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The art of targeting inflation

By Lars Heikensten and Anders Vredin
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Sveriges Riksbank – the Swedish central bank – is, by most accounts, the world's oldest central bank. Despite this status, the institutional structure of the Riksbank must certainly rank among the world's newest. In late 1998, the Swedish parliament, or Riksdag, approved changes to the Riksbank Act that not only significantly altered the organisation of the central bank and its relationship to the rest of government, but also formalised objectives representing a decade-long evolution towards an inflation-targeting regime. Although low inflation has been the primary objective for Swedish monetary policy since 1993, it was not until 1999 that a price stability objective was implemented as the law of the land.

In the new regime, with an explicit inflation target and a floating exchange rate, the Riksbank had to formulate new principles for monetary policy.

During most of the 20th century, Swedish monetary policy had been governed by the objective of keeping the value of the domestic currency fixed in terms of foreign currencies (the nominal exchange rate). In the new regime, with an explicit inflation target and a floating exchange rate, the Riksbank had to formulate new principles for monetary policy. The Riksbank had to reorganise and reformulate its ways of monitoring macroeconomic developments and implementing monetary policy. In particular, credibility for the new low inflation target had to be established in the market as well as among the public at large. Earlier, the Riksbank had adjusted its short-term borrowing rate for private banks in response to currency flows, so as

This paper has been written as a contribution to a collection of similar papers from other central banks, the initiative being taken by David Altig at the Federal Reserve Bank of Cleveland. The speech by Meyer (1998) has been a source of inspiration. Comments from David Altig, Martin Andersson, Claes Berg, John Carlson, Petra Geraats, Marianne Nessén, Torsten Persson, Eva Srejber and Lars Svensson are gratefully acknowledged.

to keep the exchange rate stable and to protect the foreign exchange reserves. In the new regime, and given that inflation cannot be controlled exactly in the short run, interest rate changes were instead motivated by the goal of achieving the inflation target in a medium-run or average sense, and by maintaining the public's confidence in such a strategy.

The new strategy developed gradually, in response to practical experiences both in Sweden and in other inflation-targeting countries.

How was the Riksbank to keep track of the development of inflation? How was it to determine when short-term interest rates should be changed and by how much? How should the Riksbank communicate its new strategy to the public in general and to financial markets in particular? The new strategy developed gradually, in response to practical experiences both in Sweden and in other inflation-targeting countries – specifically the Bank of Canada, the Reserve Bank of New Zealand, the Reserve Bank of Australia, and, in particular during recent years, the Bank of England – and to academic research about inflation targeting.

Monetary policy strategies defined as inflation-targeting regimes have certain characteristic features.[1] *Firstly*, this policy has been associated with a desire to formulate explicit and increasingly precise objectives for monetary policy, in particular numerical inflation targets. *Secondly*, steps have been taken to create an institutional setting that makes the central bank strongly committed to its objectives. *Thirdly*, the inflation-targeting central banks have developed particular decision-making processes, where inflation forecasts play a very important role. A key word in this context is transparency. An explicit objective renders policy more transparent, because it makes it easier for the public to understand the central bank's actions. An explicit objective also makes it easier to evaluate monetary policy and hold the central bank accountable for its decisions. This, in turn, both strengthens the commitment to the target and gives the central bank incentives to be transparent, so that policy actions can be evaluated on the basis of all relevant information. Finally, transparency stimulates improvements to the central bank's internal preparatory work and decision-making processes, an aspect not discussed much in the literature but of great practical importance. For instance, publication of central banks' inflation forecasts will lead external experts to scrutinise both the forecasts as such, and the relation between forecasts and policy actions.

[1] Different economists make somewhat different interpretations of inflation targeting. Our list is consistent with, e.g., Svensson (1999, 2001).

In this paper we will describe monetary policy-making in Sweden today.[2] We will start by presenting the main features of the new legislation for the Riksbank that came into effect in 1999 and some of the steps that were taken prior to that. This sets the scene for a description of the mechanics of the policy process. Finally, we discuss some strategic problems the new regime has faced. We do believe that Sweden's inflation-targeting regime has been successful and has certain advantages over other ways of conducting monetary policy. But we also want to stress that inflation-targeting central banks are still struggling with many classic problems that central banks around the world find it difficult to deal with. The problems naturally become more obvious when monetary policy has an explicit target and is implemented under a high degree of transparency.

The Riksbank's independence

On 19 November 1992, Sveriges Riksbank abandoned its policy of pegging the value of the krona to a trade-weighted average of foreign currencies.

On 19 November 1992, Sveriges Riksbank abandoned its policy of pegging the value of the krona, the Swedish currency, to a trade-weighted average of foreign currencies. A new "nominal anchor" for monetary policy had to be defined. The krona had been repeatedly devalued since the middle of the 1970s and to continue with the unilaterally pegged exchange rate policy (even with some new target level) was not considered to be a realistic alternative, at least not for the moment. At the time, Sweden was not yet a member of the European Union (EU) and participation in the European system of pegged exchange rates, the Exchange Rate Mechanism (ERM), was not feasible in the near future. Neither were the experiences of money stock targeting in other countries encouraging. Furthermore, the financial system was in the midst of a deep crisis, which made the stability of money demand questionable and successful targeting of the money stock unrealistic.

On 15 January 1993 the Riksbank decided that from 1995 onwards there would be a target for Swedish inflation of 2 per cent per year.

In this environment, Sveriges Riksbank decided to declare, on 15 January 1993, that the flexible exchange rate policy would be combined with an explicit target for inflation. The decision was partly based on the recent positive experiences of such a strategy in other countries. Contacts with the Bank

[2] For discussions of the development of the Riksbank's approach to inflation targeting, see, e.g., Heikensten & Vredin (1998), Berg (1999) and Berg & Lindberg (2001).

of Canada had been particularly intensive and useful.[3] Specifically, the Riksbank decided that from 1995 onwards there would be a target for Swedish inflation of 2 per cent per year. The inflation target was defined in terms of the consumer price index (CPI). It was decided to have a transitional period, 1993–94, because large initial inflationary impulses were expected from the depreciation of the krona (around 20 per cent) and increases in indirect taxes. But it was also made clear that even after 1994 it was not to be expected that the inflation target would be fulfilled exactly. The target was accompanied by a "tolerance interval" of ±1 percentage point.

As this history unfolded, the independence of the Riksbank gradually increased. A higher degree of independence had already developed over time in response to the successful policy changes in other countries in the late 1970s and early 1980s and the negative experiences from "stagflation" in Sweden. One step, implemented in 1988, was the decision to make the Riksbank Governor's term in office longer (five years) than the election cycle (three years, at that time). A pattern that had become virtually automatic, whereby the Governing Board (Riksbanksfullmäktige) was chaired by an under-secretary of state from the Ministry of Finance, was also broken at that time. Another milestone was the government's explicit announcement in 1991 that low inflation was an overriding political goal.

The priority given to price stabilisation and the Riksbank's strong standing became apparent when the exchange rate was defended during the currency crises in 1992. Although this involved extremely high interest rates, the Riksbank's decisions had broad political support. In the very turbulent years 1991 to 1994 the objective of low inflation thus gave the Riksbank a strong say in economic policy matters, even to the extent that some outside observers got the impression that the Riksbank was more or less dictating policy.

The change to an inflation-targeting regime in early 1993 was not accompanied by any change in the legislative framework for the Riksbank.

The change to an inflation-targeting regime in early 1993 was not accompanied by any change in the legislative framework for the Riksbank. The decision to adopt an explicit inflation target was taken by the Riksbank's Governing Board. At that time, the Governing Board consisted of seven members elected by the Riksdag (the parliament), plus an eighth member, the Governor, appointed by the first seven. The new inflation-targeting regime thus had political support in the sense that it had been

[3] It is worth noting that Sweden also had positive experiences of price level targeting in the 1930s, see Berg & Jonung (1999). This, however, probably had very little influence on the decisions taken in 1992/93.

Table 1. Sweden's steps towards inflation targeting and central bank independence

1988	A new Riksbank Act: • The chairman of the Governing Board is no longer appointed by the government, but by the other seven members of the Board. • The Governor's term in office is made longer (five years) than that of the rest of the Board and the parliament (three years, at the time).
1991	The government declares that low inflation is an overriding goal for stabilization policy.
1992	The Riksbank abandons the pegged exchange rate policy in November, after repeated speculative attacks against the krona.
1993	January: The Riksbank declares an explicit inflation target. February: A parliamentary committee presents a proposal for a new Constitution and Riksbank Act, including a price stability objective for monetary policy and increased central bank independence. The proposal does not achieve enough political support and is not formally presented to the parliament. October: The first inflation report is published, as a report from the Riksbank's *Economics Department*.
1995	Sweden becomes a member of the European Union. The first Inflation Report signed by the *Governor* is published in November.
1997	The Riksbank starts to publish its inflation forecasts. The Riksbank starts to publish Financial Stability Reports. A new proposal for a price stability objective and increased central bank independence is presented, this time under broad political consensus.
1999	The new Constitution and amended Riksbank Act come into effect. Clarifications about the inflation-targeting strategy are published in the Riksbank's *Quarterly Review*.

decided by the Governing Board, in turn elected by the parliament. In reality, however, the issue was still controversial and a proposal by a government committee to legislate a price stability objective and also give the Riksbank more legal independence did not attract enough political support to be presented to the parliament in 1993. Legal reforms did eventually pass however and came into effect in 1999. Sweden's road to central bank independence is summarized in Table 1.

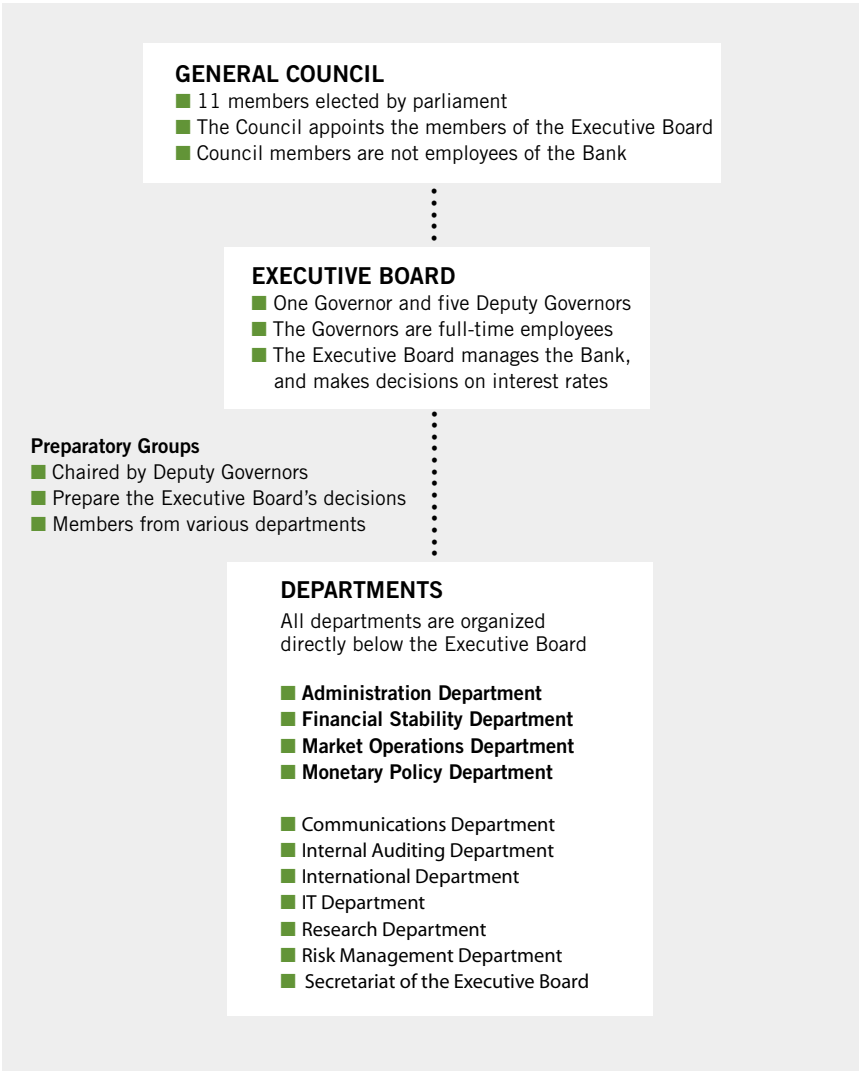
The price stability objective now has a strong legal foundation. The amended Riksbank Act states that the "objective of the Riksbank's operations shall be to maintain price stability".[4] Moreover, the Riksbank is now governed by an Executive Board (Direktion) with six members who are also full-time employees of the Bank – the Governor and five Deputy Governors. These are appointed by a General Council, which in turn is elected by the parliament and consists of eleven members. The six members of the Executive Board are appointed for six-year

[4] Both the earlier and the amended law also state that "In addition, the Riksbank shall promote a safe and efficient payment system".

terms, with overlapping mandates so that normally one appointment is made each year. Among its tasks, the General Council makes proposals to the Riksdag on the allocation of the profit of the Riksbank. The Chairman and the Vice-Chairman of the General Council have a right to participate in the Executive Board's meetings, and to ask questions, but do not have the right to make proposals or to vote. The Riksbank's organizational structure is depicted in Figure 1.

The operations of the Riksbank are thus managed by the Executive Board,

Figure 1. The Riksbank's organizational structure



implying that the Bank has "instrumental independence" from its principal. A high degree of independence is secured in several ways that impede interference with central bank operations. The Constitution Act says that the "General Council may sever a member of the Executive Board from his appointment only if he no longer meets the requirements which are made on him to be able to carry out his duties or if he has been guilty of serious misconduct". The Riksbank Act states that "Members of the Executive Board may not seek nor take instructions when they are fulfilling their monetary policy duties".

Sweden had to make the Riksbank more independent in order to comply with the Maastricht Treaty.

There were several reasons why the Riksbank was made more legally independent in 1999. Most important was perhaps that Sweden had to make the Riksbank more independent in order to comply with the Maastricht Treaty, which Sweden in effect had signed up to on becoming a member of the EU in 1995. Although Sweden has not adopted the euro and is therefore not a full participant in the EMU, there has been broad political support in Sweden for the idea that technical and practical preparations should be made for a possible future full membership.[5] Besides, the general idea that the central bank could be independent has gradually received more support in Swedish society. This is probably partly due to a favourable macroeconomic development. Inflation has remained low, while growth and employment have increased after the deep crisis in the early 1990s.

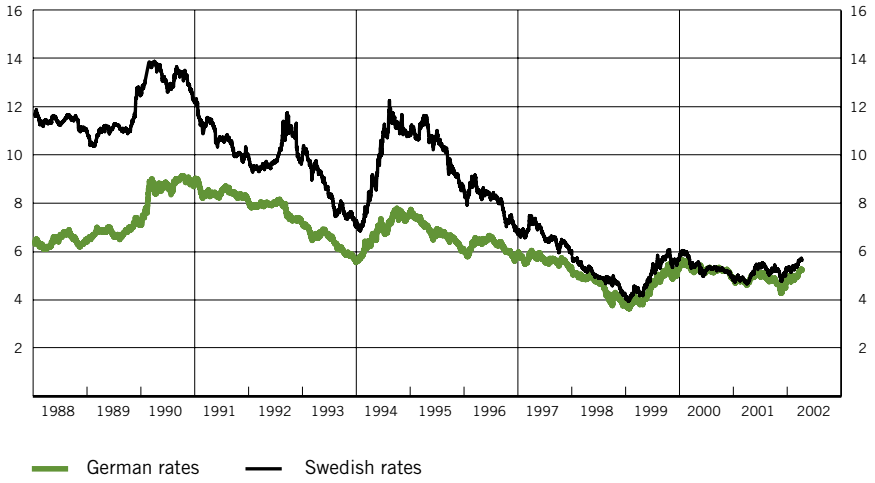
Greater openness and clarity in monetary policy seem to have improved the legitimacy of the Riksbank.

But the communication strategy chosen by the Riksbank has also been important. Greater openness and clarity in monetary policy seem to have improved the legitimacy of the institution, thereby strengthening the arguments for independence and weakening those against it. Attitudes to the Riksbank and its policy have improved substantially after record lows in the early 1990s. Most indicators show that the inflation target was credible well in advance of formal independence in 1999 (see Figures 2 and 3). The ten-year interest-rate differential relative to Germany decreased from around 4.5 percentage points in April 1995 to around 0.35 percentage points in December 1998, and the legislative changes had little concurrent effect on inflation expectations. In the surveys of public attitudes to the institution and its policy that the Riksbank has arranged

[5] The parliament's decision to make the Riksbank more independent was taken before the government's decision to postpone membership in the EMU. This timing was probably not co-incidental; legal independence for the Riksbank was viewed as useful to maintain credibility for the inflation target as long as Sweden is not a full member of the EMU.

Figure 2. Ten-year German and Swedish interest rates

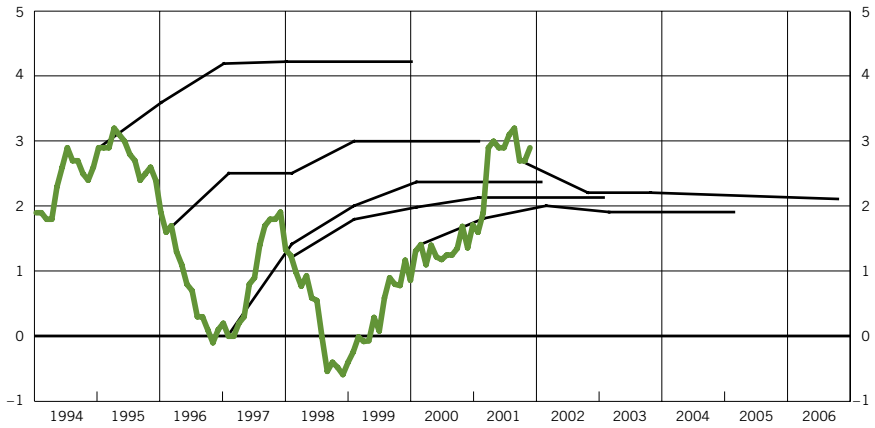
Per cent



since 1996, 37 per cent of the population thought the Riksbank was credible in December 1996, while the corresponding figure in October 1998 was 49 per cent, followed by 55 per cent in September 1999. Asked whether the Riksbank had pursued an appropriate monetary policy, 50 per cent answered yes in December 1996, 57 per cent in October 1998 and 61 per cent in September 1999.

Figure 3. CPI and money market agents' inflation expectations

Percentage 12-month change



Sources: Prospera Research AB and Statistics Sweden.

Taken together, these observations suggest that the Riksbank's legitimacy has increased gradually, and that support for the institution was quite strong even before the amendments to the Riksbank Act. To make the Riksbank formally independent with an explicit price stability objective was for many reasons less controversial in 1999 than in 1993.

Since the Riksbank is free to formulate its inflation target, it has more "goal independence" than New Zealand and the United Kingdom.

In this context it is important to stress that central bank independence is more than a legal framework; neither is independence a one-dimensional concept, it is a matter of degree. The Riksbank is in most respects legally more independent than the Reserve Bank of New Zealand and the Bank of England. In New Zealand, the Reserve Bank is an agency under the government and the inflation target is determined in a contract between the government and the Reserve Bank's governor. In the U.K., the inflation target is given to the Bank of England by the government. Since the Riksbank is free to formulate its inflation target itself, it has more "goal independence". The Riksbank Act may of course be changed by the parliament, but in practice many political obstacles, especially the Maastricht Treaty, make this very unlikely. This Treaty also provides the legal foundation for the European Central Bank (ECB). Nevertheless, the ECB in reality probably has more independence than the Riksbank since it is even less likely that the EMU countries will agree to change the treaty than that Sweden will renege unilaterally. In addition, the fact that the EMU includes many countries and governments makes it more difficult to form strong political pressures against the ECB.[6]

The mechanics of the policy process

Around eight meetings of the Executive Board per year are devoted primarily to decisions on monetary policy.

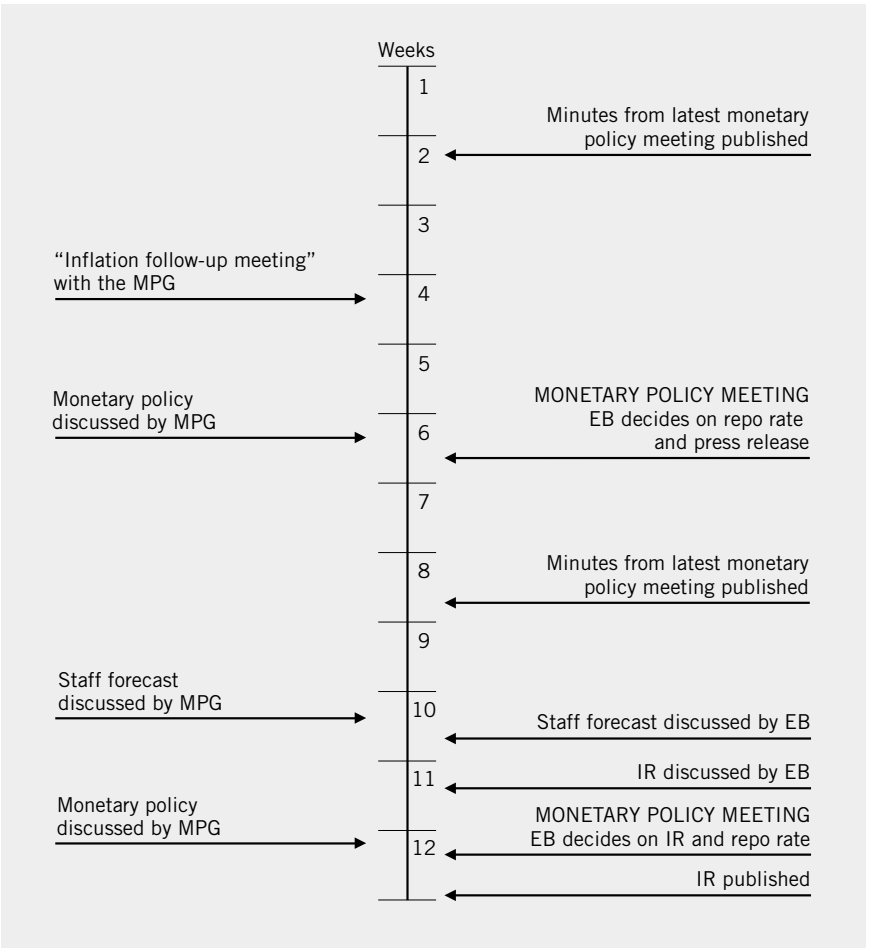
Since the Executive Board is collectively responsible for all the operations of the Riksbank, it has to meet frequently to take all kinds of decisions. Normally, this implies a meeting once a fortnight. Monetary policy is not on the agenda for most of these meetings but around eight meetings a year are devoted primarily to decisions on monetary policy. These special meetings are

[6] In terms of exchange rate policy (decisions to make interventions) the Riksbank appears to have more independence than both the Bank of England and the ECB. The Swedish government determines the exchange rate regime but once the regime has been decided, the Riksbank is responsible for exchange rate policy and can attempt to influence the exchange rate in a particular direction without having the government's approval.

announced four to six months in advance, and edited minutes of the meetings are published with a delay of around two weeks. Four of the special meetings on monetary policy coincide with publications of the Inflation Report. This means that the decision-making process during a year can be described in terms of four 12–13-week cycles, each ending with the publication of an Inflation Report and containing another monetary policy meeting halfway through. The process is presented schematically in Figure 4.

