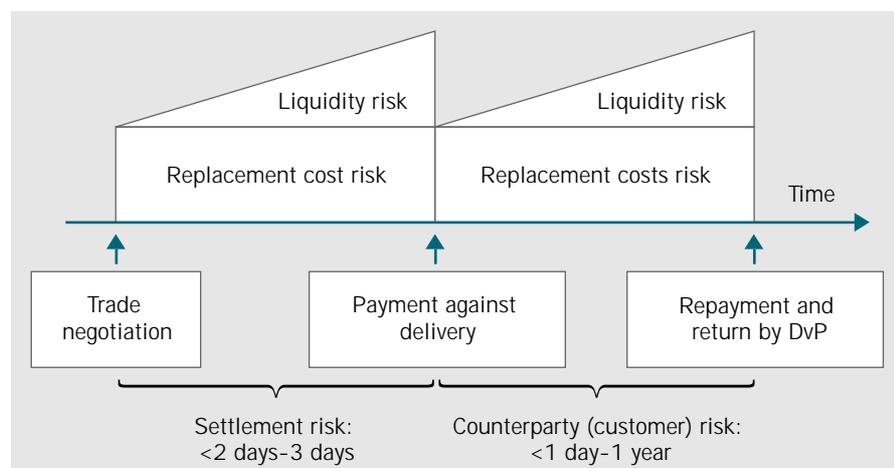
RISKS IN THE BANK'S REPO ACTIVITIES

Irrespective of the activity's purpose, the counterparty risks to the bank in repo market loans are much smaller than the corresponding risks in the interbank market. Full principal risk does not apply in that, if the counterparty defaults, the bank can hold onto the securities that were provided for the repo. In particular situations, however, full principal risk can arise: if the defaulting counterparty is also the issuer of the securities³² or in the event of the simultaneous failure of the counterparty and the issuer. Repo settlements entail full principal risk only if they do not follow the principle of DvP. As the settlement of the Swedish banks' repo transactions, which is done through either VCP or Euroclear, is invariably based on DvP, full principal risk does not arise at any stage in the transaction.

A replacement cost risk exists throughout the life of a repo (Fig. 2:2, p. 24). Changes in the value of the security used as collateral can lead to a difference between the cash payment that is due at maturity and the value of the security at that time. As one party risks losing just a small fraction of the underlying amount, the replacement cost risk is much less serious than full principal risk would be.

As in the case of derivatives, the risk situation is affected by the duration of the repo: the shorter the

Figure 2:8
Risks in the stages of a Swedish repo market trade.



maturity, the less probability there is of the counterparty defaulting. The probability of an appreciable change in the value of the security is also smaller for short maturities. The replacement cost risk varies, as in the derivatives market, with the value of the securities but as repos in the Swedish market are usually very short (often less than one week), exposures are smaller than in the derivatives market. Moreover, in that a combination of default and a negative change in the value of the repo security is required to generate a loss on the bank's position, this exposure is less risky than an exposure of the same size in the interbank market.

A loss on the bank's position presupposes a combination of default and a negative change in the value of the repo security.

A repo transaction involves exchanging securities for cash on two occasions: when the repo is executed (one party delivers the security to the other in exchange for cash) and again at maturity (the security is returned in exchange for loan repayment, including interest). The settlement risks are the same as for other securities trading and are discussed in the section on securities trading with reference to Swedish interest-bearing securities. The risks correspond to those for straight spot trading except that a repo transaction involves two settlements.

Liquidity risks in repo transactions resemble those in the interbank market. Players using the repo market for short-term financing requirements may encounter liquidity problems if the bank providing the loans defaults or is unable to complete the transaction for other reasons. An insufficiently liquid repo market increases this risk.

In the measurement period, the banks' repo market lending averaged about 6 per cent of their balance-sheet total and their borrowing averaged 7 per cent. The corresponding figures in the interbank market were 3.8 and 8 per cent. In other words, the banks' repo market claims are almost one-and-a-half times larger than their interbank market

claims, while the difference in liabilities is smaller.

As the counterparty risk to the bank in the interbank market lies in their lending, the fact that borrowing here is larger is positive. The opposite relationship in the interbank market is comparatively less important because the difference in risks to the bank between the two types of transaction is large in the case of lending but appreciably smaller for borrowing. The banks' borrowing is exposed above all to a liquidity risk. This risk can admittedly be said to be larger in the interbank market than in the repo market because a counterparty may be more prone to withdraw funds from an unsecured position than from a transaction that is collateralised. Moreover, the bank is in a better position to find new financing if a counterparty withdraws repo funds—it then recovers its repoed securities and can use them for financing elsewhere. However, the differences are less dramatic than in the case of lending.

For lending as well as borrowing, the banks' counterparties are predominantly Swedish institutions. About 30 per cent of repo activities have foreign counterparties. The repoed securities are almost exclusively Swedish treasury and housing paper.

For stability, the repo market is a positive alternative to the interbank market.

In the context of stability, the repo market is a positive alternative to the interbank market. In that collateral is exchanged for the loan, the counterparty relationship does not involve full principal risk. Exposure to full principal risk in connection with settlement occurs to only a very limited extent in that DvP is used almost exclusively in the settlement of Swedish banks' repo transactions in Sweden.

³² In this situation it is questionable whether the terms security and collateral apply.

RISK MANAGEMENT IN THE REPO MARKET

Risks to the banks in the repo market consist largely of liquidity and replacement cost risks, which can be reduced with the appropriate mechanisms for managing risk. For this purpose it is important that the banks monitor two variables: the creditworthiness of counterparties and market movements in the relevant securities.

Repo market positions are normally included in the bank's limit system. In that the positions are secured, it is not the full value of a repo that has to be accommodated, just an amount to cover the replacement cost risk. This amount is calculated most simply as a standard percentage of the underlying value, irrespective of the maturities of the repo and the security in question. But as replacement cost risk varies with these factors, it is more prudent to allow for them so that, for example, a repo in a long T-bond uses up more of the credit line than a repo in a T-bill.

The banks differ in the extent to which they have developed procedures for measuring and recalculating the utilisation of credit lines in the repo market. The level should be recalculated to incorporate changes in the value of the underlying securities. Frequent recalculations reduce the risk of the limit being exceeded on account of market movements. Daily marking to market is advisable in this respect.

An efficient and sufficiently liquid repo market presupposes that the activities have a sound legal foundation. Important aspects in this respect are the existence or otherwise of an irrevocable right to securities pledged by a counterparty, the extent to which netting agreements are used and whether they are legally enforceable. If the mutual positions of two parties are the opposite of each other and netting out can be arranged, replacement cost risk will be reduced correspondingly. The growing use of the PSA/ISMA³³ General Master Repurchase Agreement (GMRA) in the past year or so has contributed to the growth of the repo market. GMRA is an internationally valid standard agreement that pro-

vides a legal frame for repo transactions and provides for conceivable situations that may occur between the parties in a repo transaction, including the netting procedure. Most of the repo trades in the Swedish market are judged to be based on this standard agreement.

The trend towards an increased use of standard agreements is partly driven by the implementation by the EU Capital Adequacy Directive (CAD). However, the interpretation of CAD varies from country to country. The implementation in the repo market in Sweden is stricter than in, for example, Denmark and the United Kingdom, which may hamper market growth. CAD treats repos as secured loans to which the capital adequacy rules apply. Repo market participants usually have a considerable number of positions with a particular counterparty and an important question in the context of capital adequacy is whether it is permissible to net these positions when calculating capital cover. The alternative—separate capital cover for the claims of each party—entails higher costs and thereby less incentive to participate in the repo market. The Swedish implementation of CAD is such that the net calculation of capital cover is restricted to cases where the parties conclude a new agreement each time there is a change in their mutual positions. With the growing turnover in the repo market, this is not feasible. It is therefore the Riksbank's opinion that a revision of the implementation of CAD should be considered so that repo market growth is not hampered by rules that are not fully regardful of the risk-reducing mechanism.

In the Riksbank's opinion, a revision of the implementation of CAD should be considered so that repo market growth is not hampered by rules that are not fully regardful of the risk-reducing mechanism.

Conclusions

RISKS IN THE MARKETS AND THEIR INTERRELATIONS

The analyses in this chapter of the counterparty and settlement risks to the Swedish banks provide a picture of the size of the risks in different activities, besides identifying and ranking the variants of these two risk categories. The main risks and the activities in which they are most prominent are summarised in Table 2:2 together with an indication of the level of risk in each market. The latter is done by relating the banks' total exposure in the market to their capital base, accompanied by the absolute size (in SEK billion) of the four banks' aggregate exposure. It should be emphasised that the figures are rough approximations by the Riksbank, based on information from a variety of sources. They are intended to indicate the magnitude of the risks and do not constitute statistical material. Moreover, the estimates

are based on the Riksbank survey and do not include branch activities. The absence of figures from branches means that the estimated exposures are on the low side; in a number of cases this underestimation is probably relatively large.

It may be instructive to compare the magnitude of these exposures with the banks' exposures to credit risk in their stocks of loans to households and firms. The stock of bank loans to households totals approximately SEK 150 billion and the stock of corporate loans approximately SEK 370 billion (roughly 100 and 250 per cent, respectively, of the capital base). Adding the loans from housing institutions brings the stocks up to approximately SEK 630 billion for households and SEK 700 billion for firms (440 and 490 per cent, respectively, of the capital base). While these exposures are larger, the port-

33 Public Securities Association/International Securities Market Association.

Table 2:2.
Compilation of exposures
in wholesale markets

Market	Full principal risk	Replacement cost risk*	Liquidity risk
<i>Interbank</i>	68% of capital base 98 billion SEK	—	Present
<i>Foreign exchange</i>	212% of capital base 305 billion SEK	—	Present
<i>Securities</i>	144% of capital base 216 billion SEK	C. 2% of capital base 3 billion SEK (c. 100% of capital base)	Present
<i>Repos</i>	—	Ca 14 % av kapitalbas 20 billion SEK (c. 700% of capital base)	Present
<i>Derivatives</i>	—	96% of capital base 138 billion SEK (c. 6,000% of capital base)	—

*For securities and repos, exposure to replacement cost risk amounts to just a small fraction of the full amount outstanding; a standardised figure of 2 per cent of the capital base is assumed here. The percentages in parentheses refer to the full amount outstanding. In practice, the size of exposures to losses varies with the conceivable shift in interest rates and the maturity of securities in the trade. For derivatives, the net exposure to replacement cost risk is the total market value of deviates positions in the banks' balance-sheet assets.

Source: The Riksbank.

folios are highly diversified. The exposures in the wholesale market include larger positions with individual firms as well as exposures to the same firm in more than one of the sub-markets. The wholesale market exposures add up to more than SEK 750 billion and accordingly exceed the separate exposures to the household and the business sector. Once again it should be emphasised that these are simply rough approximations that have been made for the purpose of comparing exposures in the banks' different activities.

It appears to be particularly important to improve risk management in the settlement of FX transactions.

Table 2:2 indicates that the average total exposure of the banks to principal risk in the *FX market* is considerably greater than in the interbank market. It therefore appears to be particularly important to improve risk management in the settlement of FX transactions.

For the FX market, the move towards PvP settlement that CLS Bank is heralding is positive. An increased use of ECHO and similar clearing houses would also help to reduce risks. Another approach could be to make greater use of agreements that allow cash settlement of FX trades that are executed to take a position, and delivery of the currency is not required. Even in cases where PvP settlement is not available, exposures can be reduced by netting, always provided this is legally enforceable in the event of counterparty failure; otherwise the netting confers no benefit.

In the *interbank market*, an improvement in risk management could be achieved if the use of the repo market for interbank financing were to go on growing. This could be promoted by the authorities amending capital adequacy standards so that more regard is paid to the reduction of risk that is achieved with repos. For this reason the Riksbank has addressed the Financial Supervisory Authority and requested a more risk-adapted implementation than at present.

In the interbank market, an improvement in risk management could be achieved if the use of the repo market for interbank financing were to go on growing.

It should be noted, however, that the banks' securities portfolios are not large enough at present for the repo market to serve as a substitute for the interbank market. It is therefore important that collateral is used where it is most needed. Requiring collateral for OTC derivatives with a highly volatile market value may be more appropriate, for example, than lending in the repo market instead of the interbank market to a creditworthy counterparty in search of a short-term loan. Other mechanisms should also be used in an endeavour to reduce risks to acceptable levels. Limit systems can be improved by constructing them to promote a wider diversification of interbank market lending as well as a stronger incentive to prefer the sounder of two counterparties.

In the *securities market* there is exposure to full principal risk for holdings of securities issued by private institutions (issuer risk) as well as replacement cost risk in the settlement of securities trades (Table 2:2, p. 43). Approximately one-fifth of the issuer risk comes from exposures to housing subsidiaries and approximately two-fifths each from exposures to other housing intermediaries and other private issuers, respectively. Issuer risk is comparatively large—the exposure is almost twice as large as the exposure to the interbank market. As issuer risk mainly comes from the bank's own and other banks' housing institutions, it increases the risk of financial problems spreading between the dominant institutions in the Swedish financial market. Besides the issuer risk in securities issued by Swedish housing intermediaries, there is the banks' loans to housing institutions, which total the equivalent of 85 per cent of the capital base. The major part of this loan stock probably represents exposures to the bank's own housing institution. In view of this, risks in the bank sector should be considered at group level and not just in terms of the individual bank and housing institution.

As issuer risk mainly comes from the bank's own and other banks' housing institutions, it increases the risk of financial problems spreading between the dominant institutions.

The repo market provides further cause to consider risks at group level. It happens that, in a repo transaction, Swedish banks accept a counterparty's securities that have been issued by the latter's housing institution. There is probably a close relationship between the borrower's ability to pay and the value of the securities. If the counterparty has problems with payments, there is a large risk of the security's value falling (similarly, problems for the issuer of the security increase the risk of the borrower having problems too), leading to a substantial loss. This loss is liable to be greater than the exposure to losses due to market movements, even if these are sizeable. There is therefore reason for the banks to scrutinise the management of repo transactions in this respect. As collateral for its loans, the Riksbank no longer accepts securities issued by companies in the borrower's group.

