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Towards new national and international banking regulations

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The Swedish Banking Law Committee has recently put forward a proposal that entails significant changes in financial legislation. The Basel Committee on Banking Supervision has also presented a proposal for far-reaching changes in international regulations governing capital adequacy. This article discusses both proposals and identifies similarities and differences between them.

During the 1990s, the need to renew the regulatory framework governing the banking sector has become ever more apparent.

During the 1990s, the need to renew the regulatory framework governing the banking sector has become ever more apparent. This need has been recently addressed in the form of several significant proposals for reform, both nationally and internationally. In Sweden, the Banking Law Committee has proposed several fundamental changes in the Banking Business Act (SFS 1987:617). Moreover, the Basel Committee on Banking Supervision, a highly significant international body, has recently published a proposal for extensive reform of capital adequacy regulations for banks. There are clear parallels between these two proposals despite different starting points and different approaches. The similarities are most striking with regard to the increased focus on risk-adjusted capital, risk management and transparency (or, in other words, openness regarding the bank's position and actions), and more active supervision with greater focus on risks.

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The work of the Banking Law Committee

Despite extensive and detailed regulation of banks and other financial institutions, Sweden and many other countries were affected by crises in the financial system during the late 1980s and early 1990s. As a result, the Swedish government set up the Banking Law Committee in 1995 with the task of studying the need for changes in the regulatory framework governing primarily the activities of banks and other credit institutions. The assignment of the Banking Law Committee also included reviewing the need for changes in the objectives and direction of the Swedish Financial Supervisory Authority.

A regulatory system that would not need to be amended whenever a new technical solution or product was launched.

The Banking Law Committee stated early on that continued rapid developments in the financial area would entail the risk that applicable legislation would soon become obsolescent. It therefore appeared necessary to propose a regulatory system that would not need to be amended whenever a new technical solution or product was launched. For this reason, the Committee chose to conduct a more fundamental review of regulatory needs. The work of the Banking Law Committee resulted in an extensive interim report, *Reglering och tillsyn av banker och kreditmarknadsföretag* (SOU 1998:60) [Regulation and supervision of banks and credit institutions], published in December 1998. The report includes proposals for a new legal definition of the concept of banking and for amending the Banking Business Act (SFS 1987:617) wherein several broad sections are defined as principally important for the regulation of banking activities.

Starting points

The Banking Law Committee notes a general tendency in the legislation to impose special regulations on financial companies without providing very clear reasons for this. However, special regulations tend to distort competition and produce economically inefficient solutions. An important starting point for the Banking Law Committee has therefore been to reduce the amount of special regulations. By clarifying and refining the reasons for regulation, it is possible to achieve a regulatory framework that does not preserve the existing structure of the financial system. Such a framework would therefore not impede competition, but would contribute to the development of an efficient financial sector.

Instead of focusing the analysis on the need for regulation of existing institutions and institutional forms, the Banking Law Committee chose to base its analysis on the *services* supplied by the financial market. The idea was to analyse the extent to which the social significance of these services and their level of sensitivity to disturbances could give rise to special regulatory requirements. This *functional perspective* was considered to be an important starting point when defining regulatory needs.

The Banking Law Committee chose to base its analysis on the services supplied by the financial market.

Regulatory incentives

The central government states that its objectives for regulation in the financial area are to promote *stability* and *efficiency* and to provide *effective consumer protection.* The analysis undertaken by the Banking Law Committee led to the conclusion that the need for central government intervention in the financial area is greatest with regard to measures to stabilise the system. This is based on the fact that there are special systemic risks inherent in the financial system, i.e. risks of extensive shocks, which could seriously disable the functioning of the system.

Objectives for regulation in the financial area are to promote stability and efficiency and to provide effective consumer protection.

Concerns for a systemic crisis are considered to be greatest with regard to the payment system. Payments, for example via charge cards, cheques and credit transfers, are today an important step in nearly all financial transactions. If these payments cannot be implemented, there is a risk of major efficiency losses in the economy with potentially long-term damaging effects.

The stability of the payment system is dependent on the stability of the banking system. Although banks do not have a formal monopoly on payment services, in practice they have a dominant position in the payment system through the monopoly on deposits. As the bank sector has become more concentrated, the functioning of the payment system has become more dependent on a decreasing number of institutions. This also increases the risk that problems in an individual bank can have repercussions for the entire system.

The risk of contagion effects also increases due to the difference in liquidity between a bank's assets and its liabilities. A bank's assets are largely

The risk of contagion effects also increases due to the difference in liquidity between a bank's assets and its liabilities.

made up of loans, which are difficult to value and thus also difficult to convert into liquid funds at a reasonable price at short notice, while a large portion of a bank's debts can be settled immediately and are fixed in nominal terms. Since depositors and other financiers are aware of this relationship, there is a risk that fears of financial problems in a bank can lead to a rush of withdrawals, which in turn worsens the financial position of the bank. This means that even an unfounded rumour of insolvency can in principle be self-fulfilling. The difference in liquidity between assets and liabilities thus entails an inherent stability problem in traditional banking activities. Uncertainty regarding the mutual exposure of banks can have contagious effects on the banking system. The conclusion is that the risk of systemic crises in the payment system constitutes an important incentive for regulating banking activities.

The Banking Law Committee also argues that regulation is justified on the grounds that the credit supply function can be affected by disturbances. Although the reasons may appear less obvious than in the case of the payment system, it was considered appropriate to also propose a certain level of regulation of pure credit institutions. However, these proposals are not discussed in detail in this document.

It is the opinion of the Banking Law Committee that society's goals in terms of efficiency and effective consumer protection in the financial area can largely be regarded as general goals that apply to the economy as a whole and not just to the financial sector. The need for specific regulations to achieve these goals is thus less urgent than the need for regulation to preserve the stability of the system. However, a regulatory framework focused on systemic risks also has consequences for efficiency and consumer protection that must be taken into consideration. However, these consequences should be treated as far as possible in general legislation relating to consumer rights and marketing.

New legal definition of banks

The analysis conducted by the Banking Law Committee thus led to more clearly formulated motives to protect the financial system: from a social perspective, it is most important to protect the stability of the financial system, primarily the payment system. Consequently, the Committee decid-

ed to propose a new legal definition of the concept of banks. In current law, bank operations are defined as "operations that include deposits held in accounts if the balance is nominally determined and available to the depositor at short notice". This older definition focuses entirely on the deposit function of banks.

From a social perspective, it is most important to protect the stability of the financial system, primarily the payment system.

In the proposed new definition, the link with the payment system is given a more central focus: "Bank operations refer to operations which include payment services via payment systems, intended to reach several end beneficiaries who are independent of each other; they also include the receipt of funds that are available to the creditor at less than 30 days notice." According to the Banking Law Committee, the new definition is more inclusive of those aspects of bank operations that are worth protecting, i.e. both payment services via general payment systems and the receipt of funds that can be withdrawn at short notice. In view of this, the definition is considered to be less narrow and thereby more difficult to circumvent.[2]

New operating regulations for banks

The current operating regulations are characterised by detailed control in many areas, while other areas remain largely unregulated. Due to the extensive special provisions and amendments, it has not been easy to discern the underlying principles of the legislation. The Banking Law Committee has aimed at a transition to operating regulations resembling *framework legislation*, whereby the guiding principles of bank operations are outlined in several introductory general provisions known as "portal paragraphs". In this framework legislation, the currently implicit principle rule that everything that is not explicitly permitted for a bank is forbidden is now replaced by the reverse principle. The portal paragraphs regarding *solvency, risk management* and *transparency* are discussed in more detail below.

The Banking Law Committee has aimed at a transition to operating regulations resembling framework legislation.

[2] Criticism of the new definition was presented in commentaries to the draft of the Banking Law Committee's report. However, the formulation of operational regulations is not critically dependent upon the definition.

The solvency rule

The bank must be able to withstand potential losses by maintaining an adequate capital reserve, and that the risk of losses must be limited.

One of the most important objectives of any new regulation is to ensure that individual banks are, and remain, solvent. This is stated in the first introductory rule in the proposal for a new Banking Business Act (Chapter 2, Section 1), and is referred to by the Banking Law Committee as the solvency rule. This rule states that a bank shall pursue operations in such a way that the ability of the bank to fulfil its obligations is not jeopardised. According to the Banking Law Committee, this means that the bank must be able to withstand potential losses by maintaining an adequate *capital reserve*, and that the *risk of losses must be limited*, for example by limiting individual participations.

The requirement to maintain a capital reserve aims not only at making the bank resistant to losses; it is also a way of influencing incentives for risk-taking. Normally, the bank's owners and the central government have a common interest in the bank developing favourably, and they therefore do not take excessive risks. However, in situations where the bank is near bankruptcy, the owners of the bank have little to lose by increased risk-taking. Nor are the incentives for increased risk-taking mitigated by the fact that the central government stands as the ultimate guarantor for the stability of the financial system and that government deposit insurance guarantees depositors' funds to a great extent. Thus, there is a risk of opportunistic risk behaviour in some situations that conflict with fundamental social interests. The rules governing capital reserves can, however, influence risk-taking by the bank's owners since this capital acts as a sort of deductible in the case of bankruptcy. Risk and capital are thus closely related. This relationship between risk and capital has been taken into account by the Banking Law Committee in formulating the solvency rule.

According to the Banking Law Committee, the solvency rule gives the Swedish Financial Supervisory Authority increased possibilities to intervene if a bank pursues operations that jeopardise solvency. The rule does not permit the Swedish Financial Supervisory Authority to directly intervene and compel the bank to increase its capital reserves. However, this effect may result indirectly if the bank, in order to avoid restrictions on its activities, chooses of its own accord to increase its capital reserves. Thus, the new portal paragraphs provide new opportunities for the Swedish

Financial Supervisory Authority to control the capital adequacy of banks in a way that exceeds the minimum requirements stipulated in the Capital Adequacy Act.

Consequently, the solvency rule can be regarded as a supplement to the banks' capital adequacy requirements.

Consequently, the solvency rule can be regarded as a supplement to the banks' capital adequacy requirements. Capital adequacy regulations are determined to a large extent by international agreements and EU law, and Sweden's possibilities to draw up an independent regulatory framework are very limited. The need to create international standards for banking capital and to compel individual countries and banking institutions to apply them has primarily been reinforced by the globalisation of banking operations and banking establishments. Capital requirements are discussed in more detail in the section on the proposal of the Basel Committee on Banking Supervision for new capital adequacy regulations.

The risk management rule

Banking Business Act (SFS 1987:617, Chapter 2, Section 2): "A bank shall identify, measure and exercise control over those risks that are associated with its operations."

A condition of success in measures to limit risk requires that there be a good understanding of the level of risk in banking operations. The first stage in this process is to identify the relevant risks. It is then necessary to estimate the size of the risk, both in the form of individual risks and the bank's total risk. The risk analysis should also be linked to the requirement that the bank should control its own risks in some manner and be able to respond appropriately to limit risk. However, in individual cases the basis of this estimate is far from obvious and, according to the reasoning of the Banking Law Committee, falls back on the basic requirement that the bank's solvency must not be jeopardised. The reasoning of the Banking Law Committee is summarised in the second introductory rule of the proposed Banking Business Act (SFS 1987:617, Chapter 2, Section 2): "A bank shall identify, measure and exercise control over those risks that are associated with its operations."

The transparency rule

The third portal paragraph states, "Banking operations shall be pursued and organised in such a way that an overview of the bank's position can be obtained."

The third portal paragraph states, "Banking operations shall be pursued and organised in such a way that an overview of the bank's position can be obtained." Good transparency helps to strengthen market discipline in the banking sector. Strengthening the information requirements for banks increases the possibilities for the banks' interested parties – shareholders, depositors, borrowers, etc. – to assess the banks' risk-taking, profitability, etc. This may be expected to have a disciplinary effect on the banks' actions, capital adequacy and risk-taking. Greater transparency also creates improved conditions for better market pricing of a bank's debt instruments, which in turn increases possibilities for a more efficient capital allocation.

Rules which make it easier to survey the bank's assets and analyse the value of these assets also facilitate the work of the supervisory authority and provide the Riksbank with better prerequisites for fulfilling its task as lender of last resort.

Supervision

The Swedish Financial Supervisory Authority will assume responsibility for outlining the details of the supervisory work to an even greater extent.

The proposed new Banking Business Act (SFS 1987:617) will have consequences on the future focus of the supervisory authority and its need for resources and competent personnel. The Committee's proposal entails that the operating regulations shall guide the direction and forms of supervision. Primarily, this means that supervision shall be steered by the introductory rules on solvency, risk management and transparency. Consequently, the rules regarding supervision are also expressed in general terms. In other words, the Swedish Financial Supervisory Authority will assume responsibility for outlining the details of the supervisory work to an even greater extent.

The Banking Law Committee also proposes that the Swedish Financial Supervisory Authority should have a more practical and flexible system for imposing sanctions at its disposal. This would provide the Financial Supervisory Authority with greater power to intervene and greater scope to assess the appropriate course of action for a given situation. Today, the Financial

Supervisory Authority is bound by law to revoke a bank's charter in certain circumstances. This virtually never happens in practice, since such intervention is usually considered too extreme. According to the new proposal, the Financial Supervisory Authority can choose to issue a *warning* if this is considered sufficient, rather than revoking the charter. The Financial Supervisory Authority is also given the opportunity to *refrain from intervention*, if the violation is considered to be minor or if the bank takes corrective action. In some cases, the Financial Supervisory Authority can currently issue an *injunction to take corrective action* or *prohibit the execution of decisions.* As an alternative to both these possibilities of intervention, it is proposed that the Financial Supervisory Authority be given the possibility of issuing *observations.*

According to the new proposal, the Financial Supervisory Authority can choose to issue a warning if this is considered sufficient, rather than revoking the charter.

The proposal of the Basel Committee on Banking Supervision for new capital adequacy regulations

There are parallels between the Banking Law Committee's conclusions and proposals for solvency, risk management, transparency and supervision and the recently published proposal by the Basel Committee on Banking Supervision[3] to reform capital regulation, *A New Capital Adequacy Framework* (BIS Publication No. 50). The proposal, which was made public in June 1999, involves a significant expansion of the traditional and quantitative view of capital adequacy. The requirements have now been supplemented with broadened supervision which focuses on, among other things, risk management and how a bank calculates and allocates its capital in relation to its risk exposures. Furthermore, the proposal entails a strengthening of the requirements for greater transparency in terms of a bank's capital and risk

The proposal involves that weaknesses in risk management or transparency can result in increased capital adequacy requirements for an individual bank.

[3] The Basel Committee on Banking Supervision was established in 1975 by the Central Bank Governors of the Group of Ten Countries. The Committee consists of senior representatives of financial supervisory authorities and central banks from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States. It usually meets at the Bank for International Settlements (BIS) in Basel, where its permanent Secretariat is located.

exposure. All three of these components are interrelated so that, for example, weaknesses in risk management or transparency can result in increased capital adequacy requirements for an individual bank. The proposal is described in more detail in the following section.

Criticism of the 1988 Basel Accord

The 1988 Basel Accord concerning international capital adequacy regulations was a political compromise between countries with different interests and bank structures. As a consequence, the new capital adequacy regulations did not suit all banks. For example, the risk weights used for calculating capital adequacy were crude estimates, and there were rules of exception which meant that risk weighting was not applied uniformly from country to country. Yet, despite these shortcomings, the regulations governing capital adequacy were uncomplicated and had a logical structure that enabled them to be applied worldwide.

However, as time passed and banking activities continued to undergo change, the shortcomings became more apparent. For example, the exposure of banks to market risks (interest rates, exchange rates and share prices) increased rapidly. To counteract this, the Basel Committee on Banking Supervision extended the 1988 Accord, which had only covered credit risks, to also include capital adequacy requirements with regard to market risks in the trading portfolio. These became applicable at the start of 1997.

A significant weakness of the capital adequacy requirements with regard to credit risks is the crude estimates used in calculating risk weighting.

A significant weakness of the capital adequacy requirements with regard to credit risks is the crude estimates used in calculating risk weighting. Claims on corporates and private individuals always have a risk weight of 100 per cent (i.e. a capital requirement of 8 per cent of the sum exposed), irrespective of whether the borrower is financially strong or weak, known or unknown. The lack of precision in this rule acts as an incentive to choose those credits with the highest risk within each risk category. The loan portfolios thus risk being overweighted by claims on corporates and private individuals with a lower average credit value.

A further weakness in the risk-weighting system concerns claims on sovereigns and financial institutions. In the Basel Accord, claims on sovereigns within the OECD and GAB[4] are automatically classed as “low risk”,

[4] General Arrangement to Borrow.

which entails a 0 risk weight and also a 0 per cent capital requirement, while countries outside the OECD and GAB are given a 100 per cent risk weight for credits in currencies other than the domestic currency. Loans to financial institutions also have risk weights that depend on whether or not the financial institution is incorporated in a country that is a member of the OECD/GAB. This "club method" of determining risk weights can be regarded as a simplified way of distinguishing countries with different levels of country risk and/or transfer risk. However, when the OECD group was expanded in the 1990s, it became less homogenous, thus providing a less reliable indicator of risk conditions. The probability of OECD countries also falling into financial difficulties increased. This has been the case in Mexico and South Korea, for example.

The 1990s have been characterised by the increasing use of different new instruments and methods by banks to reduce their credit risks.

The 1990s have also been characterised by the increasing use of different new instruments and methods by banks to reduce their credit risks. In addition to traditional instruments such as guarantees and collateral, banks are also using netting, credit derivatives and asset securitisation. The current capital adequacy requirements do not always fully support these methods. In extreme cases, the original risk and the instrument used to reduce the risk are both subject to capital adequacy requirements, which unfortunately counteracts the bank's underlying incentive for risk mitigation.

Another shortcoming of the capital adequacy regulations is that they do not prevent banks from changing or transferring their risk exposures to reduce capital adequacy requirements, although the actual risk remains unchanged. This "regulatory arbitrage" can take place, for example, through shifts in the positions in the trading book, i.e. between instruments that are traded in the short term and in the regular credit portfolio, or through asset securitisation of the remaining risks of the bank.