As noted in Figure 4, drafts of Inflation Reports are discussed a couple of

Figure 4. The Riksbank's monetary policy process



EB Executive Board
MPG Monetary Policy Group
IR Inflation Report

times by the Executive Board before the final Report is published. This means that, in addition to the pre-announced special meetings on monetary policy, issues relating to monetary policy may come up at a further eight or so meetings of the Executive Board. Events that threaten the inflation target and require immediate policy responses may of course also occur in between the eight pre-announced meetings. This was the case when the Riksbank joined other central banks in lowering the interest rate after the terrorist attacks in the United States in September 2001, and when interventions in the foreign exchange market were made in June the same year. The Executive Board has recently declared that it intends to be equally transparent about such unusual policy actions, not because this is required by law, but to promote credibility.[7]

In the rest of this section, we first describe the process leading up to the Executive Board's decision on monetary policy. Then we discuss the intricate issue of the roles of the different board members, in relation to each other as well as to the rest of the staff. Finally, we describe some characteristic features of the forecast-based monetary-policy strategy the Riksbank has chosen.

The preparation of monetary policy decisions

The Executive Board's meetings on monetary policy are preceded by meetings of a Monetary Policy Group.

The description of the policy process in Figure 4 shows that the Executive Board's meetings on monetary policy are preceded by meetings of a Monetary Policy Group (MPG). This group is chaired by one of the Deputy Governors and meets roughly once a week. At these meetings the staff of professionals, primarily from the Monetary Policy Department, makes presentations on recent macroeconomic developments. The MPG's discussions are intended to assess the quality of the material and the line of reasoning that will subsequently be presented to the Executive Board.

Although Executive Board decisions on Riksbank matters are made by the members collectively, there is a division of labour in the preparatory work. One Deputy Governor is thus responsible for preparing the decisions on monetary policy, another for preparing decisions related to financial stability, and yet others for preparing issues relating to research, administration, etc. The Deputy Governor in charge of preparing monetary policy decisions chairs the meetings of the

[7] New routines for foreign exchange market interventions have been decided after June 2001; see Heikensten & Borg (2002).

Monetary Policy Group (MPG) and also decides the Group's membership, the aim being to bring together the staff members who are expected to contribute most to the discussion of monetary policy matters.[8] Currently, the MPG includes the heads of the departments for Monetary Policy, Market Operations, Research, and International Affairs, as well as a few advisors and some other economists from the Monetary Policy Department. It should be stressed that the MPG also discusses issues other than the current macroeconomic situation and monetary policy. Since the group meets every week, it also has time for discussions of more methodological matters. The agenda for the MPG is set by its chairman together with the head of the Monetary Policy Department.

The discussions at the Executive Board's monetary policy meetings differ somewhat depending on whether or not they are held in connection with the publication of an Inflation Report. Here we shall describe the meetings that lead up to the publication of an Inflation Report and involve a monetary policy decision. For the intervening meetings the process is simpler but follows a similar stepwise pattern.

Two to three weeks before the publication of the Inflation Report the Board receives a forecast prepared by the Monetary Policy Department.

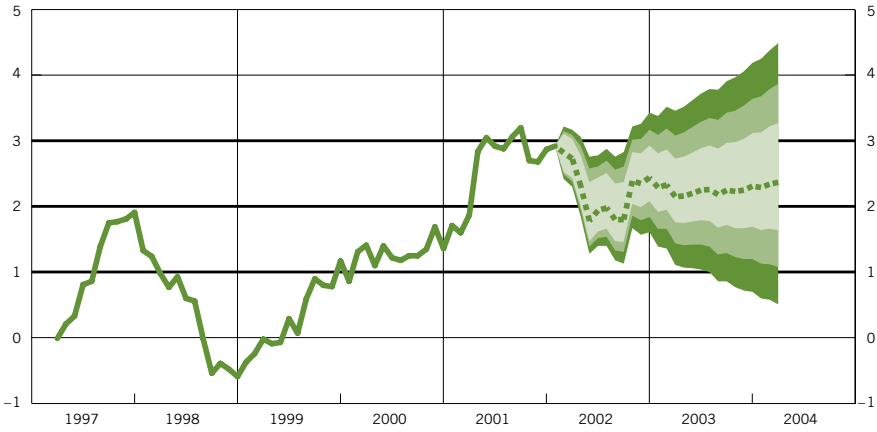
About two to three weeks before the publication of the Inflation Report the Board receives a forecast prepared by the Monetary Policy Department. On the basis of this, the Board forms its view of inflation two years ahead. Presentations supplementing written reports are given by the staff. Questions are asked and comments given by the Board members, and the discussion is usually quite lively.

The meeting follows a pre-set structure, starting with the international picture and moving on to financial market developments. The assumptions concerning interest rates and exchange rates receive special attention, partly because all forecasts are supposed to start from the technical assumption that the policy instrument will be unchanged. The discussion of Swedish inflation is more or less based on an expectations-augmented Phillips curve framework. Thus, supply and demand conditions in the Swedish economy are discussed along with various measures of the "output gap", and the picture of inflation is elaborated with inflation expectations and possible supply shocks. A decision on the forecast in the so-called main scenario is taken, followed by a discussion of the risks in the picture.

[8] As noted in Figure 1 (page 10), there are other preparatory groups than MPG, dealing with other kinds of policies by the Board than monetary policy (international issues, financial stability, research, administration).

Figure 5. CPI forecasts with uncertainty intervals

Percentage 12-month change



Note. The uncertainty intervals show the 50, 75 and 90 per cent chances of CPI inflation being within the respective range. The dotted line represents the main scenario's forecast; the horizontal lines at 1, 2 and 3 per cent are the Riksbank´s inflation target and the tolerance interval for the annual change in the CPI.

Sources: Statistics Sweden and the Riksbank.

Finally, forecasts including various risk scenarios are produced, and later presented in the form of a fan chart that provides a sense of the range of uncertainty associated with the projections (see Figure 5).[9]

These discussions take about 1 1/2 to 3 hours. Already at this stage it is usually fairly clear how the members of the Executive Board view the situation and what they are likely to think about the setting of policy instruments a few weeks later. Members who do not think they will go along with the main thrust of the description of macroeconomic conditions will also normally indicate that at this time. On the basis of the conclusions from the discussions, a draft of the Inflation Report is written by the staff in consultations with the responsible Deputy Governor and sent to the Board for discussion one week later. At this meeting the Board thoroughly reviews the texts and finalises them.

On the basis of the discussions, the staff compile a draft of the Inflation Report that is sent to the Board for discussion one week later.

[9] See Blix & Sellin (1998, 1999) for a description of a method that can be used to construct uncertainty intervals based on sector experts' judgements.

Setting the interest rate

After another week, the meeting for setting the instrumental rate is held.

After another week, the meeting for setting the instrumental rate is held. The starting point for this meeting is the by now completed Inflation Report. The members of the Board are presented with any new information since the previous week's meeting and are asked if they can approve the Report. In recent years all the members have usually agreed on the overall picture but there have been a few instances of dissent. Against this background, the setting of the policy rate is then discussed.

The Riksbank's policy instrument is the interest rate on one-week repurchase agreements with the private banks. Repurchase agreements are made every week, i.e., more frequently than the Executive Board's decisions on monetary policy, but it is only as a result of decisions by the Board that the repo rate is changed. Before the repo rate is announced, usually on Tuesdays at 9.30 a.m., the Riksbank makes a forecast of the banks' borrowing needs for the coming week. The announcement of the repo rate is thus associated with an announcement of the planned total size of the repurchase agreement. The total amount is allocated between the Riksbank's counterparties (the primary dealers) in proportion to their bids. The result is announced one hour after the first announcement (usually Tuesdays at 10.30 a.m.) and the banks receive the liquidity the day after.[10]

If there were major errors in the Riksbank's forecast of the banks' borrowing needs, the overnight interest rate could become quite volatile. In practice, in order to stabilise the overnight rate the Riksbank typically (but at its own discretion) makes loans to and accepts deposits from the banks at the going repo rate ±10 basis points. The Riksbank thus has an almost horizontal supply curve for liquidity at the intended repo rate.

At each monetary policy meeting, the prospects for inflation are assessed and the Board decides whether the repo rate should be changed.

The Riksbank's monetary policy may thus be described in terms of two stages. In the very short run, between the Board's monetary policy meetings (usually a period not longer than six weeks), the Riksbank supplies the money that is demanded at its set one-week rate. At each monetary policy meeting, the prospects for inflation are assessed and the Board decides whether the repo rate should be changed.

A monetary policy meeting starts with a summary of the MPG's view on interest rate policy, presented by the Deputy Governor who chairs the MPG and is

[10] For further discussions of the Riksbank's interest rate policy, see Mitlid & Vesterlund (2001).

responsible for preparing monetary policy decisions. The MPG is not required to produce a unanimous recommendation, and there is no voting in that group. The purpose of the recommendations is primarily to give the Executive Board some ideas about the most relevant policy issues and options and to provide a good foundation for the subsequent discussion.[11]

The interest rate is set by a majority vote.

After all the members of the Executive Board have presented their assessment of the appropriate monetary policy action – the Governor usually chooses to be the last one to present his – there may be some discussion before the Board votes on the interest rate. The interest rate is set by a majority vote.[12] Any minority views are explicitly recorded in the minutes, as formal reservations against the majority decision.

Finally, each of the eight special monetary policy meetings ends with a decision on a press release explaining the Board's decision. This release, which has also been prepared by the MPG, summarises the Board's majority view and is thus not a consensus-based document summarising the discussion.[13] It is an important policy document, particularly when no press conference is held, as is normally the case when there is no new Inflation Report or a decision to change the instrumental rate.

The roles of the staff and the Board members

The Riksbank has decided to give the staff a prominent role in the process.

Setting up a policy process of this kind clearly raises many difficult questions.[14] One concerns the *role of the staff* relative to the Board. The Riksbank has, much like the US Fed, decided to give the staff a prominent role in the process. This is manifested in the right of the staff to present full and comprehensive forecasts without the direct prior involvement of any Board member. This is for example not the case in the Bank of England, where the Monetary Policy Committee itself puts together the forecast on the basis of various pieces and model results presented by the staff.

Moreover, the staff members participate in the meetings of the Riksbank's

[11] Even though more members of the Executive Board than the MPG's chairman may attend the group's meetings, they never participate when the MPG discusses policy recommendations.

[12] In principle, there may be six different alternative suggestions and no majority for any. In practice, however, the Board's discussions usually lead to the emergence of two alternatives.

[13] From time to time there have been complaints from market participants that the minutes convey different signals about future policy actions from those in the press release. This is hardly surprising in that the latter presents the *majority* view while the minutes reflect a discussion and include the views of *all* the participants.

[14] See Heikensten (2000) for a discussion of the arguments behind the present set-up for policy making.

Executive Board and may present their views. This is for example not the case in the ECB, where one of the Board members does the presentations without any staff in the room.

There are several reasons for the model chosen by the Riksbank. Giving the staff a strong role in making forecasts is motivating and educational, partly because it makes them better informed as to which issues the Executive Board is most concerned about. That in turn is likely to result in the staff taking more responsibility and making more relevant analyses and presentations in the future. It is also a way of broadening the competence of the staff and preparing them for possible future Board membership.

Core members of the MPG participate in Board meetings.

Another important issue concerns the *roles of the various Board members*. The policy-making process at the Riksbank is very open internally. The core members of the MPG participate in Board meetings, thereby ensuring that the presented material is in line with the MPG's discussions. Also, members of the Executive Board other than the MPG's chairman are invited to participate in most of the MPG's meetings. The idea behind these principles is twofold. First, to secure that the Board can base its final decision on several fairly independent views, and second to promote an environment in which the influence of the Executive Board members primarily reflects their background and familiarity with the policy issues, rather than their responsibilities in the Riksbank's organisation. Still, the Governor has a prominent role, both by virtue of his casting vote in all matters decided by the Executive Board and because he chairs the meetings and thus can influence how the discussions (and, perhaps, negotiations) are moving. The Deputy Governor responsible for monetary policy exerts an influence as chairman of the MPG and in that role proposing decisions on rates as well as preparing press releases. In the end, however, it is our impression that the influence of the various Board members primarily reflects their background, experience of and competence in the relevant subjects and issues at hand.

The forecast-based strategy

The Riksbank's monetary policy is often described in terms of a simple rule of thumb. The following quote is from the Inflation Report from October 1999:[15]

[15] Similar formulations have been expressed both before and after October 1999, and the first (but somewhat less precise) statement of the Riksbank's rule of thumb appeared in the Inflation Report from September 1997.

"if the overall picture of inflation prospects (based on an unchanged repo rate) indicates that in twelve to twenty-four months' time inflation will deviate from the target, then the repo rate should normally be adjusted accordingly."

Large parts of the staff's analysis and the policy discussions are thus focused on the forecasts of inflation one to two years ahead, although nowadays there is also a brief outlook three years ahead. There are various arguments for a forecast-based monetary policy. One has to do with the idea that as it takes time before monetary policy exerts its full impact on the economy, the central bank cannot control inflation perfectly in the short run. Another argument is that, even if it could, the central bank presumably would not want to keep inflation exactly on target all the time. By focusing on forecast inflation, monetary policy refrains from reacting to temporary fluctuations in inflation, and thereby avoids large fluctuations in nominal interest rates. The desirability of this form of interest rate smoothing is related to the question about whether monetary policy should pay any attention to other objectives than price stability, such as the stability of GDP, employment or financial markets.

Since the mid 1990s the Riksbank has explicitly declared that it is not a "strict" but a "flexible" inflation targeter.

In the early stages of the inflation-targeting regime the Riksbank did not publicly express any concerns about the real side of the economy. Since the mid 1990s, however, the Riksbank has explicitly declared that it is not a "strict" but a "flexible" inflation targeter (like most other central banks today). The horizon at which the Riksbank aims to meet its inflation target is therefore not independent of real economic developments, neither does the Riksbank want to counter all transitory changes in inflation. This policy also has legal support. In the preparatory documents on the Riksbank's independence it is said that the "Riksbank, as an agency under the Riksdag, should accordingly have an obligation to support the general economic policy objectives to the extent that these do not conflict with the price stability objective". The task of the Executive Board is thus to implement this notion of "flexible" inflation targeting.

There is of course no exact and mechanical forecast-based policy rule.[16] For instance, various measures of "core" or "underlying" inflation are used to distinguish transitory from permanent movements in the CPI, and such filtered inflation measures have at times been more decisive for monetary policy than CPI forecasts. From time to time monetary policy decisions have also been influenced,

[16] For some empirical estimates of the Riksbank's reaction function, see Jansson & Vredin (2001) and Berg, Jansson & Vredin (2002).

at least marginally, by financial market conditions that were not entirely reflected in actual or forecast inflation.[17]

The information the Inflation Reports provide about the Riksbank's policy decisions and forecasts enables the public to evaluate the Bank's actions.

It is obvious that an inflation-targeting, forecast-based monetary policy like this does not minimise the degree of discretion in monetary policy. At the same time, the discretion ary element of policy is limited by certain rules the Riksbank has decided to impose on itself. The Inflation Reports are very important in this context. They provide incentives to make careful analyses and they discipline the internal discussions (as described above). They also convey such information about the Riksbank's policy decisions and forecasts to the public, including the publication of the forecasts themselves, that the Bank's actions can be evaluated. The minutes from the Board meetings are also useful for such purposes.

The Riksbank's principal, the Swedish parliament or Riksdag, has good reasons to evaluate the actions of its independent central bank. However, even before the amended legislation was adopted in 1999, the Governor took an initiative for an open hearing about monetary policy before the Riksdag's Finance Committee. The amended Riksbank Act requires the Riksbank to hand over a written report on monetary policy to the Parliamentary Finance Committee at least twice a year. The Riksbank has chosen to use the Inflation Reports for this purpose and some Reports thus contain separate sections with the Riksbank's own evaluation of its policy. Each year (before 15 February), moreover, the Executive Board is also required by the Riksbank Act to submit a report to the Riksdag on the Riksbank's operations during the previous year.

Strategic issues in inflation targeting

The Riksbank has tried to pursue and explain its policy as simply and transparently as possible.

The principles behind Sweden's monetary policy and the mechanics of the policy process may seem rather simple. Indeed, the Riksbank has – like the other inflation-targeting central banks – deliberately tried to pursue and explain its policy as simply and transparently as possible. This form of monetary policy is now often viewed

[17] The best examples of this are the decisions taken during the global financial crisis in the fall of 1998 and after 11 September 2001.

as "international best practice" and other central banks have been recommended to follow the examples of their inflation-targeting colleagues.[18]

Nevertheless, important problems remain and are repeatedly discussed in the meetings of the MPG and the Executive Board. Many are classic problems of monetary policy and not associated with the inflation-targeting strategy as such, although they are perhaps easier to see in such a relatively transparent framework. For instance, questions about the implications of uncertainty and about the central bank's optimal response to asset price fluctuations (in particular, stock prices and exchange rates) have been re-investigated by policy makers and researchers within the inflation-targeting framework.[19] In the following we will however focus on certain issues that are more directly tied to the inflation-targeting approach and the Riksbank's policies: the definition of the inflation target, the nature of the Executive Board's collective decision-making, and the appropriate degree of transparency.

What should the inflation target be, and what deviations can be accepted?

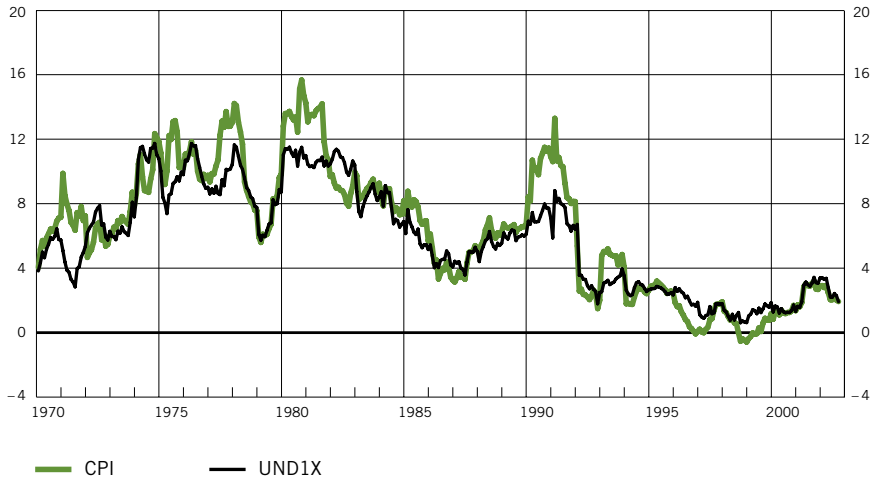
There is the question of which definition of inflation is most relevant from a monetary policy perspective.

The Riksbank's inflation target is defined in terms of the CPI. In addition to the appropriate level of the inflation target (which has been extensively discussed elsewhere), there is the question of which definition of inflation is most relevant from a monetary policy perspective. Many central banks use measures of "core" or "underlying" inflation in their analyses and rhetoric. The Riksbank has used a measure that excludes indirect taxes and subsidies as well as house mortgage interest payments. The rationale for this is most easily understood by referring to the Riksbank's experience from 1997 and 1998 (see Figure 6). At that time, CPI inflation was continuously below the target, despite large cuts in the repo rate during 1996. The Riksbank gradually understood that one property of the CPI may give rise to "perverse" short-run effects of monetary policy. When the repo rate is lowered as inflation prospects improve, this lowers house mortgage interest expenditure. Thus, a lower repo rate may initially lead to lower inflation, as measured by the CPI. This does not, of course, imply that higher inflation should be met by a more expansionary policy; over time (and

[18] See Svensson, et al. (2002).
[19] See Adolfson (2002) and Söderström (2001, 2002) for work on such issues that has been done at the Riksbank.

Figure 6. CPI and a measure of "core" inflation (UND1X)

Percentage 12-month change



Source: Statistics Sweden.

perhaps even in the short run) the "perverse" effects are presumably dominated by aggregate demand effects.[20]

Indirect taxes and subsidies also have CPI effects that are hard to handle for central banks. Changes in indirect taxes and subsidies lead to immediate changes in the price level, sometimes with small effects on future inflation. Since monetary policy can do little to counteract such price shocks in the short run, it has been argued that monetary policy should aim to stabilise inflation adjusted for those factors.

Other inflation-targeting countries have decided to formulate their inflation targets in terms of "core" or "underlying" inflation.

Other inflation-targeting countries have similar experiences and have decided to formulate their inflation targets – or at least explain their monetary policy decisions – in terms of measures of "core" or "underlying" inflation excluding interest payments and indirect taxes and subsidies. It should be stressed, however, that the theoretical basis for these measures is unclear.[21] Essentially, the problem with most measures of "core" or "underlying" inflation is that they exclude certain *categories of goods or services* from the CPI, whereas economic theory suggests that an optimal monetary policy should respond differently to dif-

[20] Theoretical explanations of the "prize puzzle" have been offered by, e.g., Altig et al. (2002) and Barth & Ramey (2000).

[21] For a theoretical analysis, see Nessén & Söderström (2001). Bryan, Cecchetti & Wiggins II (1997) also discuss how core inflation should be measured.

ferent *shocks* (which may affect the prices of many different goods and services). On the other hand, if the policy that would be optimal under ideal circumstances is not viewed as feasible in practice, the central bank may want to adhere to some simple and transparent rule for the relation between a certain inflation measure and the policy instrument. But commonly applied measures of "core" inflation do not seem to be justifiable on such grounds either.

The Riksbank has encountered several difficulties when it comes to implementing the idea of "core inflation targeting".

The Riksbank has encountered several difficulties when it comes to implementing the idea of "core inflation targeting" in practice. First, some government subsidies and charges are not defined as subsidies or indirect taxes in the CPI system, but still cause similar problems for monetary policy (the problems are not overcome just by focusing monetary policy on an index excluding subsidies and indirect taxes). For instance, during the year 2000 discussions within the Riksbank concerned the appropriate response to an expected country-wide cap on the charges for nursery care. Such a reform was expected to lead to a one-time drop in the CPI during 2002, but formally no direct subsidy was involved, since this service is financed and primarily supplied by local governments at non-market prices. Hence, both the CPI forecasts and the measures of "underlying" inflation suggested that inflation would be below the target two years ahead. It was still questionable whether the reform of the day nursery charges really justified lower interest rates.

A second problem with a monetary policy rule that focuses on any of the common measures of "core" or "underlying" inflation is that many supply and demand shocks give rise to large one-time effects on the price level and small persistent effects on inflation. Should monetary policy not counteract the inflationary effects of such shocks either, if it has been decided that changes in indirect taxes and subsidies warrant no reaction? This question has been very important during 2001 and 2002, when various supply shocks have raised prices of food and energy. Many central banks do attach considerable weight to measures of "core" inflation that exclude expenditures on food and energy. The risk with such an approach is that the central bank in effect stabilises the price of a consumption basket that excludes a large part of consumption expenditures.

Furthermore, computing the effects of any specific shock on any specific inflation measure is very difficult without a fairly sophisticated economic model. Measures of "core" inflation are usually intended to exclude the "direct" effects on CPI from certain price shocks, using the fixed weights in the CPI. Yet, it remains unclear if the effects measured in this way are what matter for monetary

policy. For instance, changes in indirect taxes or oil prices may have general equilibrium effects on consumer prices that dominate the first-round effects (at least eventually). Neither economic theory nor practical experience provides any clear guidance on how monetary policy should respond to such shocks, but the idea that a certain price index would invariably yield an unambiguous signal about the optimal policy seems ill-founded.

The Riksbank has decided not to use one specific "core" index for all situations.

The Riksbank has decided not to use one specific "core" index for all situations. The intention instead is always to communicate exactly on what forecast or other grounds the interest rate decision has been based, what deviations from the target are acceptable in any given situation because of temporary supply shocks.[22] The most important instrument for this communication is the Inflation Report. The purpose of this transparency is to commit the Riksbank to a precise discussion of these matters, which probably improves our knowledge in the long run and makes it easier to evaluate monetary policy ex post. This strategy allows for discretionary policy but it still seems to be consistent with the type of flexible monetary policy rules advocated by some academic economists, for instance Taylor (1993).

The principle of forecast-based inflation targeting itself can also be viewed as a way of systematically handling the problems with short-term CPI fluctuations. If monetary policy is based on the forecast of inflation some quarters ahead, very temporary movements in inflation will be filtered out of the inflation numbers to which the central bank reacts.