Besides the issuer risk discussed above, the concentration of risk between the four major banks in the Swedish market is pronounced in other respects, which heightens the risk of contagion if problems break out in one bank. This situation is fairly typical in small countries with a few large banks. But it may still be a problem in that the banks may tend to rely unduly on each other as "too big to fail", so that these counterparty risks are not treated as prudently as risks with other counterparties. In this way their actions may be self-fulfilling because their mutual exposures are so large that the Swedish economy could not cope with the failure of one of them. It is therefore important to monitor the development of these exposures, with action by the authorities if necessary to reduce the risks of unsound behaviour.

There is a pronounced concentration of risk between the four major banks in the Swedish market, which heightens the risk of contagion.

Settlement risks in *securities trading* are comparatively small (Table 2:2, p. 43). This is mainly because Swedish banks mostly trade in securities that have been issued by Swedish borrowers and are settled in VPC. As VPC uses DvP settlement, the banks are only exposed to replacement cost risk. Of the Swedish banks' turnover in the money and bond market,³⁴ approximately one-third consists of spot trades and two-thirds of repo transactions. The major part of the settlement risk is accordingly in the repo market. For the relevant instruments in the bond market, the settlement risk amounts to only a few per cent of the underlying exposure. The comparatively low exposure relative to the capital base means that the risks are very much lower than in the foreign exchange and interbank markets. It should be underscored, however, that liquidity problems can arise if VPC settlement ceases to function. Such liquidity risks are not considered in more detail in this Report.

Repo market risk is not confined to settlement risk in the form of replacement cost risk in connection with the exchange of securities for payment. There is also a counterparty risk in the exposure in outstanding contracts; this has been treated as a variant of replacement cost risk in the present Report and in Table 2:2 (p. 43) it is included in the figure of 250 per cent of the capital base that is the estimated total exposure to replacement cost risk. This risk also amounts to just a few per cent of the underlying exposure in a repo transaction and is therefore small compared to other counterparty and settlement risks. But there is still room for improvements in the banks' management of repo risks. Examples of relevant risk management mechanisms are daily marking-to-

³⁴ Excluding forward contracts and options.



market of outstanding positions and the use of additional collateral.

The amounts underlying derivatives contracts are extremely large, totalling about 6000 per cent of the Swedish banks' capital base (Table 2:2, p. 43). However, the actual exposure to a counterparty in a derivatives contract amounts to a very small fraction of the underlying value, often 1-2 per cent. In that derivatives contracts are booked at market values, the actual exposure is visible in the balance sheet. It is equivalent to 96 per cent of the capital base or much the same as the exposure to the interbank market. An important difference from the interbank market is the frequent occurrence of derivatives contracts with positive and negative market values with the same counterparty. Provided there is a netting agreement, counterparty risk can be reduced substantially.

The sources of liquidity risk in the different types of wholesale market transaction have been described earlier in this Report. Liquidity risk cannot be assessed, however, by comparing exposures, as has been done here for full principal risk and replacement cost risk. Their valuation requires, for instance, that a bank's overall liquidity situation is considered. Liquidity risk is also central in assessments of how clearing houses contribute to risk reduction in the payment system. At a later date the Riksbank intends to present an analysis of liquidity risk that is more comprehensive than there has been room for in this Report.

GENERAL ASSESSMENTS OF COUNTERPARTY AND SETTLEMENT RISKS

In addition to the assessments presented above concerning segments of the wholesale market, risk and risk management have a number of dimensions which these segments have in common.

One much-discussed tendency at present is full automation of trades from execution to settlement with a view to reducing the operational risks associated with trading in financial instruments. This

procedure, often referred to as Straight Through Processing (STP), reduces the manual input and the associated risks in the form of errors. Increased automation could lead to shorter settlement times and thereby reduce exposure to replacement cost risk. Arguments are sometimes heard for the settlement of transactions as soon as a trade has been executed.

The Riksbank considers that increased automation and shorter settlement times are positive in that they reduce the total exposure to risk in the financial system. But to go as far as settling trades at execution would hardly be feasible or even desirable. This is because the workings of the market require the presence of market makers who are always prepared to buy and sell in the market and must accept the offers they receive at the prices they set. This means, for example, that a market maker may be obliged to execute several sales of a particular security before he has an opportunity of beginning to buy it back. In practice, then, immediate settlement would mean that a market maker must either have a virtually unlimited stock of each security for which he has undertaken to make a market or adopt relatively narrow limits for this undertaking. The former is simply unrealistic and in the latter case the functioning of the market would be weakened appreciably if market makers have to suspend price-setting in a turbulent situation.

In practice, immediate settlement would mean that a market maker must have a virtually unlimited stock of each security for which he has undertaken to make a market.

The function of the market needs to be discussed before considering more far-reaching changes in the settlement process. In this context it should also be borne in mind that the scope for Swedish solutions is limited because many traders in Swedish paper also deal in other countries' securities. It is therefore important to arrive at an international consensus on matters to do with the duration of settlement processes.



The most important mechanism with which the Swedish banks manage counterparty risks is their internal limit systems. A drawback with current systems is that they normally do not cover all types of position with a counterparty. In many cases, moreover, there is no updating in real time. Another matter that needs to be discussed is whether the limits always measure the relevant factors. In the FX market, for instance, limits are imposed on FX positions, which bear no relation to settlement risk. Banks should endeavour to construct limit systems that cover all exposures to each counterparty irrespective of the market in which the exposure is located and whether it represents a counterparty or a settlement risk. The resources for this should be directed at the risks that are perceived as largest. Settlement risk in FX trading, for example, is of a completely different magnitude to settlement risk in securities transactions.

Banks should endeavour to construct limit systems that cover all exposures to each counterparty.

Basically, counterparty and settlement risks are problems that arise to a large extent in connection with the accumulation of excessively large exposures to a particular counterparty. For credit risks in general, this is countered by the rules against unduly large exposures to individual borrowers.

However, the current large-exposure rules essentially exclude interbank exposures from these restrictions. This exemption might be motivated by the circumstance that banks and other financial institutions that are subjected to supervision can be regarded, at least on average, as less risky borrowers than non-financial firms and that in certain cases financial trading would be less efficient if sizeable positions could not be taken with individual counterparties. On the other hand it can be argued that the risks that arise in financial institutions are greater than those in non-financial firms, in that the former tend to be dependent on investments in volatile markets and often have a high proportion of debt financing.

It is also debatable whether trading efficiency would suffer all that much from positions in the wholesale markets being taken with a larger number of counterparties. In view of the above, the Riksbank considers there are grounds for a more thorough discussion of the construction of the rules on large exposures to financial institutions. These rules have not received anything like the same attention as the capital adequacy regulations. The exemptions are so extensive that the authorities have not provided banks with sufficient incentives to manage their counterparty risks.

The Riksbank considers there are grounds for a more thorough discussion of the construction of the rules on large exposures to financial institutions.

Master agreements are an important way of constructing contracts that can cover all of a bank's transactions with its counterparties. Master agreements in current use are normally constructed for a particular market; efforts should be made to increase the use of master master agreements, which are constructed to cover all types of trades with a particular counterparty. Master master agreements enable a bank, in the event of counterparty failure, to net claims on that counterparty in one market against liabilities in another market. Such agreements can appreciably reduce the risk of losses to banks from counterparties that are active in the same markets; this applies, for example, to the four major Swedish bank groups.

It is unfortunate that the banks' aggregate exposure to their largest single counterparties could be neither estimated nor valued in the present Report. It is only the largest exposures in each market that have been discussed. Still, the exposures to individual counterparties do indicate the existence of a risk that, in an extreme situation, a Swedish bank could incur such large losses from the failure of a single foreign counterparty that it might cease to fulfil the capital adequacy standard. It should be underscored, however, the counterparty in question would have



to be a truly major player in the international financial market. As discussed earlier, there appears to be a greater risk of effects spreading between the four major Swedish banks. Proper assessments of these risks do, however, require better measurements

of the banks' exposures than those presented here. There may be reason for the Riksbank and even the Financial Supervisory Authority to undertake such measurements in the future.

The macro economy and bank sector risks

In the prevailing cyclical phase, there are no grounds for expecting sizeable loan losses. There are tendencies to increased risk-taking, particularly in the property market. But the growth of credit does not seem to be a cause for concern. The financial turbulence means increased uncertainty for the banks but their direct exposure to problem regions is moderate.

In the previous Financial Market Report, the Riksbank noted that credit risks in the bank sector are the type of risk that normally constitutes the greatest threat to financial system stability. In order to identify a build-up of risks in the banking system at an early stage, a number of macroeconomic indicators were introduced with the aim of assessing the solvency of some important categories of borrower. The primary purpose of these indicators is to catch the general macroeconomic risk that is common to the whole of the banking system but may hit individual banks differently depending on how efficiently they manage credit risk. These indicators are followed up in this chapter, with comments on their perceived implications for stability in the banking system. Readers requiring a more detailed presentation of the indicators are referred to Financial Market Report 1998:1.

The macroeconomic situation

In the September 1998 Inflation Report the Riksbank outlined its main scenario, which gave a positive picture of economic prospects in Sweden. An

upward trend driven by strong private and public consumption was foreseen, with a GDP growth rate around 3 per cent in the coming two years. Since then, however, the economic future has become more uncertain as a result of the deeper unrest in international financial markets. There is considerable uncertainty about the extent to which this unrest will dampen international economic activity.

The Riksbank's main scenario suggests that neither the business nor the household sector will probably experience considerable problems with payments in the coming years as a consequence of macroeconomic developments. But there is something of a threat connected with the unrest in the Swedish and international financial markets.

The Riksbank considers that domestically generated and macroeconomically related loan losses in the Swedish banking system will remain at low levels in the coming years.

Considering the basically bright cyclical outlook that was foreseen in the latest Inflation Report, the Riksbank considers that domestically generated and macroeconomically related loan losses in the Swedish banking system will remain at low levels in the coming years. The greatest threat in this respect

is probably that negative effects from the lengthy period of international financial instability will be greater than expected, particularly if the problems continue to worsen and spread to additional countries. In such a scenario one would probably have to allow for the turbulence having negative consequences for economic development in Sweden as well as for Sweden's financial sector, directly or indirectly. Ways in which the financial turbulence could affect the Swedish bank sector are further discussed in the next section.

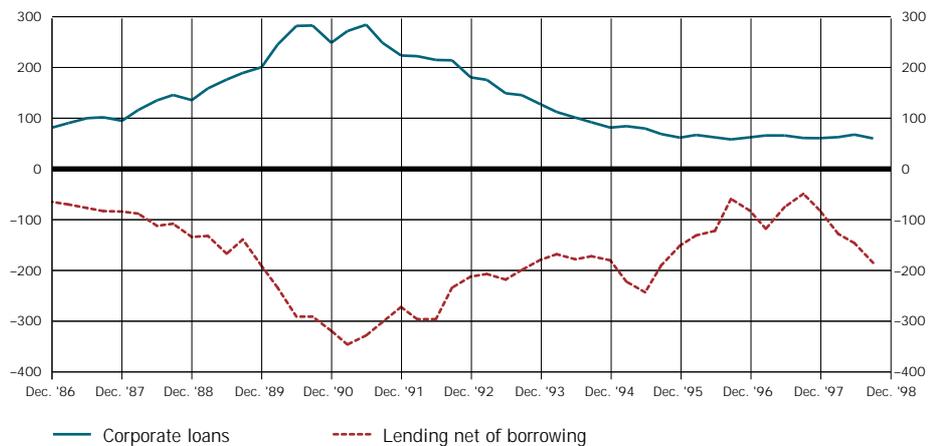
SWEDISH BANKS AND THE
FINANCIAL CRISIS

The recent period of turbulence in the international markets has affected market assessments of credit risks. Although the exposures of Swedish banks to problem regions are relatively small, so that international rating institutions will not question their creditworthiness on that account, even the Swedish market has been hit by investors' general aversion to more risky and illiquid assets. This is evident from the interest rate differentials with the assets that the market perceives as safest, T-bonds. The premium for holding assets issued by the private sector, including banks, rather than sovereign paper—the spread

between interest rate swaps and T-bonds, for example—has widened markedly. In the first fortnight in October the ten-year swap spread in Sweden was around 0.9 percentage points; for comparison, the average spread in the first half of 1998 was 0.3 percentage points. The spread between housing bonds and T-bonds gives a similar picture of an increased reluctance towards credit risk and invest in illiquid assets; with the growing uncertainty since the summer, this spread has widened almost 0.5 percentage points. As a similar picture is discernible in most markets, it can be said to represent the general unrest in the international financial markets and should not be interpreted as a lack of confidence in the future development of the Swedish economy or Sweden's financial sector.

The type of shock that is currently affecting the international financial markets could lead to lower activity throughout the global interbank market and possibly have a negative effect on the supply of liquidity. In the worst case there might be a “liquidity drought” whereby Swedish banks, despite relatively small exposures to the problem regions and to uncertain counterparties such as hedge funds, encounter difficulties in financing foreign currency lending. This happened during the bank crisis in Sweden and

Figure 3:1.
Bank FX loans to non-financial firms and difference between loans to and from foreign banks. SEK billion



Source: The Riksbank.

obliged the Riksbank to support foreign currency borrowing by certain Swedish banks so that these in turn could finance their foreign currency lending.

At the time of the Swedish bank crisis in the early 1990s, Swedish banks had very substantial foreign currency loan portfolios, particularly with the business sector (Fig. 3:1), which meant that liquidity problems arose when confidence in the Swedish banks declined in the international interbank market. As Swedish banks do not currently have such large foreign currency loan portfolios to finance, a liquidity shortage in the global interbank market would not hit them to the same extent as in the early 1990s. In September 1998 the total bank sector's stock of corporate foreign currency loans amounted to about SEK 60 billion and net borrowing by Swedish banks in the international interbank market totalled about SEK 185 billion (Fig. 3:1).