The work on a new Basel Accord

In the beginning of 1998, the Basel Committee resolved to work intensively during a short period to put forward proposals for a new capital adequacy framework. The work was to be unconditional in as much as no solutions were ruled out in advance. On the other hand, the work was to be guided by certain underlying principles:

- Although the regulations shall formally apply only to "internationally active banks", they shall be universal, i.e. they shall be formulated in such a way as to be applicable to banking activities of varying sizes and levels of complexity.
- The applicable minimum level of capital adequacy, 8 per cent, is considered to be reasonable, and the new regulations shall not lead to a general reduction of this level.
- The regulations shall promote sound risk management and sound risk-taking in banks.
- The regulations shall promote fair competition, both among banks and between banks and other financial institutions.

In June 1999, the Committee presented a proposal for a new capital adequacy framework.

In June 1999, the Committee presented a proposal for a new capital adequacy framework. The proposal is in the form of a "consultative paper" and has been submitted to authorities, trade associations and other interested parties worldwide. These have been invited to comment on the proposal no later than 31 March 2000.[5] The most important contents of the proposal are outlined in the following sections.

The three pillars

Developments during the 1990s show clearly that effective supervision cannot be based on formal and quantitative regulations alone. It is equally important that the banks have a qualitatively efficient system in order to identify, monitor and control their risks. This places requirements on management functions, information systems and control systems. The creation of a sound bank structure is also facilitated by market discipline. In order for market discipline to function, it is necessary that banks and authorities disclose sufficient information regarding the development of the banking system and financial institutions to allow the general public to make their own assessments (transparency).

[5] The proposal does not contain any clear-cut solutions on many points; instead, it discusses different alternatives. Those who read the consultative paper are requested to state and justify their preferences. One purpose of this open procedure is to secure that the final decision as far as possible reflects the actual working conditions of banks.

Against this background, the proposal for new capital regulations has been broadened to include "three pillars": *quantitative requirements*, *qualitative requirements* and *transparency*. The three pillars, which contain many parallels to the Banking Law Committee's portal paragraphs, are outlined below.

The proposal for new capital regulations has been broadened to include "three pillars": quantitative requirements, qualitative requirements and transparency.

Quantitative requirements

The quantitative capital adequacy requirements comprise the sum of the requirements for *credit risks*, *market risks* and *"other risks"* (mainly operational risks). In some cases, capital adequacy requirements may also be applied to interest rate risks in the bank's credit portfolio.

Credit risks

In addition to a standardised method to be used by the majority of banks, opportunities in principle are opening for more sophisticated banks to make use of internal credit grading systems and models as a basis for calculating capital adequacy requirements.

The standard method

In addition to the previous risk weights of 0, 20, 50 and 100 per cent, a category is proposed with a risk weight over 100 per cent, such as 150 per cent for large risks (for example, when the borrower has a low rating). The Committee is also considering the introduction of an even higher risk weight for extremely high levels of risk, such as exposures to corporate bonds with low credit quality (junk bonds) or a concentration of risk in connection with asset securitisation. An important new element is that risk classification can be based on "ratings" from recognised credit rating institutions.

An important new element is that risk classification can be based on "ratings" from recognised credit rating institutions.

In order to reduce problems associated with a too detailed classification of risk, it is proposed that similar ratings be combined into larger categories. For example, one category would contain all ratings of AA– and above. For borrowers that are non-financial companies, only two risk categories would apply. This also reflects the fact that only a small share of all companies outside the USA has credit ratings. For countries and banks,

rating occurs more widely and consistently, which has permitted more risk categories. For countries, the OECD/GAB relationship outlined above will thus be replaced by rating gradations. The proposal outlines two alternative methods for applying risk weights to banks. One of these two options will be chosen in the final decision: either all banks within a country will be given the same risk weight, which will be the risk weight immediately above that applicable for the country in which the bank is incorporated, or alternatively, the banks will be assigned individual risk weights based on their credit rating.

The Basel Committee considers that banks should exercise caution with regard to lending to central governments which do not provide adequate information for a credit assessment.

The Basel Committee considers that banks should exercise caution with regard to lending to *central governments* which do not provide adequate information for a credit assessment. In order to obtain a risk weight lower than 100 per cent, countries are therefore required to supply information in accordance with the IMF Special Data Dissemination Standard (SDDS). To minimise the risk in lending to *foreign banks*, it is important that supervision is carried out effectively in the country in which the foreign bank is incorporated. It is therefore required that, in order to receive a risk weight of less than 100 per cent, the country has implemented, or is in the process of implementing, the Basel Committee's Core Principles for Effective Banking Supervision.

The table below shows the risk weights given in the proposal. The risk weights are dependent on the type of borrower and on the rating assessment of the borrower.

Figure 1.

	AAA to AA–	A+ to A–	BBB+ to BBB–	BB+ to B–	Under B–	Unrated
Sovereigns	0%	20%	50%	100%	150%	100%
Banks Option 1[6]	20%	50%	100%	100%	150%	100%
Banks Option 2[7]	20%	50%	50%	100%	150%	50%
Corporates	20%	100%	100%	100%	150%	100%

[6] Risk weighting based on the assessment of the country in which the bank is incorporated.

[7] Risk weighting based on the assessment of the individual bank. Risk exposures in banks with less than a six-month period to maturity are given more favourable risk weightings than stated (a lower level, i.e. 20% instead of 50% and 50% instead of 100%), although never 0 per cent.

For those risks not given above, such as credit to private individuals, a risk weight of 100 per cent is applied.

In asset securitisation, it is common for a credit assessment to be performed on the different tranches of the securities that are issued. Using the same scale that is applied to other credits, the ratings can then be converted to risk weights in accordance with the table above. As stated previously, the Basel Committee is considering introducing even more stringent capital adequacy requirements, which would mean that the entire value of the exposure in tranches with a very high level of risk in asset securitisation would be deducted directly from the bank's capital base. This entails a "risk weight" of 1,250 per cent, i.e. many times higher than for junk bonds. This high risk weight would thus not be an "objective" risk assessment, but rather would be an expression of the Basel Committee's efforts to persuade banks to consider carefully whether they wish to take these risks and, in such a case, to charge a high premium for them.

In order to permit risk-weighting based on external credit ratings, the Basel Committee places certain requirements on credit rating institutions.

In order to permit risk-weighting based on external credit ratings, the Basel Committee places certain requirements on credit rating institutions. Those credit rating institutions that may be used for risk-weighting in capital adequacy calculations must first be approved by the national supervisory authorities. For this purpose, the authorities shall apply a number of criteria that are the same for all countries and credit rating institutions. The criteria specified by the Basel Committee are objectivity and transparency in the rating methods, independence from any external influence or constraints, credibility, international access to rating results and rating methods, and sufficient personnel resources. A further task is to establish how the assessment levels in different credit rating institutions can be compared and how these levels can then be converted into risk weights and capital adequacy requirements. A study is currently underway within the Basel Committee on how to solve these problems.

Internal credit grading systems and credit risk models

The Basel Committee's goal is to achieve capital adequacy requirements that better reflect a bank's particular risk profile. The revised standard approach aims to produce a method for this purpose that can be applied by the majority of banks. However, the Basel Committee considers that

The Basel Committee's goal is to achieve capital adequacy requirements that better reflect a bank's particular risk profile.

there can be significant additional advantages in using methods based on the banks' *own* qualitative and quantitative assessments of credit risk. Many banks have developed advanced internal credit risk grading systems in order to summarise the risk of individual credit exposures. These rating systems are increasingly being used as aids for credit decisions, and in risk management and risk analysis. The banks' own systems have the advantage that they can take into account client-specific information, which is more difficult for external credit assessment institutions to access. Naturally, the banks themselves have the best knowledge about their clients.

In its proposal, the Committee therefore opens up a possibility for banks to have their internal systems tested and approved by the national supervisory authority as a basis for calculating risk weights for capital adequacy requirements. By offering an alternative to the standard approach, the Basel Committee hopes to encourage banks to continue to develop and improve their internal systems for measuring and managing credit risk. However, a number of technical and conceptual problems remain to be solved, both for banks and supervisory authorities.

An important issue concerns the validation of these internal systems, i.e. how a bank can continually demonstrate that its credit risk estimates reasonably correspond to the actual credit risks. Another problem concerns the lack of uniformity of grading systems among different bank institutions. Together with the dependency on subjective assessments and subjective risk factors in internal credit ratings, this means that fair comparisons between bank institutions are difficult to achieve.

One crucial issue is how internal risk ratings shall be translated in practice to specific capital adequacy requirements.

One crucial issue is how internal risk ratings shall be translated in practice to specific capital adequacy requirements. One possibility, which is the most viable in the short term, is to map a bank's credit risk ratings onto the standardised risk categories. These can be increased in number for greater precision in an expanded capital adequacy framework. Another possibility is a more direct link between the bank's own credit risk assessments and the capital adequacy requirements. However, a number of methodological difficulties need to be resolved to

achieve this, including estimating the probability distribution for credit losses, which is by no means an easy task.

Portfolio credit risk models are currently being developed as an extension of the most advanced credit risk grading systems. Instead of merely adding individual credit risks together, these models take correlations between different "credit events" into account. Such models aim, among other things, to help banks analyse the global risk-taking within the bank. A well-validated, portfolio-based model should reflect the bank's actual risks better than a non-portfolio-based model, and is therefore desirable both for the bank and the supervisory authority.

It is considerably more difficult to create good models for credit risks than for market risks.

Portfolio credit risk models are equally affected by problems similar to those that affect internal risk grading systems. The Basel Committee has previously accepted the use of advanced models (such as Value-at-Risk) in connection with calculating capital adequacy requirements for market risks. However, it is considerably more difficult to create good models for credit risks than for market risks. The most serious problem is the lack of data. With regard to market risks, price information is available from the financial markets and is published daily or even more often. However, to learn the outcome of an issued credit, it is usually necessary to wait until the loan falls due, which can take several years. Model building and the estimation of important parameters are complicated by the lack of historical time series combined with long time horizons. The estimation of a credit loss process typically requires data spanning over several business cycles.

Even if individual probabilities of bankruptcy may be reasonably assessed, significant difficulties may arise when these are compiled into a portfolio, due to a shortage of data regarding *correlations* among a large number of variables. As a result of this data shortage, model builders are tempted to use simplified assumptions based largely on subjective assessments. Little study has been made of how the accuracy of the models is affected by such subjective assessments. Just as data shortage creates problems for model builders, it also complicates the validation of credit risk models, i.e. the possibility of empirically confirming that the models actually measure what they claim to measure. Time horizons of one year or longer mean that an "impractical" number of years of data is needed to reach a quality corresponding to that required for validating market risk models.

The transition from the simplest internal risk grading systems to the most advanced up to fully-fledged portfolio credit risk models is gradual, and an absolute dividing line cannot be drawn between the methods. Each method should result in a probability measurement in accordance with some definition of loss, which then should be finally translated into specific capital adequacy requirements. However, before any method can be used for formal capital adequacy requirements, the supervisory authorities must be convinced that the models are conceptually sound and empirically validated and that they can produce capital adequacy requirements that are comparable across institutions.

The Basel Committee finds that there remains at present many and more serious problems to be solved for portfolio credit risk models than for internal risk grading systems.

The Basel Committee finds that, before these requirements can be satisfied, there remains at present many and more serious problems to be solved for portfolio credit risk models than for internal risk grading systems. The Committee therefore believes that new capital adequacy requirements are initially more likely to be based mainly on non-portfolio-based internal risk rating systems. However, the Committee is monitoring developments in this area very closely and hopes to engage the banking industry in a constructive dialogue. The Committee's proposal is based on the distinct hope that improved incentives for refining the internal credit risk management systems will also pave the way for a future transition to more integrated credit risk models. The Committee intends to present a more detailed analysis of its proposal in a consultative paper to be published at a later date.

Risk reduction techniques, including collateral and guarantees

The Basel Committee's principle for calculating capital adequacy: the risk to be covered is the actual risk that remains for the bank after risk mitigation.

The Basel Committee aims at applying an unequivocal principle for calculating capital adequacy when risk reduction methods are used; the risk to be covered is the actual risk that remains for the bank after risk mitigation, irrespective of the instruments or methods used to reduce the risk (netting, derivatives, asset securitisation, collateral, guarantees, etc.). Although the principle may appear obvious, it is not always followed under the current capital adequacy regulations. The Basel Committee and its subcommittees are currently working intensively on converting this principle into operational rules.

Market risks

Market risks account for only a small proportion of a (average) bank's total risks. Nonetheless, the existing capital adequacy regulations governing market risks are far more detailed and in some ways more complicated than the regulations for credit risks. Since the capital adequacy regulations for market risks are relatively new, no changes are proposed in this area apart from any changes that may result from other aspects of the proposal. It should be noted that risk classification based on external rating assessments already occurs in the existing calculations of market risk.

Other risks

In accordance with the new proposal, the capital adequacy requirement for credit risks will reflect the actual risks more precisely.

The prevailing capital adequacy requirement of 8 per cent exceeds the level justified on grounds of credit risks alone. Capital adequacy requirements for other risks are also embedded in the requirement. In accordance with the new proposal, the capital adequacy requirement for credit risks will reflect the actual risks more precisely. This means that capital adequacy requirements, or other forms of management, must be defined for the "other risks". The most significant of these risks is *operational risk*, which has probably grown in importance during the 1990s due to changes in the banking industry. This includes the risk of expenses and losses arising as a result of technical problems, such as computer crashes, but it also covers much more than this. Shortcomings in a bank's control system can also be regarded as operational risks. Nick Leeson was thus an operational risk for Barings Bank. Further examples of "other risks" include *legal risks* and *reputational risks.*

It is difficult to find an objective method for calculating capital adequacy requirements for operational risks and other "other risks", partly because these risks can comprise different factors and are not always easy to quantify. Operational risks differ from credit and market risks in that a measurable correlation does not normally exist between risk and return. The probability of a particular outcome for the majority of operational risks, such as a total computer breakdown, is very low; while the financial consequences for the bank, if the risk becomes reality, can be considerable. An important task of the Basel Committee is to develop measurements that can reflect operational risk and other risks in an acceptable

way. In this context, it is of great importance to find a method that provides incentives for banks to reduce these risks.

The national supervisory authorities should have greater authority to impose capital adequacy requirements on an individual bank if the bank is extremely interest dependent or has shortcomings in its risk management system.

An entirely different type of "other risk" is the interest rate risk in the bank's loan portfolio (in contrast to the trading book). A bank's financial result is more or less related to general developments in interest rates, partly as a result of the bank's dependence on interest-rate related income and expenses. This mainly concerns the maturity mismatch in interest rate terms, i.e. the bank's long-term lending is at a fixed rate of interest, while most borrowing is predominantly short-term and at variable interest rates. The Basel Committee has been working for many years on the development of suitable methods for measuring and managing this risk, for example capital adequacy. However, it has not been considered appropriate to recommend general capital adequacy requirements that include all banks. On the other hand, it is proposed that national supervisory authorities have greater authority to impose capital adequacy requirements on an individual bank if the bank is extremely interest dependent or has shortcomings in its risk management system which render the bank particularly vulnerable to general interest rate developments.

Qualitative requirements – the supervisory review process

Although the quantitative capital requirements may seem satisfactory, a bank's capital can erode very rapidly in a crisis situation, and an 8 per cent capital adequacy soon disappears. Sweden experienced this during the banking crisis of the early 1990s with rising credit losses and falling asset values. Similar experiences in the USA led to the introduction of rules of "prompt corrective action". Prompt corrective action means that the supervisory authority shall require (in most cases the rules are binding to ensure that action is taken rapidly) a bank to take appropriate action as soon as capital adequacy begins to fall, even if it is above 8 per cent, or when other problem signs emerge. The lower the capital adequacy, the more stringent the measures that are imposed. In some countries, such as the UK, the supervisory authority is legally entitled to introduce a capital

adequacy requirement greater than 8 per cent for individual banks. This is done if the authority finds that the bank takes greater risks or applies weaker risk management than is normally the case for other banks.

The Basel document proposes that "supervisors expect banks to operate above the minimum regulatory capital ratios and should have the ability to require banks to hold capital in excess of the minimum".

The Basel document proposes that rules similar to those applied in the UK should be introduced in all countries. The proposal states as an important principle that "supervisors expect banks to operate above the minimum regulatory capital ratios and should have the ability to require banks to hold capital in excess of the minimum". The direction and intensity of supervision, as well as capital adequacy requirements, shall to a greater extent than previously be related to the individual bank's actual risks, general propensity for risk and risk structure, and to the ability of the individual bank to manage these risks. Each bank must have a system for internal allocation of capital that takes into account the concentration of risk and the volatility of the financial markets in which the bank operates. The supervisory authority shall familiarise itself with how the bank calculates its risk exposure and allocates its capital between different risks. The capital reserve must be subjected to regular "stress tests", whereby the responsible function in the bank calculates how the capital situation would be affected in the case of extremely unfavourable developments in a number of the bank's risk exposures.

Due to the highly qualitative nature of the supervision process, it is impossible to harmonise in detail the rules for its application in different countries and in different situations. However, it is important that the new Basel regulations contain relatively specific guidelines so that they are not applied too irregularly, thereby undermining the goal of harmonised international supervision. The Basel Committee is currently drafting these guidelines, which are based on a number of indicators for individual banks. The factors proposed so far include: the experience and quality of the bank management, the bank's propensity for risk and its "track record" in managing risk, the adequacy of risk management systems and controls, the nature of the markets in which the banks operate, the volatility of the bank's earnings, the quality of its equity and access to new capital, the degree of support and control provided by shareholders, the degree of risk concentration, the structure of its liquidity and liabilities,

the bank's legal and organisational structure, and the degree of supervision by other authorities.

The Basel Committee is currently working on drawing up guidelines for prompt corrective action in the case of a reduction in the level of capital. However, these guidelines will probably be less extensive than those used in the USA.

Although it is highly desirable for the supervisory authority to be able to take rapid action to prevent further capital erosion in a bank, such initiatives should primarily be taken by the bank's own management. Supervisors should not assume responsibility for the management of the bank. The Basel Committee is currently working on drawing up guidelines for prompt corrective action in the case of a reduction in the level of capital. However, these guidelines will probably be less extensive than those used in the USA.