Problems of collective decision-making

When the Swedish parliament amended the Riksbank Act in 1998 it was decided that a Board of six members would manage the Riksbank collectively, including the decisions on interest rates. This was in line with the structures in many other central banks within the EU, a fact which probably affected the decision. In the academic literature on monetary policy, however, the policy maker is usually a single individual. This means that actual policy-making raises a number of difficult and important issues that have not attracted much analytical attention.

As noted above, one characteristic feature of inflation targeting (in Sweden and elsewhere) is the desire to be transparent about the objectives of monetary

[22] The Riksbank's views on output stabilisation and CPI versus core inflation targeting have been expressed in more detail in the Inflation Reports and by Heikensten (1999), who presents and explains a formal decision on these issues taken by the newly elected Executive Board at its first meeting in January 1999.

policy and the policy-making process. To aid the Riksbank's new Executive Board in structuring its discussions and analyses and in forming a view on monetary policy and also communicating this view, in January 1999 the Board presented a suggested policy framework. This included several aspects from the existing set-up, such as the 2 per cent inflation target and the rule of thumb relating the repo rate to the inflation forecast at the 1 to 2-year horizon. The way temporary deviations from the target would be handled was spelt out more explicitly than before (see Heikensten (1999)). The Board unanimously agreed to these principles.

One characteristic feature of inflation targeting is the desire to be transparent about the objectives of monetary policy.

Minutes of the Board's monetary policy meetings are published. There have, of course, been differences of opinion in the Board that are documented in the minutes. (The minutes are edited, however, i.e., they are not transcripts.) When interpreting the minutes and the differences of opinion, one important question is whether the collective decision should be regarded as "preference aggregation" or "information aggregation".[23] Mervyn King, among others, has stressed that the different views in a monetary policy committee should be the consequence not so much of members having different objectives ("preference "), but rather of their different views on what is a good or bad policy decision in a certain situation, given the objective of reaching the explicit target at a certain horizon ("information aggregation"). It is probably correct to say that one purpose of the explicit and rather detailed framework for policymaking applied by the Riksbank (and other central banks with explicit inflation targets) is to limit the room for disagreements due to different preferences about policy objectives. That is, there should be little room for systematic differences in opinion reflecting, for example, Board members being "hawks" or "doves".

One purpose of the framework for policy making is to limit the room for disagreements due to different preferences about policy objectives.

As a reading of the published minutes will show, differences of opinion within the Riksbank's Executive Board have indeed most frequently reflected minor differences in the Board members' forecasts. From time to time there has also been some disagreement on more fundamental relationships: the effect on inflation from capacity utilisation; the persistence of shocks to the nominal exchange rate; the proper interpretation of various indicators of inflation expectations; the optimal target horizon; and the optimal response to fluctuations in financial markets

[23] We are grateful to Torsten Persson for emphasising this distinction.

(monetary aggregates and equity prices). In this sense, the Board's discussions have concerned "information aggregation".

One obvious reason behind the six-member Board is that the parliament wanted to secure a broad representation of Swedish society in the monetary policy process.

However, against the background of earlier controversies about the independence issue, one fairly obvious reason behind the six-member Board is that the parliament wanted to secure a broad representation of Swedish society in the monetary policy process.[24] Different parameters in an implicit loss function (including output and inflation stabilisation) do seem to have played a role in the Swedish case. Besides, the willingness to pursue an activist policy, i.e., the preference for interest rate smoothing, appears to have differed somewhat across Board members. Thus, some members appear to have been more "hawkish" than others over this period. That is, the Board's monetary policy meetings are partly about "preference aggregation". It should be emphasised, however, that the pattern in these respects is far from clear; the time horizon is short and it is too early to draw any firm conclusions. In principle, the hypothesis that individual Board members have the same preferences could be tested, for instance by researchers outside the Riksbank, if the minutes provide sufficiently detailed information about policy decisions (and over a sufficiently long period).

Although questions about "information aggregation" versus "preference aggregation" have never been explicitly addressed during the Board meetings, the difficult problem of how to construct a joint forecast has of course had to be dealt with. With individual accountability of the kind the Riksbank cultivates, it might not have been surprising to get six different forecasts. In practice, however, the divergence between members has been rather small. Members have tried to arrive at a common view in the monetary policy meetings on the basis of the forecast presented by the staff. The Riksbank decided in 1999 to vote on the Inflation Reports and to open up for dissenting views. Dissent has been recorded only when differences of opinion concerning the forecast of inflation have been sufficiently significant to motivate a different view on interest rates. It may be worth noting that in this respect the Riksbank's Executive Board works somewhat differently from the Bank of England's Monetary Policy Committee, where the Inflation Re-

[24] Another argument that supports this hypothesis is that it was clear from the start that a management structure of this kind is unlikely to be the most efficient for taking decisions on other kinds of issues than monetary policy, e.g., regarding organisational questions and corporate culture.

ports are consensus documents covering the views of all members.[25] The fact that the Riksbank's Inflation Reports contain a coherent forecast from a majority of the Executive Board has simplified communication with the outside world.

Another difficult task is to form a common view on the almost unlimited number of possible risk scenarios and the nature of the uncertainty surrounding the inflation forecasts. These Board discussions are now based both on a "top down" approach, starting with descriptions of various conceivable scenarios, often also presented in figures by the staff, and a "bottom up" analysis beginning with the uncertainty surrounding the variables that currently seem most important. A table prepared by the staff, indicating the probability of alternative outcomes for some of the more important variables in the forecast and the role these variables play for the final outcome, is presented as a complement to the published fan charts (see Table 2).[26] The Board discusses both the alternative outcomes and their probabilities, and decides on a distribution of inflationary outcomes using both such tables and fan charts.

Table 2. Scenarios and probabilities
Per cent

Scenario	Inflation forecast two years ahead	Deviation from two years ahead	Probability	Contribution to difference between mode and mean forecast two years ahead
Main scenario (mode)	2.2	0.0	65	0.00
Scenario 1	2.0	–0.2	10	–0.02
Scenario 2	2.3	0.2	10	0.02
Scenario 3	2.8	0.6	15	0.09
Sum			100	0.10

Scenario 1: Lower consumption in the U.S. and stagflation in Europe
Scenario 2: Higher consumption in the U.S.
Scenario 3: Higher domestic inflation pressure

How transparent can we be?

Most initiatives towards increased transparency have been taken by the Riksbank itself.

During the last decade, several central banks have become much more transparent about their objectives and policy processes. With increased focus on monetary policy after the shift in paradigm during the 1980s, and hence increased central bank independence, it has been necessary for politicians and the general public to be able to

[25] For instance, in the Bank of England's Inflation Reports "the fan charts represent the MPC's best collective judgment".

[26] Figure 5 shows that the distribution around the inflation forecast is skewed such that there is a higher probability of inflation above the main scenario (the mode of the forecast distribution) than below. Table 2 shows how such a situation could arise.

hold the central bank more openly accountable for its policies. In this situation, it has also been in the central banks' own interest to provide as good information as possible. In Sweden, most initiatives towards increased transparency have been taken by the Riksbank itself. One reason for this is that transparency has been important not only for improving the Bank's external communication and reputation, but also for raising the quality of the internal work – all important arguments made internally have to be explained externally. Central bank transparency is thus a good thing, and one may conclude that the more transparency, the better.

The Riksbank does not see any convincing arguments for deliberate central bank secrecy.[27] For instance, the Bank does not share the view that important pieces of central bank information should be kept secret because the general public cannot understand complicated economic analyses. There are many financial market analysts and media that can help the public to overcome such problems.[28] The major obstacle to transparency may be that central banks themselves do not fully understand how the economy works.

Reasons why central banks cannot be fully transparent are not difficult to find. One important fact is that policy making is to a large extent based on judgements, i.e., decisions are affected not only by explicit models of the economy but also, and perhaps primarily, by the policy makers' own interpretations of the situation. Besides being unavoidable, this is desirable, since explicit models of necessity are simplifications of reality and their accuracy is uncertain. But it also means that policy makers are virtually precluded from being fully transparent about their reasons for reaching a particular decision.

Even if full transparency were feasible, its production would come at a cost. Although central banks have softer budget constraints than other authorities, they should not use that advantage to avoid weighing the benefits of all their activities against the costs. Given this, the production of more information about the policy process has to be weighed against investments in deeper analyses of the economy. The Riksbank's experience in this area can be described as a production cycle. During the first years of inflation targeting there were large investments in analysis. Thereafter, transparency gradually increased. At the moment, we are taking steps to prevent the efforts towards greater transparency from crowding out more

[27] This is not to deny that there are good theoretical arguments against transparency; see Geraats (2002) for a survey. But we claim that they are not the reasons why central banks have been against transparency in practice.

[28] See Green (2001) for a discussion of whether central banks have an informational advantage and the implications for transparency.

in-depth, long-term analyses. There may be a trade-off between transparency in the short and the longer run.

In the end, transparency is not desirable for its own sake, but primarily to improve the public's access to such information about the macro economy and monetary policy that enables them to understand the reasons for monetary policy decisions. Thereby, monetary policy can gain acceptance and become predictable.

Transparency can enable monetary policy to gain acceptance and become predictable.

Concluding comments

The fact that low inflation is a relatively recent phenomenon has been important for the policy framework created by the Riksbank. With the strong Keynesian and parliamentary traditions in Sweden, and the scepticism the Riksbank encountered after the deep crisis in the early 1990s, it was important to find ways of quickly regaining legitimacy and credibility. A new framework was needed that would quickly provide new policy recommendations and help shape inflation expectations. In designing this framework the Riksbank chose to draw on experience from many other countries. But the Bank has also proceeded with new ideas developed internally, frequently guided by discussions with academics.

Inflation targeting was believed to be a fruitful strategy, a belief that has been supported by what has happened both in terms of interest rates and other measures of credibility, and by changing attitudes in Swedish society towards the Riksbank and its policies. Of particular importance in this context have been (i) the use of an explicit symmetric target; (ii) the publication of Inflation Reports including explicit forecasts; and (iii) a rule of thumb for the relation between policy decisions and inflation forecasts. When these three aspects of the framework had been put in place, it became easier for the financial markets and for other observers to understand the Riksbank and to evaluate monetary policy *ex ante* as well as *ex post*. The clear framework also helped the Riksbank in focusing and improving its work, which in turn has supported its position in the eyes of the outside world.

There are obvious similarities between the ways the Fed's Open Market Committee and the Riksbank's Executive Board conduct monetary policy. But there are also differences. Some of the differences have to do with perceived differences in the so-called transmission mechanisms and their implications for inflation prospects. Sweden is a small and open economy. Important effects on economic activity and inflation come not only via trade in goods and services but nowadays, and perhaps more importantly, via the international financial markets,

capital flows, exchange rates and other asset prices. These channels are often influenced not so much by monetary policy in Sweden as by the policies pursued in other countries or areas, in particular the US and the euro area. Another important difference from the US is that price and wage formation in Sweden is in many markets more concentrated and centralised, sometimes resulting in rather abrupt changes in inflation. Furthermore, low inflation has been established in Sweden only during the last ten years, making it difficult to estimate all important transmission mechanisms with confidence.

Two kinds of critique against inflation targeting have been common in recent years. One is that the inflation-targeting approach is overly simplistic.

Two kinds of critique against inflation targeting have been common in recent years. One argument is that the inflation-targeting approach is overly simplistic: following what are taken to be simple rules means that important aspects of monetary policy are neglected. We do not agree. Obviously, any relatively simple framework cannot solve all of the problems we and other central banks encounter. But our experience is that the inflation-targeting approach gives a good structure for precise discussions and analyses. This, in turn, helps in the work of improving analyses and policy. We would hardly have got to where we are today in our thinking on policy issues had we not been constantly forced to wrestle with questions about how new problems we have faced could be dealt with within our own relatively precise framework.

The second is that inflation targeting cannot be implemented until policy is reasonably credible and the central bank demonstrates a capacity to make good inflation forecasts.

A second type of critique is that inflation targeting cannot be implemented until policy is reasonably credible and the central bank demonstrates a capacity to make good inflation forecasts. We do not believe in this either. Although our forecasts have not been extremely good, we have nevertheless gained credibility by openly discussing them and the reasons for the errors. In fact, the Riksbank would claim that the Swedish experience shows that the clear framework provided by inflation targeting is particularly important precisely when there is great uncertainty concerning policy and future inflation. The Riksbank also believes that the positive experiences in Sweden and other countries with explicit inflation targets are important information for all central banks and a strong argument for clear frameworks also in countries where low inflation is already well established.

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The IRB approach in the Basel Committee's proposal for new capital adequacy rules: some simulation-based illustrations

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The Internal Ratings Based (IRB) approach for determining banks' capital adequacy is one of the cornerstones of the Basel Committee's proposed revision of the Basel Accord for banking regulation. This article presents the ideas behind the IRB approach and its fundamental features, and discusses the consequences of a number of its components for the banks' capital adequacy requirements. Using a simulation-based analysis, we will illustrate the relationship between IRB-determined capital and the risks inherent in a loan portfolio in a dynamic perspective assuming different macroeconomic developments.[1] We will also examine the effect of the number of risk classes that banks use and of different risk profiles of their credit portfolios.

The Basel Committee's regulation

In 1988, the Basel Committee introduced capital adequacy regulation that has been adopted by more than 100 countries.

In 1988, the Basel Committee introduced regulation stipulating how a bank's minimum acceptable capital base is to be calculated, i.e. the size of the capital that banks are required to hold as a buffer against future losses on their assets (e.g. the credits in their loan portfolios). From having originally been intended for internationally active G10 banks, the Basel Accord has now been adopted in over 100 countries. The regulation has also been adopted in gen-

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[1] The conclusions in this article are based in part on a paper entitled *Capital Charges under Basel II: Corporate Credit Risk Modelling and the Macro Economy* by Carling, Jacobson, Lindé & Roszbach (2002), in which the IRB approach is evaluated with the aid of data on a business loan portfolio at a major Swedish bank for the period 1994–2000.

eral by all banks, not exclusively those that operate internationally. The purpose of the Accord was, and still is, to promote security and stability in the bank sector. In recent years, supervisory authorities have expressed increasing concern over the erosion of the effectiveness of the Accord. The banks have devised methods of capital arbitrage that circumvent the capital adequacy rules and that lead to a mismatch between the risks accepted and the buffer capital the banks are obliged to hold.[2] In order to curb this development, the Basel Committee and its extensive hierarchy of working groups have drawn up a proposal for a revision of the 1988 rules. The proposed Accord is considerably more far-reaching and specifies the principles governing the activities of the banks and the supervisory authorities.[3]

Insufficient risk dependence and the possibilities of arbitrage are important reasons behind the Basel Committee's revision of the capital adequacy rules.

Insufficient risk dependence and the possibilities of arbitrage in the present regulations are important reasons behind the Basel Committee's revision of the capital adequacy rules. Its revision can also be seen as a natural consequence of the rapid developments in recent years in credit risk management and credit risk measurement and the banks' greater readiness and ability to quantify credit risk. Current methods of measuring credit risk, in a broad sense, increasingly resemble the market risk models that supervisory authorities have long been allowing banks to use to determine the level of the buffer capital for risk-exposed currency holdings and securities. Early on in its revision of the rules, the Committee discussed the possibility of allowing the corresponding use of credit risk models in determining the buffer capital for credit losses. Since no generally accepted methodology for validating, or evaluating, credit risk models has yet been established, it was decided to formulate the new rules to permit them to be transitional until full-scale credit risk modelling can be used as the basis for capital determination.[4] In practice, this means that the rules will be a compromise solution in which credit risk models are allowed, indirectly, to serve as the basis for determining buffer capital via the banks' internal risk classification systems. The Basel Committee also stresses the

[2] Jackson et al. (1999) contains a review of the extensive empirical research into the effect of the existing capital adequacy requirements on bank behaviour.

[3] The basic principles for the planned capital adequacy Accord were outlined in January 2001. The proposal is available on the Bank for International Settlements' website (www.bis.org/publ/bcbsca.htm).

[4] The difficulties associated with evaluating credit risk models are due partly to the use of such models not yet being widespread, and partly to the fact that the banks that use these models have not done so for a very long time and thus have not had the time to accumulate the large amounts of data the models require. As the actual event – the failure to pay interest or amortizations on a loan – is a relatively infrequent occurrence, data need to be collected for some considerable period of time.

importance of designing the new rules in a way that gives banks an incentive to further develop quantitative methods of handling credit risk.

The proposal for the new rules is based on three pillars.

The proposal is based on three pillars. The first pillar consists of rules for determining the buffer capital the banks must hold to cover credit and other losses that the banks incur. The second pillar consists of the supervisory process of scrutinizing the banks' internal procedures for deciding their capital base, taking risk profile into account. The purpose of the third pillar is to increase the transparency of banks' risk profiles for market players through disclosure requirements. The idea is to amplify the disciplinary effect of the market that implies, for example, that a bank with a high risk propensity is correctly recognized as such by the market and therefore, all else being equal, has to pay more for its financing.

The buffer capital currently required by the capital adequacy rules shall be at least 8 per cent of a bank's total risk-exposed assets.

The buffer capital currently required by the capital adequacy rules shall be at least 8 per cent of a bank's total risk-exposed assets. Depending on type, an asset's value is multiplied by a "risk-weight" before the sum is calculated. In the current rules, the loans in a credit portfolio are partly risk-differentiated; loans to other banks have, for example, a risk weight of 20 per cent, while business loans have a risk weight of 100 per cent. This means that loans to other banks are covered by an actual buffer capital of 1.6 per cent (20 per cent of the 8 per cent that is normally referred to as the absolute capital adequacy requirement); loans to banks are thus considered less risky than loans to businesses. However, the current rules impose a limit on such risk differentiation, so that two similarly sized business loan portfolios, for instance, also need to have the same buffer capital, regardless of each portfolio's actual credit risk profile. The new rules will take risk differentiation in the calculation of asset value considerably further. The constant risk weight for business loans has been replaced by a variable weight, so that businesses with a high credit rating and a low probability of default (PD) are thus assigned a low risk weight, and vice versa.

The first pillar proposes two main alternatives for determining risk weights. The first, the standard approach, should be applicable by all banks.

The first pillar proposes two main alternatives for determining the risk weights by which the risk-exposed assets are to be multiplied. The first, the "standard" approach, is designed to be applicable by all banks. This alternative means that the loans in a portfolio will be divided into a relatively small number of risk classes, although more than

in the current regulation.[5,6] The loans in any given risk class are assumed to be homogeneous in terms of risk. The supervisory authority assigns a risk weight to each risk class that is based on an external credit evaluation of the counterparty risk that is typical of loans in this risk class. The buffer capital can then be calculated in a number of simple steps. First, the total value of the loans in each of the risk classes is worked out and multiplied by the relevant risk weight. The risk-weighted assets thus obtained from each of the risk classes are then added together. The buffer capital requirement is then 8 per cent of this sum.

The second alternative is designed with larger and more sophisticated banks in mind.

The second alternative is designed with larger and more sophisticated banks in mind. The IRB approach differs from the standard approach primarily in that it is based on internal rather than external information. The idea behind the IRB approach is to use the information that is collected and processed in the banks' own counterparty evaluations. Since it is part of a bank's normal business to make professional assessments and evaluations of counterparty risk, it should be possible to use such evaluations to determine a risk-differentiated capital base. As a bank's internal risk classification system is a systematic compilation of its credit risk assessments, this in practice makes it a suitable point of departure. Analogously with the standard approach, the loans in each internal rating category or risk class are assumed to be homogeneous in terms of risk. The risk weight for the IRB approach, i.e. the factor calculated for each risk class and by which the sum of all loans in a specific risk class is to be multiplied to obtain the risk-weighted capital base, is calculated by the bank itself. An average PD is then calculated for the risk class on the basis of historical data for the loans in any given risk class over a particular time horizon. Using a formula provided by the supervisory authority, the banks then convert the PDs of the different risk classes into risk weights. The product of the risk weight, the exposure at the time of default (the nominal loan less any collateral is normally used) and the 8 per cent absolute capital adequacy requirement, summated over all loans in the portfolio, gives the bank's buffer capital, exactly as in the standard approach. The current proposal gives the banks the option of deciding for themselves at which of the two levels of complexity they will apply the IRB approach. The more complex method requires the bank to be able to

[5] Risk differentiation in the standard approach will increase in relation to the current rules, partly since there will be more risk-weight classes for the loan categories that are already risk-weighted, and partly since more types of loans, such as credits to business and private borrowers, will be risk-weighted.

[6] A definition of a defaulting loan that is widely used by Swedish banks is a loan for which payment of interest or amortisation is 60 days late.

compile internally data on loss given defaults (LGD) and the exposure at the time of default, while the simple method only expects the bank to be able to produce estimations of the PD.

It is a fair guess that most banks will use probability of default calculations based on historical data for the rating classes in their own portfolio.

We aim to show in this article that despite the detailed nature of the proposal, there still remain a number of important yet unresolved issues concerning the practical application of the IRB approach. We will be examining the consequences of different ways of making the important calculation of the average PD, which in turn results in a risk weight for each rating class. The Basel Committee proposes three basic methods that the banks can use to calculate these probabilities: average external rating of counterparty risk; average estimated probabilities obtained from a credit risk model; and calculations based on historical data or the rating classes in the bank's own portfolio. Our guess is that this last approach will be preferred by most banks. For this reason, this is the method we will illustrate here. We will examine the effects of the different ways in which historical data can be used. These differences can relate to the amount of data used (i.e. which time horizon has been applied) and the choice of method for estimating the PDs. These issues are relevant, regardless of the basic method employed by the banks, i.e. they are also relevant in the case of an external rating or a credit risk model. Another issue that we will discuss is how often we can expect a given capital buffer to prove inadequate in relation to the measured portfolio credit risk. The answer to this question will, of course, depend upon how the buffer capital is calculated and the choice of risk level and risk horizon for the portfolio, however defined. This is relevant to the principles governing the calculation of the capital base as given in the current Basel Accord. Nonetheless, we have opted to study capital adequacy arrived at using the IRB approach. At present, Swedish banks are in the process of adapting their businesses to the new regulations, which in itself justifies an examination of the IRB approach. Therefore, we will be illustrating how the capital as determined by the IRB method varies depending on the method used to estimate the PD in each risk class. We will also be looking at the extent to which the IRB capital covers the loan portfolio's risk of default. We will also be demonstrating the importance of taking explicit account of macroeconomic conditions when making these assessments.

Our results suggest that the choice of method for calculating the average historical default risk for the rating classes is very important; the longer the period for which the default risk is calculated, the lower the capital adequacy require-

Our results suggest that the choice of method for calculating the average historical default risk for the rating classes is very important.

ment; the longer the future period during which one assumes that the buffer capital has to provide coverage, the weaker the co-variance with future credit risk and the greater the risk of the buffer capital proving inadequate. The extent of this effect also hinges on the choice of method for calculating the default risk. Macroeconomic conditions are of importance for the design of the new capital adequacy system. A bank's business cycle sensitivity also has a major impact on the co-variation between the buffer capital and the portfolio's credit risk, and therefore also on the probability that the capital buffer will prove inadequate. Our results are not in contradiction with the fears that a strong co-variation between buffer capital and credit risk in the new Accord will increase the chances of procyclicality effects (i.e. the undesirable intensification of the business cycle).

Methodology

In this section we describe and justify each step in our analysis. Appendix A provides the technical details of the calculations. This section is written in such a way that it can be read independently of the appendix. The appendix is intended mainly for readers who are interested in applying the model themselves or redoing (parts of) the calculations.

Data generation

Our method is based on an analysis of simulated data.

Our method is quantitative but not empirical, since it is based on an analysis of simulated data. There are several reasons for this. Most importantly, actual data, to the extent we would need, are impossible to extract. Not only do we intend our analysis to cover bank loan portfolios over a long period, we also wish to analyse the characteristics of 1,000 portfolios. Another reason is that we would like to generate data with a strong and controllable correlation with macroeconomic developments to enable us to study the effects over a business cycle. The obvious drawback to a simulation approach is that the results depend upon how realistic the simulation model actually is. In the following section, we will describe the structure of the data-generating model. This model enables us to generate time-series over different periods for hypothetical loan portfolios that consist of a large number of loans. We have also generated

data describing the macroeconomic situation (the output gap, i.e. the difference between estimated potential GDP and actual GDP) in order to examine how the business cycle affects the banks' IRB-determined capital base, particularly with respect to variations in the portfolios' riskiness.