In order to finance their foreign currency lending to the business sector, the banks would have needed to borrow only around SEK 60 billion, net, in the international market. This indicates that the surplus³⁵ which is being borrowed in the international interbank market (about SEK 125 billion in September 1998) is not required for that purpose. The borrowing surplus is a result, instead, of the cheaper financing alternative of borrowing in foreign currency and swapping the funds for Swedish kronor. This implies that more than half of the foreign currency borrowing could be replaced with domestic borrowing. It also follows that more than half of the banks' net borrowing in the international interbank market could be eliminated without the banks encountering any serious liquidity problems.

All this means that Swedish banks are less vulnerable to liquidity shocks in the global interbank market than they were in the early 1990s.

All this means that Swedish banks are less vulnerable to liquidity shocks in the global interbank market than they were in the early 1990s. In the event of such shocks, moreover, other market participants

would probably have a relatively positive assessment of Swedish banks on account of the latter's limited exposures to hedge funds and the regions that are being hit by the crisis. Rating institutions' relatively positive opinions of Swedish banks confirm this. It should be noted, however, that while Swedish banks, in an international comparison, would probably cope with a serious global liquidity shock relatively well, they would be likely to encounter certain problems.

INDICATORS OF A BANK RISK BUILD-UP

As mentioned above, in the past year the Swedish economy has been in a favourable cyclical phase, so that the level of the banks' possible and incurred loan losses has been historically low. Still, during an upward phase there is reason to monitor the build-up of risks in the banking system in view of the difficulty in foreseeing the long-term viability of the projects that are being financed with these bank credits, for example.

GDP growth relative to the development of lending provides an indication of the extent to which increased lending is motivated by the present upward cyclical phase (Fig. 3:2, p. 52). Economic growth and lending have co-varied closely in the period 1995-June 1998 and there are still no signs of the situation becoming unbalanced. In the past year the debt-to-GDP ratio has risen 0.8 percentage points to 104.7 per cent in June, which cannot be regarded as an alarming break in the trend.

Imbalances between economic activity and the aggregate debt burden could have serious consequences in the event of a major, unexpected economic shock. The systemic risks associated with an economic shock ultimately depend on the size of any imbalances that have accumulated in different sectors between liabilities, assets and income. The

35 Net borrowing abroad less foreign currency loans to the corporate sector.

discussion in the following sections therefore concerns the ability to pay of different borrower categories—their capacity for coping with large and unexpected changes in the macroeconomic situation.

Credit risks in the household sector

The annual growth rate for net lending to the household sector by the banks and housing institutions was about 6.5 per cent in September 1998. To set this in a macroeconomic context, the increase in the first three quarters of 1998 can be compared with GDP growth (Appendix: Fig. 1). The ratio of household debt³⁶ to GDP in September 1998 was 40.4 per cent or 1 percentage point higher than a year earlier. The level can be compared with the high of 47 per cent in December 1989.

The deviations in lending to households compared with GDP growth still appear to be moderate.

The deviations in lending to households compared with GDP growth still appear to be moderate. Considering households' high expectations of how their

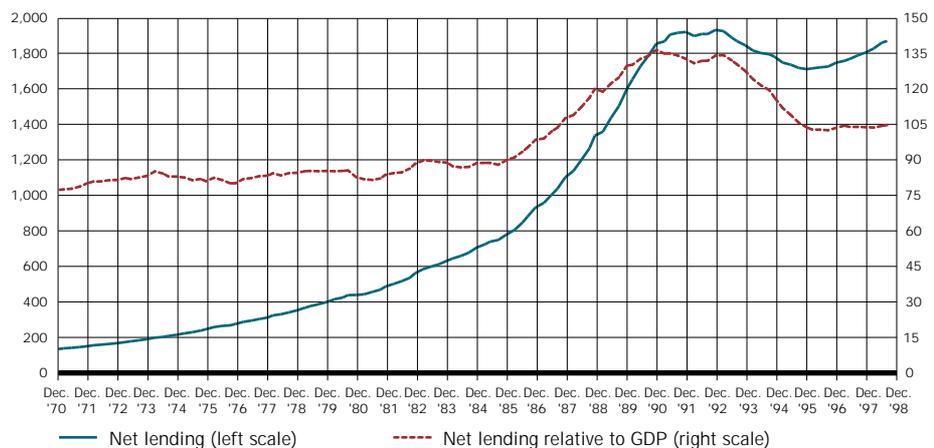
wealth will develop in the coming year, however, care should be taken so that imbalances do not build up.

HOUSEHOLD SECTOR'S ABILITY TO PAY

The ratio of total household debt to disposable income rose relatively sharply in 1997, to 84 per cent from 79 per cent the year before, due to weak income growth (about 0.4 per cent) and a stronger increase in borrowing (about 5 per cent). As this debt ratio in the two previous years had been historically low, 78–79 per cent, the increase was not regarded as alarming. But the Riksbank did point to the risk of a trend break in the burden of household debt relative to the ability to pay, particularly in view of households' currently positive personal economic expectations.

A prediction³⁷ of the debt-to-income ratio for December 1998 shows that the comparatively sharp increase in the debt burden that was observed during 1997 does not suggest a trend break—the increase during 1998 is considerably more moderate. But as household expectations are very positive, indicating that the growth of lending may accelerate, the future path should be followed closely. At the same time,

Figure 3:2.
Net lending by Swedish credit institutions: total (SEK billion) and relative to GDP (per cent).



Source: Statistics Sweden and the Riksbank.

these figures are no more than estimates and should therefore be interpreted cautiously.

With the low level of interest rates, the ratio of household interest expenditure to disposable income reached historically low levels during 1997 (Appendix: Fig. 2). The steep fall in interest rates during 1997 lowered household interest expenditure, which tended to offset the simultaneous increase in the debt-to-income ratio. In the context of stability, the low ratio of interest expenditure to disposable income is positive in that it makes households less vulnerable to sudden interest rate hikes and changes in disposable income.

The ratio of household debt to total assets is historically low (Appendix: Fig. 3). Although this is largely due to increases in the value of household assets (equity and houses), it does not give cause for concern about increased vulnerability in the bank sector. This is because the change in the value of household properties (the dominant collateral for loans to households) appears to be balanced in relation to the change in household debt. In September, house prices had risen about 8.7 per cent since the beginning of this year, while net lending to households in August was about 3 per cent higher than in

December 1997, which indicates that the price rise is not being driven by an excessive expansion of lending. Moreover, house prices fell about 1.2 per cent from August to September, which may mean that households became more cautious in connection with the stock exchange's marked decline since the summer. It is still too early, however, to say whether the price fall represents a trend break.

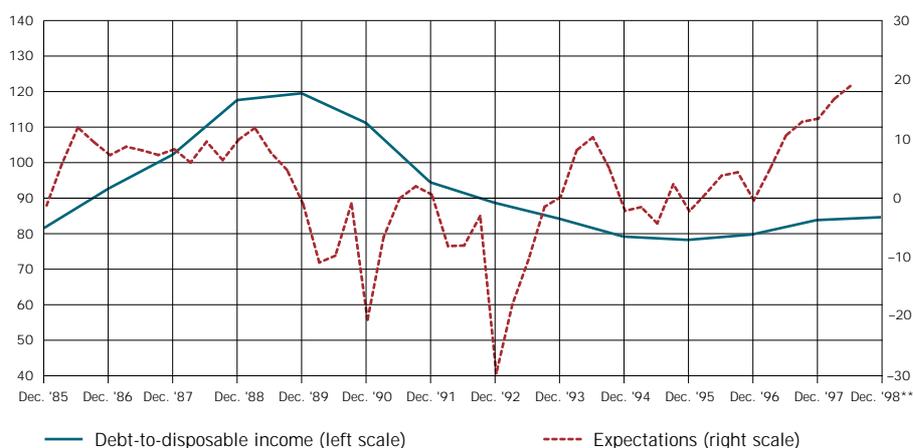
All in all, indicators monitored by the Riksbank to detect a build-up of risks in the bank sector do not give cause for concern about ability to pay in the household sector.

All in all, the indicators the Riksbank monitors to detect a build-up of risks in the bank sector do not give cause for concern about ability to pay in the household sector. Still, there is reason to be on the alert for tendencies that households are relying on expected future increases in wealth and income to

36 Liabilities with banks, housing institutions and other credit market companies.

37 An approximation, obtained with the National Institute's forecast for household disposable income at current prices in 1998 and a projection of households' liabilities, using the increase in August 1998 from December 1997 (3.7 per cent) as the annual rate.

Figure 3:3.
Households' debt-to-disposable income ratio and personal economic expectations*.



*Earlier measurement technique linked at 1997.

**Riksbank forecast.

Sources: National Institute of Economic Research and Statistics Sweden.

cope with a current increase in their debt burden. If such a tendency were to coincide with deteriorations in disposable income and decreased asset values, the problems could become substantial. The personal economic expectations of households are very positive at present but they are likely to become less so in the light of the falling stock exchange this autumn and the negative signals that are coming from the turbulence in international financial markets. That could lead to a slowdown in the growth of lending to the household sector.

Credit risks in the corporate sector

As demonstrated in the previous Report, bank stocks of corporate loans have occasioned the largest loan losses in times of financial instability. In 1992, at the height of the bank crisis, 94 per cent of the banks' total loan losses came from the corporate sector. This provides an indication of the corporate sector's importance for stability in the banking system.

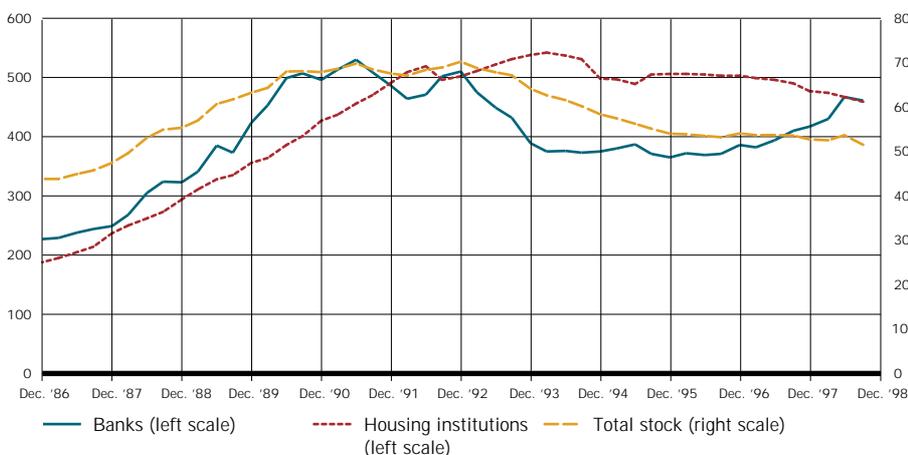
In that Report the Riksbank pointed out that, considering the importance of obtaining an overall picture of the ability to pay in the corporate sector,

there is a deplorable lack of up-to-date and reliable statistics for this sector. As a partial remedy, in cooperation with the Swedish Business & Credit Information Agency, the Riksbank has produced a more relevant statistical foundation for assessing ability to pay in the corporate sector.

The 12-month growth of bank lending to firms was still high, 12.5 per cent, in September 1998 but the level in September was 1.1 per cent lower than in June, which could indicate a trend break. And as lending from housing institutions has also declined, the growth of the banks groups' total lending to firms is moderate, under 2.2 per cent in September 1998.

Relative to GDP growth, the increase in total lending is fairly moderate. Since 1995 the level of corporate loans from banks and housing institutions relative to GDP has fluctuated around 55 per cent, which must be considered moderate compared with the levels around 70 per cent that were reached in 1992. It is worth bearing in mind, however, that the stock of corporate loans from housing institutions—the component that is normally associated with the lowest risk on account of the higher collateral requirements—is falling in favour of bank loans with their larger element of risk.

Figure 3:4.
Corporate loan stocks of banks and housing institutions (SEK billion) and total stock relative to GDP (per cent).



Source: The Riksbank.

Corporate borrowing from banks and housing institutions relative to GDP must be considered moderate.

A fairly weak development of investment during 1997 has been followed by an increase in the first half of 1998. Total gross capital formation rose more than 10 per cent, with an increase of 9 per cent for gross investment in mining and manufacturing.³⁷ Investment plans as well as economic expectations in manufacturing point to a continued growth of investment this year. A comparatively strong development of activity is indicated by the National Institute of Economic Research's business tendency data on orderbooks and stocks of finished goods. It should be underscored, however, that the recent financial unrest is contributing to a high degree of uncertainty about developments in the corporate sector. A number of interim reports for the 3rd quarter of 1998 show that effects in the corporate sector from the international financial turbulence may be more negative than expected.

However, growing corporate loan portfolios represent a threat to the stability of the banking system only if the corporate debt burden becomes unduly large in relation to the ability to pay and the amount

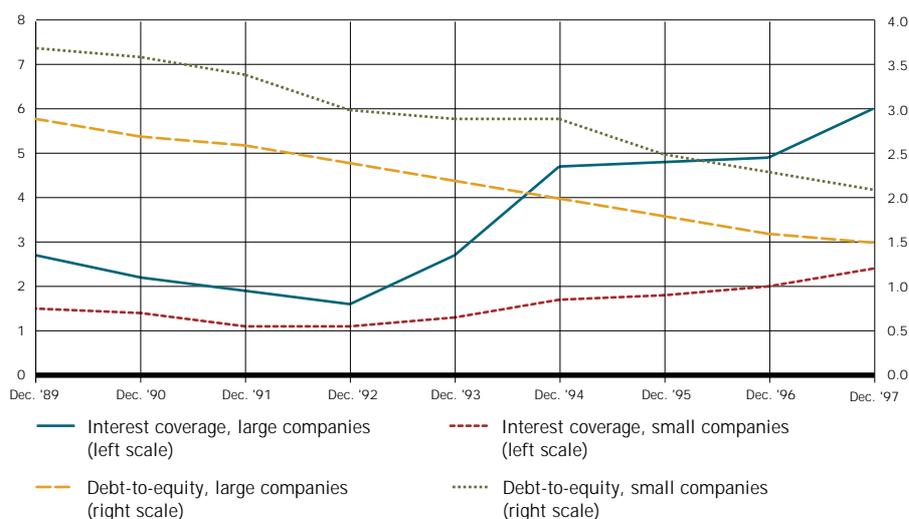
of equity capital. A closer analysis of ability to pay, expressed as the debt-to-equity ratios for small and large firms, provides no indication of the situation becoming vulnerable in this respect in either group (Fig. 3:5). This is supported by statistics on business failures, which show a continuation of the favourable trend—8 per cent fewer bankruptcies in June 1998 compared with June 1997 (Appendix: Fig. 5).