Transparency

As stated previously, market discipline increases if banks are required to disclose more information about their capital and risk situation.

Work is currently underway in the Basel Committee and its subcommittees to draft specific guidelines for reporting and transparency in connection with capital adequacy requirements. The guidelines will primarily focus on information that is directly related to the assessment of the risk exposure and capital situation of banks and on the distribution of risks among different types of risk and risk categories. Information about the bank's provisioning for losses should also be disclosed. Furthermore, the bank should disclose information on its accounting policies for valuation of assets and liabilities, provisioning and income recognition. Information should also be disclosed regarding the bank's general risk strategy and risk management. Of course, it is necessary to achieve a balance so that the transparency requirements are not extended so far as to include information that the bank management considers "strategic" and thus confidential.

Capital requirements at all levels

The relevant capital adequacy regulations shall be applied at the consolidated level, i.e. for a whole banking group or for a financial group whose parent company is a bank. Many countries, including Sweden, also apply capital adequacy requirements at the "stand-alone level", whereby each

individual banking institution within the group must satisfy the 8 per cent capital adequacy requirement. By supplementing the capital adequacy requirement at the consolidated level with the stand-alone requirement, the authority ensures an equalisation of capital among the different institutions within a group, which increases the level of protection for these institutions.

By supplementing the capital adequacy requirement at the consolidated level with the stand-alone requirement, the authority ensures an equalisation of capital among the different institutions within a group.

The capital adequacy regulations to date have not been clear in terms of what is meant by "consolidated level", for example, how bank holding companies should be included. The Basel proposal also covers holding companies, and the rules for consolidation for capital adequacy purposes are also more clearly defined. Furthermore, it is proposed that the national supervisory authorities should also ensure that banks have adequate capital levels on an individual basis (stand-alone level). The new regulations are expected to lead to greater homogeneity in the capital adequacy requirements between different banking structures and reduce the risk of weaknesses in capital levels within parts of a banking group. However, only *banking institutions* within a financial conglomerate are covered by the Basel requirements.

What happens now?

As noted above, comments on the proposal put forward by the Basel Committee shall be submitted no later than 31 March 2000. Until this date, the Committee will continue to work within several of those areas in which the general views expressed in the proposal need to be transformed into operational guidelines. Development work is also underway within the banking industry, for example with regard to internal credit grading systems and credit risk models. A revised final version of the Basel proposal will be published based on the comments and the outcome of the work currently underway. The Basel Committee aims to approve the final regulations by the end of the year 2000. Thereafter, it will take some time to incorporate the regulations into national legislation. Within EU countries, this must also be preceded by EU legislation. Intensive work on capital adequacy

The Basel Committee aims to approve the final regulations by the end of the year 2000.

regulations is also underway within the EU. Those EU directives that currently regulate capital adequacy largely follow the 1988 Basel Accord. However, the directives differ significantly in certain respects, such as the fact that the regulations apply to all "credit institutions", i.e. both banks and certain other credit market institutions and securities firms. The EU countries[8] participate actively in the process to influence the Basel regulations, among other things to ensure that these regulations take sufficient account of specific European structural issues and banking circumstances.

The studies currently underway within the EU cover a large number of areas within capital regulation. The goal is to be able to present well-founded and well-documented comments and reactions (and, if necessary, counter proposals) to the Basel Committee before the end of March 2000. The EU work can also be seen as an important preparation for amendments for the required directives. Despite these preparations, it will probably take several years from the issuance of the final proposal by the Basel Committee until corresponding legislation enters into force in the EU and in member countries.

What do the proposed changes entail?

The anticipated effects of the regulatory changes proposed by the Basel Committee can be summarised in three points:

- A broader supervisory process, quantitative and qualitative requirements, and better transparency.
- Capital adequacy requirements that better reflect actual risks, which will lead to more sound lending and risk management.
- Supervision that is better adapted to the individual bank, depending on its size, structure, propensity for risk and risk management.

The final proposal will be the result of a political compromise between countries with widely differing structures in their financial systems.

Expectations of the new capital regulations should, however, be kept at a realistic level. While the new proposal is a step in the right direction, it is hardly likely to result in perfect risk-adjusted capital adequacy requirements. This is due to two factors: firstly, many of the issues that the Basel Committee must decide upon are highly complex, and, as matters stand today, there are simply no ideal solutions to be found. Sec-

[8] Eight out of a total of 15 EU countries are represented in the Basel Committee on Banking Supervision.

ondly, even the final proposal will be the result of a political compromise between countries with widely differing structures in their financial systems.

Similarities and differences between the Banking Law Committee's proposal and the proposal of the Basel Committee

The Basel proposal is limited to requirements in the capital area while the proposal of the Banking Law Committee covers the entire banking area.

The proposals of both the Banking Law Committee and the Basel Committee are responses to shortcomings in existing banking regulations. In spite of different starting points and different approaches, the two proposals are strikingly similar in many ways, and can be seen to complement each other significantly in many respects. The fundamental principle of the Basel proposal, the three pillars of quantitative capital adequacy regulations, risk-based supervision and requirements in respect of greater transparency, are directly analogous to the Banking Law Committee's three portal paragraphs on solvency, risk management and transparency. Parts of the basic philosophy behind the Basel Committee's proposal to strengthen risk-based supervision can also be seen in the Banking Law Committee's proposal to broaden the responsibility of the Swedish Financial Supervisory Authority. In order to be effective, quantitative rules must be combined with guided supervision and transparency, which allows the market to discipline bank management. The starting points of the two proposals differ in that the Basel proposal is limited to requirements in the capital area while the proposal of the Banking Law Committee covers the entire banking area.

Both the Banking Law Committee and the Basel Committee are fully aware of the systemic risks. In the case of the Basel Committee's proposal, the systemic risks are at the international level, i.e. the risk that problems in a bank will have international effects. The Basel proposal applies primarily to internationally active banks, although the proposal is worded such that it can also be applied to other financial institutions (cf. the Banking Law Committee's aim to limit the number of special rules in the legislation).

However, it is possible to discern a difference in the two approaches: while the Banking Law Committee presupposes that a financial function shall be regulated uniformly, irrespective of which type of financial institution carries out the function, the Basel requirements are primarily directed at banks. This does not necessarily indicate two fundamentally different approaches, but stems from the fact that the mandate of the Basel Committee covers banks only. An example that demonstrates that the Basel Committee also thinks in functional terms, despite its limited mandate, can be seen within the area of risk-mitigation techniques. As noted above, the Committee has established the regulatory objective that capital adequacy requirements shall be the same for equal risks, irrespective of how risk mitigation has taken place.

Detailed legislation serves little purpose since it risks quickly becoming obsolescent.

Both Stockholm and Basel have drawn the same conclusion from the rapid developments within the financial sector. Detailed legislation serves little purpose since it risks quickly becoming obsolescent. Instead, it is necessary to draw up framework legislation that deals with developments in the financial sector, but at the same time serves as sufficient guidance to provide the necessary basis for interpretation, implementation of regulations and similar matters.

In summary, the proposals of the Banking Law Committee and the Basel Committee are both examples of the way forward in respect of regulation and supervision of financial activity. This, in turn, is a product of developments within the financial sector, whereby differences between different types of institutions, transactions and instruments are becoming less distinct.

Interest rate risk in the foreign exchange reserve – duration intervals for the investment portfolio

By Christian Ragnartz[1]
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The Riksbank manages a foreign reserve representing approximately SEK 136 billion.[2] The management of this reserve entails a significant responsibility. In light of the Riksbank's recently expanded independent status, it is important to outline in a clear manner how this reserve is managed. This article aims to explain the interest rate risk exposure the Riksbank has chosen for its foreign reserve, why the bank has done so and the implications for the Riksbank's total earnings.

Why the Riksbank manages a foreign reserve

A foreign reserve is required since it may be necessary for implementing monetary and exchange rate policies.

One of the tasks assigned to the Riksbank is the management of Sweden's foreign exchange reserve. A foreign reserve is required since it may be necessary for implementing monetary and exchange rate policies. Depending on the exchange rate policy regime, it may be necessary to intervene in the foreign exchange market. When the Riksbank intervenes in the foreign exchange market, it buys or sells Swedish kronor for foreign currency in order to influence the relative value of the krona. The need for available foreign currency for intervention purposes is greatest when a fixed exchange rate applies and least when a floating exchange rate applies. Since 19 November 1992, Sweden has had a floating exchange rate. Under the current monetary policy regime, the value of the Swedish kro-

[1] This article is the result of a long work process within the Riksbank's asset management activities. Consequently, many people have been involved in this process, especially Paul Klinkert and Marcus Söderberg. I am also very grateful to JP Morgan for their help in compiling data for this article.

[2] As of 31 December 1998; includes gold and claims on the IMF.

na is only one of several variables that affect the Riksbank's policy. The need to maintain a foreign reserve is therefore relatively small[3] at present. The Riksbank nonetheless maintains a relatively high intervention capacity since exchange rate policy regime may change in the future, which could involve a rapid change in the need for intervention.[4]

The capacity to intervene places high demands on the liquidity of the assets the foreign reserve is invested in. The liquidity requirement not only restricts the choice of possible assets, it also restricts the choice of possible currencies and their relative distribution. After these factors have been taken into consideration, the management of the foreign reserve must be conducted in accordance with "best practice" in business and risk management. This means that the foreign reserve shall be managed so as to achieve the highest possible return within the authorised limits for risk-taking and with possible future intervention in mind.

How the Riksbank can influence its earnings

The Riksbank cannot freely influence its balance sheet in order to avoid unfavourable results. Several items in the balance sheet are conditional upon monetary policy and cannot therefore be changed merely to influence the bank's financial result. However, the foreign reserve is an item that can be influenced in some ways without weakening intervention capacity, of course, and which at the same time can have a large significance on the financial result. The Riksbank's total net income is thus largely influenced by the choice of interest rate risk in the foreign reserve. However, it is not possible to actively manage the entire foreign reserve.

The reserve is divided into two portfolios, an investment portfolio and a liquidity portfolio.

The investment portfolio – the Riksbank's long-term bond holding

The investment portfolio can be managed more systematically with a view to earnings.

At present, the investment portfolio comprises the major part of the foreign reserve. The investment portfolio is the Riksbank's long-term holding of foreign

[3] What may be regarded as a suitable size for the foreign reserve is not discussed in this article.
[4] The need for intervention can also arise under the current exchange rate regime.

government bonds and represents that part of the foreign reserve that can be managed more systematically with a view to earnings. The rest of the foreign reserve, primarily the liquidity portfolio[5], is intended to meet the short-term need for intervention funds and other Riksbank commitments in its capacity as a "foreign exchange bank" for various foreign exchange transactions on behalf of other central government authorities.[6]

Both investment and liquidity portfolios in turn are divided into four different currency portfolios. These portfolios reflect the currencies in which the Riksbank invests its foreign reserves. As things stand at present, these currencies are the euro, the US dollar, the yen and the pound sterling.[7] The relative distribution between the different currencies is fixed and is therefore not actively managed.[8] The reason why the exchange rate risk is not actively managed is that the Riksbank is just one of many central banks; and if the Riksbank actively managed the exchange rate risk, this could disrupt the monetary and exchange rate policies of other central banks. Furthermore, the capacity for intervention may be affected negatively if the currency distribution was actively managed.

The value of the investment portfolio

The value of the investment portfolio is mainly affected by three factors: exchange rate developments, the degree of credit risk and the exposure to interest rate risk. Of these three overall risk factors, only interest rate risk is actively managed. The Riksbank has chosen to minimise the credit risk as far as possible, while the exchange rate risk is managed only passively.

Interest rate risk arises as a result of unforeseen changes in the yield curve.

Interest rate risk arises as a result of unforeseen changes in the yield curve. These changes in interest rates affect the value of the Riksbank's investment portfolio. Movements in the yield curve are captured by a couple of factors. The most important factor is parallel shifts in the yield curve.[9] The risk entailed by these parallel shifts can be measured and controlled by the

[5] The Riksbank also manages a gold portfolio. However, this is not managed in the same way as investment and liquidity portfolios and is therefore not discussed in this article.
[6] The largest transactions are associated with Sweden's external debt.
[7] The current distribution is 35 per cent EUR, 35 per cent USD, 15 per cent JPY and 15 per cent GBP.
[8] Exchange rate risk is managed in conjunction with periodic reviews of the currency distribution, although considerations of intervention capacity receive greater attention.
[9] Other significant factors include the slope and curvature of the yield curve.

choice of the portfolio's "modified duration"[10]. Thus for the Riksbank, the question of the level of interest rate risk exposure for the foreign reserve mainly concerns the choice of modified duration for the investment portfolio. The Riksbank has chosen to use modified duration to control risk not only on account of the fact that it captures the most important risk factor, the parallel shifts, but also due to the simplicity of the measurement. Modified duration is uncomplicated to use, both for implementing and evaluating risk management.

Starting points for choosing the duration level

Matching the duration of assets and liabilities can immunise the market risk.

The choice of duration[11] for a portfolio is simplest if the investor has a clear investment horizon. Matching the duration of assets and liabilities can immunise the market risk, i.e. assets and liabilities become equally sensitive to interest rates. Thus, any change in interest rates that increases the value of the liabilities will be neutralised by a corresponding increase in the value of the assets. With a definite investment horizon, the choice of duration thus becomes relatively easy. The task becomes more difficult if the investor departs from the natural investment horizon as sometimes constituted by the liability side of the balance sheet, or if a natural investment horizon is lacking.

The Riksbank lacks a clear investment horizon.

The problem is that the Riksbank lacks a clear investment horizon, and thus, the choice of duration is less obvious. Attempting to immunise the Riksbank against market risk is difficult. The reason is that the Riksbank does not have any interest-bearing liabilities to directly match the assets with, which would give the "natural" investment horizon. The central government debt is instead managed by the Swedish National Debt Office.[12] Nor is it known in advance when the need will arise for liquid funds from the foreign reserve. These needs arise in connection with interventions and financial turbulence, although hardly ever in connection with debt payment.

[10] Modified duration measures how the value of the portfolio is affected by a general change in interest rates, a parallel shift of the yield curve, of 1 percentage point. The higher the duration, the larger the effect that a change in interest rates has on the value of the portfolio.

[11] Duration measures the average remaining period to maturity of a portfolio. This measure is very closely related to modified duration, which measures the portfolio's interest rate sensitivity.

[12] Attempting to immunise against interest rate risk would therefore entail practical problems relating to risk control, risk monitoring and evaluation.

The Riksbank quite simply lacks a natural investment horizon, and, consequently, alternative starting points must be sought when choosing duration. The relationship between risk and yield, i.e. the shape of the yield curve, thus becomes a natural starting point.

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Unclear investment horizons and the relationship between risk and return

The liquidity-preference hypothesis is a common explanation of why the yield curve normally has a positive slope. The meaning is that bonds with a long period to maturity have a positive risk premium to compensate for increased volatility in return. This is in light of the fact that most investors dislike short-term variations in return due to a relatively short evaluation and/or investment horizon.

An additional explanation of the liquidity-preference hypothesis may be that many investors lack clear investment horizons.[13] If the investment horizon is so unclear that it cannot be used as a basis for decision making, there is a risk that investors will be less willing to accept price risk[14] as against reinvestment risk.[15] This increases the probability of a manager choosing an investment horizon that matches the accounting period. This investment horizon – which corresponds to the duration of the portfolio – is normally relatively short. If, for example, an investor reports results quarterly, he tends therefore to choose interest rate instruments with a corresponding maturity. By choosing such maturity, the actual result will always be close to the forecasted result. The asset manager thus minimises the price risk. From some kind of short-term perspective, this strategy can be termed a "risk-free" strategy. The disadvantage of this strategy is that the asset manager is exposed to a large reinvestment risk, i.e. it is difficult

[13] See Ilmanen (1996), "Does duration extension enhance long-term expected returns?"

[14] The risk that interest rates, and thereby bond prices, will develop unfavourably and thus have a direct effect on the result. If the interest rate rises, the cash flows must be discounted at a higher rate of interest, and will therefore decrease in value. The longer the cash flow horizon, the greater is the influence of the higher interest rate on the market value. A portfolio's risk therefore increases with longer average duration.

[15] Reinvestment risk arises when capital is to be invested over several periods, since the reinvestment rate during the later periods is unknown. By investing assets with the same duration as the accounting period, the only risk exposure is to reinvestment risk, and the annual result will be known at the beginning of the year.

to predict the interest rate at which the reinvestments can be made. Furthermore, the strategy entails an alternative cost, considering the normally positive slope of the yield curve, since an investment horizon has been chosen which will not maximise the return over time.

Asset managers without a clear investment horizon are thus faced with the choice of either investing in accordance with a strategy which maximises results over time, i.e. the manager accepts a greater price risk (long duration), or investing in accordance with a strategy that enables a more stable reported result, i.e. the manager accepts greater reinvestment risk (short duration). Short-term evaluation or reporting of results entails a tendency among managers to choose a short investment horizon for fear of greater variations in the result. It is likely that this tendency strengthens the mechanisms of the liquidity-preference hypothesis and contributes to a steeper slope in the yield curve than would otherwise be the case.

What yield requirements can be placed on the Riksbank?

A reasonable assumption is that the central government has a long-term perspective on its activities and its assets.

Which duration is most suitable for the Riksbank's investment portfolio? A logical starting point is to consider the perspective of the owners – the central government. A reasonable assumption is that the central government has a long-term perspective on its activities and its assets. Consequently, the central government looks to the long-term result and is less concerned by short-term variations in reported results. This is of course on condition that the long-term result over time can be expected to exceed the short-term results. With this assumption, the Riksbank would not be obliged to invest with a duration in accordance with the accounting period. There is therefore no reason for the Riksbank to pay the extra liquidity premiums that market players, on the basis of the above reasoning, appear willing to pay for interest rate securities with a short duration. Since a duration of reasonable length is expected to contribute positively to the Riksbank's average result, this opportunity should be utilised, even if it entails an expected increase in volatility in the short-term earnings trend.