The business loans in the simulated bank loan portfolios are distributed into ten credit risk or rating classes. Although we have chosen the number of classes relatively arbitrarily, the number is within the limits that most banks work with. The structure of the portfolio, i.e. the risk classes' risk profile and proportion of the total portfolio, is characterised by so called "transition matrices". The elements of a transition matrix give the probability that a counterparty (i.e. a business) will migrate from one rating class to another, or remain in the same class. They thus describe the counterparties' movement through the portfolio's different rating classes over a given period of time (e.g. from start to one year ahead).

There are good reasons to assume that changes in the business cycle give rise to different levels in credit worthiness for companies.

There are good reasons to assume that changes in the business cycle, all else being equal, give rise to different levels in a company's credit worthiness. For example, we expect relatively few companies to be forced into bankruptcy during an economic phase with high demand, or to put it another way, that relatively few credits in a bank's portfolio default. In our analysis, which is "dynamic" in the sense that we follow the development of a portfolio over several periods, we will be working with three different transition matrices, which ought to provide a fair description of migrations in a portfolio during good, normal and bad macroeconomic conditions. To prevent the simulated business loans in the bank's portfolio from "jumping" too much between different states of nature, we will smooth the migrations between the transition matrices of the different states. This smoothing process is governed by the state of the business cycle at the time.[7]

Transition matrices

The loan portfolios are characterised by transition matrices.

As previously mentioned, the loan portfolios are characterised by transition matrices. This comes about in the following way. Assume that our hypothetical bank, just as banks are meant to do under the new Basel Accord, assigns all its borrowers (counterparties) a quarterly credit worthiness

[7] We use the output gap, that is the difference between the actual real GDP and an estimated potential GDP, to approximate the business cycle. The potential GDP is what the economy could produce if all its resources were being utilised to the full.

appraisal or credit rating as part of its lending activities. This means that the loans in the portfolio are distributed over a number (in this case ten) of rating classes. If the bank does this for a series of quarters and systematically records the data relating to the migration of these loans between rating classes, it can, using this information, estimate a transition matrix (TM):

$$TM = \begin{bmatrix} p_{11} & p_{12} & \cdot & \cdot & \cdot & p_{1r} & p_{1d} \\ p_{21} & p_{22} & \cdot & \cdot & \cdot & p_{2r} & p_{2d} \\ \cdot & & & & & & \cdot \\ \cdot & & & & & & \cdot \\ p_{r1} & p_{r2} & \cdot & \cdot & \cdot & p_{rr} & p_{rd} \end{bmatrix},$$

where r is the number of non-defaulting rating classes and d denotes the rating class in which the defaulting loans are placed. If the bank, as in our case, uses ten non-defaulting rating classes, the TM contains ten rows and eleven columns. The element p_{24} denotes an estimated probability that a loan placed in rating class 2 at time t will have migrated to rating class 4 at time $t + 1$; the element p_{11} represents the probability that loans in the rating class with the highest credit rating will still be in that class in the next period, while p_{rd} is the probability that the worst rated loans will default during the period t to $t + 1$. It might be worth noting that the sum of the probabilities in any one row (with respect to one rating class) is 1.

There is reason to expect that the probabilities in the transition matrix are not constant throughout a business cycle.

As already mentioned, there is reason to expect that the probabilities in the transition matrix are not constant throughout a business cycle. During a boom period, the default risk should decrease and in a recession a transition matrix with higher probabilities of borrower downgrading will reflect a bank loan portfolio more accurately. This business cycle dependency is something we take into account by assuming three economic situations: a kind of normal economic situation, a boom period and a slump, each of which are characterised by their own transition matrix: TM_{normal}, TM_{high} and TM_{low}. The transition matrix TM_{normal} has the following appearance:[8]

[8] TM_{high} and TM_{low} are shown in Appendix A.

$$TM_{\text{normal}} = \begin{bmatrix} .90 & .04 & .03 & .02 & .01 & .00 & .00 & .00 & .00 & .00 & .00 \\ .01 & .90 & .02 & .02 & .01 & .01 & .01 & .01 & .01 & .00 & .00 \\ .00 & .01 & .89 & .03 & .02 & .02 & .01 & .01 & .01 & .00 & .00 \\ .00 & .01 & .02 & .85 & .03 & .03 & .015 & .02 & .01 & .01 & .005 \\ .00 & .005 & .01 & .025 & .82 & .04 & .03 & .03 & .025 & .01 & .005 \\ .01 & .02 & .00 & .03 & .05 & .80 & .04 & .02 & .01 & .01 & .01 \\ .00 & .02 & .02 & .03 & .04 & .05 & .75 & .04 & .02 & .02 & .01 \\ .00 & .00 & .01 & .01 & .02 & .04 & .08 & .75 & .05 & .025 & .015 \\ .00 & .00 & .00 & .01 & .02 & .03 & .06 & .12 & .70 & .04 & .02 \\ .00 & .00 & .00 & .00 & .01 & .02 & .02 & .06 & .15 & .70 & .04 \end{bmatrix}.$$

The numeric values of the matrix elements are determined with the use of empirical data.

The numerical values of the matrix elements have not been calculated and are therefore, to a certain extent, arbitrary. In the case of TM_{normal} we have used empirical data for the business loan portfolio of a major Swedish bank.[9] We have, however, allowed the exact values in the matrix to deviate slightly from actual data in order to obtain a smoother reduction of the probabilities when moving along a row in the matrix away from the diagonal elements.[10] TM_{high} and TM_{low} are fair, if somewhat arbitrary, adjustments of TM_{normal}, and have been given such values that the portfolios' default risks, both on average and during boom and recession periods, give rise to credit losses that roughly correspond to the actual credit losses incurred by the Swedish bank sector (see Figure 3). In the next section, we will describe in more detail just how the prevailing economic situation changes the characterisation of the portfolio with the help of these matrices.

The business cycle

Macroeconomic conditions are approximated with a time-series of the Swedish output gap.

As pointed out, we approximate macroeconomic conditions with a time-series of quarterly observations of the Swedish output gap.[11] A recession is characterised by a nega-

[9] See Carling, Jacobson, Lindé & Roszbach (2002) for a detailed description of this data, in particular the characteristics of the transition matrices that are estimated for this loan portfolio.

[10] The probability of migrating from one arbitrary class to another is in fact less than the probability of remaining in the same risk class. For example, the following should apply: $p15<p14<p13<p12<p11$. In the case of a real loan portfolio, it may be that the risk of default in the risk classes does not increase monotonously, so that this inequality does not hold. Changes may also come about in the definitions of the rating classes, causing problems in estimating the transition matrices.

[11] See footnote 1 for an explanation.

tive output gap with unutilised resources, while a positive output gap, i.e. when GDP is higher than the trend, is associated with a boom. Since GDP's trend is not observable, a time-series for the output gap is estimated using data from observable variables, typically those that are related to actual GDP. We have chosen to use a vector autoregressive time-series model (VAR), in which foreign and Swedish GDPs, inflation and interest rates, along with Swedish credit losses, the repo rate, the real exchange rate and import prices are the variables included. For further details, see Appendix A.

Figure 1. Actual output gap according to the VAR model and an approximation of this output gap according to the AR(5) model

Per cent

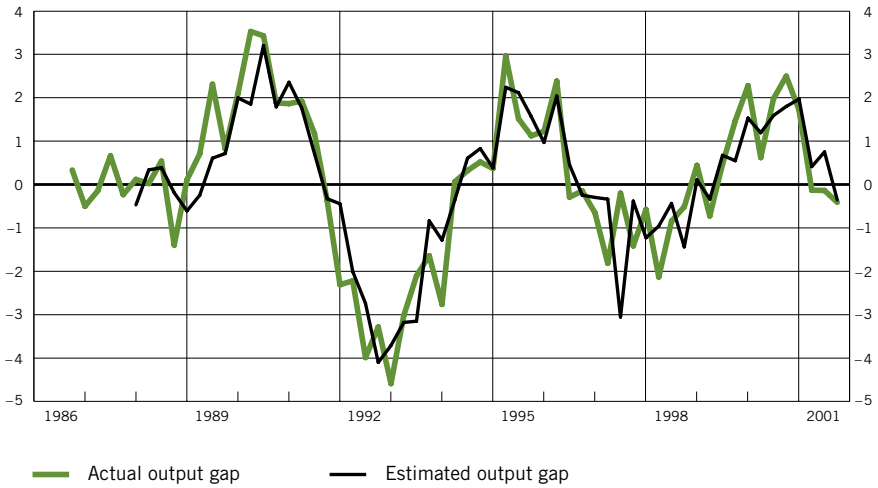
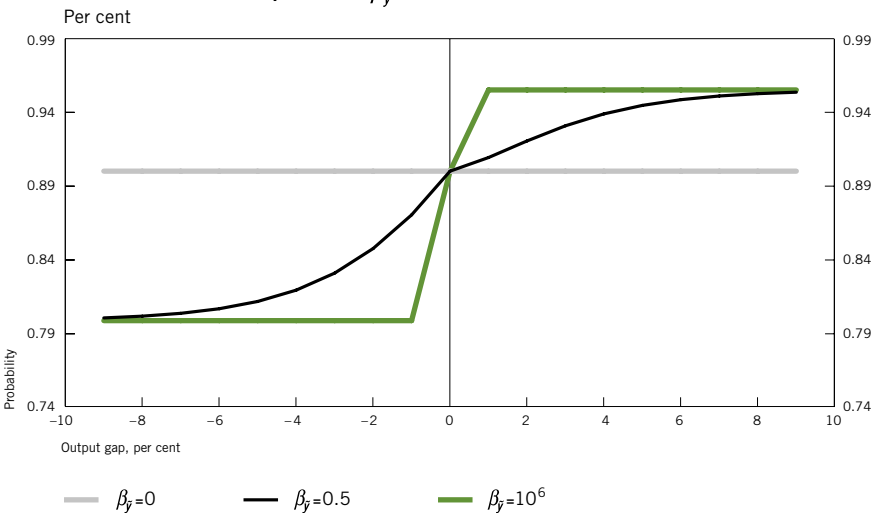


Figure 1 shows that the output gap was strongly positive at the end of the 1980s, only to drop dramatically from the beginning of the 1990s to the end of 1992, when the Riksbank floated the krona. Note that as the estimated output gap is level-adjusted to zero on average during this period, the percentage points on the axes should be interpreted as deviations from the average economic conditions during the sample period.

For the sake of simplicity, we assume that the probabilities in the transition matrices depend solely on the output gap.

For the sake of simplicity, we assume in our analysis that the probabilities in the transition matrices (which we will need to simulate bank data that fluctuate with the business cycle) depend solely on the output gap. This means that we are approximating the process that generates the values for the

Figure 2. The element $_{p\,1,\,1}$ in the transition matrix as a function of the output gap for different values of the parameter $\beta_{\tilde{y}}$



output gap with a simple autoregressive model. The advantage of this simplification is that we do not need to model the remaining macroeconomic variables from the VAR model when generating our portfolio data. The results of the estimation (see Appendix A) show that an auto-regression in which the output gap in the current period is a function of five previous realisations (an AR(5) model) provides a reliable statistical approximation. As can be seen from Figure 2, the AR(5) model not only follows the trend in the output gap in accordance with the VAR model but also takes up the short term variations.

The transition matrix as a function of the business cycle

The parameters of the model have been chosen in such a way that both the business cycle and credit losses display a behaviour pattern which resembles that of the Swedish banking sector during the 1990s.

Here we describe how we make the probabilities of the transition matrix change over time with the movements of the business cycle. The transition matrix in each quarter will be limited by the extremities of the boom and recession periods (TM_{high} and TM_{low}). With the normal situation as given by the TM_{normal} matrix (page 43) as a starting point, the transition matrix at any given point in time is determined by macroeconomic conditions. A positive (negative) output gap, or a boom or slump period, will thus give a lower (higher) PD in the transition matrix and increased (decreased) probabilities of upgrading, and vice versa

for downgrading. We can also determine the value of a parameter β_y that governs the rate at which the transition matrix moves towards the peak and trough of a business cycle.[12] Figure 2 illustrates the effects on the portfolio's cyclical sensitivity of choosing different values for the parameter β_y. Our goal is to decide on a level for β_y that ensures that the credit losses in our simulated portfolio exhibit a behaviour pattern that resembles the losses incurred by the Swedish bank sector during the 1990s. The figure shows that a portfolio with $\beta_y = 0$ will be completely cyclically insensitive; the probability that a company in rating class 1 in period t will be in the same class in the next period (i.e. $t + 1$) is constant (0.9) and thus independent of the output gap. A high value for β_y, on the other hand, means that the probability shifts greatly between the upper and the lower parameters when the output gap is not zero, thereby creating a cyclically sensitive portfolio. Only for relatively small positive values for β_y, like 0.5 (the assumed value in our analysis), is there a smooth transition in probabilities, and therefore "normal" cyclical sensitivity.

The construction and simulation of a hypothetical portfolio over time

As we are working with simulated data, we have no natural starting point for distributing the companies into the portfolio's different rating classes. Our analysis therefore needs a set of starting values – in other words, an initial distribution. In the appendix, we describe how the TM_{normal} transition matrix can be used to calculate such a distribution of companies in the portfolio. Since the TM_{normal} transition matrix is based on data from a Swedish bank, the initial distribution that we thus obtain will resemble what is observable in the data. Hereafter we will refer to this initial distribution as the steady state distribution.

The data simulation takes place as follows:

1. In the first period ($t = 1$), we allocate companies to all rating classes. The number of companies in each class is determined by multiplying the steady state proportion by the total number of companies. We have set this figure at

[12] This means that we can control the cyclical sensitivity of the loan portfolio by selecting the value of β_y. It should be noted that in practice β_y is slightly different for each rating class, which could mean that the sensitivity of the various rating classes to the macro-economy differs slightly. In this article, we have used the values 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.6, 0.6, 0.8, and 0.8 for rating classes 1 through 10, which means that companies in rating classes 7 to 10 are assumed to be slightly more cyclically sensitive than companies in classes 1 to 6. The appendix provides more details about the calibration of the parameters.

10,000, and each company is given a company registration number $i = 1,\ldots, 10{,}000$ and a loan amount.[13]

2. We then calculate the output gap $\tilde{y}_t$ with the aid of the AR(5) model and generate the accompanying transition matrix for the period in question. The matrix is used to calculate the distribution of existing companies in the next quarter, $t + 1$.[14]
3. The new distribution in period $t + 1$ consists not only of the companies that were there in the previous period. We also assume that the bank grants loans to new companies in each period. We assume that the *distribution* of these new loans is the same as in the steady state distribution. We further assume that the *number* of new companies to which the bank grants loans in each period is constant and equal to the average number of companies that default, multiplied by the number of companies in the portfolio at $t = 1$ (i.e. 10,000). This means that if the output gap was 0 in all periods $t = 1,\ldots, T$, both the number and distribution of companies in the portfolio would be constant over time. It is assumed that the new companies are not able to default in the same period as they are granted credit.
4. For each period $t = 1,\ldots, T$, we record the following information on all "active" companies in the bank's portfolio: the company's registration number, the period, the risk class allocated, default (= 0 if the company is active, 1 if it defaults in this period) and size of loan. This information can then be used to calculate the capital adequacy requirements under Basel II and the portfolio's Value-at-Risk (VaR).

In this article, we use $N = 1{,}000$ hypothetical loan portfolios and assume that the banks keep information on their portfolios for $t = 1,\ldots, 40$ quarters, i.e. 10 years. Note that the data generation process is the same for all the N different simulated portfolios insofar as they are characterised by the same transition matrix. On the other hand, each portfolio is exposed to a unique series of macroeconomic condi-

[13] For the sake of simplicity, we assume that all the companies have loans of the same value. One could also let the companies have different loans by drawing loan amounts at random from a distribution with a mean of 1 and a standard deviation equal to what can be observed in actual bank data. The problem with the latter approach is that one would be assuming that over time the amount of the loan is independent of the companies and rating classes in the portfolio. It would be worthwhile to study the co-variation of the loan amount with rating class over time for the loan portfolios of Sweden's "big four" banks.

[14] For each company, i, we generate a random number, $p_{i,t}$ from a uniform probability distribution (which assumes a value in the interval [0.1]). If this company i is in rating class l during period t it is given rating class k in the next period, i.e. period $t + 1$, when the condition $\tilde{p}_{i,t} < \Sigma p_{lk,t}$ is satisfied for the lowest possible value of $k = 1,\ldots, r$, and where the probabilities $p_{lk,t}$ are obtained from the transition matrix. It should be noted that if the condition is not satisfied for $k = r$, this means that company i defaults during the period in question.

tions and all loans to unique, idiosyncratic risks. We also assume that each company in each period has a company-specific risk of defaulting.[15]

Figure 3 shows how well our simulation approach can match the actual credit losses to non-financial companies (as a percentage of total lending) that were incurred by the four major banks from 1990 Q1 to 1996 Q4.[16] As can be seen, the values predicted by our model correspond closely to the actual values. The results of the model's simulation can therefore be assumed to provide a fair, albeit stylised, picture of how the credit losses in the Swedish bank sector are affected by macroeconomic changes.

Figure 3. Actual and simulated credit losses for non-financial companies

Per cent

Note. Credit losses are expressed as a percentage of total lending. Simulated credit losses are generated in accordance with steps 1-4 of the dynamic portfolio model method and by applying the actual output gap (see Figure 1).

[15] We have described the way we model the company-specific risk in detail in Appendix A.

[16] To calculate the credit losses of the "big four" banks as a proportion of their lending to non-financial enterprises, we have used the following information: The total credit losses of the "big four" banks have been taken from Sveriges Riksbank's Financial Stability Reports (see, for example, Figure 1:9 in Financial Stability Report (1999). A compilation of what proportion of these total credit losses were loans to non-financial enterprises is provided by Dahlheim, Lind & Nedersjö (1993) for 1991 and 1992. For 1993 through 1996 we have obtained corresponding figures from the Swedish Financial Supervising Authority. For 1990 Q4 we assumed that the credit loss ratio was the same as for the whole of 1991. Information on the total volume of credit granted to non-financial enterprises has been obtained from Jan-Olof Elldin at the Riksbank's Financial Statistics Department (now the Monetary Policy Department).

VaR and IRB capital

The analyses of the simulated loan portfolios are made using two variables: VaR, which gives the portfolio risk, and IRB capital, which indicates the capital adequacy of the portfolio, calculated in the manner specified by the new Basel Accord.

Value-at-Risk is a measure of the credit risk in a loan portfolio for a given time horizon.

In this context, VaR is a measure of the credit risk to which a loan portfolio is exposed for a given time horizon. More specifically, we define the VaR as the amount, expressed in kronor, that the bank risks losing within a given period of time, with a maximum probability of Z. An alternative way of expressing this is to say that there is a probability of $1 - Z$ that the bank's loss will not exceed the VaR amount in kronor during the given period of time, j. In practice, it is normal to select a time horizon, j, of one year and a probability, Z, in the interval [0.001–0.01].

To calculate VaR we need to determine two additional parameters: the forecasting horizon and the number of possible future scenarios for each of the portfolios.

There are two more parameters we need to determine to be able to calculate VaR: the forecasting horizon, j, and the number of possible scenarios of the future, F, for each of the N portfolios for which we have generated data. We use j = 1, 2, 3, 4 quarters and F = 1,000. In each of the N portfolios we begin with the structure of the portfolio and the macroeconomic conditions in the final period, T. We then simulate 1,000 macroeconomic scenarios for the periods $T + 1$, $T + 2$, …, $T + j$, and for each scenario we record information on the aggregate proportion of the portfolio that is defaulted for the coming j = 1, 2, 3, 4 quarters. Using this information we can then calculate, for each portfolio, the VaR at the 95 per cent level, j = 1, 2, 3, 4 quarters ahead in time, as the 95th percentile in the distribution for the aggregated losses in the F different future scenarios.[17]

The loan portfolio's IRB capital is calculated in a number of steps. Firstly, we calculate the average risk of default for each rating class.

The loan portfolio's IRB capital is calculated in a number of steps. Firstly, we calculate the average risk of default for each rating class. This is a key component, since fluctuations in the probability of default (PD) over time have a direct effect on the IRB capital. According to the draft Basel Accord, the PD shall be characterised as a long-term estimate based on data for at least five years and covering a complete business cycle. This idea is based on the view

[17] Details about how VaR is calculated are provided in Appendix B.

that changes in portfolio risk shall be reflected in transitions by counterparties from one risk class to another; in other words, a bank's internal rating system shall be fully effective. If this is true, then there is some point in using a constant, characterising PD that is not allowed to vary during the course of a business cycle. In practice, it will be necessary to arrive at some sort of compromise between two conflicting approaches. On the one hand, the PD should vary over time so that it can reflect changes in credit risk that the internal credit system fails to pick up. On the other hand, it is important to avoid exaggerated, short-term instability in estimates of the PD, since this will cause unnecessarily wide fluctuations in the IRB capital, in the sense that they do not correspond to changes in the actual portfolio risk. We will look at differences in IRB capital for a range of horizons in the risk-weight estimates, namely 1, 4, 8, 20 and 40 quarters.

Given the estimated PDs for all of a bank's rating classes, the next step is to calculate the IRB risk weights as a function of these PDs.

Given the estimated PDs for all of a bank's rating classes, the next step is to calculate the IRB risk weights as a function of these PDs. The risk weights are then multiplied by the exposed assets (loans) in all rating classes and then summated to arrive at a total exposure. These exposed assets in turn serve as the denominator in the calculation of the portfolio's capital adequacy ratio.[18]

Some question marks, for example concerning the number of rating classes, still remain over the Basel Committee's proposal regarding the IRB approach.

Even though the Basel Committee's proposal for the IRB approach is specific in many respects, several question marks still remain. One of these relates to the number of rating classes banks should use. Variation in the capital adequacy requirement can arise, through several variables and parameters in the risk-weight formula. A higher PD in any rating class will, for example, raise the capital adequacy requirement for this rating class. Moreover, changes in transition frequencies between rating classes will affect the distribution of counterparts over the classes, and consequently the risk weight of these classes in the aggregated IRB capital. This means that changes in the number of rating classes and the boundaries between them can also affect the capital adequacy requirement. A reduction in the number of classes will shift the distribution of all loans over the classes and probably reduce the level of transition activity. But this also influences PDs that are associated with the risk classes, as the riskiest

[18] The risk weight function is discussed in Appendix C. We do not discuss the properties of the risk weight function or its derivation in this report. What can be mentioned, however, is that the function has been estimated by the Board of Governors using data on US bonds. The suitability of the function itself can thus also be a matter for discussion.

(safest) class will be aggregated with safer (riskier) classes. The significance of these effects is therefore an important empirical question.

Estimation of probabilities of default

Method A estimates the PD for a rating class over the most recent quarter.

The results show the amount of IRB capital calculated using two basic methods. Using Method A, the bank estimates the PD (and thus the risk weight) $f_{i,t}$, for rating class i for quarter s by calculating the probability of default between the immediately preceding quarter, $s-1$, and quarter s. If we call the single-period PD between quarter $s-1$ and quarter s $d_{i,s-1}$, then $f_{i,t}$ is determined as the average of $d_{i,s-h}$ for a number of horizons, h, backwards in time. In other words, $f_{i,t} = (1/h)\sum_1^h d_{i,s-1}$. If the bank wishes the characterising probability to be based on for example, three years of historical data, it calculates the twelve single-period probabilities and then uses the average of these twelve figures.

Method B starts with the companies in a rating class *h* quarters earlier and calculates what proportion of them has defaulted until today.