For 1999 there are indications of a slowdown in activity. Statistics Sweden reports that the inflow of domestic as well as export orders is tending to decline. During the summer and autumn the procurement index³⁹ has pointed to weaker tendencies in the future compared with the corresponding months last year. Residential investment is an exception, with virtually little change to date in 1998 compared with last year, but preliminary statistics herald an upturn and stronger construction activity during 1998 is indicated by figures from Statistics Sweden as well

38 Measured as an average of net figures for expected output in the coming months, current stocks of orders and current stocks of finished goods. The absolute level of the survey data is less interesting than the level's changes, which give the forecast path.

39 Compiled by FöreningsSparbanken and the Organisation for Purchasing and Logistics, the index represents the judgements of 200 purchasing managers about their own company as regards the order inflow, output, employment, suppliers' delivery times and own stocks.

Figure 3:5.
Interest coverage and debt-to-equity ratios for large* and small Swedish companies



*Equity capital + 70 per cent of untaxed reserves > SEK 5 million.
Source: Swedish Business & Credit Information Agency (UC).

as the National Institute. The latter points in turn to a recovery in residential investment from the very low levels that have prevailed for a considerable time. As residential construction is comparatively credit-intensive, higher investment here may imply increased credit stocks. But as falling investment in other parts of the business sector may have contrary effects and dampen credit demand there, the overall effects are somewhat uncertain.

All in all, there are signs that investment activity may slacken during 1999, which could indicate expectations of decreased profitability in the corporate sector. As mentioned earlier, there is also a large element of uncertainty about how profitability in this sector will be affected by developments in international financial markets. There are potential risks, for example, among companies with a large proportion of sales in countries that are being hit most heavily by economic setbacks. Moreover, problems with profitability in large segments of the export sector could spread to firms with a domestic-market orientation in that the export sector's suppliers are hit by declining sales.

Property sector

Property is the dominant type of collateral in the bank groups' stocks of loans to firms and households. Loans collateralised with private houses, tenant-owned dwellings and rented dwellings are mainly provided by the banks' housing institutions, while the parent banks arrange most of the loans secured with commercial and industrial properties. Changes in the value of the collateral are highly important for the banks in that they need to cover any loan losses if the borrowers default.

As noted in the section on the household sector, although the price level for 1- and 2-family houses (the dominant form of collateral for loans to households) has risen at an accelerating rate in both 1997 and to date during 1998, it appears to be balanced.

In that the price increases do not seem to have been driven by an unduly rapid expansion of lending, a credit-driven price bubble should not be developing in this market.

The price increases do not seem to be driven by an unduly rapid expansion of lending.

Approximately half of the stock of corporate loans is for property management (including construction companies), which represents a substantial concentration of credit risk to a single industry. Loan losses associated with property and construction accounted for about 70 per cent of the major bank groups' total loan losses in 1997. Continuous monitoring of developments in the property market is therefore an important component of the Riksbank's oversight of financial system stability.

The price index for residential properties³⁹ shows a relatively uniform development in the three metropolitan areas⁴⁰ since the property crisis in the early 1990s, with an accelerating price rise in recent years (Fig. 3:6). Prices have recovered and are now higher than before the crisis. Residential properties are the type of property that is associated with the lowest risk in that rents, vacancies and thereby prices usually vary less than for other types of property. Notwithstanding the lower level of risk in residential properties, it is questionable whether the acceleration of the price rise, from levels that were already high, during the first half of 1998 is economically motivated. If this tendency were to continue at an undiminished rate there is a risk that relatively small changes, above all in the level of interest rates, would have serious consequences for the value of a large segment of the banks' collateral. This is mitigated by the circumstance that residential property rents and thereby incomes are relatively rigid, which means that the negative impact of interest rate increases on the net income is probably not as great as on property values. But the lower vulnerability does presuppose that the indebtedness of residential property owners is not unduly high.



Commercial property prices⁴¹ in the metropolitan regions vary more and the recovery has tended to be strongest in Stockholm (Appendix: Fig. 6). As economic growth in Sweden is also strongest in Stockholm, the price rise for commercial properties seems to be more economically motivated than the increases that occurred before the property crisis in the early 1990s.

The price rise for commercial properties seems to be more economically motivated than the increases that occurred before the property crisis in the early 1990s.

The direct return on a property⁴³ serves as an indicator of the property's expected future value. In that this return needs to cover debt servicing as well as compensation to the owner, it is crucial for the property sector's capacity to service and repay loans. A direct return that does not cover interest expenditure implies that property investors accept a current loss because they count on a future increase in income. In other words, the value of the property or the rent income associated with this is expected to rise. In that interest expenditure is the dominant cost for most property companies, a falling direct return may also mirror expectations of lower interest rates. Expectations of falling interest rates imply that a

comparatively low direct return when the investment is made is judged to be sufficient for servicing and repaying loans in the future.

The direct return on metropolitan properties went on falling in the first half of 1998, though the decline has become flatter for commercial properties (Fig 3:7, p. 58). The fall since 1993 is appreciable and reflects the increase in property prices since the crisis. There are also signs that the decline in the direct return in recent years has been more differentiated, with a concentration to the growth regions, which suggests that the price increases have more substance.

The path of the direct return can be compared with that of the risk-free interest rate, in that the latter can be assumed to be related to borrowing costs in the property sector, besides representing an alternative investment without risk. The development of interest rates is of considerable importance for prop-

41 The housing properties on which the index is based represent 21 per cent of the aggregate taxable value of all residential properties.

42 Stockholm, Göteborg and Malmö.

43 The commercial properties on which the index is based represent 45 per cent of the aggregate taxable value of all commercial properties.

44 The ratio of income net of operating costs to the value of the property.

Figure 3:6.
Commercial and residential property prices in the metropolitan regions.
Index: 1987=100



Source: Catella Information.

erty-owners' earnings because capital intensity is very high in this sector and therefore involves relatively high borrowing requirements that generate interest expenditure. Higher prices and lower direct returns on property are therefore motivated to some extent when interest rates are falling. Moreover, the difference between the direct return and a risk-free interest rate indicates the risk premium that investors in property demand. A small spread (even a negative spread such as was noted in the 1980s and early 1990s) may therefore imply that investors are not demanding adequate compensation for the larger risk compared with T-bond investment.

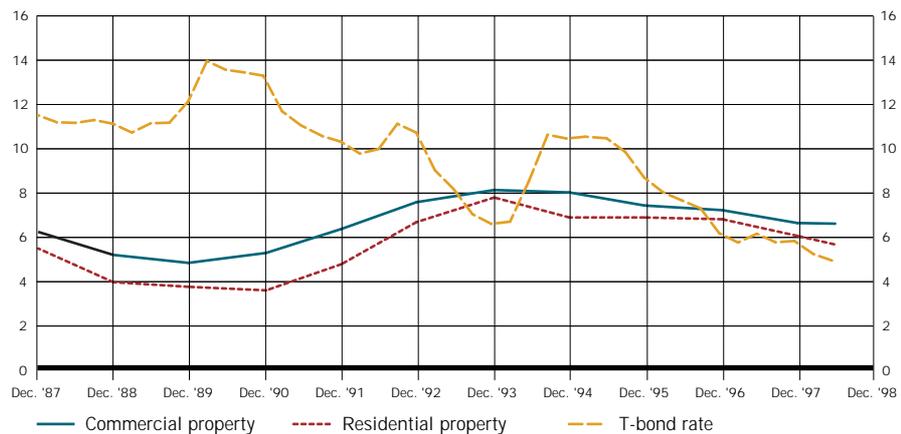
Today the relationship between the five-year bond rate and the direct return on residential and commercial properties in the metropolitan regions appears to be relatively sound. In particular, the increased spread in the case of commercial properties—the type of real estate that is normally associated with the highest risk—is a sign that the price rise is economically motivated. Another important distinction compared with the price rise in the second half of the 1980s is that the price increases in 1997–98 are not being driven by a high rate of inflation, which probably means that property prices are less sensitive to fluctuations in economic activity

than was the case in the early 1990s. The comparison also shows that although the price rise for residential properties in the past six months has been unusually rapid, it does have some substance. At the same time, residential property prices seem to have reached levels at which they are beginning to be relative sensitive to any interest rate increases.

The value of properties as collateral for bank loans is becoming increasingly vulnerable to interest rate hikes and falling property income.

Marked economic changes, such as substantial interest rate hikes or a falling GDP, are not likely to lead to property-related loan losses that have substantial repercussions in the banking system unless falling property values are accompanied by failures in property companies' ability to pay. Measured as the interest coverage ratio⁴³ (Fig. 3:8), ability to pay has steadily improved for the property companies in recent years as a result of falling interest rates. The falling interest rates have also countered the rising trend for the debt/equity ratio since 1996, which would otherwise have implied a declining interest coverage ratio (Fig. 3:8). The falling interest rates have probably been an incentive to use a higher degree of loan financing.

Figure 3:7.
Direct return on property in the metropolitan regions and the 5-year T-bond rate.
Per cent



Source: Catella Information.



The rising debt/equity ratio for property companies heightens the vulnerability to any interest rate increases, which tend to be detrimental for ability to pay. Higher interest rates would probably also be negative for property values and incomes. It follows that the value of properties as collateral for bank loans is becoming increasingly vulnerable to interest rate hikes and falling property incomes. In the context of stability it is therefore important to monitor the debt/equity ratio's rising trend. Since the beginning of 1998, however, the stock of loans from banks and housing institutions with property as collateral has not grown appreciably, which supports the impression that the increase in property prices is motivated relatively well by economic fundamentals and has not been driven by increased credit. At the same time there may have been an increase in unsecured lending to the property sector; this could not be determined from the available statistics.

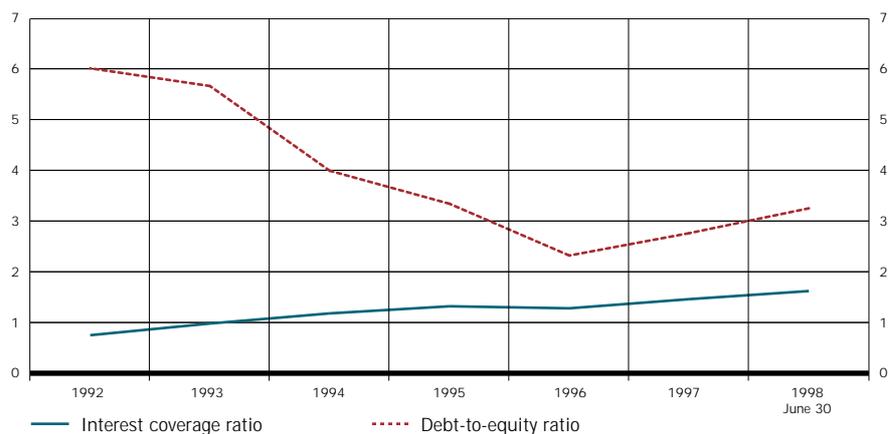
Lending abroad by Swedish banks

The exposure of the four major Swedish banks to foreign counterparties is discussed in this section in general terms, without singling out a particular bank or banks. The Swedish banks' total stock of loans to the rest of the world rose 6.7 per cent in the course of the first half of 1998 (Appendix: Fig 7). Among the problem-burdened regions, there was a marginal increase in lending to Latin America, virtually no change in the case of Asia excluding Japan and a reduction by half in lending to Japan. It can therefore be said that the Swedish banking system's aggregate exposure to problem regions (Russia, Latin America and Asia) is still moderate.

Lending to non-bank enterprises makes up a large share of both the banks' gross lending and their net exposure to the growth economies. A large proportion of these enterprises are Nordic establish-

45 The sum of earnings before financial net and financial income in relation to interest expenditure.

Figure 3:8.
Interest coverage and debt-to-equity ratios for some listed real-estate companies.
Per cent



Sources: Annual accounts.

ments in these regions. Japan is an exception in that the largest proportion of the loans there has gone to domestic banks. Many of these banks have substantial problems of a domestic nature as well as high exposures to problem-burdened countries in the rest of Asia. In view of this as well as Swedish banks' exposures to problem regions such as Latin America, for example, the Riksbank is following the Swedish banks' provisions for losses and the considerations that underlie them.