In the case of the Riksbank, this reasoning is probably further strengthened by compliance with the principles governing the transfer of Riksbank profits to the central government. According to these principles,

the Riksbank shall annually remit to the central government 80 per cent of the average earnings for the most recent five-year period. Variations in the annual result are therefore probably of subordinate interest, and the central government can instead be expected to maximise its earnings in the long term. For the Riksbank, a larger price risk is worth taking, in contrast to the reinvestment risk, since the short-term evaluation is less significant. The Riksbank has therefore selected this approach for the choice of the investment portfolio duration and has therefore concentrated on a relatively long duration (two years or longer).[16]

For the Riksbank, a larger price risk is worth taking, in contrast to the reinvestment risk, since the short-term evaluation is less significant.

Practical aspects – the need for benchmark portfolios

Regarding the choice of duration, it is difficult, if not impossible, to establish the exact level which provides maximum return. The relationship between risk and return decreases the further you progress on the curve.[17] This means that if a clear investment horizon is lacking, the choice of duration will always be associated with a certain amount of subjectivity. It is therefore natural to weigh in practical aspects. The Riksbank's investment portfolio is currently evaluated using externally designed benchmark portfolios. These benchmark portfolios are used because it is obviously important to be able to evaluate and monitor portfolio management against some form of standard/benchmark. This holds for both active and passive portfolio management.

The Riksbank's investment portfolio is currently evaluated using externally designed benchmark portfolios.

A specific portfolio should be chosen for benchmarking. The return of this portfolio can then serve as a basis for comparison. It is not possible to base the comparison solely on a specific duration level, since, in principle, it is possible to achieve a given duration by means of an infinite number of portfolio combinations. This important factor constitutes a basis for the Riksbank's choice of duration interval.

[16] The positive relationship between risk and yield is most pronounced on the shorter part of the yield curve, and then gradually decreases and even becomes negative on the longer part of the curve. The correlation naturally varies, both over time and from market to market. See, among others, Ilmanen (1996) or Domian, Maness and Reichenstein, "Rewards to Extending Maturity" (1998).

[17] The decreasing relationship can possibly be explained by the market segmentation hypothesis.

Duration intervals and active portfolio management

So far, this article has focused on explaining why the Riksbank's investment portfolio has a relatively long duration and the choice of starting point for setting the risk exposure within the long duration span.

Another important issue concerns whether the investment portfolio should be managed actively or passively. In passive management, the benchmark portfolio constitutes not only a basis for determining the interest rate risk. There is also the aim for the investment portfolio to mirror as far as possible the benchmark portfolio's profile and holdings.

The Executive Board of the Riksbank has decided that the investment portfolio shall be managed actively.

Active management involves the issuance of a mandate enabling the investment portfolio's holdings to deviate from the benchmark portfolio, which instead becomes a measure for evaluating the active management. The Executive Board of the Riksbank has decided that the investment portfolio shall be managed actively. In order to enable active management, a duration interval must be specified within which the duration of the investment portfolio may vary.

Active management increases investment possibilities and entails more flexible risk-taking:

- Investment possibilities increase with active management. With passive management, many investment alternatives risk being lost, since it is very difficult to design benchmark portfolios that include all potential investment possibilities. The Riksbank uses, for example, derivative instruments and international issues[18] in its portfolio management that are not included in the benchmark portfolio.
- Active management increases flexibility, which means that risk-taking can be influenced to a greater extent. This makes it possible to anticipate and parry changes in the yield curve. If rising interest rates are anticipated, the portfolio's risk exposure is changed by reducing the portfolio's duration, and vice versa. There are corresponding opportunities for parrying other risk factors, such as changes in the slope and/or curvature of the yield curve.

[18] International issues, known as euro issues, are "offshore" issues, i.e. bonds issued in another currency.

- Active management also provides favourable conditions for recruiting skilled asset managers (these are also needed in the case of passive management).

Potential problems using benchmark portfolios

The benchmark portfolios currently used by the Riksbank have been constructed by JP Morgan. They are constructed as an average of a large number of liquid issues and represent, for each of the currencies included in the investment portfolio, an average for each market. The reason that externally constructed benchmark portfolios are used is due to the substantial work effort involved in constructing, implementing and maintaining benchmark portfolios.

A weakness often noted in global benchmark portfolios of the type used by the Riksbank is that their duration changes over time. Since they are constructed as an average of a large number of government bonds outstanding in a given market, the risk exposure of the benchmark portfolios is to a certain extent exogenously determined. In the case of the Riksbank, the risk level of the benchmark portfolios will depend on the structure of the central government debts of those countries included in the foreign exchange reserve. Consequently, a benchmark portfolio will never represent a constant risk level, since the structure of issues and central government debts in the different markets are constantly changing, which gives rise to a duration drift, i.e. the duration changes as bonds mature and new bonds are issued in line with the capital requirements of the individual central governments.[19]

A weakness often noted in global benchmark portfolios of the type used by the Riksbank is that their duration changes over time.

However, this problem should not be exaggerated, since, for most countries, the structure of the external debt usually changes only marginally in the short term. However, if a change were to result in significant changes in the duration of the benchmark portfolio, the duration drift could, in the worst case scenario, become so large that those who determine the duration may consider that the benchmark portfolio no longer reflects the chosen levels of risk and expected return. The Japanese mar-

[19] For further reading on benchmark/bond indexes, see "Why use bond indexes?", Sveriges Riksbank Quarterly Review, no. 4, 1998.

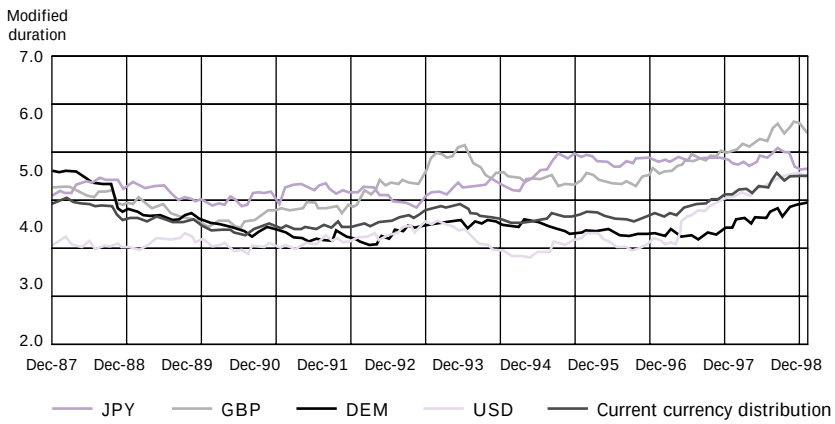
ket is a current example of how public finances might have significant effects on the size and structure of the market and thereby also on benchmark portfolios. Against this background, it can be interesting to see how the duration has evolved since the end of 1987 for the investment portfolio's currencies, both separate and aggregated according to the current currency distribution (Diagram 1).

It can be noted that duration can vary for each currency portfolio, while the development for the investment portfolio as a whole is relatively stable. It is also interesting to note that the difference in duration between different currencies can be relatively large.

The main function of benchmark portfolios is to act as instruments to evaluate the results of portfolio management.

However, the problem of duration drift should not be exaggerated. The main function of benchmark portfolios is to act as instruments to evaluate the results of portfolio management. If anything, duration drift is a problem for the evaluation of active portfolio management, although not for risk management. Even if the choice of risk exposure is based on the average modified duration of the current benchmark portfolios, the risk exposures of the investment portfolio are determined by the absolute duration levels and not by a benchmark portfolio. The guidelines for investment portfolio duration adopted by the Executive Board always apply, irrespective of the trend in the duration of the benchmark portfolios.

Diagram 1. Modified duration for the investment portfolio's different benchmark portfolios, aggregated according to the current currency distribution for the period December 1987–February 1999

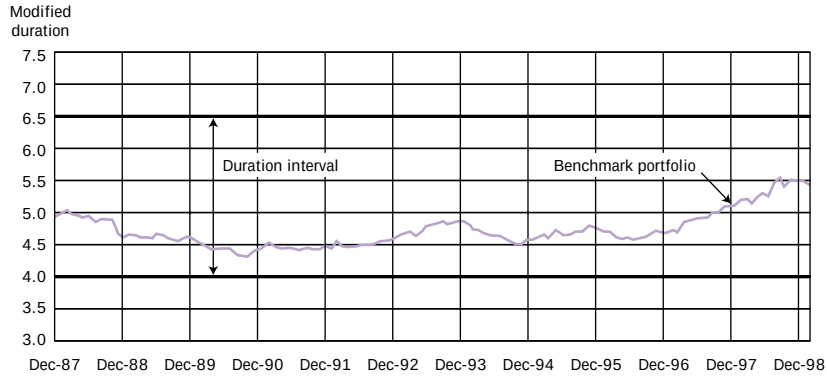


The duration interval

The interval of 4.0–6.5 percentage points was based more on experience than on exact criteria.

Due to the difficulty in establishing which duration is best within the longer time span, it is appropriate to take certain practical aspects into consideration – it should be possible to perform an evaluation of the portfolio management by comparing it with a specific benchmark portfolio. This means that the approximate interest rate risk that was current in the Riksbank's benchmark portfolios when the interest rate risk was set was used as a basis for decisions regarding the interest rate risk exposure of the investment portfolio. The average interest rate risk, expressed as modified duration, was approximately 5.5 per cent, which thus became the guideline for the investment portfolio. An interval was set around this level to enable active management. In order for active management to be meaningful, it required a mandate enabling changes to the modified duration of the investment portfolio within an interval of 2.5 percentage points, and thus a duration interval of 4.0–6.5 percentage points for the entire investment portfolio (Diagram 2).[20] The size of the interval was based more on experience than on exact criteria.

Diagram 2. Development of the aggregated[21] modified duration of the Riksbank's benchmark portfolios and duration interval for the investment portfolio



However, the entire mandate is used only in exceptional cases and only then in connection with very strong views and assessments of the trend in

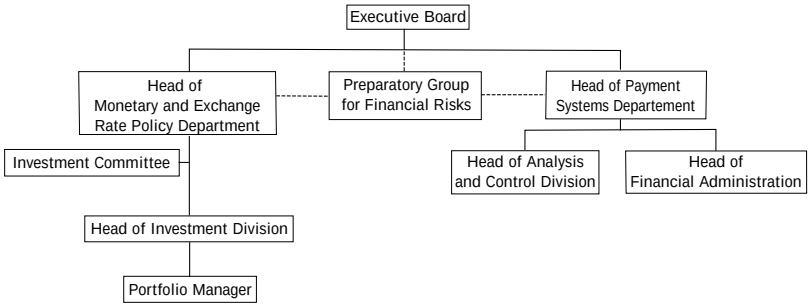
[20] The deviation mandate is asymmetric to allow the asset management division to reduce the risk exposure slightly more, relative to the benchmark portfolio average of 5.5 per cent, than it is able to increase the risk exposure.

[21] According to the current currency distribution.

interest rates. In the case of such extreme positions, scenario analyses using portfolio optimisations supplement analyses of the real economy and market conditions in an attempt to forecast as far as possible the consequences of different interest rate outcomes. Major, long-term investment decisions are taken by an investment committee, while less significant decisions are taken by individual managers (Figure 1, organisation chart). The investment committee is thus authorised to change the interest risk exposure of the investment portfolio within the duration interval set by the Executive Board, while individual investors have individual mandates to change the interest rate risk, albeit in line with the decisions taken by the investment committee.

However, the total interest rate exposure of the investment portfolio must never deviate from the duration interval set by the Executive Board. The evaluation is undertaken, independently of the asset management division, using JP Morgan benchmark portfolios.

Figure 1. Division of responsibility for investment and risk control operations



Summary

A portfolio's duration is the single most significant factor for determining risk and expected return.

A portfolio's duration is the single most significant factor for determining risk and expected return. However, the Riksbank lacks a natural investment horizon, which means that the choice of duration interval is somewhat arbitrary. However, it can be maintained that the central government should have a long-term perspective on its activities and should

therefore not be sensitive to visible price risk, in comparison with the alternative cost entailed by placing the investment portfolio with a short-term duration. However, this does not indicate which duration is best for the investment portfolio within the longer time span. Due to difficulties in determining the duration that provides the maximum return within the longer time span, it was appropriate to take practical aspects into consideration. The average risk in the Riksbank's benchmark portfolios was therefore considered a suitable starting point. The reason that investment portfolio risk is controlled with an interval is that the Executive Board decided that the investment portfolio shall be managed actively. The mandate of the asset management division shall be within the scope of the guidelines set by the Executive Board. In all, the above reasoning produced a duration interval for the entire investment portfolio of 4.0–6.5 per cent.[22]

In all, the above reasoning produced a duration interval for the entire investment portfolio of 4.0–6.5 per cent.

The main reason why the Executive Board set this duration interval is that the average expected result will be higher with a longer duration. A higher expected yield is also associated with greater variability in the result – but given the long-term perspective of the activities of the Riksbank and the central government, the alternative cost that would arise in the case of a short duration cannot be justified.

[22] The decision applies to the entire investment portfolio, i.e. the aggregated, modified duration of the investment portfolio and not the duration of individual portfolios.

Inflation Forecast Targeting: the Swedish Experience

By Claes Berg*
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This article is an abbreviated version of a paper prepared for the seminar on Inflation Targeting in Rio de Janeiro, 3–5 May 1999, organized by the Monetary and Exchange Affairs Department of the IMF and the Central Bank of Brazil.

In this article key points in the development of the present Swedish inflation targeting strategy are analysed. Since the implementation of the inflation target strategy began in 1993, three different phases are distinguished: the establishment of the inflation target, the communication of explicit inflation forecasts, and, finally, the introduction of distribution forecast targeting.

The increased credibility of the inflation target has resulted in both a lower average inflation level and a lower inflation variability.

In practice, distribution forecast targeting involves presenting a main scenario for future inflation, and assessments of both the degree of uncertainty in the forecast and the magnitude of the upside and downside risks in the main scenario in quarterly inflation reports. While inflation targeting in Sweden has been successful in reducing both inflation and private sector inflation expectations, aggregate demand as well as supply shocks and temporary factors have also exerted a downward influence on inflation in the 1990s. It is likely that the increased credibility of the inflation target has resulted in both a lower average inflation level and a lower inflation variability.

1. Introduction

In the long run, the inflation rate is the most important macroeconomic variable that monetary policy can affect. During recent years a broad consensus therefore

* I would like to thank Mårten Blix, Hans Dillén, Lars Heikensten, Per Jansson, Hans Lindblad, Hans Lindberg, Eva Srejber, Lars E.O. Svensson, Staffan Viotti, Anders Vredin and seminar participants for many constructive comments. Mårten Blix and Peter Sellin provided background material for the discussion on forecast uncertainty. Martin Edlund and Hanna Widell provided research assistance. I also thank Ann-Christine Högberg for secretarial assistance. The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Executive Board of Sveriges Riksbank.

Monetary policy needs a nominal anchor.

has been established that price stability should be the overriding goal for monetary policy. When monetary policy is used to address short-run stabilization objectives, the long-run objective of price stability should not be compromised. Monetary policy therefore needs a nominal anchor. An inflation target can serve as such a nominal anchor, aiming at coordinating inflation expectations. As a nominal anchor an inflation target will also provide a commitment mechanism and will increase the accountability of the monetary policy authority. The inflation target communicates to the public the inflation rate the central bank is aiming at in the future. It will thus serve as a reference point against which the central bank can be judged.[1] The purpose of this paper is to illuminate and discuss the experience of implementing the Swedish inflation target since 1993.[2]

The article is organized as follows. Section 2 considers the reasons for an inflation target regime. Section 3 discusses the main principles in the implementation of such a policy regime. The role of the inflation forecast and the way to deal with forecast uncertainty and transitory effects are analysed. The respective roles of the Staff and the Executive Board in the decision making process are discussed. Section 4 presents the new central bank act and its requirements on accountability and the role of the tolerance interval. Section 5 gives an overview of the implementation of monetary policy since 1993 and describes the development from implicit inflation forecast targeting (1993–1995) to explicit inflation forecasting (1996–1997) and finally distribution forecast targeting (1998 and onwards).[3] Section 6 discusses some preliminary results regarding the effect of inflation targeting on the economy. Section 7 concludes.

2. Why inflation target regime?

The fundamental reason why long-term price stability is desirable is that inflation is detrimental economically and socially.[4] Price stability facilitates the role of the payment system, reduces uncertainty in firms and households investment deci-

[1] Bernanke et al (1999).

[2] The evolution of the Swedish inflation target strategy is also analysed in Andersson and Berg (1995), Berg and Gröttheim (1997), Bäckström (1998), Heikensten and Vredin (1998) and Svensson (1997). The Swedish experiment of price level targeting in the 1930s is analysed in Berg and Jonung (1999).

[3] The term "distribution forecast targeting" was introduced in Svensson (1999d), which gives a theoretical and coherent foundation of monetary policy with price stability as the primary objective.

[4] A more detailed review of inflation's negative effects lies outside the scope of this memorandum; the reader is referred, for example, to Fischer (1994).

The central bank is in a unique position to pursue the objective of price stability.

sions and prevents arbitrary redistribution of income and wealth. The central bank is in a unique position to pursue the objective of price stability in that it has the exclusive right to create assets, such as notes, coins and bank reserves, that can be used for final payments. To a limited extent, moreover, the central bank can contribute to the stabilization of real economic activity.

In January 1993 the Riksbank specified that the objective of monetary policy is to limit the annual increase in the consumer price index in 1995 and onwards to 2 per cent, with a degree of tolerance of ±1 per cent. This objective corresponded to the so called underlying rate of inflation when the target was announced. In 1993 as well as in 1994, monetary policy aimed at preventing the inflationary impulse which was deemed unavoidable, due to the large depreciation of the krona and changes in indirect taxes, from causing a persistent increase in inflation, that is, an increase in the underlying rate of inflation.

In many countries the CPI tends to overestimate inflation.