The other method, Method B, of calculating the risk of default, $f_{i,t}$, for a rating class, i, for a given horizon h back in time, starts with the companies that were in the rating class h periods earlier, and then calculates what proportion of them defaulted between $t-h$ and t. In other words, with Method B we calculate only one probability for the entire period. Both methods are reasonable, but it is fairly evident that the former method, A, makes use of more information than the latter does. It is relevant to consider Method B since a bank that has not recorded historical data for *each* quarter back in time could still produce the profile of the portfolio at a particular time in the past and then evaluate it on the basis of its current profile. We have chosen to show results for horizons h = 1, 4, 8, 20 and 40 quarters. Given the numerous mergers in the banking sector, and the introduction of internal rating systems in most banks in recent years, it is hardly likely that any Swedish bank has access to data going back for more than 40 quarters.

Another question that is closely related to the main topic is that of the risk horizon of the IRB capital, in other words, how far into the future the buffer capital should provide cover for the portfolio's credit risks. Since, as far as we are aware there is no given answer to this question, we show the results for risk horizons of one to four periods (quarters). These describe how well the IRB capital covers the portfolio risk, defined as its VaR.

Results

In this section, we give a numerical illustration of the IRB approach for calculating a bank's capital base. We use a dynamic perspective and an explicit connection to the effects of the business cycle. More specifically, using simulations, we will examine the amount of IRB capital in relation to the loan portfolio's credit risk, as measured in terms of its VaR. The overriding purpose of the simulations is to estimate how often the capital base, determined using the IRB formula, fails to provide adequate cover for the credit losses incurred by the portfolio. The opposite problem – an excessively large capital base in relation to the portfolio risk – is naturally of equal interest. As we are using admittedly realistic but nonetheless simulated portfolios and transition matrices, the results should not be interpreted literally but rather seen as illustrations of the qualitative character of the effects.[19]

Using Method A, the average amount of IRB capital is the same for a range of time horizons, while with Method B it falls as the horizons become longer.

The results of a few simple experiments are presented in Table 1. It should be noted that all the figures in the table are shown in relation to the portfolio value. They also relate to the average of the 1,000 simulated portfolios. We can immediately see that with Method A the average amount of IRB capital is the same for each of the time horizons h. However, using Method B, it is lower for the longer time horizons. We can also note that the shorter the time horizon h the bank uses, the wider the variations in the capital requirement. This is a natural implication of our method, where we have assumed that it is the underlying macroeconomic conditions that determine the risk of default. If the bank uses data for a long period of time – one that includes several business cycles – the booms and slumps will tend to offset each other. If, on the other hand, the bank only uses data for the previous few quarters, or even only one quarter, there will naturally be wider fluctuations in the capital adequacy requirement, as the estimation period could have been a boom or a trough. It should also be noted that since Method A and Method B are identical when $h = 1$, the results for this time horizon are the same.

Our simulated portfolios imply a higher average capital adequacy level than with the existing set of rules.

We may also note that our simulated portfolios imply a higher average capital adequacy level than with the present set of rules (around 11 per cent instead of the present 8 per cent).

[19] The default risk in our simulated data generally matches the empirical distribution on a portfolio level, but is only approximately matched for individual risk classes.

Table 1. Results of the simulation of the amount of IRB capital and Value-at-Risk (VaR) for the portfolio method

	Amount of IRB capital as a proportion of the value of the portfolio using information *h* quarters backwards in time				
Method of calculation	*h* = 1	*h* = 4	*h* = 8	*h* = 20	*h* = 40
A	0.111	0.113	0.114	0.112	0.111
	(0.043)	(0.042)	(0.039)	(0.026)	(0.023)
B	0.111	0.114	0.111	0.099	0.087
	(0.043)	(0.044)	(0.040)	(0.019)	(0.012)

	Average VaR *j* quarters ahead			
VaR percentile	*j* = 1	*j* = 2	*j* = 3	*j* = 4
95 %	0.020	0.039	0.059	0.080
99 %	0.023	0.044	0.066	0.090

	99th percentile for the amount of IRB capital				
Method of calculation	*h* = 1	*h* = 4	*h* = 8	*h* = 20	*h* = 40
A	0.223	0.221	0.213	0.178	0.169
B	0.223	0.227	0.208	0.144	0.115

Note: The number of simulated portfolios is 1,000. At first, these have been simulated 40 periods, after which the amount of IRB capital has been calculated. After that each and every one of these 1,000 portfolios has been simulated 1,000 times for four more periods with different macroeconomic results. This is done in order to calculate a measure of future credit risk (VAR) for every portfolio. The figures within the parentheses are the standard deviation of the amount of IRB capital.

However, this result should be interpreted with some caution as it could be an effect of the probabilities in the chosen transition matrices being typical of banks with a higher risk propensity than is actually the case. Empirical results for a business loan profile in Carling, Jacobson, Lindé and Roszbach (2002) suggest that the capital requirement based on the IRB approach could vary widely depending on the phase in the business cycle. In other words, in a recession it could exceed the absolute capital adequacy requirement of 8 per cent, while in good times it could fall to very low levels.[20] This result is consistent with the Basel Committee's endeavour to design its new Accord in such a way that the capital adequacy requirement more accurately reflects a portfolio's credit risk. However, what is a reasonable or desirable variation in a bank's capital base due to changes in macroeconomic conditions remains an open question.

In Table 1, we have also illustrated the average of the 95% and 99% VaR estimates of the portfolio risk for a range of forecasting horizons (the coming 1, 2,

[20] These empirical results are calculated on the assumption that neither the bank's portfolio nor credit policy changes as a result of the new regulation.

The Value-at-Risk exposure increases almost linearly with the forecasting horizon.

3 and 4 quarters). It should be observed that VaR is independent of the method of calculation, and that the portfolio risk does not depend on the method used to determine the capital requirement. Table 1 shows that the risk exposure increases almost linearly with the forecasting horizon. The average 95% VaR for one year ahead is 8 per cent, which may be compared with some 2 per cent for the next quarter. The linear increase in the risk over time can be explained in part by the fact that the proportion of companies defaulting on their loans each quarter remains roughly constant in the long term. The more pronounced linearity for the 95% VaR than for the 99% VaR is probably due to the fact that extremely unfavourable outcomes – which are reflected in the 99% but not the 95% VaR – do not occur at regular intervals. The rate of increase in the average 99% VaR will therefore be less regular than for the 95% VaR.

Finally, in the lower section of the table we show the 99th percentile of the distribution of the IRB capital for the 1,000 simulated portfolios. The higher standard deviation in the IRB capital for $h = 1$ than for $h = 40$, which we observed earlier, is reflected here in the form of a markedly higher percentile value for $h = 1$ than for $h = 40$. The distribution of IRB capital of the 1,000 portfolios thus acquires a longer "tail" the shorter the historical period used for calculating the capital. We should also note how the results with Method A differ from those obtained with Method B. Whereas the two methods generate broadly equally large values when h is less than 20, the 99th percentile is considerably greater with Method A than with Method B for $h = 20$ and $h = 40$. With system A, in other words, as a consequence of the (historically) extremely poor macroeconomic conditions included in the calculations, the IRB capital will be considerably higher than with system B.

Which method, A or B, implies the highest correlation between IRB capital and VaR?

This observation brings us directly to the question of which of the methods, A or B, gives the highest correlation between the IRB capital and VaR? The objective of the new Accord is to make banks' capital bases sensitive to risk; in other words, the greater the credit risk the larger the IRB capital. The upper section of Table 2 reflects the co-variation between the various measures of IRB capital and portfolio risk, defined as the 99% VaR. As expected, the co-variation between the buffer capital and credit risk is stronger the shorter the horizon used for calculating the risk of default. For the shortest horizon, $h = 1$, the IRB capital is determined solely by the losses incurred during the immediately preceding quarter. The portfolio risk is driven by changes

in the output gap. As this is autocorrelated (observations in the series co-vary with earlier observations) the latest observations in the sample incorporate more information than an average observation. A short horizon therefore gives a closer match between the buffer capital and the portfolio risk than when information from several periods is used. That Method A generates a closer correlation than Method B for all values of h above 1 is also in accordance with our expectations, since Method B only uses information from two quarters to estimate the PD, $f_{i,t}$. Method B thus disregards more recent information about the prevailing state of the economy. The difference between the two methods becomes even more marked as the horizon, h, becomes longer. Our conclusion is that in this respect Method A is a better tool than Method B; to what extent this is so depends in practice on the autocorrelation with macroeconomic conditions (output gap), the cyclical sensitivity of loan portfolios, and h. It is worth noting that if a portfolio's credit risk is exclusively idiosyncratic in character, and is not affected by changes in the macroeconomy, a higher h could very well result in a higher correlation between risk and buffer capital.

Table 2. Interaction between capital adequacy requirements, Value-at-Risk and macroeconomic conditions based on simulated data

	Correlation between IRB capital and VaR at the 99 per cent level					
Quarters ahead	Method A			Method B		
j	*h* = 1	*h* = 8	*h* = 40	*h* = 1	*h* = 8	*h* = 40
1	0,90	0,69	0,67	0,90	0,63	0,54
2	0,89	0,61	0,59	0,89	0,54	0,47
3	0,84	0,51	0,51	0,84	0,44	0,40
4	0,80	0,42	0,43	0,80	0,35	0,33

	Probability that IRB capital will fall short of VaR at the 95 per cent level					
Quarters ahead	Method A			Method B		
j	*h* = 1	*h* = 20	*h* = 40	*h* = 1	*h* = 20	*h* = 40
1	0,00	0,00	0,00	0,00	0,00	0,00
2	0,00	0,00	0,00	0,00	0,00	0,00
3	0,00	0,00	0,00	0,00	0,04	0,13
4	0,11	0,16	0,16	0,11	0,30	0,40

	Correlation between the capital adequacy requirements in period *t* and macroeconomic developments, *t*+1, *t*+2, *t*+3 och *t*+4					
	Method A			Method B		
Quarter	*h* = 1	*h* = 8	*h* = 20	*h* = 1	*h* = 8	*h* = 20
t	–0,89	–0,60	–0,53	–0,89	–0,54	–0,37
t+1	–0,74	–0,38	–0,34	–0,74	–0,31	–0,23
t+2	–0,60	–0,15	–0,15	–0,60	–0,08	–0,08
t+3	–0,35	0,12	0,08	–0,35	0,19	0,09
t+4	–0,17	0,37	0,30	–0,17	0,43	0,25

Note: See Table 1.

What is the probability that the buffer capital will fall short of the losses incurred on the portfolio in the future?

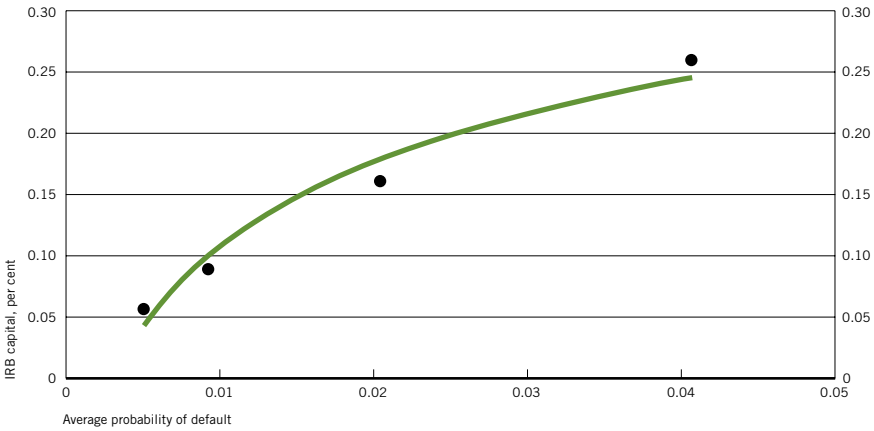
The next question is: What is the probability that the capital adequacy requirement, and thus the buffer capital, will fall short of future portfolio losses? The risk that the bank itself will default or be compelled to sell assets to cover the losses incurred can be measured in terms of the probability that the IRB capital will fall short of some critical VaR percentile. We can see in the second panel in Table 2 that the risk that the buffer capital will not be adequate to cover the 95% VaR is almost non-existent for forecasting horizons of up to an including six months. For longer horizons and higher values for h, there is a significant risk that the buffer capital will not be adequate, especially if Method B is used.

A large capital base is not an end in itself, but a means of enabling supervisory authorities to compel banks to ensure their survival in the event of unfavourable outcomes.

A large capital base is not an end in itself, but a means of enabling supervisory authorities to compel banks to ensure their survival in the event of unfavourable outcomes. Admittedly, an exaggeratedly high capital adequacy requirement could give rise to other problems. For example, it might encourage banks to devote their energy to devising means of circumventing the rules instead of concentrating on their core business, that of assessing and pricing risk. Our analysis shows that the IRB capital can be inadequate in the event of a deep recession. Is this acceptable? To put it another way, how often should this be allowed to happen? The point at issue is to decide on the correct level for the absolute capital adequacy requirement of 8 per cent. This is the level used in the current regulatory system, and it has its origins in the capital ratios that well-run banks adhered to when the current rules were drawn up a decade or so ago. It has been decided that the new Accord should retain the 8 per cent level, and an attempt has been made to modify the IRB approach so that it prevents the capital adequacy requirement on average from falling below the level in the existing set of rules. When the new Accord was being worked out, priority was not given to identifying the socially optimal level for a bank's capital base. This topic also lies outside the scope of this article. In the absence of such an analysis, it is difficult to determine whether the results in Table 2 are reasonable in terms of their social welfare.

A much discussed problem that can arise if buffer capital is based on risk is that of its "procyclicality". A close co-variation between buffer capital and risk, which will result when h is low, can mean that banks will need to add financial assets to their reserves precisely when the macroeconomy stance is weak. This

Figure 4. Average probability of default and IRB capital



Note. Figure 4 shows how the average IRB capital (as a proportion of the portfolio) varies with the portfolio's average risk of default when macroeconomic conditions are normal ($\beta\tilde{y} = 0$).

A much discussed problem associated with having a risk-based buffer capital is that of procyclicality.

could result in a credit crunch that would aggravate the recession. The reverse also applies: the lower level of risk during a boom could lead to a low capital adequacy requirement that would release capital for a credit expansion. This in turn would reinforce the boom. This is illustrated in the lower section of Table 2: a small h and j in combination with Method A, which generates a close relationship between buffer capital and risk, is broadly associated with the closest correlation between the capital adequacy requirement and macroeconomic conditions. Empirically, the quantitative significance of this effect has, however, only been supported to a limited extent.

Finally, in Figure 4 we show a tentative relationship between the average IRB capital and the portfolio's average PD under normal macroeconomic conditions, $\tilde{y}_t = 0$. The figure shows that the capital does not appear to increase linearly with the risk, but that the capital/risk ratio is falling. This means, at the risk of taking things to extremes, that the IRB approach gives banks an incentive to increase their portfolios' riskiness rather than reduce it, as a higher risk does not require proportionately more capital.

To obtain a better understanding of the relevance of the macroeconomy for the effects of the new Basel Accord, we have examined what effect the cyclical sensitivity of loan portfolios has on the conclusions to be drawn from Table 1 and Table 2. The cyclical sensitivity in the simulations is determined by two groups of

parameters, the three different transition matrices, and the number of degrees of freedom that control the rate at which the portfolio shifts from the normal situation to a recession or a boom. Table 3 and Table 4 illustrate simulations for banks with portfolios that are perfectly insensitive to cyclical fluctuations ($\beta_{\tilde{y}} = 0$) and banks that are assumed to be heavily exposed to cyclical fluctuations ($\beta = 10^8$). The portfolios of both types of bank have the same average default risk. All our calculations have been made using estimation Method A, since it appears more useful than Method B in the light of the earlier results.

Just as in Table 1, the average VaR at a 99 per cent level doubles for every quarter by which the forecasting horizon is extended. This is true of both types of bank, but the VaR is roughly twice as high for the cyclical sensitive ones. Table 3 also illustrates how cyclical sensitivity influences the average capital adequacy requirement, which in the case of cyclically sensitive banks is some 25 per cent higher with a standard deviation that is greater by a factor of 10 to 25, almost regardless of the horizon h considered. These differences are also reflected in differences in the 99th percentile of the banks' IRB capital. The maximum loss the bank will be exposed to at the 1 per cent level is around 125 per cent higher in the case of cyclically sensitive banks for all horizons h.

The co-variation between the IRB capital and the 99 per cent VaR depends very closely on the bank's sensitivity to changes in macroeconomic conditions. Table 4 shows that a greater sensitivity to variations in the output gap leads to a

Table 3. Comparison of a relatively cyclical sensitive portfolio with a relatively less sensitive portfolio with respect to the amount of IRB capital and Value-at-Risk

	Amount of IRB capital as a proportion of the value of the portfolio using information h quarters backwards in time				
Business cycle sensitivity	$h = 1$	$h = 4$	$h = 8$	$h = 20$	$h = 40$
$\beta_{\tilde{y}} = 0$	0.105	0.105	0.105	0.105	0.105
	(.008)	(.005)	(.003)	(.002)	(.002)
$\beta_{\tilde{y}} = 10^6$	0.129	0.135	0.137	0.133	0.132
	(.080)	(.077)	(.071)	(.051)	(.046)

	Average VaR at the 99 per cent level j quarters ahead			
	$j = 1$	$j = 2$	$j = 3$	$j = 4$
$\beta_{\tilde{y}} = 0$	0.016	0.030	0.044	0.057
$\beta_{\tilde{y}} = 10^6$	0.032	0.063	0.095	0.127

	99th percentile for the amount of IRB capital				
	$h = 1$	$h = 4$	$h = 8$	$h = 20$	$h = 40$
$\beta_{\tilde{y}} = 0$	0.121	0.115	0.113	0.111	0.109
$\beta_{\tilde{y}} = 10^6$	0.280	0.279	0.278	0.254	0.238

Note: See Table 1.

higher correlation between the buffer capital, on the one hand, and macroeconomic conditions and the VaR, on the other. It should be noted that even if a bank is fully protected against macroeconomic fluctuations, the IRB capital and the VaR will co-vary to some extent; by exactly how much will depend on the forecasting horizon.

Table 4. Interaction between capital adequacy requirements, Value-at-Risk and macroeconomic conditions: a comparison of a relatively cyclical sensitive portfolio to a relatively less sensitive

	Correlation between IRB capital and VaR at the 99 per cent level					
Quarters ahead	$\beta_{\bar{y}} = 0$			$\beta_{\bar{y}} = 10^6$		
j	*h* = 1	*h* = 8	*h* = 40	*h* = 1	*h* = 8	*h* = 40
1	0.40	0.41	0.37	0.87	0.82	0.81
2	0.38	0.37	0.33	0.86	0.78	0.78
3	0.32	0.35	0.30	0.85	0.74	0.75
4	0.29	0.30	0.32	0.84	0.70	0.72

	Probability that the IRB capital will fall short of VaR at the 95 per cent level					
Quarters ahead	$\beta_{\bar{y}} = 0$			$\beta_{\bar{y}} = 10^6$		
j	*h* = 1	*h* = 20	*h* = 40	*h* = 1	*h* = 20	*h* = 40
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.12	0.01	0.00
3	0.00	0.00	0.00	0.28	0.10	0.06
4	0.00	0.00	0.00	0.38	0.40	0.41

	Correlation between the capital adequacy requirements in period *t* and macroeconomic conditions at *t*, *t*+1, *t*+2, *t*+3 och *t*+4					
	$\beta_{\bar{y}} = 0$			$\beta_{\bar{y}} = 10^6$		
Quarter	*h* = 1	*h* = 8	*h* = 20	*h* = 1	*h* = 8	*h* = 20
t	0.02	–0.01	–0.01	–0.77	–0.55	–0.49
t+1	–0.01	0.01	–0.02	–0.63	–0.35	–0.32
t+2	–0.00	0.02	0.00	–0.50	–0.15	–0.15
t+3	0.01	0.04	0.02	–0.28	0.11	0.06
t+4	0.01	0.01	0.01	–0.10	0.33	0.26

Note: See Table 1.

The risk that a cyclically sensitive bank will default turns out to be far greater than with the bank in Table 1 and Table 2, for example, especially when h is small and forecasting horizons are long. With a forecasting horizon of one year, which may be regarded as a reasonable period in the IRB context, the probability of the buffer capital falling below the 95 per cent VaR is approximately 0.4, regardless of the h chosen. This may be compared with 0.11–0.16 (for A, but 0.11–0.40 for B) for the bank in Tables 1 and 2. The perfectly insensitive bank has a risk of 0.0 for all h and all forecasting horizons. The reason for this is that a model for calculating the capital adequacy requirement that only takes account of

economic conditions during the latest quarter disregards important information about the ensuing development of the business cycle. Shortcomings of this type will naturally have a greater impact on a bank's capital ratios if it is sensitive to the business cycle. A bank that is entirely shielded from macro fluctuations will base its buffer capital on an estimate of the constant, steady state default risk (at portfolio level). As the risk of default does not fluctuate at all, the buffer capital will be adequate under almost any circumstances whatsoever.

The results suggest that the number of classes as such does not necessarily affect capital adequacy requirements.

As a final experiment, we have investigated whether the number of risk classes used by a bank affects the level of IRB capital and its co-variation with the VaR. The underlying hypothesis is that fewer classes should lead to wider variations in their risk profiles. As we have already observed, the non-linearity of the IRB approach's risk-weight function prompts the question of what effect the number of classes (naturally in combination with the size of the portfolio) will have on the capital adequacy requirement. The results of a number of modest experiments suggest that the number of risk classes as such has no effect on the capital adequacy requirement. However, the question of the number of classes is to be considered in combination with the bank's ability to classify its corporate clients into the given rating classes (see Carling, Jacobson, Lindé & Roszbach (2002)). If there is a growing tendency for corporate clients to be wrongly classified by the bank, a reduction in the number of classes could give rise to wider fluctuations in risk weights and consequently also in the IRB capital.

Summary and conclusions

The main principle underlying the Basel proposal is to make buffer capital significantly more dependent on risk than in the existing system.

In January 2001, the Basel Committee published its proposals for new capital adequacy rules for banks. The main principle in its proposals is that the buffer capital should be significantly more dependent on risk than in the existing system. Currently, in the case of business loans, for example, a bank is expected to maintain 8 per cent of its exposure as a buffer to cover credit losses. Some types of collateral accepted by banks can reduce the capital requirement, but broadly speaking the requirement is constant and independent of counterparty risk. Under the new regime, banks would be given greater responsibility for calculating both capital at risk and the required amount of buffer capital. The proposal includes two alternative systems: a standard method and a more sophis-

ticated, IRB approach whereby the banks would need to introduce or improve upon each of their internal rating systems for classifying the counterparties in their loan portfolios. Quantified risk characteristics in these rating classes are used to calculate risk weights, which in turn determine how much capital the bank needs to hold in reserve for each krona it has lent.

In this article we have looked at what effect the characteristics of the proposed IRB approach would have by simulating a large number of business loan portfolios. These simulations have provided new information about what consequences the new Accord will have for banks and how these effects will vary depending on the final wording of the Accord adopted by the supervisory authorities.

One conclusion is that the distribution of the IRB capital over the 1,000 portfolios in our analysis depends on the method used to calculate the average actual, historical risk of default for each rating class: the longer the period for which the risk of default is calculated, the lower the capital adequacy requirement. The shift in the distribution is reflected in both the mean value and the variance.

The longer the period for which the probability of default is calculated, the lower the capital adequacy requirement.

On top of this, it turns out that the probability that the buffer capital will fall short of the credit losses increases as the forecasting horizon lengthens. The longer the time horizon it is assumed the IRB capital has to cover, the weaker the co-variation with the future credit risk and the greater the risk of the buffer capital proving inadequate. This characteristic is due to the way the portfolio risk, defined as the VaR, increases linearly with the forecasting horizon. For the portfolios we have examined, the probability varies between 0 and as much as 0.4 for forecasting horizons up to one year. The magnitude of this effect also depends on the preferred method of calculation, since this has an influence on the correlation between the IRB capital and the VaR.

The longer the forecasting horizon, the higher the probability that the buffer capital will fall short of the credit losses.