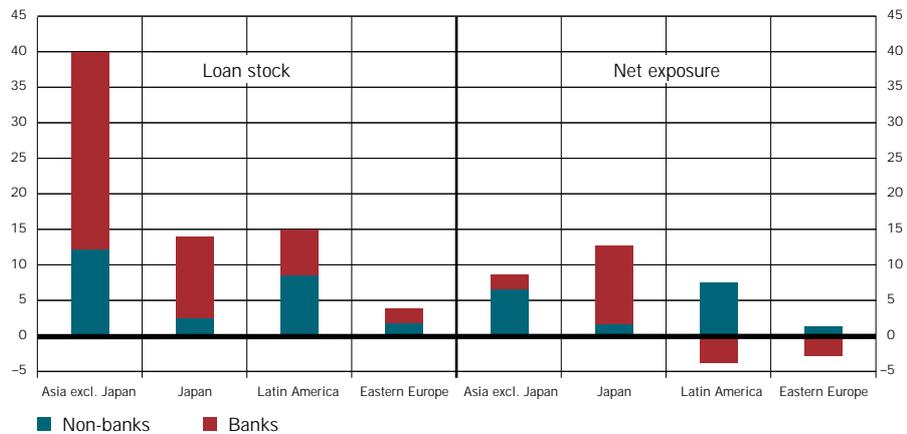
Perhaps the largest risk to Swedish banks from the international problem regions is their indirect exposure to these regions in the form of wholesale market exposures to banks in, for instance, the United States and countries in Western Europe. Many highly-reputable European and American banks have incurred large loan losses on account of substantial exposures to the problem regions. In this

way, major problems in a country hit by a crisis could have consequences for Swedish banks even though the latter's direct exposure to the country in question is limited or zero. Under these circumstances, the Riksbank's analysis of counterparty and settlement risks in the Swedish banking system is an important component in the oversight of the financial system. The analysis provides guidance when assessing the extent to which the international and domestic risks might spread in Sweden's financial system.

The risk to the aggregate Swedish bank sector from losses in the problem regions is still considered to be limited.

In view of the discussion above, the risk to the aggregate Swedish bank sector from losses in the problem regions is still considered to be limited.

Figure 3:9.
The banks' exposures to Asia, Latin America and Eastern Europe, June 1998. SEK billion



Source: The Riksbank.

Year 2000—a threat to financial stability?

Preparations in the financial sector for the turn of the millennium appear to be proceeding largely as planned. This matter is important to the Riksbank as the promoter of a safe and efficient payment system. During 1999 the Riksbank will be increasingly engaged in the preparatory work of the financial sector, since the time would have come to test how different segments of the financial system function together.

The discussion of risks to financial system stability usually focuses on *financial risks*, such as credit and liquidity risks. Various *legal risks* have also been discussed from time to time, for instance with reference to the construction of netting systems. The risks connected with the technical and administrative infrastructure—*operational risks*—are debated less frequently. Considering the high degree of technical complexity of today's activities in the financial system, in a way this is surprising, particularly as there are practical examples of occasions when operational risks have struck and had tangible effects. A clear example with which many are familiar is the crisis in the Bank of New York in the autumn of 1985, when a computer failure meant that the Bank's credit requirement rocketed in the course of a single day and necessitated intervention by the Federal Reserve Bank of New York.

There are grounds, in other words, for stability risks of this type to be analysed, perhaps more than has been the case to date, by central banks and supervisors. At the present time there happens to be a particular operational risk that is generating intensive activity in the financial and central-bank worlds—a risk that is unique in that it applies to everyone simultaneously and at a time that is known in advance. This is the risk involved in the transition to a new millennium.

What does Year 2000 stand for?

Problems with the transition into 2000 would arise if IT facilities are not capable of interpreting the new millennium digits correctly. This is not a complicated matter in itself; the problems lie in the vast and incomprehensible number of computer programmes involved and the fact that there is little time left to deal with them. Part of the difficulty in surveying the extent of the problems and diagnosing them correctly lies in the fact that the chips which are now incorporated in so many applications—machinery, hospital equipment, home electronics and lifts, for example—often have embedded functions that are controlled by the date. Tracing and diagnosing all these circuits is time-consuming work and in this context time is short.

Financial market enterprises have been working on Year 2000 conversion for several years. They are now approaching the phase in which linkages and functions with various external systems are to be tested and assessed. For more than a year now, the Financial Supervisory Authority has been following this work closely and actively on behalf of the Government. Specific standards have also been for-

mulated for the management of the Year 2000 problems by these institutions and their boards. In the international field, central banks and supervisors in the G-10 countries have stepped up their activities appreciably during 1998 and have initiated the formation of the Joint Year 2000 Council as a forum for these issues. The Riksbank has been working on the analysis and conversion of its internal systems for more than a year and is likewise planning tests together with external participants; tests of the RIX system are scheduled for March-April 1999.

There is now a widespread international discussion of problems with the transition to Year 2000 and assessments differ greatly as to the probability of disruptions and their likely effects for particular sectors and total economies, in both a national and a global perspective. There is some agreement that the Anglo-Saxon world has made more progress in readiness work than Continental Europe and that the financial sector is ahead of most other economic sectors. Opinions differ widely, on the other hand, when it comes to the extent of possible disruptions; there are some observers who are talking in terms of depression and chaos. Others, who appear to be in a majority, consider that while the effects may have clear consequences in certain areas, they will be entirely manageable and relatively transitory.

The transition into 2000 will be costly for individual enterprises as well as for national economies.

Without being alarmist, it can be stated that in any event the transition into 2000 will be costly for individual enterprises as well as for national economies; in an economic sense Year 2000 can be seen as a "natural disaster" that destroys parts of an economy's capital stock. It therefore calls for increased investment inputs, not to expand or improve production capacity but just to keep it intact; these expenditures will thus have to be made even if the actual transition occurs without disruptions, a matter that is strongly dependent in turn on such replacement investments being sufficiently extensive and timely. Assessing the likely level of the aggregate costs

is a very hazardous business. Some estimates indicate a level of one to four per cent of GDP, with a variation between countries. In Sweden the Year 2000 costs for the major banks have been judged to be of the order to SEK 2.5 billion. All this indicates that in any event the amounts are economically substantial.

A similar operational risk could exist in connection with the conversion of the EMU countries' currencies into euro at the turn of 1998. This conversion involves numerous changes in various financial systems. Sweden will not be participating in the euro area but Swedish banks will still have to be capable of handling euro and will probably also be affected by any problems in other countries. The Riksbank has therefore started a discussion with banks and other players about this, and the necessity of having a high state of readiness.

The situation at present

As indicated above, in the past year central banks and supervisors all over the world have appreciably increased their Year 2000 activities. This applies at the national level and, not least, in fora for international cooperation. The activities of the Joint Year 2000 Council, with a Secretariat provided by the Bank for International Settlements, include collecting and distributing material, providing guidelines for assessments, arranging meetings and seminars and building up networks for contacts that can facilitate the transition.

In Sweden, the Financial Supervisory Authority has presented two reports to the Government this year that describe the current situation on the basis of survey data from financial institutions and other material. The first report was published on March 31st and the second on October 1st.

The gist of these reports is that the major institutions have made good progress in work on the transition—they are up to schedule and consider that they will be able to cope. The reports also note, how-

ever, that some smaller institutions have made a late start and may encounter problems with the transition. But if they do, it is unlikely that this would constitute a threat to financial system stability because the players that might have problems are of relatively marginal importance in the financial markets. In general, then, the situation looks good. At the same time it must be noted that the aggregate effects on the financial system cannot be assessed with any certainty until the external tests, involving contacts between institutions and authorities, have been carried out. Most of this testing is scheduled for the spring of 1999.

With reference to its reports, the Financial Supervisory Authority has therefore called on the institutions to intensify their preparations still more, analyse the financial risks they face and produce readiness plans. During the autumn, moreover, the Authority will be conducting in-house studies at the institutions which are considered to have key functions, in order to monitor and assess their preparations in detail.

Role of the Riksbank

The Riksbank's statutory function of promoting "a safe and efficient payment system" includes ensuring that the financial market infrastructure functions properly and safeguarding the pathways for financial transactions, matters that are also crucial for monetary policy's implementation. In addition, widespread disruptions on account of Year 2000 problems could have negative consequences for the real economy in a wide sense.

In view of all this, it is only natural that the Riksbank is playing an active part in mapping and assessing the situation for the total financial system as regards the Year 2000 transition and is doing this at the present time, when the systemic aspects are becoming more visible. The aim is to assist in identifying and solving any remaining problems that are relevant for the functioning of the financial system.

This is a matter of avoiding risks and also building up a readiness to manage any disruptions that may occur in spite of all the preparations.

The role of the Riksbank in relation to the financial sector in this context is basically the same as in the context of preparations for European Monetary Union. It amounts to assistance in the coordination of activities, the distribution of information and acting as a catalyst to facilitate the transition.

Some main issues

There are two main aspects to the question of what will happen in the financial sector in the transition from 1999 to 2000:

- how the institutions manage their internal systems and routines
- the nature and force of 2000 disruptions from external sources—customers and suppliers, financial institutions and markets outside Sweden, the general infrastructure (electricity, telecommunications and transportation, for example) and the functions of different authorities.

The disruptions from external sources can likewise be divided into two components: disruptions that spread directly through technical systems and indirect disturbances that arise, for example, from difficulties in obtaining information, borrowers' problems with profitability, general uncertainty that has destabilising effects and so on.

All this means that a bank with large credit exposures to enterprises whose production technology or other factors render them particularly vulnerable to disruptions of this type will then have to cope with the fact that the credit risk is higher than it had expected. This could entail growing loan losses and the associated problems for the bank or, if the bank is not prepared to accept the increased risk, a demand for additional collateral or the cancellation or renegotiation of the loan. In the latter case the problems

would rest with the borrowers, with negative effects on the real economy if such problems were widespread. A similar situation applies to country risks — given that certain countries will have greater difficulties than others in coping with the transition, both the former and/or institutions with sizeable activities there are more likely to be hit.

Risks of such “exogenous” disruptions cannot, in principle, be influenced by the institutions but the institutions can and must identify these risks in order to reduce their *exposure* to them and also have methods and readiness for coping with them if they should arise. This also applies to external disruptions connected with the public infrastructure, such as electricity and telecommunications. In this respect, however, the possibility of mitigating the exposure to risk is no doubt very limited.

The risks that can and must be managed directly and which the Riksbank naturally focuses on, concern the functioning of the sector and its institutions in three main respects, in each of which it is necessary to consider both the practical aspects and the question of confidence.

■ *Safeguarding deposits and accounts*

If people fear that their accounts may be wiped out at the transition to 2000, or at least be inaccessible for a time, they will probably want to withdraw their

money. If such fears are widespread and the amounts substantial, this could lead to problems with bank

liquidity and affect financial system stability.

It is therefore important that the banks are convinced that no such problems will occur and communicate this in a convincing way to the public.

■ *Safeguarding interbank systems for trading, clearance and settlement*

The second respect that is particularly relevant for the Riksbank is the functioning of the financial infrastructure. The interfaces of banks and other institutions with these systems—the Stockholm Stock Exchange, OM, the Central Securities Register (VPC), the bankgiro system (BGC), Data Clearing, the RIX system—must function separately as well as together.

■ *Safeguarding retail payment systems*

The third main task for the Riksbank is to avoid a situation in which payments arranged through giro systems, card systems and so on are replaced for a shorter or longer time by the use of cash. While the Riksbank does have a good state of readiness to cope with an increased demand for banknotes, a greatly increased turnover and handling of cash involves problems with costs as well as security that should be avoided as far as possible.

Conclusions concerning stability

Notwithstanding the global unrest in financial markets, the situation in the Swedish bank sector appears to be stable. In the May 1998 Financial Market Report it was noted that a build-up of credit risks in the bank sector might be in progress. Today, certain indicators show that this build-up has been accentuated, mainly as regards tendencies in the property sector, while others show a slowdown. The analysis of counterparty and settlement risks to the four major banks provides evidence of substantial exposures to Swedish as well as foreign banks. This entails a risk of financial problems spreading from banking systems abroad to Sweden. There is therefore reason to monitor tendencies in foreign banking systems, particularly in the industrialised countries, which is where the exposures of the Swedish banks are largest. One of the more considerable risks to payment system stability that is foreseeable in the near future is the Year 2000 problem. The Riksbank is contributing actively here in the work to make consequences of this problem as small as possible, above all as regards sustaining confidence in the payment system in order to avoid withdrawals from banks becoming so large that bank financing and the supply of notes are threatened.

The macro economy and stability

Recent macroeconomic developments have been marked by the turbulence in international financial markets, where the focus in recent months has been primarily on the problems in Russia and Brazil. Meanwhile, economic activity in Sweden has been rising strongly, giving growth rates that are comparatively high. While the international unrest is probably tending to dampen activity in Sweden, it has not altered the strong underlying trend.

In the previous Report in May 1998 it was considered that the strong activity implied that the banks' borrowers in Sweden would be unlikely to encounter substantial problems with payments in the near future. There were grounds, however, for being

alert so that credit risks to the banks do not build up on a scale that would be liable to result in sizeable problems with payments in a cyclical downturn. These assessments are still broadly valid, though tendencies in the past six months show some deviations from the earlier picture as regards the three borrower categories on which the Riksbank focuses when analysing bank credit risks: the household sector, the corporate sector and the property sector.

In September 1998 the 12-month rate of increase in net lending to households was 6.5 per cent, which is a comparatively high figure but not dramatically different from rates associated with a strong upward phase. The ratio of household debt to disposable income has tended to rise in the past two years but this increase in the debt burden has been accompanied by falling interest rates that have made

the burden less heavy for households to carry. Moreover, the increase in the debt-to-income ratio is probably levelling out during 1998. In relation to ability to pay in the household sector, it therefore seems that the growth of lending is not unmotivated.

The personal economic expectations of households were still strong in August, which could herald a stronger future increase in the growth of household borrowing. Falling stock exchanges and the negative signals that the international financial turbulence is probably sending this autumn may lead to these expectations being adjusted downwards. All in all, the increase in households' liabilities does not appear to give cause for concern.

The 12-month growth of bank lending to firms was still high, 12.5 per cent, in September 1998 but the level in September was 1.1 per cent lower than in June, which indicates a possible trend break. And as lending from housing institutions has also declined, the growth of the banks groups' total lending to firms is moderate, under 2.2 per cent in September 1998. Lending to the corporate sector does not therefore seem to constitute a build-up of risks that might threaten stability. Relative to GDP, the corporate loan stock has been stable since 1995 at around 55 per cent.

The ability to pay in the corporate sector appears to be good, as one would expect in an upward cyclical phase. It has improved for small as well as large enterprises, accompanied by a decreased debt ratio. There are some indications, however, that corporate profitability may decline next year, which might weaken solvency.