There is no clear evidence that the optimal level for an inflation target is exactly 2 per cent. There are grounds, however, for not having an inflation target that is too low. For one thing, there are indications that in many countries the CPI tends to overestimate inflation, e.g. the measurement bias. For another, an excessively low inflation target may cause problems if, as is often the case, nominal wages display downward rigidity. In the absence of any inflation, adjustments to shocks then occur to an unnecessarily large degree via labour shedding because that is the only way of cutting the total wage bill.[5] A final argument in favour of a positive inflation target is the fact that nominal interest rates are non-negative.[6]

Sweden is a member of the European Union since 1995. The primary policy objective of the new European Central Bank (ECB), which assumed responsibility for monetary policy in the euro area from the beginning of 1999, is the maintenance of price stability. Until further notice Sweden has chosen not to join the euro area. The difference between the target formulations of the ECB, with its implicit price norm of 1.5 per cent, and the Riksbank target of 2 per cent is probably small in practice and it has not led to a revision of the level of the Swedish inflation target.

[5] Two per cent is the borderline in Akerlof, Dickens and Perry (1996), who study the effects of downward rigidity of nominal wages.

[6] One per cent is the borderline in Orphanides and Wieland (1998), who examine the consequences of non-negative nominal interest rates.

The Swedish inflation target is expressed as the change in the official consumer price index. The CPI is meant to measure the price changes for total private consumption in the domestic market. The advantages of the CPI are well understood: it is widely used and recognized as a measure of inflation among economic agents and the general public, published monthly with a short time lag, and rarely subject to revision. Using the CPI eases communication with the general public and politicians and has educational value.

Using the CPI eases communication with the general public and politicians and has educational value.

A drawback, when using headline CPI as a target variable for monetary policy, is that it contains prices that are outside the control of the Riksbank (indirect taxes and subsidies) and prices that have perverse effects on monetary policy (mortgage interest costs). Another potential problem with the use of a conventional price index is that transitory price movements in the market prices of particular goods may mask a different development of the general price level. There are commodities that historically have given rise to such one-off effects on the price level, for example oil products, food products, etc. The current role of a measure of underlying inflation, UND1X, in the conduct of monetary policy and the issue of how to deal with transitory effects will be discussed in section 3.4 below.

When proposals have been presented by the CPI Inquiry appointed by the Swedish Government, which is scheduled to be published in the autumn of 1999, there may be occasion to consider which index of inflation should guide policy. One alternative to the CPI could be the HICP, which is being constructed under EU auspices. There may also be cause for a future assessment of monetary policy's formulation and target in the light of the move to Stage Three of EMU and the monetary policy of the European Central Bank.

3. The principles of an inflation target regime

3.1 The inflation forecast[7]

The considerable lag before monetary measures affect inflation means that policy has to be forward-looking. Forecasts of central macro variables, inflation in particular, therefore play an important part. In practice, the part played by the Riksbank's inflation forecast is so vital that it resembles an intermediate target.

The main principle for implementing an inflation target regime can be for-

[7] For a more technical presentation see Svensson (1999b).

mulated as a simple rule of thumb: if the inflation forecast, based on an unchanged repo rate, is in line with the target at the time horizon of twelve to twenty-four months, then the monetary stance is appropriate; if the forecast is above (below) the inflation target, then the monetary stance is too expansionary (restrictive), and the repo rate should be raised (lowered) immediately or in the near future. As this rule of thumb refers to an inflation forecast with the instrumental rate unchanged, it is natural for the Riksbank to present its forecasts accordingly.

3.2 The main scenario

The inflation forecasting framework imposes discipline on judgemental adjustments.

In order to construct the inflation forecast various econometric models are used. There is also a rule for additional extra-model information and judgemental adjustment, given the uncertainty about modelling the transmission mechanism. The inflation forecasting framework imposes discipline on judgemental adjustments, as convincing cases must be presented why pieces of extra-model information will affect inflation at the time horizon which is relevant for monetary policy.

A main scenario, and several alternative scenarios, are presented by the Staff to the Executive Board. The factors that, in addition to monetary policy, essentially determine the development of inflation are international activity and inflation, demand relative to supply, other cost shocks (effects of indirect taxes and interest expenditure) and inflation expectations.

The Riksbank's forecast is not directly comparable to other forecasts that typically assume some response from monetary policy.

The forecasting round at the Riksbank culminates in a main scenario that is published in the Inflation Report[8]. It should be stressed that the main scenario is viewed as the most likely outcome under the assumption that the repo rate is held constant over the forecast horizon. The assumption of an unchanged repo rate is made primarily for pedagogic reasons in order to show whether or not the repo rate needs to be changed to bring inflation in line with the target. One consequence of this assumption is that the Riksbank's forecast is not directly comparable to other forecasts that typically assume some response from monetary policy.

[8] See for example the Inflation Report 1998:4 for a discussion of the framework for the forecast.

3.3 Dealing with forecast uncertainty[9]

However, monetary policy is not only guided by the most likely outcome, e.g. the main scenario, based on an unchanged repo rate over the forecast horizon. An assessment of the risk spectrum is also important, and in practice the mean forecast of future inflation is therefore taken into consideration, when deciding on the appropriate monetary policy stance.[10] In recent Inflation Reports, confidence intervals for the forecasts have been published. The Executive Board may take the properties of the whole distribution into account when setting the repo rate. This implies that monetary policy can be described as being guided by "distribution forecast" targeting. Since this is a fairly new component in the implementation of inflation targeting, there is reason to present the approach in some detail.

The assessment in the main scenario is the path of future inflation that is deemed to be most likely over the forecast horizon.

As indicated above, the assessment in the main scenario is the path of future inflation that is deemed to be most likely over the forecast horizon. It is based on assessments of the factors that are deemed to be important for how inflation will develop, such as total demand and supply in the economy, import prices and wages. Such assessments are of course associated with uncertainty. The uncertainty analysis is based on two types of assessments for each factor that is deemed to affect inflation. First, an assessment is made whether the uncertainty in the forecast is larger or smaller than the uncertainty that historically has been associated with the factor. Second, there might also be reasons to believe that the probability of outcomes above the main scenario is larger than the probability of outcomes below. This would then constitute an "upward" risk in the forecast. Correspondingly, there would be a downward risk if the probability of outcomes below the main scenario is judged to be larger than the probability of outcomes above the main scenario. In other words, it is possible for the risks to be asymmetrically distributed around the main scenario. The resulting distributions are then weighed together to an inflation-forecast distribution with weights that reflect each factor's relative importance for future inflation.

How are these assessments made in the forecasting round? The economists at the Economics Department of the Riksbank make forecasts one and two years ahead for the factors that they are responsible for. For each assessment and forecast horizon they make a subjective judgement whether the uncertainty is the

[9] This section is based on Blix and Sellin (1999).

[10] By focusing on the mean forecast, the use of econometric models is facilitated, as such models normally produce forecasts of the mean.

The economists at the Economics Department of the Riksbank make forecasts one and two years ahead for the factors that they are responsible for.

same as or larger or smaller than the average historical uncertainty. A subjective assessment that departs from the historical has to be accompanied by a clear explanation – for example in the form of some indicator – that justifies it. Likewise, if the risks around the main scenario are deemed to be asymmetric, this also has to be motivated.

The inflation forecast distribution

When there is a forecast in the main scenario as well as an assessment of uncertainty and risk for each factor deemed to be important for inflation this information must be weighed together in some way to determine what it implies for the inflation-forecast distribution.

The inflation forecasts from the main scenario that are published in the Inflation Reports (since 1998:2) are presented with surrounding uncertainty bands that are derived using the inflation-forecast distributions discussed here. The bands are constructed such that the probability of outcomes below the lower band and outcomes above the upper band are equal. A 5 per cent chance of being below and 5 per cent chance of being above, for example, define the 90 per cent interval.[11]

The respective role of the Staff and the Executive Board in the decision making process

All economists involved in the forecast meet to discuss and potentially adjust their assessments.

The work with these assessments is initiated at the Economics Department concurrently with the main scenario. It seems natural that the forecasters of a certain factor also make an uncertainty and risk assessment for the factor. But in order to make the assessments consistent with one another, all economists involved in the forecast meet to discuss and potentially adjust their assessments so that the overall risks are congruent.

The Executive Board takes a preliminary main scenario and the picture of risk from the Economics Department's analysis as the starting point for its assessment at an early stage of the process.[12] The initial assessment from the Economics

[11] Wallis (1999) criticizes the Bank of England for not having equal tail probabilities. See also the Economist (1999). It should be stressed that the Riksbank's uncertainty bands have equal tail probabilities.

[12] As the present management structure has been in place for a short period of time, the interaction between the Executive Board and the Staff is still developing. See section 4 below.

Department thereby provides a concrete basis for the Executive Board's discussion. The Executive Board's conclusions may imply that the main scenario and the distribution for the inflation forecast are revised. This final assessment is presented in the Riksbank's Inflation Report, enabling the Riksbank to pedagogically communicate its view on uncertainty and (a)symmetric risk for the inflation forecast in the main scenario.

3.4 Policy clarification to deal with transitory effects

There is a limit to the ability of monetary measures immediately to counter price movements arising from some kind of shock.

As mentioned above, there is a limit to the ability of monetary measures immediately to counter price movements arising from some kind of shock, for instance changes in the exchange rate, indirect taxes and subsidies, raw materials prices, etc. Given a credible monetary policy, moreover, countering the direct effects of shocks in full is not necessarily desirable if their impact on inflation is only transitory. Such countermeasures might destabilize real economic activity. It is important, on the other hand, to try to counter – and thus to obtain information about – shocks that affect prices more permanently, and hence influence inflation expectations.

The problem of temporary influences can be managed in different ways. One possibility is to specify in advance which deviations from the CPI are acceptable. This is the method used in New Zealand. A closely related alternative is to use a measure of the underlying inflation as the target. Another possibility is to supplement the CPI by one or several measures of the underlying inflation. In Canada the objective is expressed in terms of the CPI, whereas a measure of the underlying inflation – which descibes the process of inflation better – is the operational target. A "softer" variety on the same theme is to clarify how the practical policy is influenced by various measures of the underlying inflation, since it can often give a clearer picture of the process of inflation.

When the Swedish inflation target was clarified in 1999 it was modified in two respects.

There may be grounds for explaining in advance that a deviation from the CPI target is warranted.

The first respect concerns situations when CPI inflation in the relevant time perspective is being affected by specific factors that are judged to have no substantial permanent impact on inflation or the inflation process. A repo rate adjustment, up or down, affects house mortgage interest expenditure, which is a sizeable component

of the CPI. This is evidently not an effect on the CPI that the Riksbank ought to counter. Monetary policy effects of indirect taxes and subsidies can be analysed in a similar way.[13] Although supply shocks are more difficult to analyse, they also deserve special mention. Price movements for petroleum and other imported goods, for example, that are judged to have only transitory effects on domestic inflation, ought not to elicit monetary policy countermeasures. When policy is formulated in these situations, there may be grounds for explaining in *advance* that a deviation from the CPI target is warranted.[14]

In the Inflation Reports published in June and in October 1999, changes in indirect taxes, subsidies and house mortgage interest expenditure were judged to have no permanent effect on inflation. They were therefore disregarded in the formulation of monetary policy. In practice, monetary policy is currently based on an assessment of underlying inflation as measured by UND1X.

Target horizon

The second respect which required a clarification in the formulation of the inflation target is when inflation for some reason has deviated markedly from the target. This raises the question of how quickly inflation should be returned to the target rate of 2 per cent. With an inflation target strategy, it is the Riksbank's duty to construct monetary policy so that forecasted inflation at an appropriate horizon is in line with the inflation target. This *target horizon* is a forward-looking concept for how far ahead monetary policy is calibrated to fulfil the inflation target.

There are several grounds for preferring a longer horizon and a gradual adjustment of the monetary stance.

Attempts to fulfil the inflation target in the short run may prove difficult and require sharp interest rate adjustments and abrupt shifts in the monetary stance. There are several grounds for preferring a longer horizon and a gradual adjustment of the monetary stance. Very pronounced changes in interest rates and the monetary stance are liable to generate instability in real variables, such as output, employment and the real exchange rate. With a longer horizon and a gradual policy realignment, the inflation target can be fulfilled along with some stabilization of these real variables.

[13] It should be noted, however, that even taxes and charges contain important information about the inflation process. Political decisions affect administered prices, e.g. for medical care; increased fees or indirect taxes may be a sign of growing pressure from public sector costs.

[14] It should be underscored that the question of what constitutes a transitory effect is *complex*. This is particularly evident in the case of supply shocks. To what extent do import price movements, for example, reflect transitory factors rather than international competition's more long-term consequences? This suggests that supply shocks may need to be analysed particularly closely and cited selectively as an argument for departing from the CPI target.

The choice of target horizon is very contingent on the lag with which monetary policy affects inflation, and the length of this lag is generally difficult to specify. Experience in Sweden as well as international studies suggest that the lag before monetary policy elicits its main effect is 1–2 years.[15]

This horizon for the main effect of monetary policy implies that policy is guided by inflation forecasts 5–8 quarters ahead. The target horizon, however, is not necessarily the same as the horizon for the main effect of monetary policy. The target horizon for meeting the inflation target *normally* is 5–8 quarters ahead. However, in the event of a sizeable deviation from target, there are always grounds for weighing the ambition to achieve a rapid return to target against its consequences for the real economy.[16]

4. Accountability

4.1 The new central bank act

The amendments to the Riksbank act which came into force 1 January 1999 were designed to ratify the Swedish central bank´s independence.

The amendments to the Riksbank act which came into force 1 January 1999 were designed to ratify the Swedish central bank´s independence from political influence, establish a primary objective for monetary policy (price stability) with a legal backing and ensure accountability on the part of the Riksbank for achievement of its policy objective.[17,18]

The responsibility for monetary and exchange rate policies was transferred to a new body, an Executive Board. The Executive Board has six full-time members of which one is chairman and Governor of the Riksbank.[19] Their term of office is six years, and they will be up for election on a rolling basis. The Governing

[15] For references, see Bernanke and Gertler (1995) and Gerlach and Smets (1994).

[16] See Heikensten and Vredin (1998) for a discussion of flexible inflation targeting.

[17] With regard to exchange rate policy, the Government will have the authority to decide, after consultation with the Riksbank, on the choice of exchange rate regime. The Riksbank will have responsibility for the implementation of the exchange rate regime adopted by the Government. This means, for example, that the Riksbank will decide on the central rate and the band width in a fixed exchange rate system and on the practical application of policies in a floating rate system.

[18] The first step towards making the Riksbank more independent was taken already in 1988. For a discussion of the Swedish debate, see Heikensten and Vredin (1998).

[19] Also having constitutional status is a provision to the effect that no public authority will be allowed to issue instructions to the Riksbank in matters relating to monetary policy. A corresponding provision is included in the Riksbank Act. No member of the Executive Board is allowed to seek or accept instructions in monetary policy matters.

Board retains general, supervisory functions and appoints the members of the Executive Board.[20]

Proposals aiming to ensure transparency and Riksbank accountability were also laid down in law.

Proposals aiming to ensure transparency and Riksbank accountability were also laid down in law. The Riksbank is required to make a written report on monetary policy to the Parliamentary Standing Committee on Finance at least twice a year (Riksbank Act, Ch. 6, Art. 4). The Riksbank considers that these reports should coincide with its Governor's appearance before the Standing Committee. After the legislation went into force the Riksbank has clarified the role of the tolerance bands in this context. It also started the publication of the minutes of the Executive Boards monetary policy meetings, with a publication lag of 6–8 weeks. This publication lag will be reduced during the second half of 1999.

4.2 The role of the tolerance interval

Inflation may lie outside the interval for a certain percentage of time.

As monetary policy cannot control future inflation exactly, inflation will fluctuate around the targeted rate. There are several grounds for a tolerance interval. A tolerance interval may be useful in the assessment of monetary policy by the body to which the central bank is accountable. It can also be seen as a way for the Riksbank to explain that it is not capable of keeping inflation exactly on target. The width of the tolerance interval can also be regarded as an indicator of inflation's presumed variability. In other words, the degree of tolerance can be interpreted as a confidence interval in the statistical sense, implying that inflation may lie outside the interval for a certain percentage of time.

Two measures have been taken recently aiming at clarifying the role of the tolerance band. First, after the new central bank legislation went into force 1 January 1999, the assessment of monetary policy by the Riksdag has been clarified. Certain routines have been prescribed when inflation moves outside the tolerance interval. In connection with the Governor´s first appearance before the Riksdag each year the Riksbank intends to account for results of its policy. In this context the tolerance interval will have an operational function. The Riksbank has an-

[20] It is not possible to separate a member of the Executive Board from his position unless he no longer fulfils the conditions required for the performance of his duties or if he has been guilty of serious misconduct.

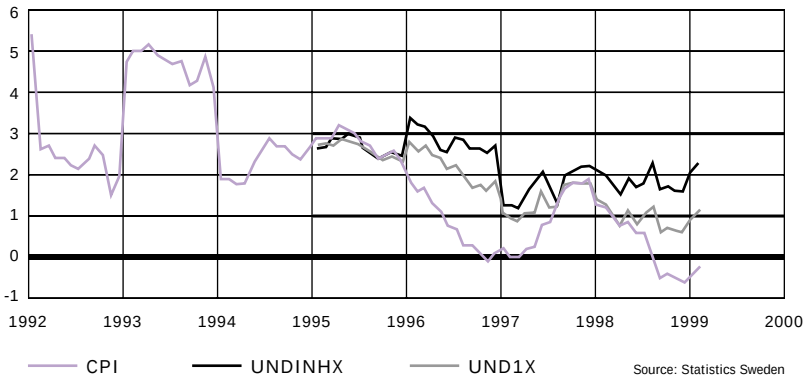
nounced that whenever CPI inflation is outside the tolerance interval, it will present an explanation of the reasons.[21]

The assumption of unchanged interest rates results in a wider confidence interval than if an endogenous response of monetary policy is assumed.

Second, in order to specify the statistical uncertainties in the inflation forecasts, the Inflation Report, since mid-1998, includes a table showing the probabilities of inflation of being inside the tolerance interval inflation twelve and twenty-four months ahead, assuming unchanged monetary policy stance. In March 1999, for example, the probability of the twelve-month CPI inflation being inside the tolerance band in March 2001 was calculated at 50 per cent, while there was a 41 per cent probability of inflation being below 1 per cent and a 9 per cent probability of inflation being above 3 per cent. It should be noted that the assumption of unchanged interest rates results in a wider confidence interval than if an endogenous response of monetary policy is assumed.