Macroeconomic conditions, not unexpectedly, also play an important role in the way the new capital adequacy system ought to be designed. Our results suggest that a bank's business cycle sensitivity has a marked influence on the correlation between the IRB capital and the portfolio's VaR and thus also on the probability that the buffer capital will turn out to be inadequate.

The bank's business cycle sensitivity has a considerable effect on the correlation between the IRB capital and the portfolio's VaR.

Variations in the cyclical sensitivity of banks can multiply the variance in the IRB capital many times over. Given otherwise identical capital adequacy systems, the risk that a bank's buffer capital will not be enough to cover its credit losses will double or even triple. How important the selection of calculation method is in this context will in turn depend on the interaction, if any, between the forecasting horizon for the risk of default and the serial correlation in the output gap.

The new Basel Accord could reinforce cyclical fluctuations more than current regulation.

The results of our analysis are not inconsistent with the results of other studies examining whether or not the new Basel Accord will involve greater risk of procyclical effects. A strong co-variation between buffer capital and credit risk, which some of the possible methods of calculation can generate, could very well mean that banks will need to build up their financial reserves precisely when macroeconomic conditions are weak. The new Accord would thus have a tendency to reinforce cyclical fluctuations rather more than the existing system of capital adequacy rules.

To sum up, therefore, we may note that even if the basic characteristics of the new Accord have now been settled, quite some work remains to be done on the details for the practical application of the Accord by banks. How factors such as the forecasting horizon, method of calculation, and consideration of the business cycle sensitivity of banks are finally incorporated into the Accord will be of significance to the amount of IRB capital and its variance. Decisions on these factors could have far-reaching consequences for the functioning of the banking system and the economy in general. Close attention is already being paid to problems associated with inadequate capital reserves and the possibility that the Accord will reinforce cyclical effects. The need for such attention will certainly not decline in the future; the final wording of the Accord, however, will not be affected to any significant extent by such analyses.

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Appendix A: Method of analysis, transition matrices and the business cycle

In this Appendix, we describe in detail the various components of our analysis. We make use throughout of hypothetical bank portfolios consisting of 10,000 business loans per quarter distributed among a number of rating classes. The portfolios are characterised by transition matrices, in which the elements consist of probabilities that a counterparty will migrate from one rating class to another, or probabilities that counterparties will stay in the same class. The transition matrices thus reflect the migration between the rating classes in the portfolio for any given time horizon, from the initial date, say, until one year later. The movements between these transition matrices are determined by the prevailing output gap, which is the measure of the general state of the economy.

Transition matrices

Let us suppose that in its credit operations, our hypothetical bank gives each counterparty a credit rating each quarter. This means that the loans in the portfolio are distributed among a number of rating classes. If the bank does this for a longer series of quarters and systematically records the data relating to the migration of these loans among the rating classes, it can then, using this information, estimate a transition matrix (*TM*):

$$TM = \begin{bmatrix} p_{11} & p_{12} & \cdot & \cdot & \cdot & p_{1r} & p_{1d} \\ p_{21} & p_{22} & \cdot & \cdot & \cdot & p_{2r} & p_{2d} \\ \cdot & & & & & & \cdot \\ \cdot & & & & & & \cdot \\ p_{r1} & p_{r2} & \cdot & \cdot & \cdot & p_{rr} & p_{rd} \end{bmatrix},$$

where r is the number of non-defaulting rating classes and d denotes the rating class in which defaulting loans are placed. If the bank uses, say, ten non-defaulting rating classes, *TM* will have ten rows and eleven columns. The element p_{kl} denotes an estimated probability that a loan in rating class k in period t will be moved to rating class l in period $t + 1$. For example, p_{11} represents the probability that loans in the rating class with the highest credit rating will still be in that class in the next period, while p_{rd} indicates the probability that the lowest rated loans will default during the time interval t to $t + 1$. It might be worth noting that *TM*

has to be estimated on the assumption that the sum of the probabilities in any one row (in respect of one rating class) is 1.

$$TM_{\text{low}} = \begin{bmatrix} .80 & .08 & .05 & .03 & .02 & .01 & .01 & .00 & .00 & .00 & .00 \\ .00 & .80 & .07 & .04 & .03 & .02 & .02 & .015 & .005 & .00 & .00 \\ .00 & .005 & .80 & .05 & .04 & .03 & .02 & .02 & .015 & .01 & .01 \\ .00 & .00 & .02 & .81 & .03 & .02 & .03 & .05 & .01 & .02 & .01 \\ .00 & .00 & .005 & .01 & .79 & .05 & .03 & .04 & .02 & .03 & .025 \\ .00 & .00 & .01 & .02 & .03 & .82 & .03 & .00 & .02 & .03 & .04 \\ .00 & .00 & .005 & .01 & .015 & .02 & .82 & .03 & .03 & .03 & .04 \\ .00 & .00 & .00 & .00 & .01 & .01 & .04 & .79 & .05 & .05 & .05 \\ .00 & .00 & .00 & .00 & .00 & .01 & .02 & .04 & .75 & .09 & .09 \\ .00 & .00 & .00 & .00 & .00 & .00 & .01 & .03 & .06 & .72 & .18 \end{bmatrix}$$

$$TM_{\text{high}} = \begin{bmatrix} .95 & .03 & .01 & .01 & .00 & .00 & .00 & .00 & .00 & .00 & .00 \\ .03 & .95 & .01 & .01 & .00 & .00 & .00 & .00 & .00 & .00 & .00 \\ .02 & .03 & .93 & .02 & .00 & .00 & .00 & .00 & .00 & .00 & .00 \\ .01 & .02 & .06 & .88 & .02 & .01 & .00 & .00 & .00 & .00 & .00 \\ .01 & .01 & .05 & .07 & .82 & .025 & .01 & .00 & .00 & .005 & .00 \\ .005 & .015 & .02 & .04 & .08 & .785 & .03 & .02 & .005 & .00 & .00 \\ .00 & .01 & .02 & .03 & .07 & .09 & .72 & .03 & .015 & .01 & .005 \\ .00 & .00 & .02 & .02 & .05 & .07 & .10 & .69 & .02 & .02 & .01 \\ .00 & .00 & .00 & .01 & .03 & .05 & .07 & .14 & .66 & .03 & .01 \\ .00 & .00 & .00 & .00 & .01 & .02 & .02 & .07 & .18 & .68 & .02 \end{bmatrix}$$

As already noted, there is reason to believe that the probabilities in *TM* do not remain constant throughout an economic cycle (see e.g. Wilson (1997)). It is reasonable to suppose that the risk of default can be expected to decline when the economy is strong, and that in a recession a transition matrix with higher probabilities that borrowers' credit ratings will be lowered will more accurately describe a bank's loan portfolio. Using three different transition matrices, we will now explain how general macroeconomic conditions can alter the characterisation of the portfolio. In the case of TM_{normal}, the numerical values of the matrix elements have been determined with the aid of empirical data from a major Swedish

bank's business loan portfolio (see Carling, Jacobson, Lindé & Roszbach (2002)). TM_{high} and TM_{low} – which are reasonable, albeit arbitrary, adjustments of TM_{normal} – have been arrived at on the basis of the transition matrices presented in Wilson (1997). TM_{normal} is described in the main text, while TM_{low} and TM_{high} are shown below.

If TM_{low} and TM_{high} are compared with TM_{normal} in the main text, we can see how the whole block of probabilities has shifted to the right (left) in the matrix in TM_{low} (TM_{high}). This means that on average corporate borrowers are running a greater risk of having their credit rating downgraded (upgraded) in a recession (boom), in relation to a normal, more balanced point on the economic cycle.

The business cycle

Macroeconomic developments are approximated using a time-series of quarterly observations of Sweden's output gap. This is expressed as the difference between the actual real GDP and an estimated secular trend in GDP. A direct observation of the secular trend in GDP is not possible, a time-series has to be estimated on the basis of observed data. Numerous estimating methods are described in the literature. We have chosen to use a vector autoregressive time-series model. Let X_t stand for a 9 x 1 column vector with the variables y_t^* (logarithmic foreign GDP, TCW-weighted), π_t^* (foreign inflation, annual rate; in other words $\pi_t^* = \ln(p_t^*/p_{t-4}^*)$, TCW-weighted), R_t^* (foreign interest rate, 3-month duration, TCW-weighted), y_t (logarithmic Swedish GDP at current prices), π_t (annual rate of inflation, measured using GDP deflator), k_t (logarithmic credit losses in Sweden's big four banks), R_t (repo rate and its equivalent before 1 June 1994), Q_t (real effective exchange rate, TCW-weighted), and π_t^{imp} (import price index at producer stage, as defined by Statistics Sweden). The VAR model for X_t can then be expressed as:

$$(1) \qquad X_t = C + \tau T_t + \delta_1 D_{92Q3} + \delta_2 D_{93Q101Q3} + \sum_{j=1}^{2} \Gamma_j X_{t-j} + \varepsilon_t \ ,$$

where C is a constant, T_1 a linear time trend, and D_{92Q3} is a dummy variable that assumes the value 1 in the third quarter of 1992 and equals 0 otherwise. $D_{93Q101Q3}$ is a dummy variable that assumes the value 0 before 1993 and 1 thereafter. We estimate the model (1) on quarterly data for the period between 1986 Q3 and 2001 Q3. As the model incorporates two lags, this means that we use data for the period between 1986 Q1 and 2001 Q3. By simulating the estimated model dynamically for the period 1986 Q3 to 2001 Q3 (using the real values for X, 1986

Q1 to 1986 Q2 as the opening values in the simulation and where $\hat{\varepsilon}_t = 0$), we can obtain a trend that varies with time for the variables in X_t, which we have called $\tilde{X}_t$. The deviation around the trend, designated $\tilde{X}_t$, can then be calculated as $X_t - \tilde{X}_t$. The resultant deviation around the trend for GDP, which we call the output gap in the following, is shown as the green line in Figure 1 (page 44).

Since in our analysis we will, for the sake of simplicity, assume that the probabilities in the transition matrix are solely dependent on the output gap, and thus not on the other variables in the VaR model, we have decided to approximate the data-generation process for the output gap by a simple AR(5) model The estimated model can be expressed using the following formula:

$$\begin{aligned} \tilde{y}_t &= \underset{(0.12)}{0.65}\tilde{y}_{t-1} + \underset{(0.13)}{0.19}\tilde{y}_{t-2} + \underset{(0.13)}{0.05}\tilde{y}_{t-3} + \underset{(0.13)}{0.41}\tilde{y}_{t-4} + \underset{(0.11)}{0.67}\tilde{y}_{t-5} + \hat{\varepsilon}_{y,t}. \\ \bar{R}^2 &= 0.76,\ \hat{\sigma} = 0.90\%,\ \textit{Box} - \textit{Ljung}\ Q(8) = 3.89\ (p - \textit{value} = 0.87) \end{aligned} \tag{2}$$

As we can see from the estimation results, the estimated equation is an acceptable approximation for the output gap. We have plotted the estimated values according to equation 2 (the black line) in Figure 1 (page 44).

The transition matrix as a function of the output gap

In this section we present our method for modelling the continuous shifting from a characterising transition matrix in one quarter to another matrix in the next quarter. These shifts occur in response to changes in the macroeconomic conditions as time passes. In other words, we want the probabilities in the transition matrix to shift with time as a function of changes in the output gap. Let us call the portfolio-characterising transition matrix in each quarter $TM_{\text{state,t}}$. Let us limit this in the extreme positions – TM_{high} and TM_{low} – and use TM_{normal} as an identifier. We arrive at the elements, or probabilities, in $TM_{\text{state,t}}$ by using a flexible probability distribution, $\chi^2(df)$. We control the appearance of this distribution by using the parameter df, which indicates the number of degrees of freedom. For example, if the probability mass for the distribution shifts to the right, then df increases. We let df be a function of the output gap, $df_t = df(\tilde{y}_t)$, such that a positive output gap (boom) results in lower probabilities of default in the transition matrix, higher probabilities of a higher credit rating and lower probabilities of the rating being lowered. A negative output gap (recession) results in the opposite, namely higher probabilities of default, lower probabilities of a rating upgrade and higher probabilities of it being lowered. The function $df_t = df(\tilde{y}_t)$ is expressed as:

$$df_t = \overline{df} + \frac{(\underline{df} - \overline{df})}{1 + e^{-\beta_{\tilde{y}} \tilde{y}_t}} - \frac{\left(\frac{\overline{df} + \underline{df}}{2} - df \right)}{e^{\text{abs}(\beta_{\tilde{y}} \tilde{y}_t)}} \quad (3)$$

where df, $\overline{df}$ and $\underline{df}$ are the degrees of freedom associated with TM_{normal}, TM_{high} and TM_{low}.[21] $\beta_{\tilde{y}}$ is a vector with parameters that we can use to control the rate of convergence of df_t towards $\overline{df}$ or $\underline{df}$, for each rating category when the economy is moving towards a boom or a recession respectively. In other words, high values for $\beta_{\tilde{y}}$ correspond to a cyclically sensitive loan portfolio, and low values to a less sensitive loan portfolio. Figure 2 (page 45) illustrates how the choice of the effect parameters $\beta_{\tilde{y}}$ influences the probabilities of transition in $TM_{\text{state, t}}$.

Given our three transition matrices, TM_{normal}, TM_{high} and TM_{low}, we can calibrate values for df, $\overline{df}$ and $\underline{df}$ that match the transition probabilities in these matrices.[22] Given df, $\overline{df}$ and $\underline{df}$, the selected effect parameters $\beta_{\tilde{y}}$, and a time-series for the output gap, $\tilde{y}_t$, the degrees of freedom df_t for each quarter can be calculated. Finally, once we know df_t, we can determine a time-series with transition matrices $TM_{\text{state,t}}$ that characterises the loan portfolio throughout its duration.

We have selected $\beta_{\tilde{y}}$ so that the credit losses in our model display a pattern that resembles the losses incurred by the Swedish banking sector during the 1990s (see Figure 3 on page 48).

Construction and simulation of a hypothetical portfolio over time

In this section we describe our algorithm for constructing and simulating a dynamic business loan portfolio. Our first step is to generate an initial distribution of companies in the various $k = 1,\ldots, r$ rating classes, which we do in the following way:

1. Let us assume that there is an equal proportion of companies in each class in the first period t.
2. We use the transition matrix TM_{normal} and calculate the distribution of companies at the beginning of the next period, assuming that macroeconomic conditions are normal, i.e. that the output gap is 0. We can then arrive at the resultant distribution of companies in the portfolio at the beginning of period $t + 1$ by using: $F_{t+1} [f_{1,t+1} \cdot \cdot \cdot f_{r,t+1}]$ where $\sum_{k=1}^{r} f_{kt+1} = 1$.

[21] Note the following properties for the function $df(\tilde{y}_t)$; (i) if $\tilde{y}_t = 0$, $df_t = df$, (ii) when $\tilde{y}_t \to \infty$, then $df_t \to \overline{df}$, (iii) when $\tilde{y}_t \to \infty$, then $df_t \to \underline{df}$.

[22] For a full description of how this is done, see "Notes to Jacobson, Lindé and Roszbach", a technical appendix which can be obtained from the authors on request.

3. We repeat step 2 until $F_t = F_{t+1}$, i.e. until the distribution of companies does not change from one quarter to the next, which means that $\sum_{k=1}^{r} f_{k,t+1} - f_{k,t} = 0$. We can then use this distribution, which we call in the following the steady state distribution, as the starting value in all of our simulations.

Simulating a hypothetical business loan portfolio for the bank over the period $t = 1, 2, \ldots, T$ involves the following steps:

1. In the first period, period 1, we allot a number of companies to each rating class by multiplying the steady state distribution by the number of companies in the portfolio, which we have taken to be 10,000.
2. We give each company a company registration number, $i = 1,\ldots, 10{,}000$, and a loan amount. We select a random number $\varepsilon_{y,1}$ and use equation (2) to calculate $\tilde{y}_t$, after which we use equation (3) to generate a relevant transition matrix, $TM_{\text{state,t}}$, which is used in turn to calculate the distribution of the companies in the portfolio in the next quarter, $t + 1$.[23]
3. The new distribution in the next period consists not only of the companies that existed in the previous period. We also assume that the bank grants new loans to new companies in each period. We assume that the distribution of these loans to the new companies is the same as in the long-term distribution. We assume that the number of new companies to which the bank grants loans in each quarter is constant and equal to the proportion of companies that defaults in each period in the steady state (when the output gap is 0) multiplied by the number of companies in the initial portfolio (10,000). It is assumed that the new companies do not default during the period in which they are granted their loans. The new companies are given company registration numbers 10,001, 10,002, etc. in the order in which they are added to the portfolio.
4. We repeat steps 2 and 3 until $t = T$.
5. For each period $t = 1, \ldots, T$, we record the following information about all surviving companies in the bank's portfolio: company registration number, time period, rating class, default (variable which has the value 0 if the company survives, 1 if it defaults during the period), loan amount and the macroeconomic conditions for

[23] For each company i we generate a random figure $\tilde{p}_{i,t}$ from a uniform probability distribution (assumes values in the interval [0,1]). If the company i is in the rating class l in time period t it is assigned the rating class k in the next period (i.e. period $t + 1$) when the condition $\tilde{p}_{i,t} < \sum_{k=1} p_{lk,t}$ is fulfilled for the lowest possible value of $k = 1,\ldots, r$ where the probabilities $p_{lk,t}$ are obtained from the transition matrix $TM_{\text{state,t}}$. If the inequality is not satisfied for $k = r$ it means that the company i defaults in this period. This means that the company i, apart from the macroeconomic conditions that shift the $p_{lk,t}$ probabilities, also has a company-specific risk of defaulting depending on the outcome of the stocastic variable $\tilde{p}_{i,t}$.

each period. This information can then be used to calculate the capital adequacy requirement according to Basel II along with the portfolio's VaR.

By this means, we can generate data for $n = 1, 2, \ldots, N$ different portfolios ($N = 1{,}000$). Each portfolio contains a total of some 400,000 observations, since we have assumed that the banks record the data on their loan portfolios for 40 quarters (10 years).

Appendix B:
Basel Committee's risk-weight function

According to the Basel Committee's proposal of 16 January 2001, the risk-weight function for a rating class k in quarter t is:
where $LGD_{k,t}$ is the estimated loss given default for rating class k in quarter t, and

$$(B.1) \qquad RW_{k,t} = \min\left\{\left(LGD_{k,t}/50\right) \times BRW_{k,t};\ 12.5 \times LGD_{k,t}\right\}$$

$$(B.2) \qquad BRW_{k,t} = 976.5 \times N\{1.118 \times N^{-1}(PD_{k,t}) + 1.288\} \times \{1+0.047 \times (1 - PD_{k,t})/PD_{k,t}^{0.44}\}$$

where N is a standard normal distribution (with mean 0 and standard deviation 1) and $PD_{k,t}$ is the estimated probability of default for rating class k in quarter t. The following characteristics of the risk-weight function should be noted: (i) the higher a company's *LGD*, given its *BRW*, the greater the risk-weight (*RW*), and (ii) the higher the *PD* for any given risk class, at any given *LGD* level, the higher the *BRW* and thus the risk-weight.

The IRB capital for the bank's portfolio is calculated using formula:

$$(B.3) \qquad IRBcap_t = 0.08 \sum_{k=1}^{r} RW_{k,t} \times Exposure_{k,t},$$

where *Exposure* is the sum of the loans granted in the risk class $k = 1, 2, \ldots, r$ in period t. Formula (B.3) shows quite clearly that the absolute level of 8 per cent plays a crucial role in the new Basel proposal.

In the simulations we have used $LGD_{10} = 0.8$ and $LGD_k = 0.8*(k-1)/9$, $k = 1, 2, \ldots 9$.

Appendix C: Calculation of Value-at-Risk (VaR)

The analyses of the simulated loan portfolios we have described are made using two variables: Value-at-Risk (VaR), which describes the portfolio risk; and IRB capital, which indicates the capital adequacy requirement of the portfolio, calculated in the manner specified by the new Basel Accord.

In this context, VaR measures the loan portfolio's credit risk for a given time horizon. More specifically, we calculate VaR as the amount, expressed in kronor, that the bank risks losing within any given period of time, j, with a maximum probability of Z per cent. An alternative way of expressing this is to say that the probability of the bank's credit losses not exceeding the VaR amount, expressed in kronor, during the time period ending with j is (100-Z) per cent. In practice, banks tend to select a one-year time horizon j and a probability, Z, in the interval [0.001–0.01].

In the analysis the VaR for a given portfolio n during the period T for the time horizons of the coming j = 1, 2, 3, 4 quarters is calculated in the following way:

1. Take the initial structure of portfolio n at time T and the macroeconomic conditions at that time.
2. Simulate the portfolio for the coming j = 4 quarters using the method described in Steps 2–5 in Appendix A. The total loss incurred on the portfolio is then calculated for the coming j = 1, 2, 3, 4 quarters. Call the total loss on the portfolio $L_{i,j} = \sum_{s=1}^{j} L_{i,s}$.
3. Repeat Step 2 for various macroeconomic scenarios i = 1, 2, …, 1,000 times for the coming j = 1, 2, 3, 4 quarters. We thus obtain for portfolio n a set, $L_1 \ldots L_{1000}$, in other words 1,000 different possible portfolio losses for different quarters j into the future. We sort all the possible outcomes, L_i, from the smallest to the largest loss for the coming j = 1, 2, 3, 4 quarters. The VaR at a 95 per cent level on horizon j for this portfolio is then calculated as the 950th largest $L_{i,j}$ for the coming j = 1, 2, 3, 4 quarters.
4. By repeating steps 2–3 for all 1,000 portfolios, we can calculate the VaR for all the portfolios at different levels of significance.

Reformed management of international financial crises

By Ola Melander
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The international financial crises in recent decades started a widespread debate about how different types of crises should be handled. Since the presentation in 2001 of the International Monetary Fund's proposals for improving the management of sovereign solvency crises, the debate has become more intense. The author describes a variety of motives and suggestions for reforming the management of liquidity and solvency crises.

Current problems and issues

The international financial crises in recent decades started a widespread debate about shortcomings in the international community's handling of countries in crisis.

The international financial crises in recent decades – from the Latin American debt crisis in the 1980s to the ongoing crisis in Argentina – have evoked a widespread debate about shortcomings in the international community's handling of countries in crises and possible ways of tackling the problem.[1] It is not least the issue of private sector involvement (PSI) that has been discussed. PSI is a concept with no generally accepted definition and is used in several different senses. Broadly speaking, the PSI issue is about the possibility, when a country is in a crisis, of maintaining private financing in the form of lending or debt reduction. The appropriate forms for PSI depend on whether the crisis concerns liquidity or solvency (a temporary or a permanent inability to pay).[2]

There are two motives for reforming crisis management: the problem of coordinating private creditors and the problem of moral hazard among lenders

[1] For surveys, see Eichengreen (1999), Kenen (2001) and Rogoff (1999).
[2] Financial crises can also be subdivided into debt, banking and currency crises, or combinations of these.

There are two motives for reforming crisis management: the problem of co-ordination and the problem of moral hazard.

and/or borrowers. The former problem has to do with the conflict in a crisis between individual incentives and the creditors' collective interest. For instance, the individual creditor wants to be paid in full but in a solvency crisis it may be more advantageous for creditors as a group to agree to a general writedown of claims; this may enhance the country's growth potential and thereby its ability to pay in the longer run. The problem of moral hazard arises when public financing protects private creditors from losses (creditor moral hazard) and reduces the country's costs (debtor moral hazard). In that they reduce the expected cost of taking unsound risks, both types of moral hazard increase the probability of future crises.

The question of how to improve crisis management should be addressed in the light of an economic analysis of the existing arrangements. What are the problems and market failures? How do different proposals for reforms aim to tackle the problems? Would the proposed reforms have negative secondary effects? This paper begins with a brief account of the current framework for the management of international financial crises. A distinction is then made between liquidity crises and solvency crises, with the focus on various kinds of problems with the co-ordination of private creditors, and the problem of moral hazard is discussed. Political demands for a fair distribution of the burdens are considered. Finally, various proposals for a reformed management of crises are described and analysed.