Property prices have been rising strongly for a number of years, for residential as well as commercial properties, and the increase has accelerated in the past six months.

Property prices have been rising strongly for a number of years, for residential as well as commercial properties, and the increase has accelerated in the past six months. However, a considerable part of the large increase can be explained as an effect of falling

interest rates and increased income from rents. The direct return on residential properties has not declined to the extent that the large price rise might suggest. In the case of commercial properties, the direct return has been unchanged in the past six months despite falling interest rates. This indicates that there is some balance in the relationship between interest rates, income from rents and property prices. But the strong price rise for residential properties in particular does entail a growing risk of prices falling in a cyclical downturn. The vulnerability to rising interest rates is particularly marked in that increased financing costs for property owners would then probably be accompanied by falling property prices. The stock of bank loans with real estate as collateral has not grown appreciably, which indicates that the increase in property prices is not driven by increased credit and that the banks have not become more vulnerable to payment problems in the property sector.

Today the level of debt among property companies is appreciably lower than at the time of the bank crisis in 1992, which implies less vulnerability to falling prices and rising interest rates. But the level of debt has risen since 1996, making it particularly important to keep an eye on the future path of this indicator. The interest coverage ratio, which serves as an indicator of ability to pay in the property sector, has improved continuously since the early 1990s. Falling interest rates have been a major factor here, while the high property prices may have generated good profits on property sales, which also contributes to higher interest coverage.

All in all, the property sector is the sector where the indicators of risk accumulation motivate heightened attention. It should be underscored, however, that a comparatively large proportion of the price increases in recent years can be attributed to fundamental factors; this is a notable difference compared with the situation in the late 1980s.

The property sector is where the indicators of risk accumulation motivate heightened attention.

Lending by the Swedish bank sector to problem-burdened countries has not changed substantially since the Report last May. The exposures are moderate and many of the loans have been provided for Nordic enterprises in these regions. The risk to Swedish banks is probably greater from the possibility of problems among their major counterparties in the wholesale market. The analysis of counterparty and settlement risks in this Report shows that in certain cases exposures to individual counterparties are so large that a bank could incur considerable losses from just a single failure. Many large and highly reputable banks in the industrialised countries have sustained sizeable loan losses in the problem regions and there is a risk, if the crisis were to go on spreading, of the losses leading to failures among such banks. That in turn could have considerable effects for Swedish banks.

There is also a risk of the financial market turbulence leading to decreased liquidity in the international interbank market. That was a real problem for Swedish banks during their crisis in 1992 but today their liquidity is comparatively good. Compared with 1992, moreover, the foreign currency financing requirement of the banks is appreciably smaller today, partly because their on-lending in foreign currency is considerably lower. Even with the comparatively strong resilience to liquidity problems, however, an extensive global liquidity shortage could probably lead to certain financing problems for the Swedish banks.

Counterparty and settlement risks to Swedish banks

A large part of this Report is devoted to a description of how counterparty and settlement risks arise in wholesale financial transactions and how these risks can be managed. As pointed out, it is through these transactions that financial problems are liable to spread from bank to bank via the payment system. The global unrest in financial markets prompts a look both at the mechanisms whereby such problems

spread and at the vulnerability of Swedish banks in these respects. The conclusions from the assessment of counterparty and settlement risks are presented in some detail in the final section of Chapter 2. It is only the overall assessment that is summarised here.

The assessment of counterparty and settlement risks centres on the risk of a counterparty failing to meet obligations in a financial transaction and the consequences this could have. It is then particularly important to identify the occurrence of full principal risk—the risk of losing the whole of the transaction's underlying amount. In many financial transactions, the only consequence of counterparty default is that the transaction has to be replaced and that price movements in the underlying asset (a security, for example) then entail a loss that is equivalent to a small fraction of the underlying amount. This risk is referred to here as replacement cost risk. The element of risk in transactions involving replacement cost risk is typically smaller than in those that involve full principal risk.

When assessing counterparty and settlement risks, it is particularly important to identify the occurrence of full principal risk.

Counterparty and settlement risks have been assessed in five markets for wholesale transactions. The risks in each market have been considered in relation to each other.

In the *foreign exchange (FX) market*, full principal risk is present in the settlement process, which involves exchanging one currency for another. The risk to the bank arises because of the interval between the time when it sends one currency and receives the other. FX trading is perhaps the market with the largest element of risk in that it has the highest exposures to full principal risk and the mechanisms for managing risk are often not particularly developed. In the cases where netting arrangements are available, for example, their use is comparatively limited.

Lending in the *interbank market* and the banks' own *securities portfolios* are also exposed to full principal



risk but the exposures here are not fully as large as in FX trading and risk management is more highly developed.

Securities trading and repo transactions are associated with replacement cost risk. Exposure to losses here is not nearly as extensive as in the markets with full principal risk. This is because full principal risk is avoided by using settlement systems that arrange delivery and payment simultaneously (DvP). The Riksbank considers that the repo market needs to be promoted because it contributes to increased liquidity in Swedish securities trading and reduces counterparty risks connected with financing in the wholesale market, mainly in that the risks are less substantial than in the interbank market.

Derivatives positions mainly entail replacement cost risk. As the underlying amounts are considerably larger than in securities and repo transactions, the exposure to losses is appreciably higher than in those markets, while it is lower than in the markets with full principal risk.

A general feature of the Swedish market is that in each of these sub-markets there are large exposures between the four major banks. This accentuates the risk of the effects spreading if one bank encounters substantial problems. The situation is fairly typical for small countries with just a few major banks. Nevertheless, it can be a problem in that the banks are liable to be unduly prone to regard each other as "too big to fail", with the result that these counterparty risks are not managed as prudently as other counterparty risks.

In all the segments of the wholesale market there are large exposures between the four major banks.

The rules for large exposures in a bank's assets tend to disregard the exposures that occur in interbank trading. The Riksbank considers there are grounds for discussing the construction of the rules for large exposures to financial enterprises, internationally as well as in Sweden, because at present there are really no restrictions on the size of a bank's exposure to a single counterparty.

The aggregate exposure of the banks to their largest single counterparties has not been measured in this Report, only the largest exposures in each market. These exposures indicate a risk of a Swedish bank incurring major losses on its engagements with a single counterparty, losses that in an extreme situation might bring the capital base below the statutory requirement. In order to arrive at more definite assessments, however, the banks' exposures need to be measured more thoroughly. There is therefore reason for the responsible authorities to improve the monitoring of the banks' exposures to counterparty and settlement risks.

Year 2000 problems

Much work is currently in progress in the financial sector to ensure that the transition to the new millennium can be achieved without seriously harming financial enterprises. The Financial Supervisory Authority considers that the important financial institutions have their preparations well in hand. But as the various institutions and systems have still to be tested jointly, there may be additional questions and problems that have to be solved. The work must therefore continue at a high level of intensity during 1999.

In its statutory function of promoting payment system stability, the Riksbank has a self-evident interest in the Year 2000 transition and its effects on the financial system. This interest is heightened now that testing is entering a new phase that will demonstrate the effects on the system as a whole. In consultation with the financial sector, the Riksbank will therefore be taking an active part in ensuring that the preparations are completed.

A similar operational risk may arise in connection with the conversion of EMU countries' currencies to euro at the turn of 1998. The Riksbank has therefore started a discussion with banks and other players about this and the necessity of having a high level of readiness.



Summary assessment

There are some signs at present that a build-up of the risks associated with bank lending is on the way in Sweden's financial system, in the first place in the real-estate sector. Much of this tendency, however, can be attributed to changes in economic fundamentals. Some build-up of credit risk is also natural in a strong cyclical phase. The warning signs should be read in this light. The assessment in the May 1998 Report that the build-up of risks would probably need to continue for a longer period before it becomes serious, still holds.

The international unrest in financial markets increases the uncertainty in the assessment of financial system stability. A suspension of payments by sizeable international banks is one way in which the problems could spread to Swedish banks. While this risk does exist, determining its probability is very difficult. The risk would grow if the international financial crisis were to go on spreading to other countries.

The direct exposures of Swedish banks to problem countries are comparatively small and the banks,

in an international comparison, look strong at present. That is one reason why they may cope with international turbulence more successfully than banks in other countries. Indicators of the earning power of the Swedish banks are presented in the Appendix. The banks are surpassed in profitability only by American and British banks. Swedish banks, moreover, have the highest level of efficiency measured as costs relative to income (C/I). Profitability, measured as the return on equity capital, seems to be developing satisfactorily, though the international unrest may tend to lower results on account of some increase in loan losses, a decreased net result of financial transactions and lower income from financial trading commissions. The assessment in earlier Reports that the good competitive position of Swedish banks strengthens stability still stands.

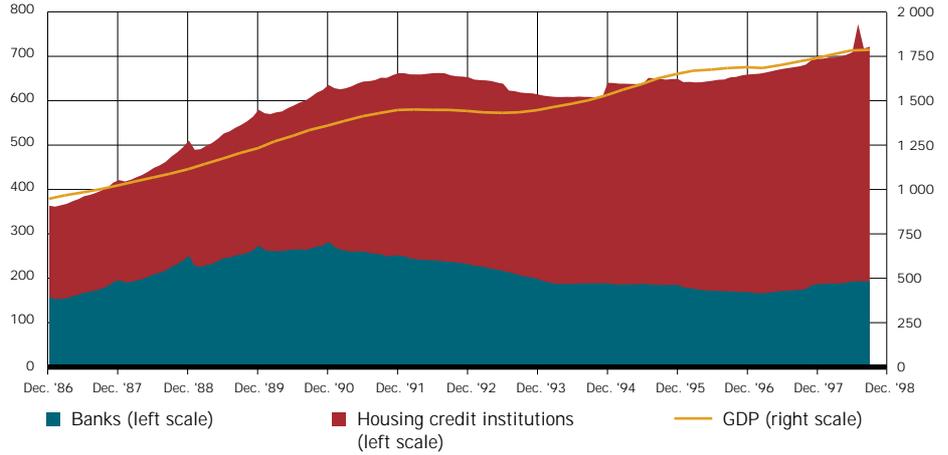
Even with the recent increase in risks, the Swedish financial system is currently stable.

The overall assessment is that, even with the recent increase in risks, the Swedish financial system is currently stable.

Indicators

Household sector

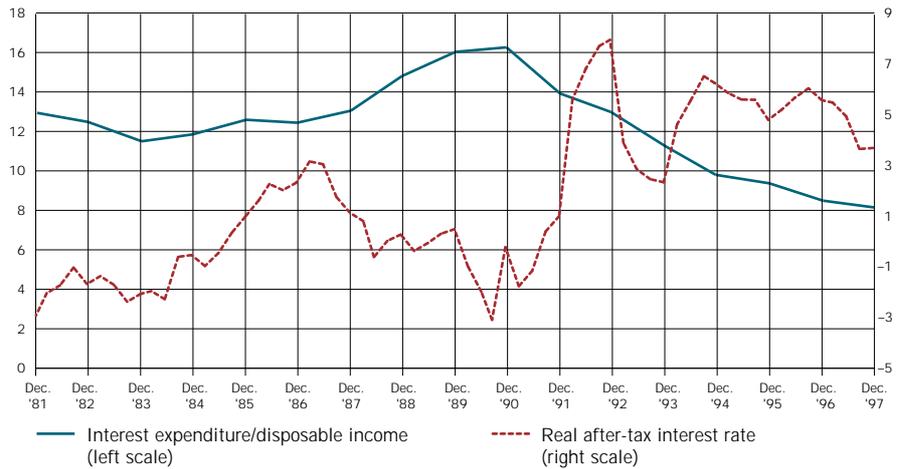
Figure 1.
Lending to households by banks and housing credit institutions; GDP. SEK billion



Sources: Statistics Sweden and the Riksbank.

The increase observed to date in lending to households does not seem to give cause for concern in the light of the upward cyclical phase.

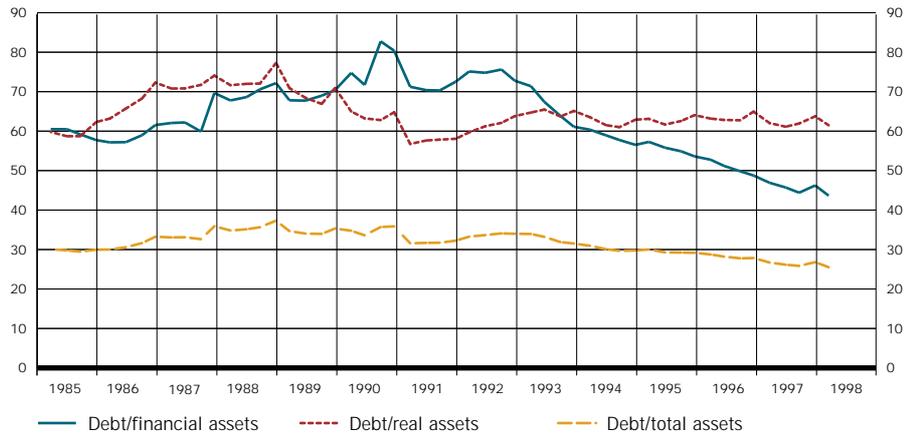
Figure 2.
Households' interest expenditure/disposable income and real after-tax interest rate.* Per cent and percentage points



*Five-year house mortgage rate adjusted for inflation and effect of tax allowances.

With the low level of interest rates, the ratio of household interest expenditure to disposable income has been falling since 1996 even though the ratio of debt to disposable income has risen around 4 percentage points in the same period.