Since the inflation target came into force at the beginning of 1995, the annual increase in consumer prices has averaged 1.1 per cent. This average outcome is below the targeted figure but inside the tolerance interval. In the same period the average underlying rate of inflation has been somewhat higher: 1.7 per cent in terms of UND1X and 2.3 per cent in terms of UNDINHX (Diagram 1). This shows that during these four years, transitory downward effects on inflation have been stronger on the whole than the upward effects.

Diagram 1. CPI and Underlying Inflation. Per cent



[21] This clarification has been inspired by the rule requiring the Bank of England, as soon as inflation is outside a tolerance interval, to write an open letter explaining why inflation is not on target. It was suggested by Heikensten and Vredin (1998).

4.3 The publication of minutes

One way to facilitate effective monitoring of the central bank is to publish the minutes of the decision making body.

Evaluation of monetary policy decisions requires knowledge about the analysis and discussion preceding the decisions. One way to facilitate effective monitoring of the central bank is to publish the minutes of the decision making body.

Moreover, a brief account of the grounds for decisions are presented in a communiqué on the day after the meeting.

There may be situations in which members of the Executive Board reach divergent conclusions. That will necessitate a more formal voting procedure. The outcome will be recorded in the minutes. No mention of a vote indicates that the Board agreed unanimously; otherwise, members with dissenting opinions will be named.

The first minutes from a monetary policy meeting (the meeting on 12 February) were published on 6 April.[22] The outline of the minutes is similar to the structure of the Inflation Report. The first section covers international activity, interest rates and exchange rates, monetary aggregates, demand and supply, prices, transitory factors and inflation expectations. The second section gives the Executive Board's assessment of inflation prospects in the main scenario and the risk spectrum for the formation of monetary policy. The third section presents the discussion and assessment of the monetary policy situation. The decision is finally presented in the fourth section.

5. The implementation of monetary policy in Sweden since 1993

5.1 Introduction

Since the announcement of the inflation target, long-term inflation expectations have fallen from above 4 to 2 per cent.

The implementation and communication of monetary policy since 1993 can be divided into three phases. In the first phase, 1993–1995, the inflation target strategy was announced and established. During the first two years of this period the objective was to prevent the underlying rate of inflation to increase. The publication of a report "Inflation and inflation expectations

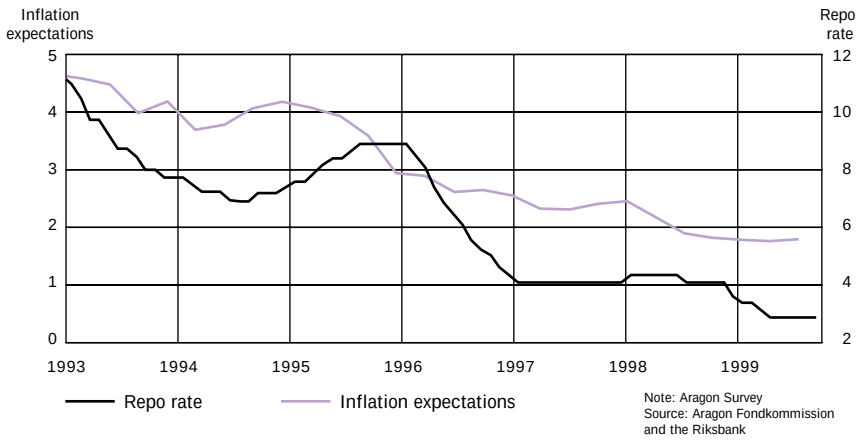
[22] See Sveriges Riksbank's web page: www.riksbank.se/eng/

in Sweden" began. During this phase bond investors' long-term (five-year) inflation expectations fell from above 4 per cent to 3 per cent, that is to the upper bound of the tolerance interval (Diagram 2). At the end of this phase the credibility of fiscal consolidation increased. In the second phase, 1996–1997, inflation forecast targeting was introduced. The Riksbank´s own inflation forecasts were given more weight in communication of monetary policy. Forecasts for future inflation were gradually introduced in the reports which changed names to "Inflation Reports". During this phase bond investors' inflation expectations five years ahead fell from 3 per cent to around 2 per cent, implying that the inflation target gained credibility. In the third phase, 1998, "distribution forecast" targeting was introduced and explicit paths for future inflation were published, surrounded by uncertainty intervals. Uncertainty bands around the inflation serve to illustrate that the inflation forecast is inherently uncertain. Long-term inflation expectations during this period were slightly below 2 per cent, signalling the credibility of the inflation target strategy.

5.2 Establishing the inflation target strategy and implicit inflation forecasting

The move to a flexible exchange rate in November 1992 did not entail any change in the principal objective of monetary policy, price stability. This was made clear by the Riksbank when announcing the inflation target in January 1993.

Diagram 2. Repo rate and long-term inflation expectations (5 years). Per cent



Since monetary policy measures show their full effect on the economic activity and price developments only after a year or two, monetary policies must be far sighted in their direction. The Riksbank started to employ a number of indicators of economic activity and anticipated future inflation. The publication "Monetary Policy Indicators" in June 1993 summarized the work during the first six months of inflation targeting. The first publication of a report providing an account of the Riksbank's analysis of current inflationary pressure and inflation expectations occurred in October 1993.

Excessively large steps might cause inflation expectations to rise.

The Riksbank lowered the instrumental rate from November 1992 to June 1994 by more than 5 percentage points, to 6.92 per cent (Diagram 2). This was done mostly in small steps; as the Riksbank considered that, with the new framework, excessively large steps might cause inflation expectations to rise or lead to the market misunderstanding the Riksbank's intentions.

Inflationary pressure grew during the spring and summer of 1994. This prompted the Riksbank to start raising the repo rate in August 1994; a series of increases, totalling 2 percentage points, brought the rate up to 8.91 per cent in the summer of 1995. The Riksbank was forward-looking and based its monetary policy on inflation forecasts. In August 1994, the internal inflation forecast for the annual increase of CPI inflation in 1995 was 3.8 per cent, given a constant weak exchange rate. In order to bring inflation down to 3 per cent an appreciation of the krona of around 2–4 per cent per quarter was deemed necessary.

In October 1994 the Riksbank stated that monetary policy indicators showed that the inflation target would be threatened.

However, during this period the Riksbank did not publish inflation forecasts. In the reports "Inflation and Inflation Expectations in Sweden", published three times a year, monetary policy adjustments were motivated in a more general way. In October 1994, for example, the Riksbank stated that monetary policy indicators showed that the inflation target would be threatened. It was pointed out that firms' and investors' inflation expectations were not in line with the target and that inflation forecasts by outside observers indicated that they did not expect the inflation target to be met.

5.3 Explicit Inflation Forecast Targeting

CPI inflation in 1995 turned out to be just under 3 per cent, and estimates of the underlying rates were about 2 per cent. The difference mainly reflected tax changes but also had to do with increased house mortgage interest costs. The re-

po rate increases, however, were of little consequence for mortgage interest costs, which largely rose in connection with the upward shift in bond rates.

Increased confidence in the economic policy during 1996 was evident.

Slackening economic activity in central Europe led to a slowdown in Sweden in the second half of 1995. Partly for this reason, the Riksbank successively adjusted the inflation forecast down. The Riksbank saw a possibility of lowering the repo rate in January 1996. The internal inflation forecast for 1996 and 1997 was somewhat above 2 per cent in terms of headline CPI. Indirect taxes were assumed to contribute around 0.2–0.4 percentage points to the annual increase in CPI. However, this internal forecast was based on a growth assumption on the high side for 1996 (around 2 per cent), and it became more and more clear that domestic and international demand were becoming weaker than expected. Therefore the internal discussion focused on the probabilities for alternative growth and inflation scenarios, giving more weight to a scenario in which the economy would grow at less than its potential rate in 1996. Increased confidence in the economic policy during 1996 was evident from an appreciation of the krona and falling market interest rates.

By December 1996 the repo rate had been lowered from 8.91 to 4.1 per cent. The monetary policy easening was motivated in the reports. The report changed name to "Inflation Report" in March 1996. From March 1996 and onwards the Riksbank publishes four "Inflation Reports" per year. Inflation forecasts were gradually introduced in the reports.

During the autumn of 1997, a marked economic recovery was evident in more and more sectors.

Inflation turned upwards again during the autumn of 1997. A marked economic recovery was evident in more and more sectors.

Considering that activity was becoming stronger and the monetary stance still was expansionary, inflation was expected to rise in the years ahead. In the Inflation Report published in December 1997, graphs showing forecasts for future inflation and uncertainty margins were published for the first time. CPI inflation by the end of 1999 was expected to be around 2.5 per cent, while the underlying rate of inflation (UND1) was expected to be above 2.5 per cent. It was concluded that monetary policy had to be given a less expansionary stance. The repo rate was increased by 0.25 percentage points to 4.35 per cent. The report was published when wage negotiations were held in Sweden and it was felt important to stick to the inflation target regime in a credible way.

Diagram 3. Distribution forecast targeting

Inflation Report	June1998	September 1998	December 1998	March 1999
End of forecast horizon	June 2000	September 2000	December 2000	March 2001
Forecast of 12-month CPI inflation	1.6	1.9	1.4	1.4
Forecast of 12-month underlying inflation	1.8	2.0	1.8	1.8
Uncertainty in the inflation assessment	Normal	Above normal	Slightly above normal	Slightly above normal
Risk assessment	Downside risks dominate	Symmetric	Downside risks dominate	Downside risks dominate

1. At the end of the forecast horizon.
2. UND1 in June 1998 and September 1998. UND1X in December 1998 and March 1999. (UND1 was calculated by the Riksbank, whereas UND1X is calculated by Statistics Sweden.)

5.4 Distribution forecast targeting

As mentioned above, distribution forecast targeting involves presenting a main scenario for future inflation, and assessments of both the degree of uncertainty in the forecast and the magnitude of the upside and downside risks in the main scenario.

In the June 1999 Report a construction of the uncertainty interval, based on the two-piece normal distribution, was introduced.

In the June 1999 Report a construction of the uncertainty interval, based on the two-piece normal distribution, was introduced, showing the perceived probability of inflation being inside a particular interval in some future period. The overall inflation assessment accordingly pointed to a rate of inflation that was somewhat lower than in the main scenario. This was reflected in the uncertainty interval, which, instead of being symmetric around projected inflation, was somewhat broader on the downside, reflecting uncertainty regarding the effects of the Asian crisis (Diagram 3). It was concluded that the monetary conditions could be moved in a somewhat more stimulatory direction. The repo rate was cut by 0.25 percentage points to 4.1 per cent.

In the September 1998 Report the main scenario presupposed that the weakening of the krona by almost 4 per cent since the June report was temporary and mainly a consequence of short-term market reactions generated by the stock exchange unrest.

There were still considerable downside risks in the international picture, above all in the form of a weaker than expected outcome in Japan and the United

States. But there were also upside risks in the form of a permanently weakened Swedish exchange rate and the strong upward trend in Sweden´s economy. All in all, the downside and upside risks were judged to be equally large. The equal magnitude of the upside and downside risks was represented by the uncertainty interval being symmetric around the main inflation forecast. The uncertainty in the inflation assessment was appreciably greater than usual on account of the financial market unrest and the consequences it and other factors may have had for international economic developments. The greater uncertainty in the inflation assessment was reflected in a broader uncertainty interval compared with the June Report (Diagram 3). It was also reflected in the monetary policy conclusion not to change interest rates at the publication of the September Report.

In November 1998, there were grounds for a downward revision of growth and inflation forecasts for the OECD area.

In November, the real economic consequences of the global financial crisis were judged to be greater than expected earlier. There were grounds for a downward revision of growth and inflation forecasts for the OECD area. Therefore, the repo rate was cut twice by 0.25 percentage points in November, lowering it from 4.10 to 3.60 per cent.

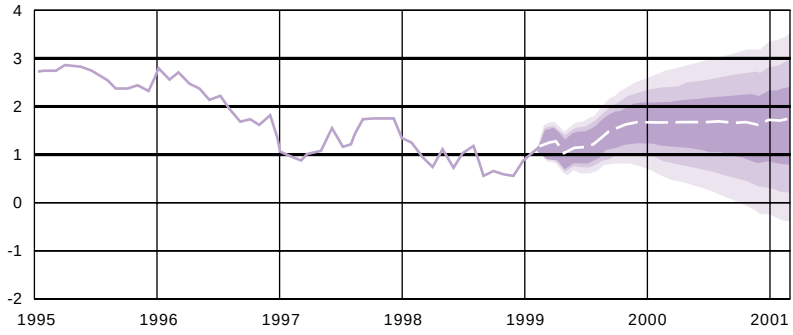
In the December 1998 Report growth prospects in Sweden seemed to be somewhat poorer than at the time of the September Report. All in all the balance of risks in the inflation assessment seemed to be somewhat on the downside, as was evident from the probability distribution published in the Report (Diagram 3). This picture differed from the assessment in the September Report in that the balance of risks at the time was judged to be symmetrical. However, the financial unrest had tended to subside since September, and the general uncertainty in the inflation assessment had decreased since the September Report. Therefore the uncertainty interval was narrower in the December Report. The repo rate was cut by 0.20 percentage points to 3.40 per cent in mid-December.

In February 1999, immediate inflationary pressure in Sweden once again had proved to be somewhat lower, compared with the Riksbank's most recent inflation assessment in December 1998. The newly elected Executive Board of the Riksbank decided to lower the repo rate by 0.25 percentage points, from 3.40 to 3.15 per cent.

In the March 1999 Inflation Report, it was noted that the consumer price tendency had been weaker than expected.

In the March 1999 Inflation Report, it was noted that the consumer price tendency since the December Report had been weaker than expected. A price fall for petroleum-related products that exceeded expectations

Diagram 4. CPI with uncertainty interval. Percentage 12-month changes (Inflation Report March 1999)



Sources: Statistics Sweden and the Riksbank

contributed to this. Moreover, since the beginning of December the lowering of repo rates had had a downward effect on household interest expenditure.

All in all, the inflation assessment carried a downside risk stemming from the risk of weaker international activity than in the main scenario. The downside risk for inflation was accordingly somewhat larger than the upside risk. The larger downside risk was represented by the uncertainty interval being somewhat broader below the forecast path than above it (Diagram 4). In that downside risks predominated, the mean assessment of inflation in March 2001 was almost 0.2 percentage points below the mode, e.g. the main scenario´s forecast. The width of the uncertainty interval, reflecting the uncertainty in the inflation assessment, was slightly above normal.

The rate of inflation twelve to twenty-four months ahead would be somewhat below the Riksbank's target.

The Report concluded, that after adjustments for transitory effects from indirect taxes, subsidies and interest rates, the rate of inflation twelve to twenty-four months ahead would be somewhat below the Riksbank's target. On the basis of this conclusion, the Executive Board decided to lower the repo rate by 0.25 percentage points to 2.90 per cent.

6. What effect does inflation targeting have on the economy?

In this section some preliminary results regarding the effect of inflation targeting on the real economy are discussed. Has the adoption of the inflation targeting framework affected inflation, growth and the inflation-output trade-off? Did the

adoption of inflation targeting alter the private sector's inflation expectations? Did the pass-through of exchange rate movements to CPI inflation change after the introduction of the inflation target? Some of these questions are difficult to answer, since Sweden has not been through a complete business cycle since adoption of the inflation target.

Inflation-output trade-off and household inflation expectations

Inflation in Sweden since 1992 has been low, accompanied by declining inflation expectations and rising credibility in monetary policy. Moreover, the sharp fall in households' inflation expectations is a clear sign of increased credibility for the inflation target. In the 1980s, these expectations of inflation in the coming twelve months averaged 6.5 per cent, while average inflation expectations since the beginning of 1992 have been slightly below 2 per cent. The clear break in households' inflation expectations in 1992 can be interpreted as an initial sign of a downward shift in the inflation process.[23] Diagram 5 also shows that households have been quite successful in forecasting future inflation. In particular, households in Sweden appear to have foreseen the disinflation in the early 1990s surprisingly well. The adoption of the inflation target, however, involves a process of learning for all actors in the economy, which means that there is some time lag before long-term inflation expectations move down, as is evident from bond investors´ inflation expectations (Diagram 2).[24]

The sharp fall in households' inflation expectations is a clear sign of increased credibility for the inflation target.

The adoption of the inflation target involves a process of learning for all actors in the economy.

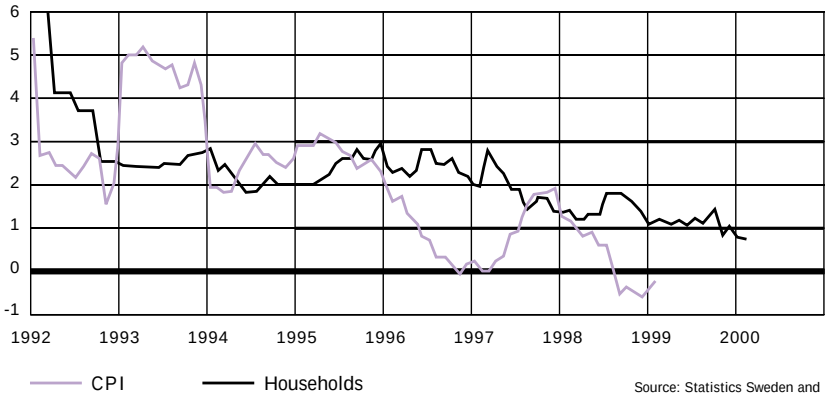
Using Phillips type equations, it is possible to analyse whether the inflation process has changed since the introduction of the inflation target. The inflation process is affected by inflation expectations, the trade-off between the output gap (or unemployment) and inflation, and transitory or supply effects. A more permanent change in the inflation process may arise because of institutional changes and affect the way in which inflation expectations are generated as well as the trade-off between

A more permanent change in the inflation process may arise because of institutional changes.