The current framework for the management of international financial crises

The starting point is that a country which faces a financial crisis needs additional financing because incomes do not suffice to finance expenditures. There are three different but, in practice, complementary ways of handling the financing problems: economic adjustment (decreased spending), loans from the International Monetary Fund (IMF), other international organisations and/or countries (increased income), and private financing (increased income).

The IMF adopted a framework in April 2000 for the Fund's approach to countries facing financial crises.

In April 2000 the IMF's policy committee adopted a framework for the Fund's approach to countries facing financial crises. Much of the framework was based on earlier work

by the IMF and the G7[3] and G10[4] countries. The approach allows the IMF to be highly flexible in adapting its actions to the conditions in a particular case. The framework envisages that the approach is to be chosen in the light of the IMF's assessment of the particular country's underlying payment capacity and its prospects of regaining access to the international capital market. In simple terms, an assessment is made in each case of the extent to which the crisis concerns liquidity rather than solvency. A liquidity crisis where there is a good chance that a combination of IMF catalytic lending[5] and the country's implementation of a programme of economic adjustment will quickly restore access to the international capital market is not to be met with demands for compulsory PSI even if the financing requirement is large. Voluntary measures, for instance routines for supervising flows of private portfolio capital, may be required in certain cases to solve the problem of creditor co-ordination. When a country's debt is unsustainable in the longer run, on the other hand, so that the crisis is one of solvency, mandatory PSI, in the form of a re-negotiation of private claims, is to be a condition for obtaining IMF money.

Simplifying somewhat, the framework accordingly means that large IMF loans may be obtainable in liquidity crises and that debt is to be restructured in solvency crises. Criticism of the framework has mainly focused on the lack of clear rules for the size of IMF loans and the absence of effective alternatives to large IMF loans.

The framework means that large IMF loans may be obtainable in liquidity crises and that debt is to be restructured in solvency crises.

Problems with private creditor co-ordination in liquidity and solvency crises

For banks and other corporations there is a clear distinction, at least in theory, between liquidity and solvency crises.[6] The distinction is also applicable to sovereigns with the important difference that the actual size of payments is conditioned not only by the ability to pay but also by the political will. Even if it is economically feasible, using a large proportion of GDP to meet payment commitments may be out of the question politically. A liquidity crisis is characterised by a

[3] Canada, France, Germany, Italy, Japan, United Kingdom and United States.
[4] The G7 countries plus Belgium, the Netherlands, Sweden and Switzerland.
[5] Lending aimed at encouraging the inflow of private capital by demonstrating the IMF's confidence in the country's economic policy.
[6] See Eichengren & Portes (1995) and Paues (2001).

A liquidity crisis is characterised by a temporary inability to meet payment commitments, while the characteristic of a solvency crisis is that the country's debt is unsustainable in the longer run.

temporary inability to meet payment commitments with the incomes and liquid assets at the country's disposal. The characteristic of a solvency crisis is that, given the size of the country's debt and the prospects for future incomes, reasonable economic assumptions indicate that the debt situation is unsustainable in the longer run. The management of a solvency crisis accordingly requires that the present value of the debts is written down by reducing interest rates and/or repayments. The debtors' inability to pay is temporary in a liquidity crisis and more permanent in a solvency crisis.

The distinction is difficult to make in practice, not least when time is short in a crisis and above all as regards sovereigns.

For a number of reasons, however, the distinction is difficult to make in practice, not least when time is short in a crisis and above all as regards sovereigns. A liquidity crisis often has to do with fears of future insolvency – otherwise the debtors ought to be able to obtain financing in the market – and can develop into a solvency crisis. Moreover, future payments are dependent both on the country's future economic policy, which affects the payments capacity, and on the political will to pay and these two factors are difficult to predict. Finally, sovereign insolvency is in fact applicable only to foreign currency loans, that is, when the burden of interest and repayment is too heavy in relation to exports. The burden of loans in the domestic currency can always be lightened by means of an expansionary monetary policy that reduces the debt through inflation.

The problem of co-ordinating private creditors may have to be handled in liquidity as well as solvency crises.

Both liquidity and solvency crises may entail a need to manage the problem of co-ordinating private creditors. This involves getting individual creditors to act in the collective interest of creditors as a group.[7] In a *liquidity crisis* the co-ordination problem is characterised by multiple equilibria. If a sufficient number of creditors expect that a sufficient number of other creditors will not renew their short-term loans, so that the country will no longer be able to meet its payment commitments, their expectations will be self-fulfilling. The result is a "bad" equilibrium. While it is in each creditor's interest to withdraw credit while the country still holds liquid assets, it would pay the creditors as a group not to do so at each other's expense. The short-run ability to pay declines and the liquidity crises may even develop

[7] The account of the co-ordination problem is based mainly on Bank of England (2002).

into a solvency crisis if the lack of liquidity damages the country's long-term payments capacity. If, on the other hand, creditors expect that others will renew their loans, no credits will be withdrawn and the potential liquidity crisis will not materialise. The result is a "good" equilibrium.

Individual creditors can act in a solvency crisis in a way that conflicts with the majority's interest.

In a *solvency crisis*, individual creditors may likewise act in a way that conflicts with the majority's interest if, instead of accepting the debt reduction that a sustainable debt situation requires, they resort to litigation in the hope of obtaining payment under the loan's original contract. This can lead in several ways to a further reduction of the country's payments capacity, with the result that creditors as a group obtain less than they would have done without litigation. Above all, a disorderly and protracted re-negotiation of the debt exacerbates and prolongs the crisis, with negative consequences for GDP and thereby the country's payments capacity. In more theoretical terms, the threat of future litigation weakens the incentive to invest and implement an economic policy that strengthens the country's long-term payments capacity – there is a risk of any future surplus being sequestered by the courts.

One of the basic problems in crisis management is that of achieving a co-ordination of creditors by prolonging credits in liquidity crises and accepting debt reductions in solvency crises.

One of the basic problems in crisis management is that of achieving a co-ordination of creditors, in liquidity as well as solvency crises, so that individual creditors are persuaded to act in the common interest. This amounts to prolonging short-term loans in liquidity crises and accepting necessary debt reductions in solvency crises. The importance of co-ordination has grown since the debt crisis in the 1980s, when the IMF called on the private sector to contribute to the country's financing requirement. In those days, private financing was facilitated by the countries' creditors being a homogeneous and relatively small group of international banks whose financing mainly consisted of medium- and long-term syndicated loans.[8] The losses creditors incurred from the re-negotiation of debt in the 1980s and early 1990s was a major reason why the syndicated bank loans were replaced to a growing extent by sovereign bonds, which for a long time were seen as a form of borrowing that was safer for the creditors. In the 1980s sovereign bonds were usually excluded from re-negotiations both because the amounts were comparatively negligible and on account of the difficulties that

[8] A syndicated bank loan is a loan arranged jointly by a number of banks that guarantee to lend the principal.

re-negotiation posed. In recent years, however, there have been a number of bond loan re-negotiations. The large number of bond holders today, compared with the number of banks involved in lending to countries in the 1980s, has made co-ordination in the event of debt restructuring considerably more of a problem.

Moral hazard – a problem?

It is mainly concern about what could happen if creditors are not forced to take the consequences of imprudent decisions that has left its mark on the crisis management debate.

The problem of moral hazard does not concern conflicts of interest between private creditors. The conflict in the present context is between the private creditors and other parties – the international community (creditor moral hazard) and the debtor country (debtor moral hazard). A major feature of the crisis management debate has been concern about the creditor moral hazard that arises if, instead of being forced to take the consequences of imprudent decisions, lenders are protected from losses when countries are granted large loans from the international financial institutions, primarily the IMF.

Debtor moral hazard has not been discussed to quite the same extent.[9] It is conceivable in theory that, by mitigating the economic consequences of a financial crisis, IMF loans weaken the incentive for a country to pursue a policy whereby financial crises are avoided. But even with IMF loans, a crisis is always costly for the country in question, not least in terms of lost GDP. Debtor moral hazard would be a problem, however, if the cost of financial crises were to be unduly low for the country concerned.

IMF loans ought not to support an economic policy that does not promote the country's long-term interests.

The IMF's former chief economist Mussa (2002) considers that the problem of creditor moral hazard in particular has been greatly exaggerated in the debate. IMF loans are for the short term, have to be repaid with interest and presuppose economic reforms. Even with IMF financing, financial crises generally entail considerable economic costs for the country in question as well as its creditors. However, Mussa admits that moral hazard may be a problem in the future if security policy considerations are involved in decisions on IMF loans.[10] Another problem he mentions is that a government may have interests that differ

[9] An exception is, for example, Lipworth & Nystedt (2001).

[10] The primary example of this is Russia in the late 1990s, when market agents talked of "the moral hazard play" (investment in Russian treasury bonds) on the assumption that the country was "too big and too nuclear to fail".

from those of the country's inhabitants. IMF loans may enable a government to implement an imprudent, short-sighted economic policy that postpones the crisis and renders it more serious. The basic problem lies in the government's time horizon possibly being shorter than that of the electorate, perhaps extending only as far as the next election.[11] IMF loans ought not to support an economic policy that does not promote the country's long-term interests.

The possibility of IMF loans for a country in a crisis encourages economic and financial openness, which benefits not just the country in question but other countries, too.

While the problem of moral hazard should be taken seriously, the effects of IMF lending need to be studied in a wider perspective. The IMF borrowing facility is a form of insurance whereby loans are granted, subject to conditions, to countries that are in economic trouble. This, like all forms of insurance, involves some degree of moral hazard but the question is whether this outweighs the IMF loans' positive consequences. The possibility of IMF loans for a country in crisis encourages economic and financial openness, which benefits not just the country in question but other countries, too, by enlarging the opportunities for international economic exchange.

Turning now to empirical tests of the occurrence of moral hazard, Lane & Phillips (2000) have examined how market interest rates in emerging market countries have been influenced by events that have a bearing on the future possibility of obtaining IMF loans. Examples of such events are additions to the Fund's financial resources or the granting of large lending packages. There is no clear evidence to support the moral hazard hypothesis but testing it empirically is difficult.

Distributing the burden – a political problem

The problem of moral hazard concerns, as mentioned, the distribution of a crisis burden between the international community, borrower countries and private lenders. If the chief problem is creditor moral hazard, then the private creditors should shoulder a larger burden, while borrower countries should do so if the main problem is debtor moral hazard. So reforms to alter the burden's distribution should aim to rectify economic shortcomings (moral hazard) in the present system.

[11] A similar phenomenon may occur among banks and/or other companies if the management adopts an imprudent strategy in an attempt to eliminate problems with solvency (gambling for resurrection).

It is in the long-term interest of borrower countries that default and debt reduction continue to be costly.

Some advocates of reform supplement the economic analysis with a more political perspective and call for debt reductions in order to achieve a "fair" distribution of the burden.[12] The idea here is that the burden on the borrower countries ought to be eased at the lenders' expense. However, such a system would be perceived as arbitrary and would greatly reduce the emerging markets' possibility of borrowing in international capital markets. A politically motivated redistribution would benefit debt-burdened countries in the *short run* but would have serious consequences for their future borrowing. Consequently it is in the *long-term* interest of borrower countries that default and debt reduction continue to be costly.[13]

While the IMF often shoulders a major part of the financing burden in the short run, in the longer run a larger share is covered with private capital.

Another politically sensitive issue is that in the short run private actors reduce their exposure to countries in a financial crisis while the international community, primarily the IMF, provides large-scale financing. The lower interest rate on IMF loans is taken to mean that the international community carries a cost in the form of interest subsidies. This imbalance has led to demands that the private sector must carry a larger share of the burden. However, there is an important difference between these two types of loan: whereas private loans are not always paid back, the IMF has so called preferred creditor status. Countries give priority to the repayment of IMF loans and the lower interest rate is a token of the lower credit risk.[14] Another important aspect of the burden's distribution is the time profile: in the short run the IMF often shoulders a major part of the financing burden but in the longer run a larger share is covered with private capital. So a short-term comparison between official and private financing is somewhat misleading.

Proposals for reforming crisis management

Concern about growing problems with private creditor co-ordination and the problem of moral hazard accordingly lie behind various proposals for improving

[12] See e.g. Raffer (1990) and Pettifor (2002).

[13] This is not meant to imply that debt reduction is undesirable for the poorest and most heavily indebted countries. Such reductions are already being handled under the HIPC initiative. The present article is concerned instead with crisis management in emerging markets with access to international capital markets.

[14] The special status of the IMF reflects the fact that its financing benefits not only the borrower country, where access to private capital is very limited in a crisis, but also other countries and private creditors in that international trade is facilitated and the country's payments capacity is increased.

the management of liquidity and solvency crises. A selection of the most important proposals is presented below, starting with the IMF's proposal for a sovereign debt restructuring mechanism (SDRM). A mechanism for handling liquidity crises – an international lender of last resort (LOLR) – is then described, followed finally by two proposals for the management of both types of crisis; the first is confined to IMF loans combined with payment standstills and the second uses collective action clauses (CACs) in loan contracts to facilitate the re-negotiation of debt.

Proposals for reforms stem from concern about growing problems with private creditor co-ordination and the problem of moral hazard.

International mechanism for managing solvency crises

The IMF proposal for a new international procedure – the Sovereign Debt Restructuring Mechanism – for the management of sovereign solvency crises was presented in the autumn of 2001 and draws inspiration from national laws on corporate insolvency, primarily Chapter 11 of the United States Bankruptcy Code.[15] The aim, as at national level, is to handle the problem of creditor co-ordination in a predictable, orderly and prompt process and thereby maximise the borrowers' capacity to repay debt. The introduction of an international bankruptcy mechanism has not been feasible to date because of certain differences between sovereigns and corporations. Sovereigns cannot be wound up or taken over in the event of insolvency and their ability to pay is partly dependent on the willingness to pay. The IMF proposal recognises these differences and does not mean that sovereigns would be subjected to an international law court.

The IMF proposal for a new international mechanism, SDRM, for the management of sovereign solvency crises was presented in the autumn of 2001 and draws inspiration from national laws on corporate insolvency.

In the original SDRM proposal the mechanism was to be activated only after an application from the crisis country. The activation was to be approved by the IMF provided the debt situation was unsustainable and the country had or was negotiating an IMF programme. The proposal has three components that come into force when the mechanism has been activated. The *first* component is a

[15] For a more detailed account of the proposal see Krueger (2001, 2002c). For an early variant, designed for both liquidity and solvency crises, see Sachs (1995) and for a historical survey of the idea see Rogoff & Zettelmeyer (2002).

temporary stay on creditors taking legal action against a country that has suspended payments, provided the country fulfils certain requirements to do with economic policy and its treatment of creditors. The *second* component is that countries, under IMF surveillance, are enabled to issue new bonds with priority over existing debts. Today, bond contracts protect the interest of earlier investors and aim to obstruct such new borrowing. The *third* component is the possibility for a majority of creditors to bind a minority to a reconstruction of the country's debt. The proposal envisages that the conditions for a reconstruction would be negotiated by the country and its creditors and could be approved by the IMF but the Fund would have no formal power over them.

The central decisions would be made by a majority of the creditors and the role of the IMF would be limited.

The initial SDRM proposal has been modified after the United States and others opposed the IMF's central role.[16] A majority of the creditors would be responsible for making the central decisions about activating and prolonging the stay on litigation, issuing priority debt and conditions for a restructuring of debt. As at present, the conditions for restructuring debt would be approved informally by the IMF granting loans as a contribution to financing the country's capital requirement.

The IMF – an international lender of last resort?

Some observers consider that the IMF already functions as an international lender of last resort (LOLR) for countries, in keeping with a national LOLR for financial institutions. Others argue that this is not the case at present but that the IMF ought to be developed in this direction.

An international LOLR has a role to play in international financial crises.

In the event of a threat to the stability of the financial system, a national LOLR is able to provide unlimited short-term loans for financial institutions that are solvent but lack liquid assets.[17] The ideal case calls for a high interest rate, to prevent abuse, and collateral, as a safeguard against loan losses, but this is seldom feasible in practice. A national LOLR may not be in a position to manage an international financial crisis because this requires liquidity in foreign currency. So an international LOLR may have a role to play here. Fis-

[16] For the revised versions of the proposal see Krueger (2002a, 2002d).

[17] Note that central bank LOLR lending is restricted to situations that threaten the financial system's stability. Central banks also supply the banking system with liquidity under normal circumstances but they then require eligible collateral.

cher (2000) considers that with the increased possibilities of granting large short-term loans in a crisis, the IMF is developing into an international LOLR.

There are a number of differences at present between the IMF and a national LOLR.

At present the IMF differs from the theoretical national LOLR in a number of respects. Its lending potential is limited by the organisation's resources, neither can the provision of bilateral supplementary loans be guaranteed in advance. Unlike a national central bank, the IMF is not in a position to issue currency in unlimited amounts. The timing of loan payments is tied to economic reforms by the country in question. Loans with a relatively long maturity are needed in many cases in order to restore the confidence of financial markets and obtain a sufficient respite for reforms. High borrowing rates may threaten the sustainability of sovereign debt and are therefore used with some caution.

The chief difference between the national and international levels is that sovereigns are not comparable to banks and other corporations.

The chief difference between the national and international levels as regards the distinction between liquidity and solvency crises is that, in the absence of an international bankruptcy court to which the world's countries are subordinate, sovereigns are not fully comparable to banks and other corporations. A country's future payments are dependent both on its future economic policy, which influences the payments capacity, and on the political willingness to pay. In the case of domestic currency loans, moreover, there is always the option of printing more money, so that insolvency is not possible for such loans.

These are not the only differences between countries and private borrowers. Collateral is often difficult to obtain from sovereigns, neither can a country be wound up or taken over in bankruptcy proceedings in the same way as banks and other firms. And while national authorities can dismiss bank executives, international organisations cannot do the same to a country's political leaders. There is no direct international counterpart to the possibilities that national supervisors have of overseeing and influencing the actions of banks.

But neither should the differences between countries and private borrowers be exaggerated. Although collateral is difficult to obtain, in practice sovereigns give the repayment of IMF loans priority over private loans. And even at the national level, adequate collateral is a theoretical concept in an acute crisis. Governments cannot be removed by the IMF but experience shows that financial crises often lead to a change of government. Finally there several similarities between the IMF and national supervisors. The Fund oversees the economies of

its Member States, above all through Article IV consultations, and is in a position to exert a direct influence on economic policy in borrower countries.

A continued development of the IMF in the direction of an international LOLR is recommended in the Meltzer Report.

The Meltzer Report to the United States Congress (IFIAC 2000) recommends that the IMF continues to be developed into an international LOLR by being enabled to provide larger loans, albeit with shorter maturities and higher interest rates than at present. Loans would only be made to countries that have already complied with certain conditions for financial stability and transparency. It is doubtful whether the proposals are feasible. A commitment to provide loans only for certain pre-selected countries can never be followed entirely objectively in every situation. Neither is it likely that IMF loans can be shorter and more costly without this having negative effects on market confidence and programme sustainability.

Limited IMF loans and temporary payment standstills

The combination of temporary payment standstills and limited IMF loans is intended for both liquidity and solvency crises.

The combination of temporary payment standstills and limited IMF loans is intended for both liquidity and solvency crises.[18] Standstills can apply either to sovereign debt or to all external debt via capital and/or exchange controls. In a liquidity crisis a standstill is an alternative to large IMF loans. Capital outflows are arrested for a time and there is a respite for economic reforms. The problem of co-ordinating private creditors is also handled. The liquidity crisis is resolved in that creditors are unable to reduce their exposures individually. In a solvency crisis a standstill is not a sufficient remedy because the debt is, by definition, unsustainable and has to be written down, but it can provide a breathing space while the debt is restructured. Both types of crisis call for a limited amount of IMF lending, not least as a contribution to temporary financing. In order to enhance the credibility of declarations that the IMF loans will be limited, greater clarity is proposed in rules and criteria for the granting of IMF loans in excess of the regular access limits. Exemptions from the rules would still be allowed in exceptional cases, for instance if international financial stability were to be threatened.

[18] See e.g. Haldane & Kruger (2001).

A number of potential problems are connected with a greater use of payment standstills. One risk is that at the first indication of a future standstill, creditors would withdraw financing, thereby making a standstill inevitable. Another problem is the risk of litigation. As a way of overcoming this problem, Buiter & Sibert (1999) propose the introduction of clauses for prolonging loans, a universal debt rollover option with a penalty (UDROP). The clauses would confer the right to prolong sovereign bonds and inter-bank loans, using pre-determined maturities and interest rates. The conditions would be written into loan contracts so that creditors and debtors will have accepted them in advance. Countries could choose to include UDROPs in their loan contracts, at least for loans in foreign currency. An advantage with this proposal is that it disposes of the need to protect against litigation because loans would be prolonged in accordance with the contract. One problem is the time it would take – even assuming that the clauses are included in all new contracts – before all the outstanding contracts without these clauses expire. The greatest problems, however, concern the effects on capital flows and interest rates, besides the lack of a simple way of inducing countries to adopt UDROPs.

A greater use of payment standstills raises a number of potential problems.

Facilitating debt restructuring with collective action clauses

Collective actions clauses (CACs) in a bond contract are a contract-based adjunct to the SDRM proposal. A basic difference is that while an SDRM is intended only for solvency crises, CACs can facilitate the management of both solvency and liquidity crises. In a liquidity crisis, CACs can simplify the problem of creditor co-ordination and thereby make it possible to postpone payments. In a solvency crisis, CACs can be used to achieve a necessary reduction of debt. So CACs have appreciable positive effects.

An SDRM is intended only for solvency crises, while collective action clauses can facilitate the management of both solvency and liquidity crises.

Today CACs are a routine feature of bonds issued under English law but seldom of bonds issued under United States law. At present there are four types of CAC:[19]

[19] For a fuller account see Dixon & Wall (2000).

- Collective representation clauses (for the appointment of a joint representative in the negotiations).
- Majority action clauses (a qualified majority of bond holders can bind a minority when restructuring debt).
- Sharing clauses (payments to one bond holder are distributed between all bond holders).
- Non-acceleration clauses (a minimum proportion of the bonds is needed in order to demand full payment after a country has suspended payments, that is, protection from litigation by individual creditors during the negotiations).

However, CACs pose a number of difficulties that make them an adjunct to an SDRM rather than an alternative. The principle difficulties are:

- The negotiations and voting proceed contract by contract rather than applying to the whole of the outstanding debt. Clauses for comprehensive negotiations have been proposed but would increase the risk of abuse. The sovereign could then issue new bonds to actors it controls and thereby exert an influence on the outcome of the negotiations. There could also be legal problems, with interpretations that differ from country to country.
- Experience shows that many emerging market countries are unwilling to introduce CACs lest they reduce capital flows and add to their costs.[20]
- Even if CACs were to be included in all new bond contracts, it would be a long time before all the outstanding contracts without CACs mature, leading to a considerable delay before the full effect of CACs materialises.

The political and legal conditions for introducing an SDRM are still not clear.

These problems could, however, be handled with an SDRM. The negotiations and voting would apply to the whole of the outstanding debt, while the prevention of abuse would be entrusted to an independent international legal organ.[21] The problem of implementation would also be resolved in that an SDRM would automatically and immediately yield effects corresponding to those of CACs. However, the political and legal conditions for introducing an SDRM are still not clear.[22]

[20] For empirical studies of CACs' effects on interest rates see Eichengreen & Mody (2000) and Becker, Richards and Thaicharoen (2001).
[21] For a fuller description of the functions of the proposed legal organ see Krueger (2002b).
[22] For a discussion of outstanding issues and difficulties to do with the introduction of an SDRM and CACs see Boorman (2002).

Conclusions

The proposed SDRM and clauses for handling co-ordination problems would be significant reforms for improving the management of international financial crises.