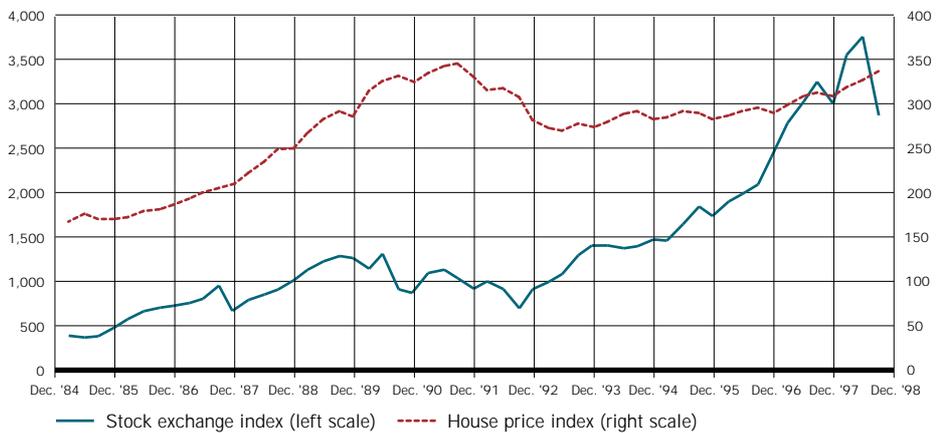
Figure 3.
Household debt-to-asset ratios.
Per cent



Sources: Statistics Sweden and the Riksbank.

The household debt-to-asset ratio has fallen in recent years and this trend has continued in the first half of 1998. With a strong stock-exchange trend and high saving in the first half of the 1990s, the debt-to-asset ratio has declined to the lowest level since 1985. In September 1998 the price level for 1- and 2-family houses—the main type of asset that is used as loan collateral—was about 8.7 per cent higher than at the beginning of the year. Compared to the growth of lending to households, which stopped at about 3 per cent in August this year (compared to December 1997), it seems that the increase in house prices is not being driven by an undue expansion of lending.

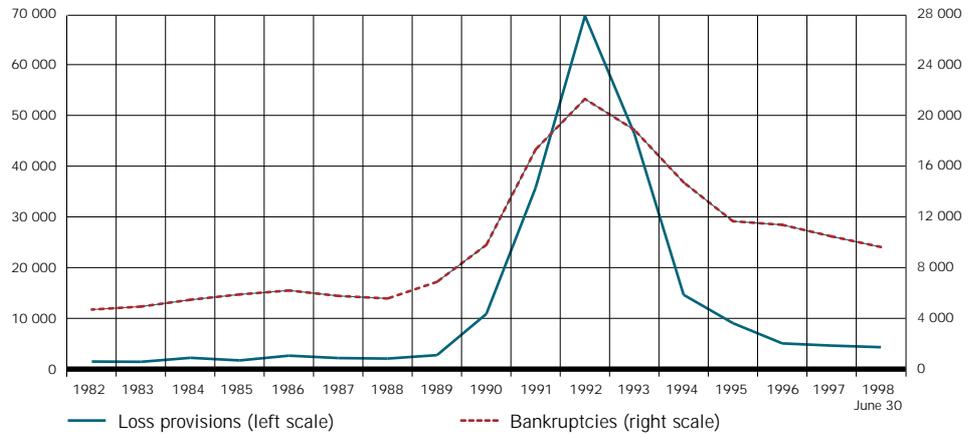
Figure 4.
Stock exchange index and house price index.
Current prices



Sources: Statistics Sweden and Stockholm Stock Exchange.

Asset prices have been developing favourably for households for some time, though the recent fall in stock-market prices has left its mark on the value of share portfolios. The price trend for owner-occupied houses and secondary dwellings has been positive, though a slight fall of around 1.2 per cent was observed in September.

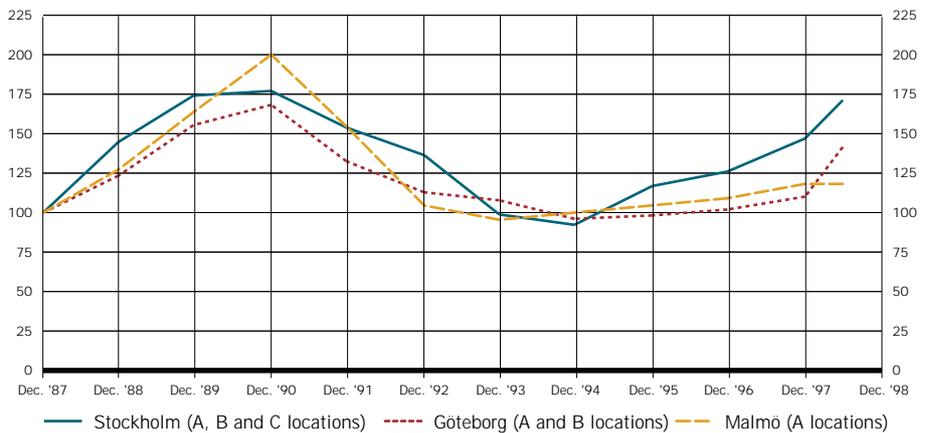
Figure 5.
Bank loan loss provisions*
and corporate bankruptcies.
SEK billion and number



*Loan provisions in the first half of 1998 refer to the four largest banks (pending figures for all banks).
Sources: Business & Credit Information Agency (UC) and Statistics Sweden.

The downward trend in bankruptcies is continuing (on a 12-month basis the number of bankruptcies is falling at a rate of -8 per cent), which mirrors rising economic activity and satisfactory profitability in the corporate sector. This trend is leading to decreased corporate loan losses.

Figure 6.
Commercial property prices
in the metropolitan regions.
Index: 1987=100



Source: Catella Information.

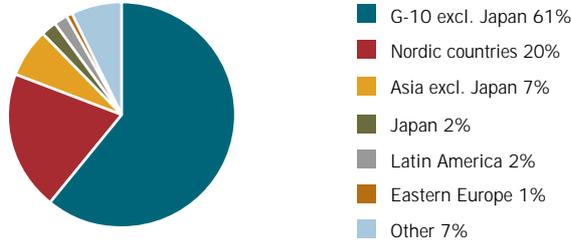
The development of commercial property prices is not as geographically uniform as the pattern for residential properties. It is prices in the Stockholm region in particular that have been rising strongly for some time, to levels that were reached before the property crisis began in the early 1990s. As Stockholm is the region in Sweden where economic growth is currently strongest, the price rise for commercial properties seems to have more to do with economic fundamentals than was the case with the upward trend that preceded the property crisis in the early 1990s.

Bank lending abroad

Figure 7.

Breakdown of bank loans to non-residents, by groups of countries, June 1998.

Total: SEK 602 billion



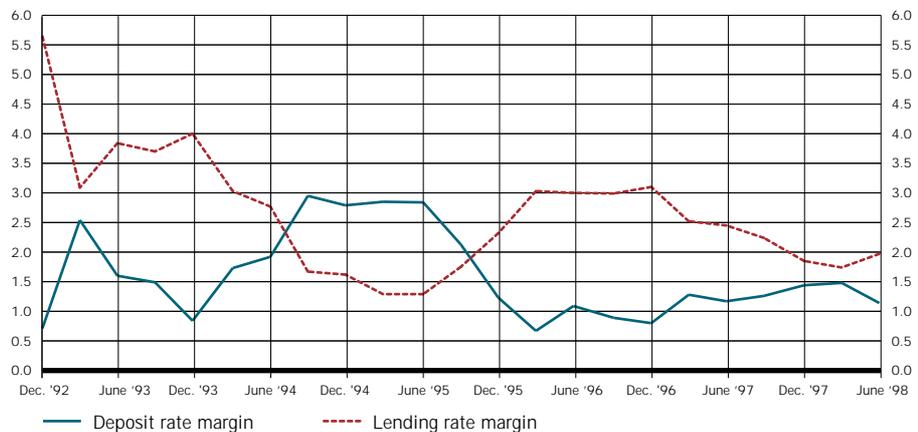
Source: The Riksbank.

Lending abroad by Swedish banks showed an upward tendency during the first half of 1998 (about 6.7 per cent). The breakdown by countries is much the same as at the beginning of 1998, though there has been some fall in the share of lending that goes to OECD countries (excl. Japan). Among the problem-burdened regions, there has been a marginal increase in the share of lending that goes to Latin America and virtually no change in the case of Asia excluding Japan, while the share to Japan has been halved since the beginning of 1998.

Deposit and lending margins

Figure 8.

The banks' corporate deposit and lending rates, expressed as the margin to the 6-month T-bill rate. Percentage points



Source: The Riksbank.

The charts refer to SEK deposits and loans at variable interest rates, excluding problem loans, repos and loans on special terms, e.g. to group companies.

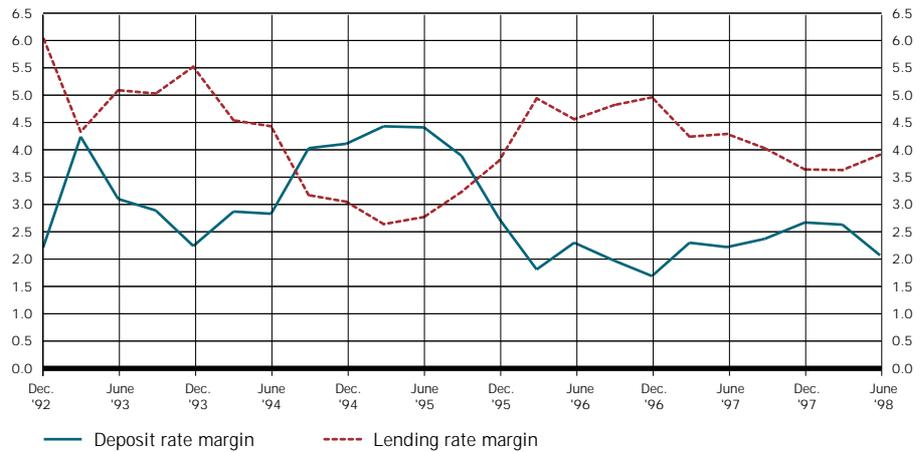
The deposit and lending rates are measured as a weighted average of quarter-end rates and the T-bill rate is the weekly average.

The corporate loan market is highly competitive, with a low level of interest rates, as can be seen from the margins. A falling margin on deposits has not been fully offset by a rising margin on lending; the spread⁴⁶ between these margins on corporate business has accordingly narrowed 0.33 percentage points since the beginning of 1998, to 3.11 per cent.

⁴⁶ The difference between the banks' lending rate to firms and the rate they pay on corporate deposits.



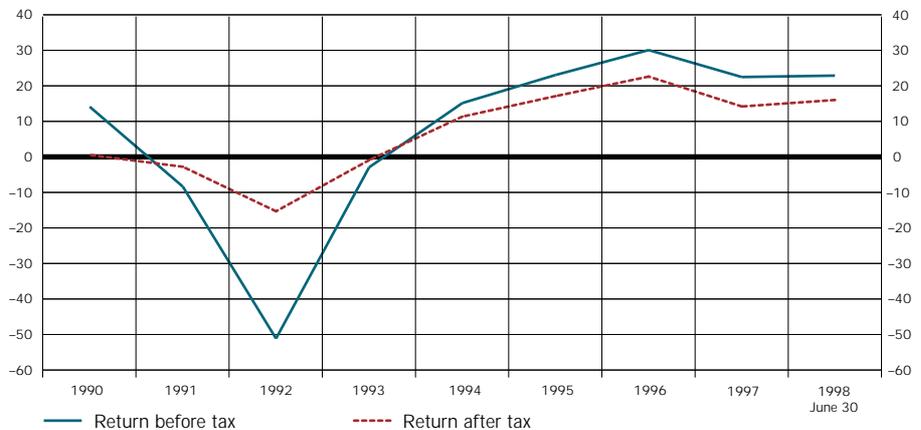
Figure 9.
The banks' household deposit and lending rates, expressed as the margin to the 6-month T-bill rate. Percentage points



Source: The Riksbank.

In the market for household deposits and loans there is a clearer picture of a falling deposit margin and a slightly rising margin on lending.

Figure 10.
Return on equity before and after tax. Per cent



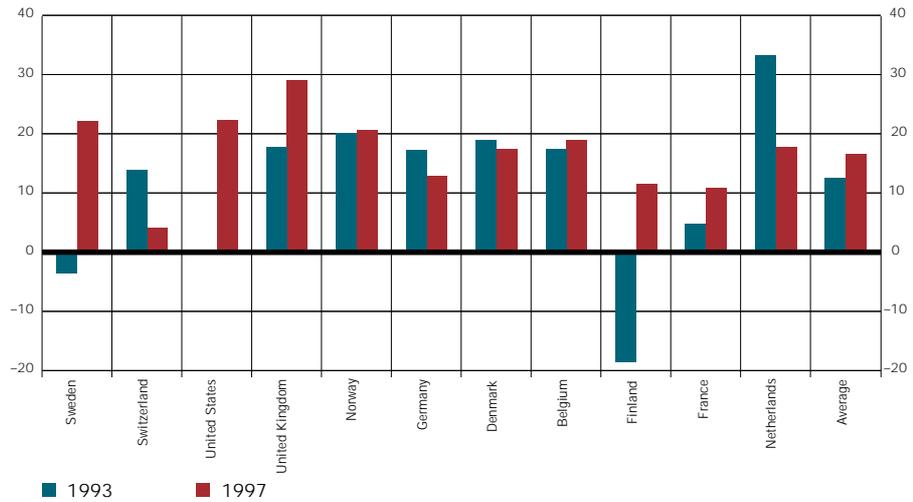
Source: The Riksbank.

Average return on equity capital before tax = operating earnings in per cent of the average of equity capital at the beginning and end of the year.

Average return on equity capital after tax = net profit in per cent of the average of equity capital at the beginning and end of the year.

The level of profitability, measured as the return on equity capital, is still high. Including restructuring costs and one-off effects, for the first half of 1998 the profitability of the four major banks averaged 23 per cent; excluding these items, the level was almost 20 per cent, which shows that the underlying profitability is good. The annual figure for 1997 was 18 per cent; one factor behind the improvement is a fall in the bank sector's aggregate equity capital, partly as a consequence of one-off distributions to shareholders.