[23] In the 1991 Budget Statement, the Government declared that a policy for a fair distribution and full employment must give the fight against inflation presedence over other ambitions and demands.

[24] The downward shift in Swedish inflation is explicitly modelled in Blix (1999) with two discrete regimes, a high- and a low-inflation state. The probability of switching between the regimes is estimated and discussed.

Diagram 5. CPI and inflation expectations of households. Percentage 12-month change



Source: Statistics Sweden and National Institute of Economic Research

the supply and demand situation and the rate of inflation. In a Riksbank study, it was found that when demand was represented by indicators of an output gap, inflation tended to be overpredicted for the years immediately after the introduction of the inflation target in 1993.[25] Thus, the inflation-output trade-off seems to have improved in Sweden. However, when the output gap was replaced by unemployment, the Phillips curve relationship no longer overestimated inflation in the period after 1993. In another Riksbank study the analysis starts from the following decomposition of registered inflation:

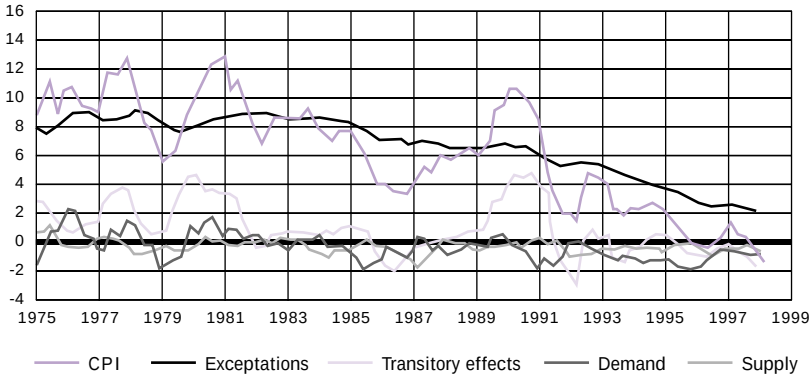
$$\pi_t = \pi_t^{LS} + \pi_t^E + \pi_t^T, \qquad (1)$$

where π_t is the measured inflation rate, π_t^{LS} long-run inflation (*expected*), π_t^E the component of inflation generated by cyclical fluctuations in the economy (often regarded in turn as an indicator of variations in aggregate demand), and π_t^T the component of inflation generated by various types of transitory effects and supply shocks, for example changes in indirect taxes, subsidies and oil prices.[26]

The picture of the inflation process conveyed by the model agrees in important respects with other analytical approaches (used by the Riksbank as well as other observers) and with the overall picture outlined in recent Inflation Reports. The most notable finding is perhaps, as shown in Diagram 6, the marked decline of expected inflation in the 1990s.

[25] See Berg and Lundkvist (1997).
[26] A discussion of the model was presented in a box on pp. 35–37 in Inflation Report 1999:1.

Diagram 6. CPI inflation and underlying factors. Percentage 12-month change



Sources: Statistics Sweden and the Riksbank

Monetary policy in the 1990s has been rather successful in bringing expected inflation down to a more favourable level.

Another conclusion from Diagram 6 is that the level of demand has had an appreciable downward effect on inflation almost continuously in the 1990s but that supply effects and transitory factors of various types have exerted an appreciable downward influence as well.[27] This picture of inflation's path can be said to indicate that monetary policy in the 1990s has been rather successful in bringing expected inflation down to a more favourable level but that overall measured inflation has also been lower as a result of a weak demand trend and various other transitory factors. Given the chosen specification, in 1998 Q4 the contribution from the latter type of effects was as much as –1.6 per cent (–2.1 per cent including the contribution from supply shocks).

The dominance of falling expected inflation in the 1990s makes it difficult to analyse the partial relationship between demand and inflation. There are some indications of a change in this relationship. While the reduction of expected inflation does indicate that the average *level* of measured inflation will be lower in the future, it is not certain that inflation's *fluctuations* related to the business cycle have decreased. It is conceivable, however, that the development of inflation expecta-

[27] In the specification used here, the origins of transitory effects are changes in the short-term nominal interest rate, the nominal oil price, nominal import prices and indirect taxes; supply shocks are approximated with changes in the real oil price and productivity.

tions also plays some part in inflation's short-run fluctuations, in which case the result could be a lower average *level* as well as a lower *variability.*[28,29]

The exchange rate

The Riksbank´s view on the exchange rate has altered in some respects since 1992. Gradually more emphasis has been placed on the krona´s forecast path, while occasional fluctuations have been played down.[30]

When the flexible exchange rate regime was introduced, the krona depreciated markedly.

When the flexible exchange rate regime was introduced, the krona depreciated markedly; in the first six months it weakened about 20 per cent, measured by the TCW index. A major factor behind the krona´s initial depreciation was no doubt uncertainty about the Swedish economy and economic policy. In the first years with a flexible exchange rate the path of the krona was not strongly related to current inflation or demand. A simple regression analysis shows that the confidence of market agents in Swedish economic policy – measured as the long-term interest rate differential against Germany (Diagram 7) – can explain almost a third of the nominal exchange rate´s variability since 1992. In the period from 1994 to 1996 the swings in credibility, measured in this way, actually explain almost two-thirds of the exchange rate movements.

From 1994 to 1996 the swings in credibility, measured in this way, actually explain almost two-thirds of the exchange rate movements.

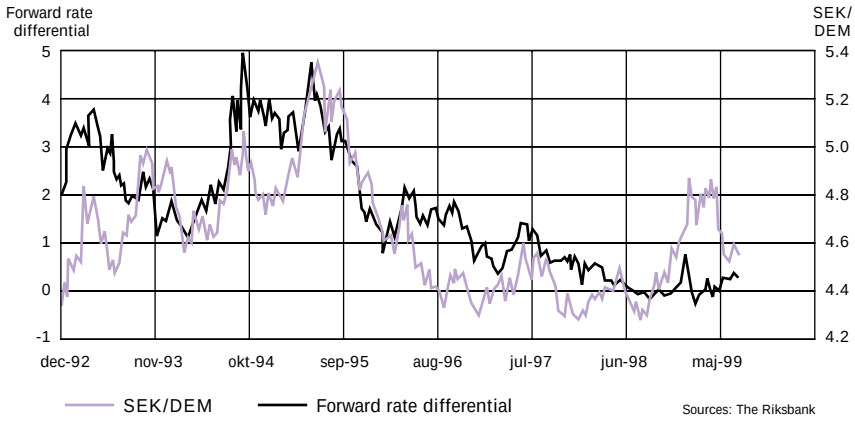
In the period thereafter, the exchange rate has been relatively more stable, except during the widespread turbulence in connection with the international financial crisis in the autumn of 1998. But even with relatively strong Government finances and low inflation, a flexible exchange rate does seem to entail exchange rate fluctuations that are greater than what was believed when the krona fell in the autumn of 1992. This experience is shared with other inflation targeting countries, like the UK and Canada, and may not be related to credibility prob-

[28] See Apel and Jansson (1999).

[29] A general result in the recent study by Bernanke, Laubach, Mishkin and Posen (1999), is that inflation targeting appears to have been successful in reducing both inflation and private sector inflation expectations in four inflation targeting countries. They also find evidence in favour of a an improved inflation-output trade-off in Sweden since the introduction of the inflation target. Bernanke et al find that the sacrifice ratio in Sweden is lower than in Canada, New Zealand and the United Kingdom during the disinflation process. This result, however, may partly be a consequence of the method they use to calculate the output gap. In their VAR model, lower than expected inflation rates in Canada, New Zealand and the United Kingdom, but not in Sweden, are accompanied by substantial shortfalls of GDP over the two years following target adoption of the target. Thereafter, GDP growth rates in all four countries exceed the projections, while inflation and short-term interest rates remain at levels below the forecasted levels.

[30] See "Monetary Policy and the Exchange Rate", speech held by Lars Heikensten, April 1999.

Diagram 7. Forward 10-year interest rate differential with Germany and SEK/DEM exchange rate



Sources: The Riksbank

lems regarding economic policy in Sweden, as is evident from bond market developments. Although the long-term interest rate differential with Germany increased somewhat during the financial turmoil in 1998, it stayed on a very low level (below 1 percentage point), compared to the levels at the beginning of the floating exchange regime.

The exchange rate normally affects inflation through import prices as well as via foreign trade and resource utilization. The relationship is complicated, however, in that the average pass-through from exchange rate movements to import prices seems to be incomplete. In the short run and particularly if the exhange rate movement is judged to be temporary, this is a consequence of price rigidities and other adjustment costs. In the longer run the pass-through is also dependent on other market conditions.

Since the introduction of the inflation target, the pass-through of exchange rate movements to CPI inflation seems to have weakened.

Since the introduction of the inflation target, the pass-through of exchange rate movements to CPI inflation seems to have weakened. One important explanation is probably that the move to a flexible exchange rate has altered pricing behaviour. When the krona was devalued during the last decades of the fixed exchange rate regime, the new exchange rate was perceived as permanent, and prices were set in relation to its weaker level. Since 1992, depreciations of the krona have probably been perceived as temporary and therefore resulted in more limited price adjustments. Another factor may be downward price pressure from increased international competition. It is reasonable to

suppose that increased competition has the primary effect of depressing inflation temporarily. It is a matter of a one-off effect – albeit a protracted one on the *price level*, in that firms are obliged to adjust prices downwards as long as competition is intense. In an inflationary environment this shows up as lower inflation.

7. Conclusions

In this article key points in the design of the present Swedish inflation targeting strategy have been described and analysed. According to the Riksbank act, the primary objective of monetary policy is price stability. A numerical target value of 2 per cent for inflation, with a tolerance band of ±1 percentage point, serves as a target for monetary policy and as a nominal anchor for inflation expectations. In practice, monetary policy is currently based on an assessment of underlying inflation as measured by UND1X.

The target horizon for meeting the inflation target normally is 5–8 quarters ahead.

The target horizon for meeting the inflation target normally is 5–8 quarters ahead. However, in the event of a sizeable deviation from target, there may be scope for adjusting the target horizon, allowing for stabilization of real variables. The publication of inflation forecasts in the Riksbank's Inflation Reports for both headline CPI and underlying inflation as well as uncertainty assessments is used to motivate monetary policy decisions. The publication of the forecast is thereby an important feature of the Riksbank's accountability to the public and to the Parliament on achieving the inflation target. When inflation is outside the tolerance band, the Riksbank has to present the reasons for this and show how inflation can be brought in line with the target.

Since the implementation of the inflation target strategy began in 1993, three different phases have been distinguished: the establishment of the inflation target, the communication of explicit inflation forecasts, and, finally, the introduction of distribution forecast targeting.

In practice, distribution forecast targeting involves presenting a main scenario for future inflation, and assessments of both the degree of uncertainty in the forecast and the magnitude of the upside and downside risks to the main scenario. The probabilities of inflation twelve and twenty-four months ahead being inside certain intervals are published in the Inflation Reports. When the Executive Board sets the interest rate (the repo rate), both the main scenario, that is the mode of the forecast, and the risk spectrum surrounding the main scenario, are taken into account.

While inflation targeting in Sweden has been successful in reducing both inflation and private sector inflation expectations, aggregate demand as well as supply shocks and temporary factors have also exerted a downward influence on inflation in the 1990s. It is therefore difficult to distinguish any improvements in the inflation-output trade-off after the announcement of the inflation target in 1993. It is likely, however, that the increased credibility of the inflation target has resulted in both a lower average inflation level and a lower inflation variability.

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Notices

PSAB takes over the distribution of banknotes

In June, the Riksbank began operation of the wholly-owned subsidiary PSAB Pengar i Sverige AB.

"We will offer cash handling services and products such as sorting and validating notes, counting daily receipts and automated teller services. Together with banks, post offices and other agents, we intend to create better conditions for improving the safety and efficiency of cash handling routines," says Hans Krook, MD of PSAB Pengar i Sverige AB.

PSAB will also develop new cash handling services and products.

The changes are being made so that the Riksbank can focus on its role as a governmental authority and can reduce the social costs for cash handling.

Y2K tests of the RIX system

RIX, the Riksbank's clearing and interbank system, settles all interbank payments, which amount to SEK 350 billion–SEK 400 billion a day.

Testing of the system began last autumn, and the banks participating in the RIX system had completed all tests by the end of June. The tests include year-end and leap-year tests as well as testing of the SWIFT system and "online-communication".

In early June, tests of ERIX (the euro component of RIX) and the linkage to the TARGET system were also completed.

The Y2K tests of the SEK and EUR components of the RIX system have shown that the system and its connections with participants function properly. These tests will also be completed as planned. In principle, there

will be a moratorium on any changes and developments in the system until 1 March 2000.

However, for the days around the turn of the millennium, a special detailed plan will be drawn up for implementing payments in the RIX system in case any disturbances should nonetheless occur.

Primary dealer agreement with Den Danske Bank

The Riksbank has concluded a primary dealer agreement for the foreign exchange market with Den Danske Bank A/S, Copenhagen. The agreement entered into force on 11 June 1999.

The Riksbank's primary dealers are as follows:

Twelve in the foreign exchange market: ABN AMRO Bank N.V., Chase Manhattan Bank NA, Citibank N.A., Crédit Agricole Indosuez, Den Danske Bank A/S, FöreningsSparbanken AB, HSBC Midland, MeritaNordbanken, SEB, Svenska Handelsbanken, UBS AG and Unibank.

Eight in the money market: ABN AMRO Bank N.V., Danske Bank Consensus, E. Öhman J:or Fondkommission AB, FöreningsSparbanken AB, MeritaNordbanken, SEB, Svenska Handelsbanken and Unibank.

The Riksbank launches a new web site

On 22 June, the Riksbank's new web site was launched at www.riksbank.se

As part of our efforts to adapt the web site to different target groups, journalists and researchers have been given their own access from the start page. By the end of 1999, special information for school pupils/students will also be available. The computer game "Stargold" which deals with monetary policy can still be accessed to teach young people more about inflation.

No major changes have been made to the structure of the web site. However, several more subject headings have been added, including price stability and financial stability.

The design is in line with the graphic profile of the Riksbank and has been developed in collaboration with the corporate communications agency Intellecta and the web technology company ElektroPost.

Monetary policy calendar

1997.01.02 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent as of 3 January 1997.

1997.04.01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1997.07.01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1997.10.01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1997.12.11 The *fixed repo rate* is increased by the Riksbank Governor from 4.10 to 4.35 per cent as of 17 December 1997. Due to the Christmas and New Year holidays, the repo rate set on 16 December will apply for four weeks until 14 January 1998.

1998.01.02 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1998.04.01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.5 per cent (unchanged).

1998.06.04 The *fixed repo rate* is lowered by the Riksbank Governor from 4.35 per cent to 4.10 per cent as of 9 June 1998.

1998.07.01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 2.0 per cent as of 2 July 1998.

1998-11-03 The *fixed repo rate* is lowered by the Riksbank Governor from 4.10 per cent to 3.85 per cent as of 4 November 1998.

1998-11-12 The Riksbank lowers its *deposit and lending rates*, in each case by 0.5 percentage points, as of 18 November 1998, thereby setting the deposit rate at 3.25 per cent and the lending rate at 4.75 per cent.

1998-11-24 The *fixed repo rate* is lowered by the Riksbank Governor from 3.85 per cent to 3.60 per cent as of 25 November 1998.

1998-12-15 The *fixed repo rate* is lowered by the Riksbank Governor from 3.60 per cent to 3.40 per cent as of 16 December 1998.

1999-01-04 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 1.5 per cent as of 5 January 1999.

1999-01-05 The *fixed repo rate* is confirmed by the Riksbank Governor at 3.40 per cent. The decision is extended on 29 January 1999 to apply until 17 February 1999.

1999-02-12 The *fixed repo rate* is lowered by the Riksbank Governor to 3.15 per cent as of 17 February 1999.

1999-02-12 The Riksbank lowers its *deposit and lending rates*, in each case by 0.5 percentage points. The deposit rate is set at 2.75 per cent and the lending rate at 4.25 per cent. The decision takes effect on 17 February 1999.

1999-03-25 The *fixed repo rate* is lowered by the Riksbank Governor to 2.80 per cent as of 31 March 1999.

1999-03-25 The *fixed repo rate* is lowered by the Riksbank Governor from 3.15 per cent to 2.90 per cent as of 31 March 1999.

1999-04-01 The *reference* (official discount) *rate* is confirmed by the Riksbank Governor at 1.0 per cent as of 6 April 1999.

Statistical appendix

Statistics from Sveriges Riksbank are to be found on the Internet (http://www.riksbank.se). Dates of publication of statistics regarding the Riksbank's assets and liabilities including foreign exchange reserves plus financial market and the balance of payments statistics are available on the homepage of the International Monetary Fund, IMF (http://dsbb.imf.org). Dates of publication can also be obtained from the Information Centre at Sveriges Riksbank.

Daily capital market interest rates (Table 13), daily overnight and money market interest rates (Table 14) and daily krona exchange rates (Table 16) can be ordered from the Information Centre at Sveriges Riksbank via e-mail: info@riksbank.se, fax: +46 8 787 05 26 or phone: +46 8 787 01 00.

1 Riksbank's assets and liabilities

Assets. Period-end stock figures. SEK million

		Foreign exchange[1]	Government securities	Lending to banks	Fixed assets	Other	**Total**
1998	Jan	92 654	54 081	3 464	1 245	35 780	187 224
	Feb	78 329	53 672	192	1 182	54 429	190 265
	March	82 954	43 335	9	1 186	58 587	188 532
	April	103 679	35 651	102	1 193	50 208	193 294
	May	107 781	36 828	1 504	1 199	41 432	191 205
	June	106 248	35 808	4	1 207	45 601	191 205
	July	110 112	36 052	1 014	1 215	39 078	190 274
	Aug	115 613	37 526	71	1 222	32 992	189 885
	Sept	130 597	34 885	19	1 230	21 222	190 414
	Oct	127 619	35 118	756	1 237	26 450	193 641
	Nov	124 234	34 784	4 664	1 248	28 015	195 406
	Dec	113 464	35 576	2 265	1 151	43 594	198 614
1999	Jan	113 875	36 086	1	1 162	44 617	195 757
	Feb	142 998	32 862	730	1 094	38 977	216 678
	March	130 172	33 376	1 997	1 104	52 872	219 538
	April	133 770	34 152	229	1 089	47 483	216 732
	May	140 671	33 279	98	1 090	42 424	217 568
	June	137 691	33 163	2 412	1 140	39 344	213 756
	July	141 359	32 712	65	1 140	36 802	212 085
	Aug	152 249	32 660	117	1 138	32 869	219 042

Liabilities

		Notes and coins in circulation	Riksbank liquidity bills	Bank deposits in the Riksbank	Capital liabilities	Other	**Total**
1998	Jan	77 559	–	114	32 239	77 312	187 224
	Feb	76 621	–	925	32 211	66 257	190 265
	March	76 680	–	392	32 211	65 998	188 532
	April	76 417	–	220	32 211	70 195	193 294
	May	77 096	–	1 460	37 162	75 487	191 205
	June	77 669	–	951	37 162	75 547	191 205
	July	78 002	–	66	37 162	75 044	190 274
	Aug	79 203	–	1 665	37 162	73 175	189 885
	Sept	78 275	–	3 377	37 162	71 600	190 414
	Oct	78 991	–	120	37 162	77 368	193 641
	Nov	79 633	–	50	37 162	78 561	195 406
	Dec	86 268	–	1 679	37 162	73 505	198 614
1999	Jan	81 539	–	653	37 162	76 403	195 747
	Feb	80 470	–	95	49 848	86 265	216 678
	March	81 609	–	1 188	49 848	86 893	219 538
	April	81 738	–	1 007	49 848	84 139	216 732
	May	82 652	–	808	49 848	84 260	217 568
	June	83 024	–	2 301	60 487	67 944	213 756
	July	83 950	–	145	60 487	67 503	212 085
	Aug	84 525	–	3 792	60 487	70 238	219 042

2 Money supply

End-of-month stock

	SEK million		Twelve months change in per cent		
	M0	M3		M0	M3
1997					
Jan	67 503	791 513	Jan	5,3	7,4
Feb	67 490	783 635	Feb	5,8	7,4
March	68 683	807 482	March	7,4	6,5
April	67 473	788 247	April	5,4	4,3
May	67 527	794 077	May	5,1	4,1
June	68 101	807 112	June	4,7	5,3
July	66 763	791 753	July	5,0	3,2
Aug	68 623	804 033	Aug	4,0	4,6
Sep	68 118	799 854	Sep	3,7	2,1
Oct	68 556	799 604	Oct	5,7	3,4
Nov	69 762	807 415	Nov	4,6	1,3
Dec	74 380	826 242	Dec	3,0	1,3
1998					
Jan	70 751	821 712	Jan	4,8	3,8
Feb	70 434	806 800	Feb	4,4	3,0
March	69 560	802 877	March	1,3	–0,6
April	70 181	807 368	April	4,0	2,4
May	70 783	814 796	Mayl	4,8	2,6
June	71 118	829 968	June	4,4	2,8
July	71 369	835 079	July	6,9	5,5
Aug	73 042	835 199	Aug	6,4	3,9
Sep	71 954	838 568	Sep	5,6	4,8
Oct	73 041	846 579	Oct	6,5	5,9
Nov	73 929	852 805	Nov	6,0	5,6
Dec	78 139	843 416	Dec	5,1	2,1
1999					
Jan	74 940	855 180	Jan	5,9	4,1
Feb	74 621	853 298	Feb	5,9	5,8
March	75 302	853 557	March	8,3	6,3
April	75 533	861 790	April	7,6	6,7
May	76 532	868 965	May	8,1	6,6
June	76 413	879 325	June	7,4	5,9
July	77 050	872 482	July	8,0	4,5

3 Interest rates set by the Riksbank

Per cent

	Date	Repo rate	Deposit rate	Lending rate		Date	Discount rate
1996	08-14	5,40			1993	01-05	9,00
	08-21		4,75	6,25		04-02	7,00
	08-28	5,25				07-02	6,00
	09-11	5,15				10-08	5,00
	09-25	5,05			1994	01-04	4,50
	10-09	4,95				07-04	5,50
	10-23	4,80				10-04	7,00
	10-30	4,60	4,25	5,75	1995	07-04	7,50
	11-27	4,30				10-06	7,00
	12-11		3,75	5,25	1996	01-03	6,00
	12-18	4,10				04-02	5,50
1997	12-17	4,35				07-02	4,50
1998	06-10	4,10				10-02	3,50
	11-04	3,85			1997	01-03	2,50
	11-18		3,25	4,75	1998	07-02	2,00
	11-25	3,60			1999	01-05	1,50
	12-16	3,40				04-06	1,0
1999	02-17	3,15	2,75	4,25			
	03-31	2,90					

4 Capital market interest rates

Effective annualized rate for asked prices. Monthly average, per cent

		Bonds issued by:					
		Central government				Housing (Caisse)	
		3 years	5 years	7 years	9–10 years	2 years	5 years
1997	Aug	5,33	5,82	6,00	6,53	5,24	6,27
	Sep	5,26	5,70	5,86	6,38	5,15	6,13
	Oct	5,42	5,76	5,86	6,22	5,36	6,19
	Nov	5,57	5,88	5,98	6,30	5,56	6,42
	Dec	5,46	5,71	5,77	6,03	5,55	6,29
1998	Jan	5,15	5,33	5,49	5,65	5,56	5,81
	Feb	5,02	5,19	5,36	5,53	5,37	5,63
	March	4,95	5,06	5,18	5,35	5,27	5,44
	April	4,88	4,99	5,05	5,21	5,16	5,31
	May	4,83	4,98	5,04	5,20	5,08	5,25
	June	4,46	4,70	4,79	4,97	4,70	4,96
	July	4,36	4,61	4,71	4,88	4,58	4,88
	Aug	4,39	4,60	4,66	4,80	4,68	4,99
	Sept	4,37	4,56	4,63	4,79	4,72	5,15
	Oct	4,35	4,53	4,68	4,75	4,71	5,30
	Nov	3,94	4,19	4,47	4,59	4,18	4,79
	Dec	3,64	3,86	4,12	4,25	3,89	4,46
1999	Jan	3,38	3,59	3,87	4,02	3,59	4,14
	Feb	3,36	3,67	4,01	4,18	3,52	4,13
	March	3,39	3,80	4,25	4,44	3,55	4,29
	April	3,12	3,53	3,99	4,24	3,26	3,99
	May	3,30	3,80	4,26	4,50	3,47	4,54
	June	3,72	4,28	4,67	4,87	3,82	5,09
	July	4,17	4,81	5,12	5,26	4,14	5,75
	Aug	4,43	5,09	5,39	5,49	4,42	6,15

5 Overnight and money market interest rates

Monthly average, per cent

		Repo rate	Inter-bank rate	SSVX			Company certificates	
				3 months	6 months	12 months	3 months	6 months
1997	Jan	4,10	4,20	3,76	3,81	3,90	3,95	4,00
	Feb	4,10	4,20	3,93	4,00	4,11	4,13	4,20
	March	4,10	4,20	4,13	4,23	4,42	4,34	4,43
	April	4,10	4,20	4,03	4,15	4,52	4,24	4,35
	May	4,10	4,20	4,09	4,20	4,57	4,30	4,40
	June	4,10	4,20	4,05	4,15	4,44	4,28	4,37
	July	4,10	4,20	4,06	4,21	4,40	4,36	4,46
	Aug	4,10	4,20	4,17	4,33	4,40	4,45	4,60
	Sep	4,10	4,20	4,11	4,25	4,63	4,37	4,53
	Oct	4,10	4,20	4,23	4,41	4,78	4,49	4,68
	Nov	4,10	4,20	4,31	4,51	5,13	4,59	4,79
	Dec	4,19	4,29	4,42	4,70	5,06	4,70	4,99
1998	Jan	4,35	4,45	4,41	4,55	4,82	4,67	4,59
	Feb	4,35	4,45	4,33	4,51	4,71	4,56	4,73
	March	4,35	4,45	4,48	4,56	4,72	4,68	4,76
	April	4,35	4,45	4,47	4,58		4,66	4,76
	May	4,35	4,45	4,49	4,51		4,67	4,23
	June	4,18	4,28	4,20	4,20	4,26	4,39	4,38
	July	4,10	4,20	4,11	4,11		4,29	4,30
	Aug	4,10	4,20	4,19	4,23		4,37	4,39
	Sept	4,10	4,20	4,19	4,18	4,26	4,36	4,36
	Oct	4,10	4,20	4,20	4,18		4,36	4,34
	Nov	3,83	3,93	3,82	3,75		4,00	3,96
	Dec	3,51	3,61	3,45	3,51	3,53	3,65	3,69
1999	Jan	3,40	3,50	3,27	3,25		3,45	3,46
	Feb	3,30	3,40	3,14	3,16		3,31	3,35
	March	3,14	3,24	3,13	3,18	3,17	3,30	3,33
	April	2,90	3,00	2,87	2,90		3,04	3,07
	May	2,90	3,00	2,92	2,96	3,26	3,11	3,15
	June	2,90	3,00	2,97	3,03	3,37	3,18	3,22
	July	2,90	3,00	3,01	3,16		3,30	3,57
	Aug	2,90	3,00	3,00	3,20	3,83	3,32	3,77

6 Treasury bills and selected international rates

Annualized rate. Monthly average, per cent

		3-month deposits					6-month deposits				
		USD	DEM	EUR	GBP	SSVX	USD	DEM	EUR	GBP	SSVX
1997	Jan	5,58	3,13		6,47	3,76	5,67	3,14		6,66	3,81
	Feb	5,50	3,19		6,35	3,93	5,60	3,19		6,49	4,00
	March	5,62	3,29		6,42	4,13	5,79	3,30		6,54	4,23
	April	5,81	3,25		6,48	4,03	5,99	3,29		6,74	4,15
	May	5,80	3,20		6,54	4,09	5,97	3,26		6,72	4,20
	June	5,77	3,16		6,77	4,05	5,89	3,22		6,91	4,15
	July	5,72	3,16		7,05	4,06	5,81	3,23		7,24	4,21
	Aug	5,69	3,28		7,25	4,17	5,82	3,42		7,37	4,33
	Sep	5,67	3,34		7,29	4,11	5,80	3,48		7,43	4,25
	Oct	5,73	3,65		7,36	4,23	5,80	3,78		7,46	4,41
	Nov	5,83	3,78		7,71	4,31	5,87	3.89		7,77	4,51
	Dec	5,89	3,76		7,69	4,42	5,94	3,84		7,77	4,70
1998	Jan	5,62	3,57		7,57	4,41	5,67	3,67		7,57	4,55
	Feb	5,61	3,53		7,53	4,33	5,63	3,62		7,52	4,50
	March	5,63	3,54		7,53	4,48	5,67	3,72		7,55	4,56
	April	5,66	3,63		7,47	4,47	5,71	3,73		7,46	4,58
	May	5,66	3,61		7,47	4,49	5,73	3,72		7,45	4,51
	June	5,67	3,56		7,70	4,20	5,72	3,66		7,74	4,20
	July	5,64	3,55		7,77	4,11	5,72	3,63		7,83	4,11
	Aug	5,63	3,51		7,70	4,19	5,68	3,59		7,69	4,23
	Sept	5,47	3,50		7,45	4,19	5,39	3,56		7,33	4,18
	Oct	5,18	3,48		7,05	4,20	4,97	3,45		6,83	4,18
	Nov	5,24	3,56		6,79	3,82	5,06	3,51		6,55	3,75
	Dec	5,14	3,26		6,27	3,45	5,00	3,22		5,97	3,51
1999	Jan	4,88		3,04	5,74	3,27	4,89		2,99	5,52	3,25
	Feb	4,87		3,02	5,38	3,14	4,93		2,97	5,25	3,16
	March	4,89		2,98	5,26	3,13	4,97		2,93	5,17	3,18
	April	4,87		2,63	5,17	2,87	4,94		2,62	5,12	2,90
	May	4,90		2,51	5,20	2,92	5,01		2,51	5,18	2,96
	June	5,09		2,57	5,08	2,97	5,28		2,63	5,09	3,03
	July	5,22		2,61	5,03	3,01	5,53		2,81	5,21	3,16
	Aug	5,37		2,64	5,13	3,00	5,78		2,97	5,43	3,20

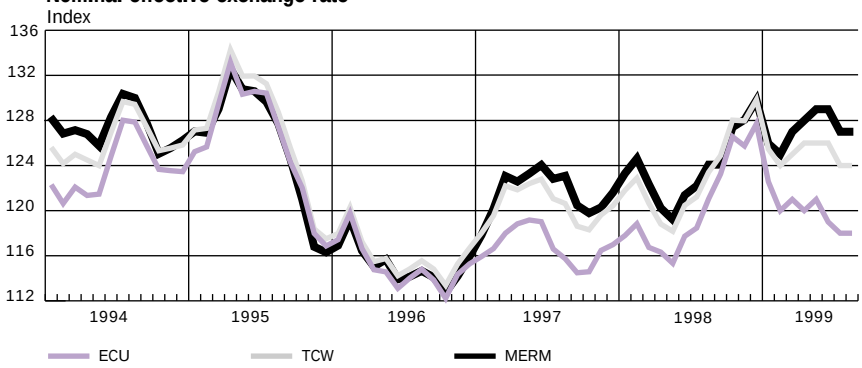
7 Krona exchange rate: theoretical ECU index, TCW-weighted index and MERM-weighted index; selected exchange rates

Annual and monthly averages; annual highs and lows

					SEK per			USD per	
		ECU index	TCW index	MERM index	USD	100 DEM	100 JPY	DEM	JPY
1997	Jan	115,93	118,02	117,84	7,06	440,02	5,99	1,60	117,83
	Feb	116,63	119,55	120,15	7,40	442,22	6,02	1,67	122,93
	March	119,00	122,20	123,07	7,65	450,95	6,25	1,70	122,57
	April	118,83	121,85	122,56	7,68	449,31	6,12	1,71	125,56
	May	119,17	122,40	123,29	7,67	450,73	6,46	1,70	118,61
	June	119,02	122,79	124,05	7,74	448,77	6,78	1,73	114,29
	July	116,60	121,06	122,82	7,81	436,41	6,78	1,79	115,24
	Aug	115,74	120,63	123,09	8,00	433,89	6,78	1,84	117,88
	Sept	114,49	118,62	120,47	7,70	430,56	6,38	1,79	120,73
	Oct	114,58	118,36	119,78	7,57	430,99	6,26	1,76	120,96
	Nov	116,47	119,62	120,29	7,56	436,58	6,04	1,73	125,18
	Dec	116,99	120,44	121,51	7,78	438,03	6,01	1,78	129,49
1998	Jan	117,79	121,66	123,30	8,01	441,26	6,20	1,82	129,50
	Feb	118,84	122,89	124,62	8,08	445,30	6,43	1,81	125,69
	March	116,74	120,65	122,35	7,97	436,38	6,18	1,83	129,00
	April	115,32	118,81	120,23	7,82	431,37	5,93	1,81	132,13
	May	115,33	118,17	119,21	7,69	433,42	5,70	1,77	134,96
	June	117,73	120,47	121,38	7,91	441,36	5,62	1,79	140,15
	July	118,46	121,22	122,20	7,98	444,30	5,68	1,80	140,63
	Aug	121,04	123,41	124,08	8,13	447,30	5,48	1,79	144,68
	Sept	123,25	124,88	124,68	7,91	464,26	5,88	1,70	134,57
	Oct	126,56	128,03	127,40	7,85	479,02	6,49	1,64	120,78
	Nov	125,74	127,97	128,06	7,99	475,49	6,64	1,68	120,35
	Dec	127,70	129,83	129,79	8,05	482,79	6,86	1,67	117,24
1999	Jan	122,57	125,46	125,95	7,82	464,45	6,92	1,69	113,16
	Feb	120,37	124,00	125,18	7,95	455,54	6,82	1,75	116,72
	March	120,81	125,43	127,09	8,22	457,34	6,87	1,80	119,64
	April	120,49	125,75	127,91	8,32	455,88	6,97	1,83	119,72
	May	121,24	126,87	129,16	8,44	458,97	6,93	1,84	122,05
	June	119,34	125,69	128,56	8,51	451,67	7,05	1,88	120,76
	July	118,16	124,40	127,41	8,46	447,31	7,07	1,89	119,54
	Aug	118,26	124,17	126,77	8,26	447,81	7,29	1,84	113,25

Note. The base for the ECU index is the central rate with the ecu on 17 May 1999; for the Merm-weighted and the TCW index it is 18 November 1992.

8 Nominal effective exchange rate



Note. The base for the ECU index is the central rate with the ECU on 17 Maj 1991; for the MERM-weighted and the TCW index it is 18 November 1992.

9 Forward foreign exchange market

Forward net position with authorized currency dealers. SEK million, period ends

		Non-bank public		Bank abroad	Riksbank	Total
		Resident (1)	Non-resident (2)	Net (3)	Net (4)	(1+2+3+4)
1998	Jan	–212 998	–22 001	140 364	– 262	– 94 897
	Feb	–186 583	–18 304	119 476	1 382	– 84 029
	March	–192 115	–19 175	142 227	5	– 69 058
	April	–186 239	–17 669	122 320	397	– 81 191
	May	–174 575	–47 495	133 608	0	– 88 462
	June	–220 387	–23 274	112 675	0	–130 986
	July	–218 997	–22 052	129 587	0	–111 462
	Aug	–284 131	–27 586	201 845	0	–109 872
	Sept	–239 370	–26 312	178 740	0	– 86 942
	Oct	–283 253	–29 446	157 158	0	–155 541
	Nov	–304 235	–26 910	158 008	0	–173 137
	Dec	–274 469	–16 164	129 535	0	–161 098
1999	Jan	–251 675	–11 774	117 395	0	–146 054
	Feb	–252 950	–12 878	93 133	0	–172 695
	March	–272 142	–11 752	131 858	0	–152 036
	April	–274 127	– 9 540	127 642	0	–156 025
	May	–289 324	– 4 744	150 131	0	–143 937

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