Figure 11.
International comparison of
return on equity before tax.
Per cent

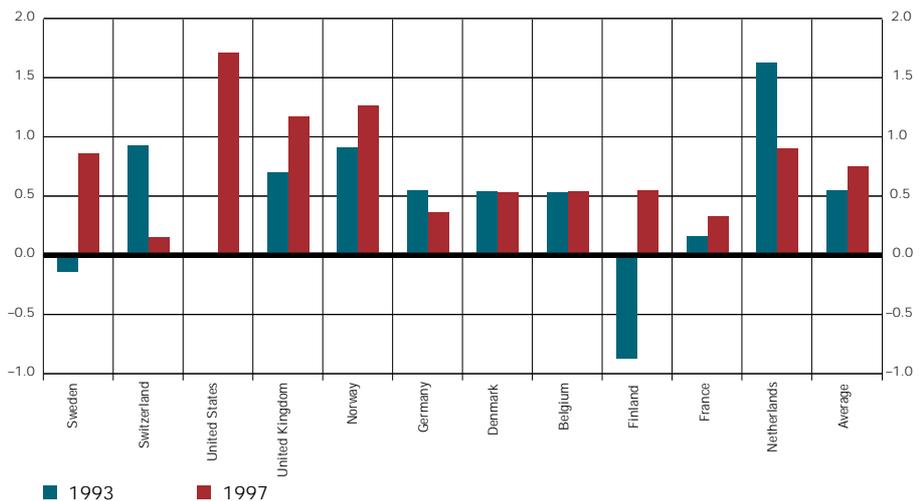


Source: Bankstat.

In an international comparison of return on equity, the profitability of Swedish banks is high notwithstanding large costs for mergers during 1997. It is only the British and American banks that reported a higher return on equity capital in 1997.

When comparing banks internationally, it should always be borne in mind that national accounting principles and rule systems, as well as the nature of business, are liable to differ between countries and banks. Still, the comparisons do provide an approximate picture of how the banking systems in different countries are performing.

Figure 12.
International comparison of
return on total assets
before tax.
Per cent



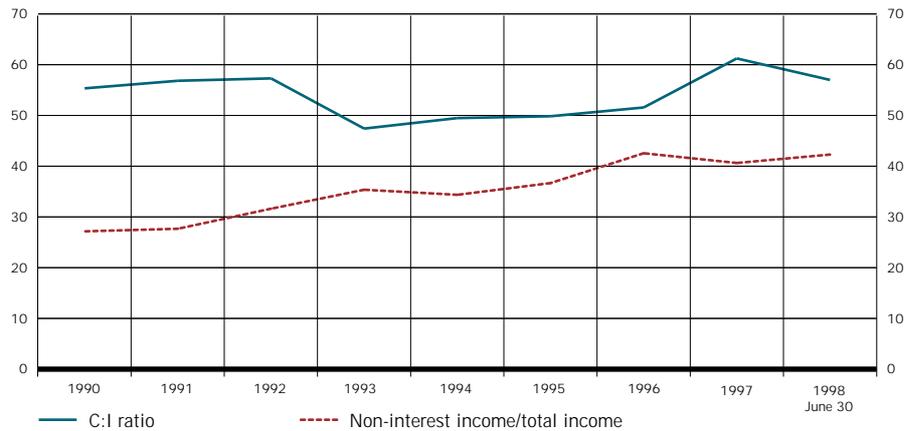
Source: Bankstat.

Return on total assets = Pre-tax profits relative to average balance-sheet total.

An alternative indicator of profitability is the rate of return relative to total assets. This indicator has the advantage of not “favouring” banks with a comparatively small stock of equity capital. It shows how efficiently the banks are managing their assets. This international comparison likewise shows that the profitability of Swedish banks is relatively high (fifth after American, British, Norwegian and Dutch banks).



Figure 13.
Cost-to-income ratio and
ratio of non-interest income
to total income.
Per cent



Source: The Riksbank.

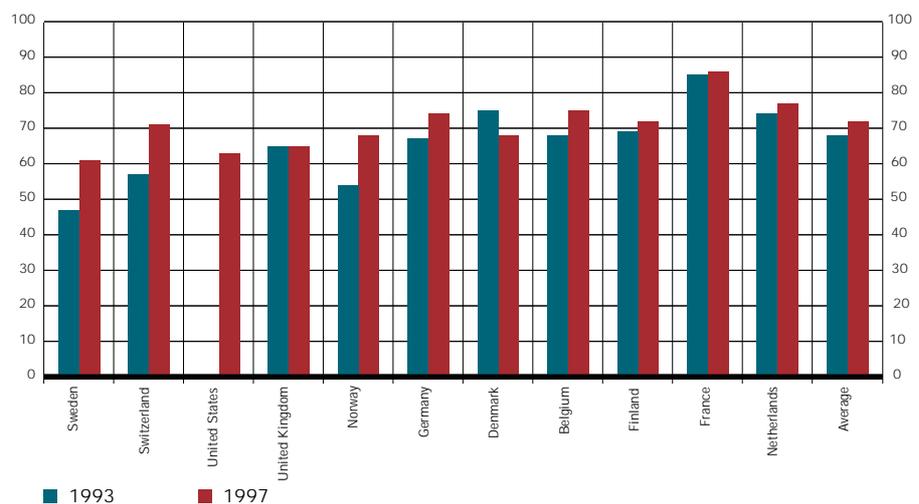
Decreased net interest earnings have heightened the importance of the banks' non-interest income, mainly the net result of trading and commissions. The latter net item went on rising relative to total income in the first half of 1998 and is currently over 40 per cent. In view of the financial market turbulence in the summer and autumn, however, it is uncertain whether a further increase in non-interest income can be achieved this year. The turbulence will probably have negative effects on net trading income as well as net commission income.

C/I ratio = ratio of total operating costs, excluding taxes and loan losses, to total income.

Trading income, commission income and other non-interest income, net, in per cent of total income.

Bank efficiency, measured as the ratio of costs to income (C/I), improved in the first half of 1998—the C/I ratio has tended to fall. The earlier fall in efficiency (a rising C/I ratio) came from higher expenditures, mainly costs for IT and restructuring in connection with mergers. During 1998, however, this has been balanced to date by higher net commission income and occasional capital gains.

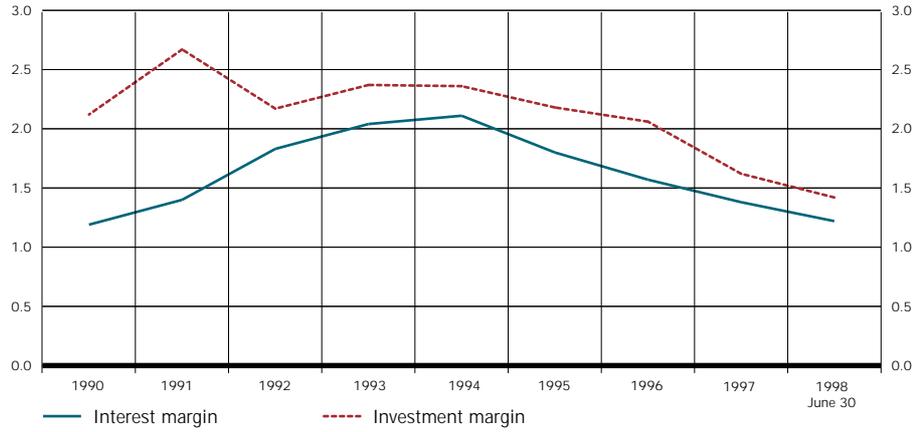
Figure 14.
International comparison of
C:I ratio.
Per cent



Source: Bankstat and the Riksbank.

An international comparison shows that, notwithstanding higher costs, the C/I ratio for Swedish banks was low in 1997. Thus, it is not just Swedish banks that are experiencing rising costs; this phenomenon, not least growing IT expenditure, is hitting banks in a majority of countries.

Figure 15.
Interest margin and net
return on assets.
Per cent

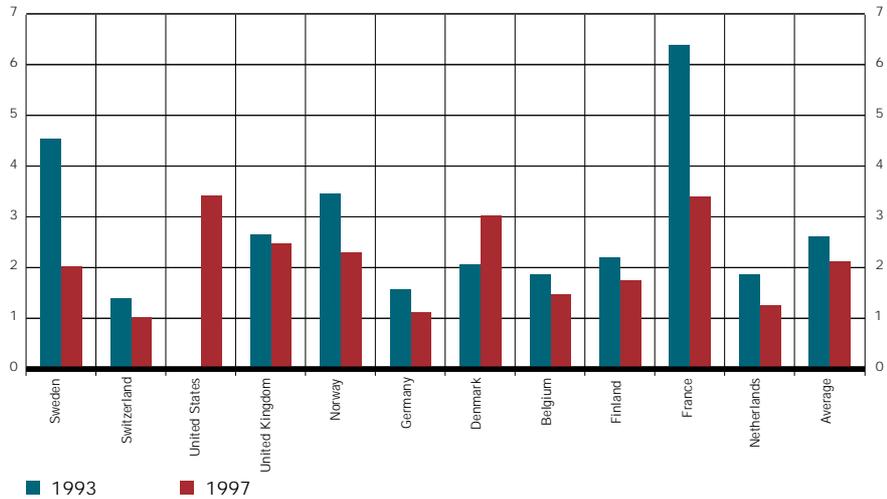


Interest margin = interest income in per cent of balance-sheet total less interest expenditure as a percentage of balance-sheet total excluding equity capital. Net return on assets = net interest income in per cent of average balance-sheet total.

Source: The Riksbank.

The narrowing spread between lending and deposit margins has led to a further fall in both the interest margin and the net return on assets during 1998. This in turn is due to increased competition in the bank sector and the low level of interest rates.

Figure 16.
International comparison of
adjusted net return on assets.
Per cent



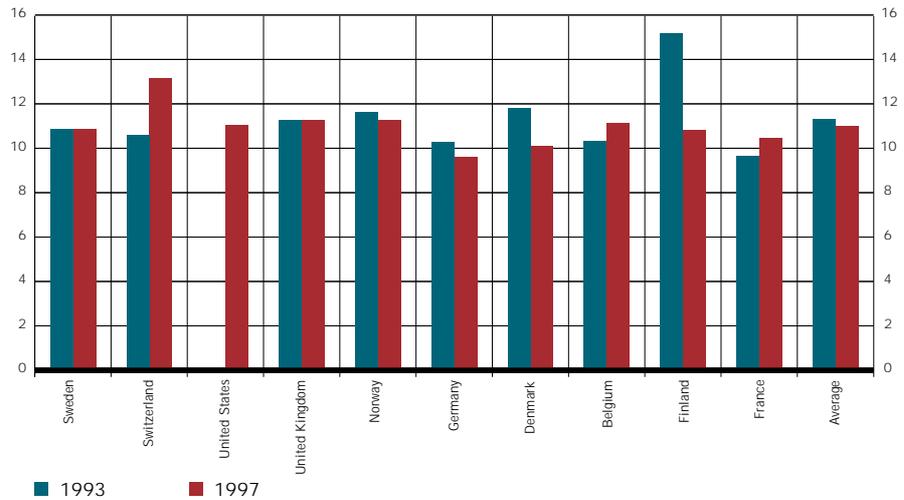
Source: Bankstat.

Adjusted net return on assets = net interest income in per cent of interest-bearing assets.

Neither is a falling net return on assets confined to Sweden. Of the countries in the comparison, it is only banks in Denmark that increased the net return in 1997 from 1993.



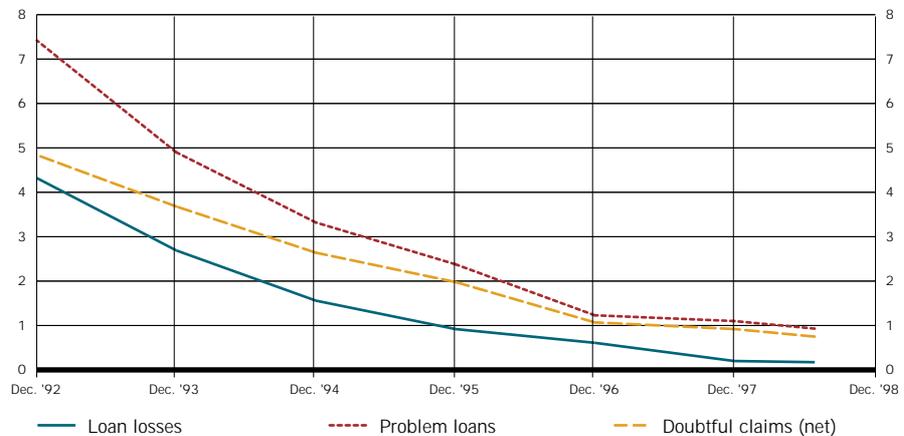
Figure 17.
International comparison of capital adequacy ratio.*
Per cent



*For certain countries, the selection of banks is more limited in this comparison because annual accounts are less informative.
Source: Bankstat.

Figure 18.
Ratios of loan losses, problem loans and doubtful claims (net) to lending.
Per cent

Level of loan losses = loan losses in per cent of loans to the non-bank sectors, pledges taken over, and credit guarantees at the beginning of the year.
Problem loan = claim subject to interest reduction, doubtful claims, and assets taken over to protect claims. Claim subject to interest reduction = claim for which lower interest rate terms have been agreed as a respite for a temporarily insolvent borrower. Doubtful claim = a loan for which interest, repayment or a debit balance is more than 60 days overdue or where other circumstances make repayment uncertain and the value of any collateral does not cover the principal and interest due with an adequate margin.
Doubtful claims net = provisions for credit losses have been deducted.



Source: The Riksbank.

The quality of the banks' loan portfolios, which has improved markedly in recent years, had up till June 1998 shown no sign of weakening. There is no indication of an imminent upturn in loan losses in the domestic market. A deterioration of the quality of these assets has nevertheless taken place in certain banks during the third quarter of 1998 in that substantial provisions have had to be made for apprehended loan losses abroad, above all in Russia.