Both the problem of creditor co-ordination and the problem of moral hazard indicate that the international mechanisms for crisis management are probably not optimal. It is important, however, that reforms are based on economic analyses rather than on political considerations and that any negative secondary effects of different proposals are carefully assessed. To some extent the IMF already functions as an international lender of last resort but a further development of the organisation in that direction seems to be neither desirable nor politically feasible. Loans with relatively long maturities and interest rates that are not unduly high are often required in order to restore market confidence and pave the way for private capital inflows. It is also important that the IMF acts in the long-term interests of the debtor country and does not allow short-run political interests in the country to persuade the Fund to grant loans that only postpone and exacerbate the crisis. The proposed international mechanism for solvency crises and bond contract clauses for handling problems with the co-ordination of private creditors fill important economic functions and would be significant reforms for improving the management of international financial crises.

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The Riksbank's statement regarding the report "Stabilisation policy in the monetary union"

SOU 2002:16

Sveriges Riksbank has been given the opportunity to comment on the final report of the Government Commission on Stabilisation policy for full employment in the event of Swedish membership in the Monetary Union (SOU 2002:16). The Riksbank's views are described below. Robert Boije at the Monetary Policy Department, together with Anders Borg and Jörgen Eklund at the Secretariat of the Executive Board have co-authored the statement under the guidance of Deputy Governor Villy Bergström. The statement has the full support of all members of the Executive Board.

The summary of the report of the Government Commission on Stabilisation policy for full employment in the event of Swedish membership in the Monetary Union is presented in an Appendix following this statement.

Summary and conclusions

If Sweden were to join the Eurosystem there would still be a need for a national stabilisation policy.

Swedish participation in Stage Three of the European Monetary Union (EMU) would involve a change in stabilisation policy regime. Responsibility for monetary policy would be transferred from the Riksbank to the European Central Bank (ECB). The Riksbank shares the Committee's opinion that the ECB's inflation target would be a credible guide for inflation expectations in Sweden in the long term. However, there is a risk of prices and wages in small member states like Sweden departing from the euro area average in the medium term. This might occur following various country-specific shocks or if price and wage setters become less cautious now that they no longer need to worry about high price and wage inflation leading to higher interest rates. This suggests that

there would still be a need for a national stabilisation policy if Sweden were to join the Eurosystem.

Participation in Stage Three of EMU – and to some extent even in ERM2 – would give fiscal policy greater responsibility for national stabilisation policy. Experience from periods where fiscal policy has had the main responsibility for stabilisation policy highlights the difficulty of pursuing a long-term sustainable policy. In the 1970s and 1980s fiscal policy was overly expansionary on average, which served to fuel inflation and undermine competitiveness. To avoid the same problems in future, it is important to create a framework that helps to maintain the credibility of stabilisation policy. Such a framework can also reduce the risk of fiscal policy itself becoming a source of domestically generated shocks.

Participation in Stage Three of EMU would give fiscal policy greater responsibility for national stabilisation policy.

In the light of experience from recent years' stabilisation policy, the Riksbank considers it important to look at whether key elements of the present stabilisation policy framework could be retained on participation in Stage Three of EMU: a clear target for economic policy, clear institutional guarantees of a long-term sustainable policy, and open and clear decision-making processes that can increase understanding of the policy and afford an opportunity to evaluate it.

The Riksbank considers it important to look at whether key elements of the present stabilisation policy framework could be retained on participation in Stage Three of EMU.

Structural reforms that help to increase the flexibility of the economy would also reduce the need for stabilisation policy measures. This would increase the likelihood of participation in Stage Three of EMU proving a success.

The need for a clear target

One key issue is what the target for stabilisation policy should be if Sweden takes part in Stage Three of EMU. The Committee recommends that the output gap – a measure of the utilisation of resources in the economy – be used as the stabilisation policy target. However, the Riksbank believes that there may be grounds to consider whether a national inflation target for fiscal policy would be preferable. A focus on stabilising inflation will normally also serve to stabilise the real economy and so the difference between these two potential stabilisation policy targets should not be exaggerated. An inflation target may be

The Riksbank believes that there may be grounds to consider whether a national inflation target for fiscal policy would be preferable to an output gap target, which the Committee proposes.

preferable for some types of supply shock, such as an increase in oil prices that could lead to calls for compensation from wage earners. In such cases a stabilisation policy based on an output gap target could lead to an overly expansionary policy.

The advantage of an inflation target is that it is clear and can be easier to evaluate than an output gap target.

An output gap target may prove more difficult to measure and more difficult to explain to the public than an inflation target, so leading to uncertainty about stabilisation policy. The advantage of an inflation target is that it is clear and can be easier to evaluate than an output gap target. In this context it is important to remember that measures of output gaps and the like are essential for assessing demand and future inflation.

The inflation target should be designed in such a way as to limit how far Swedish inflation is permitted to deviate from the euro area average. However, some flexibility must be built in to allow for the need for necessary changes in relative prices (the real exchange rate) between Sweden and the euro area, e.g. after foreign trade or productivity growth shocks.

The Riksbank shares the Committee's opinion that stabilisation policy instruments should impact as generally as possible.

The Riksbank shares the Committee's opinion that stabilisation policy instruments should impact as generally as possible. The distribution effects of the measures used should also be limited. This would provide a better basis for applying these measures symmetrically over the business cycle. The issue of which specific instruments would be appropriate for implementing stabilisation policy should be further investigated.

The need for institutional reforms

If stabilisation policy suffers from a lack of credibility, there is a risk of the measures introduced being less effective. The challenge is to find institutional solutions that help to maintain the credibility of stabilisation policy if Sweden takes part in Stage Three of EMU.

The government bill (1997/98:40) behind the new Riksbank Act in 1999 stated: "By delegating responsibility for the formulation of monetary policy to an independent Riksbank with a clearly defined price stability target, policy can be given the long-term perspective needed for the target to be credible." The equivalent argument could also be made in a discussion of the need for institutional

reforms to lend credibility to stabilisation policy on participation in Stage Three of EMU.

The Riksbank would like to see a broader discussion in addition to the Committee's proposal for an expert advisory council. For example, there may be grounds to look at whether stabilisation policy decisions should be taken directly by the government in order to shorten the otherwise long decision-making processes. Another more radical option, which is closer to the current system and has also been discussed in the economic literature, would be to delegate some fiscal policy instruments to an independent authority. The Riksbank believes that while such a solution would be complex, not least in terms of principle, it should not be ruled out without further consideration.

The Riksbank would like to see a broader discussion in addition to the Committee's proposal for an expert advisory council.

Continued good budget discipline is essential for the credibility of economic policy. However, the Riksbank does not believe that it would be self-evident to raise the government net lending target as proposed by the Committee.

Introduction

The Riksbank has been invited to comment on the report "Stabilisation policy in the monetary union" (SOU 2002:16).

The Committee discusses three main issues: (i) How likely is Sweden to be affected by macroeconomic shocks if it participates in Stage Three of EMU? (ii) What spontaneous adjustments might arise in the economy as a result of participation in Stage Three of EMU? (iii) What demands would Swedish participation in Stage Three of EMU make of fiscal policy?

This statement focuses on the last of these issues and discusses the first two more briefly. First there is a discussion of experiences from the current stabilisation policy regime, partly to show what we would be giving up if Sweden takes part in Stage Three of EMU and partly to highlight the key elements of the current regime. Next the Riksbank presents its views on the need for a stabilisation policy on participation in Stage Three of EMU, the formulation of the stabilisation policy target, the opportunities for fiscal policy to stabilise the economy, and the need for institutional reforms to lend credibility to the new stabilisation policy regime. Finally there is a discussion of the need for budget discipline.

This statement focuses on the issue: What demands would Swedish participation in Stage Three of EMU make of fiscal policy?

The Riksbank does not discuss the issue of whether or not Sweden should

In this statement the Riksbank does not discuss the issue of whether or not Sweden should participate in Stage Three of EMU.

participate in Stage Three of EMU in this statement. Nevertheless there are grounds to stress here that the issue of Swedish participation in Stage Three has many aspects besides stabilisation policy, such as political influence and long-term growth prospects. This statement deals only with the stabilisation policy aspect as this is the aspect investigated by the Committee.

In its response to the EMU Committee 1996 the Riksbank concluded that there were no grounds to postpone Swedish participation in Stage Three.

Reference can instead be made to the Riksbank's response to the EMU Committee's report "Sweden and EMU" (SOU 1996:158), which discussed the various pros and cons of Swedish participation in Stage Three of EMU from three different perspectives: the economic aspect, the stabilisation policy aspect and the political aspect. The report concluded that the benefits of Swedish participation in Stage Three of EMU outweighed the drawbacks when it came to the economic and political aspects, but vice versa when it came to the stabilisation policy aspect. One main argument was that Sweden would be taking unnecessary risks in handing over monetary policy in a time of low employment. Another was that, until the labour market and wage formation had been stabilised through structural reforms, there would be no viable alternative to monetary and foreign exchange policy when it came to handling country-specific shocks. Since the report attached considerable importance to the stabilisation policy aspect, it concluded that Sweden should postpone participation in Stage Three of EMU. The Riksbank was of the opinion that the report presented an overly cautious assessment of the economic and political benefits of participation in Stage Three and overestimated the stabilisation policy cost. For this reason the Riksbank concluded that there were no grounds to postpone Swedish participation in Stage Three.

Experience from the current stabilisation policy regime

The Riksbank would like to begin by taking a brief look at experiences from the last decade's stabilisation policy with an inflation target and independently managed monetary policy. Experience from this period is relevant when it comes to choosing the economic policy measures that may need to be introduced if Sweden takes part in Stage Three of EMU.

There is currently broad consensus that low and stable inflation is important

for sustainable strong growth and for avoiding unnecessary fluctuations in economic activity. Low inflation promotes the efficient allocation of resources in the economy. The reason for this is that low and stable inflation makes it easier for businesses, households and other players to detect changes in the relative prices of different goods and services, which gives them a better basis for making properly informed decisions.

There is currently broad consensus that low and stable inflation is important for sustainable strong growth.

Developments in Sweden in the 1970s and 1980s illustrate the negative consequences with which high and volatile rates of inflation can be associated. High inflation led to repeated cost crises, devaluation cycles and financial uncertainty, which probably resulted in unnecessarily large fluctuations in activity. In some respects economic policy failed to deal with the problems and actually became a source of new shocks. Both investment and productivity seem to have suffered during this period. High inflation also led to extensive wealth redistribution.

The Swedish krona was allowed to float in November 1992 and an inflation target was announced the following year. The transition from a policy with a fixed exchange rate as the nominal anchor for the economy to an inflation target policy resulted in a change in stabilisation policy regime. Confidence in the new regime was limited at first but, once the policy had been pursued consistently and steps had been taken to strengthen public sector finances, confidence in the whole of Sweden's economic policy grew.

The transition in 1992 from a policy with a fixed exchange rate to inflation targeting resulted in a change in stabilisation policy regime.

The inflation target guides expectations

A nominal anchor – in this case an inflation target – aims to stabilise the expectations of the players in the economy. By publishing a clear target for monetary policy, the central bank can steer expectations towards a specific level and so influence price and wage setting.

With a clear target for monetary policy, the central bank can steer expectations and so influence price and wage setting.

The Riksbank's target is an annual rate of inflation of 2 per cent with a tolerance interval of ±1 percentage point. Inflation is defined as the consumer price index (CPI), which is a well-known measure and reflects movements in prices for the basket of goods most relevant to the average citizen. The Riksbank's procedure is normally to adjust its instrumental interest rate if forecasts suggest that inflation will move outside the target interval one to two years ahead.

The repo rate is a blunt instrument that kicks in only after a long and variable time lag and so offers limited scope to fine-tune the economy in the short term. The Riksbank's monetary policy therefore focuses on the medium term.

Independence and transparency

The Riksbank's independence – including in the formal sense – was laid down in law on 1 January 1999. Confidence in the inflation target policy already seemed high but was further strengthened by these legal changes.

One important element in the work to build confidence has been transparency.

One important element in the work to build confidence has been transparency. Each quarter the Riksbank publishes an inflation report that presents the forecasts and reasoning underlying the executive board's monetary policy decisions. The executive board's meetings to discuss these decisions are held in camera but the minutes are subsequently published, generally about a fortnight later.

The goal is for the public to know enough about the Riksbank's analytical framework and deliberations to be able to predict future interest rate decisions.

The idea is that a more clearly presented policy will be a more effective policy. Transparency makes it possible for external commentators to check that the Riksbank is acting consistently and that its forecasts for inflation one to two years ahead are reasonable. If the general public and market players understand how decision makers (in this case the Riksbank) reach their decisions, there is a reduced risk of unnecessary fluctuations in exchange and interest rates. The goal is for the public to know enough about the Riksbank's analytical framework and deliberations to be able in principle to predict future interest rate decisions on the basis of the information available. Statutory independence has also increased the need for external scrutiny of monetary policy. This has made it even more important to develop and communicate the reasoning behind the Riksbank's actions. Transparency and clear policy targets also make it easier to focus internal work: there is a stronger incentive for the Riksbank to produce properly documented analyses to support its decisions if these documents are to be made public.

The credibility of the regime affects the policy's room for manoeuvre

The credibility and clarity of stabilisation policy themselves mitigate the risk of major fluctuations in the business cycle. In the light of the positive experience reaped from recent years' stabilisation policy, the Riksbank believes that there

would be good reason to retain key elements of the existing stabilisation policy framework even on participation in Stage Three of EMU: a clear target, clear institutional guarantees of a long-term stabilisation policy objective and a high degree of transparency and clarity.

The Riksbank believes that there would be good reason to retain key elements of the existing stabilisation policy framework.

There is less experience of fiscal policy in the management of stabilisation policy than of monetary policy and so it is harder to draw definitive conclusions about which system is most appropriate. Against this background the Riksbank considers it important for there to be a more detailed examination besides that already carried out by the Committee of what form the stabilisation policy target should take, which fiscal policy instruments should be used for different types of shock, and how the fiscal policy decision-making process can be improved to lend credibility to stabilisation policy.

The Riksbank considers it important for there to be a more detailed examination of what form the stabilisation policy target should take.

The need for a national stabilisation policy if Sweden takes part in Stage Three of EMU

The Riksbank shares the Committee's opinion that there is a risk of the Swedish economy beeing hit by shocks even if Sweden takes part in Stage Three of EMU. The common monetary policy would not prevent Sweden's economy and inflation from deviating from the euro area average periodically. The Riksbank also shares the Committee's opinion that participation in Stage Three would at best lead to a marginal improvement in the Swedish economy's ability to deal with shocks, at least in the foreseeable future. In the long term there may be an increase in nominal wage flexibility, especially if stabilisation policy proves incapable of handling major fluctuations in the economy. The Riksbank shares the Committee's concern that there is a risk of the parties in the labour market – especially in small EMU countries – becoming less cautious if they no longer need to worry about high wage growth leading to higher interest rates. However, the threat of higher unemployment and lower profits – in the absence of the devaluation option of the 1970s and 1980s – should have a disciplinary effect on wage formation in the competitive sector.

An economic policy that focuses on increasing the economy's flexibility and long-term growth potential is desirable whether or not Sweden participates in

An economic policy that focuses on increasing the economy's flexibility and long-term growth potential is desirable whether or not Sweden participates in Stage Three of EMU.

Stage Three of EMU. Nevertheless there will be a need for a credible framework for stabilisation policy if the current stabilisation policy system with a floating exchange rate and independent central bank with a clear target is given up.

A credible framework for stabilisation policy is also needed because participation in Stage Three will reduce the supervisory role played by the financial markets as it will no longer be possible to trade in assets denominated in Swedish kronor. Changes in the credibility of economic policy currently trigger movements in market interest rates and exchange rates, giving clear signals about the policy's sustainability. The cost of pursuing a policy that is not long-term sustainable will be less for small EMU countries in the short term as their actions have only a limited impact on movements in the euro area's overall interest and exchange rates. The Riksbank can see a risk of adjustments to economic policy being delayed if this signal is no longer available.

What is it that needs to be stabilised?

The ECB's price stability target would set a long-term limit on inflation in Sweden. As a result the Committee believes that the natural goal for stabilisation policy in Sweden should be to counter major fluctuations in activity in the short and medium term. The Committee therefore proposes that the goal for stabilisation policy should be to prevent the emergence of large output gaps in times of overheating or recession.[1]

The Riksbank shares the Committee's opinion that the ECB's inflation target would serve as a guide for the Swedish public's inflation expectations in the long term. However, as stated in the previous section, there is a risk that price and wage inflation in small EMU countries will depart from the average in the medium term. Different shocks can hit different countries, and price and wage setters can become less cautious if they no longer need to worry about high price and wage inflation leading to higher interest rates. This scenario would undermine Sweden's competitiveness and could in the longer term necessitate a protracted and expensive (in terms of higher unemployment) process of readjustment to lower inflation. To prevent this the Riksbank, like the Committee, believes that there

[1] The output gap is the difference between actual and potential output. Potential output is sometimes based on how quickly productivity and production factors are increasing and what GDP growth is then possible without resource utilisation rising. Potential output can somewhat simplistically be defined as long-term trend GDP growth.

may be a need for a national stabilisation policy target in the medium term even on participation in Stage Three of EMU.

However, the Riksbank believes that there may be grounds to consider whether a national inflation target for fiscal policy would be preferable to the Committee's proposal for an output gap target. There is currently broad support for the inflation target in Sweden. The Riksbank sees good reason to exploit this if Sweden takes part in Stage Three of EMU. An output gap target is more difficult to measure and more difficult to explain to the public than an inflation target. Before the output gap can be measured, potential gross domestic product (GDP) must be calculated. Different methods often give different results and GDP statistics are generally revised retrospectively. This may make it difficult to evaluate a policy based on an output gap target.

The Riksbank believes that there may be grounds to consider whether a national inflation target for fiscal policy would be preferable to the Committee's proposal.

With a less clear target and reduced scope for scrutiny there is a risk of stabilisation policy being considered less predictable, which could erode public confidence in economic policy and so limit the scope for flexibility in stabilisation policy.

Although curbing variations in economic activity is not an explicit goal for the Riksbank, a medium-term inflation target means that various indicators of the output gap are taken into account in economic policy decisions. Resource utilisation and inflation are to some extent different sides of the same coin. But inflation can also be driven up when resource utilisation is low, e.g. due to an oil price shock.

A flexible national inflation target

An inflation target for fiscal policy should be formulated in such a way as to limit how far Swedish inflation is permitted to deviate from the euro area average. However, some flexibility must be built in to allow for the need for necessary changes in the real exchange rate, i.e. necessary deviations between inflation in Sweden and the euro area. Changes in the relative prices of goods and services produced in Sweden and elsewhere may be necessary to counter permanent shifts in relative productivity growth between different countries, for example. In recent years much of the variation in the real exchange rate has taken the form of changes in the nominal exchange rate. Since the nominal exchange rate is highly mobile, substantial relative price changes can take place within a short period if necessary. If Sweden adopts the euro, it will no longer be possible for the nominal

exchange rate to move relative to the other EMU countries. Changes in the relative prices of goods produced in Sweden and other countries in the euro area would then have to be attained exclusively by different rates of price growth.

The inflation target should apply in the medium term and be designed in such a way as to take account of necessary changes in relative prices.

Experience from assessing the real performance of the krona shows that it may be possible to determine the direction and size of deviations from the krona's long-term valuation. However, it is difficult to know what path the krona will take towards its long-term real value, which makes it complicated to pursue a domestic inflation target policy. The inflation target should therefore apply in the medium term and be designed in such a way as to take account of necessary changes in relative prices. However, the Riksbank would emphasise that frequent attempts to adjust the real exchange rate would not be possible.

An assessment of whether an inflation target might be preferable to an output gap target should also look at the different types of shock that could hit the economy. For example, a surge in domestic demand might warrant the tightening of the economy using fiscal policy instruments. However, a surge in export demand might give grounds to allow inflation in Sweden to depart temporarily from the euro area average to bring foreign trade into balance through a change in the real exchange rate. Some types of domestic productivity shock might also provide grounds to allow Swedish inflation to deviate from the euro area average.[2] In the first case it makes no difference whether the stabilisation policy target takes the form of an inflation target or an output gap target, but in both the latter cases it may perhaps be more difficult to justify an inflation target since these shocks should in the first instance be managed by allowing inflation to deviate from the euro area. An inflation target may be preferable for some types of supply shock, such as an increase in oil prices that could lead to calls for compensation from wage earners. In this scenario a stabilisation policy based on an output gap target could lead to an overly expansionary policy.

Even with an output gap target, the need for changes in the real exchange rate must be taken into account. Allowing inflation to deviate from the euro area average is normally the same as allowing the output gap to deviate from the euro area average. An inflation target designed to take the greatest possible account of the need for changes in the real exchange rate should be flexible enough to hand-

[2] For a more detailed analysis of how different shocks can be countered, see Blanchard, O., (2000), "Country adjustments within Euroland. Lessons after two years", *Monitoring the European Central Bank*, March 2001.

le different types of shock. It is essential to identify the type of shock in any case, whatever the stabilisation policy target.

As mentioned earlier, the Riksbank's standard procedure is to take action if the inflation outlook one to two years ahead deviates from the target. However, the Riksbank has made it clear that this procedure cannot always be followed rigidly and must be applied with some flexibility. One concrete example is when there are temporary supply shocks of the kind that hit food and energy prices in spring 2001. By not returning inflation to the target overly quickly, unnecessary variations in output and employment can be prevented.

The Riksbank has made it clear that the standard procedure cannot always be followed rigidly and must be applied with some flexibility.

When the new Sveriges Riksbank Act entered into force in 1999, the Riksbank published a memorandum containing a clarification and appraisal of the Riksbank's inflation target. This clarification has facilitated communication with the actors in the economy. The Riksbank believes that evaluation of which shocks may necessitate action must continue in the future, and that the government and the Riksdag (the Swedish parliament) should present a framework for stabilisation policy that provides guidance in this respect. In the Riksbank's experience it is possible to pursue a stabilisation policy flexibly if the framework is fundamentally credible and the reasons for any actions deviating from the normal procedures or patterns are reported openly and clearly.

Is a national inflation target compatible with the ECB's goals?

Like the Committee, the Riksbank does not see any conflict between a national target for stabilisation policy and the ECB's responsibility for maintaining price stability throughout the euro area. An inflation target for fiscal policy in Sweden should be designed in such a way as to be compatible with the ECB's price stability policy. The ECB's monetary policy must always be based on an assessment of fiscal policy. Fiscal policy will impact on inflation even on participation in Stage Three of EMU. There will thus be grounds for the ECB to take into account how fiscal policy in the various member states will impact on the rate of inflation in the euro area as a whole. This applies whether or not fiscal policy has an explicit national stabilisation policy target. In this respect an output gap target is no different from an inflation target.

An inflation target for fiscal policy in Sweden should be designed in such a way as to be compatible with the ECB's price stability policy.

Can fiscal policy take the place of monetary policy?

Risk of credibility problems

The Riksbank shares the Committee's conclusion that as a rule it would seem to be possible to use discretionary fiscal policy measures to push aggregate demand in the right direction, although the size of this effect will depend on the measure, the type of shock and the economic climate. The Riksbank also shares the Committee's opinion that the key problems lie instead in factors that can affect the credibility of stabilisation policy.

Fiscal policy decisions are more likely than monetary policy decisions to be associated with various forms of delay in the decision-making process and with conflicts of interest.

Fiscal policy decisions are more likely than monetary policy decisions to be associated with various forms of delay in the decision-making process and conflicts of interest. The decision lag – i.e. the time elapsing between the problem being observed and action being taken – is probably far longer for fiscal policy than for monetary policy because decisions to change taxes and expenditure are often subject to protracted political negotiations. This problem can be particularly acute with minority and coalition governments. As the Committee notes, this problem could increase the risk of measures being introduced too late and so impacting on the economy in the wrong phase of the business cycle. However, fiscal policy changes probably have a more rapid impact on the economy than monetary policy changes once the decision has been taken. Fiscal policy also has various goals, which means that other goals may be given priority over stabilisation policy. In some cases it may also be difficult to distinguish between the various goals.

The political difficulties associated with implementing a tight fiscal policy during a boom period can also result in fiscal policy being overly expansionary on average, reinforcing business cycle fluctuations and pushing up public sector debt over time. The stabilisation policy failures of the 1970s and 1980s with the associated cost crises and subsequent devaluations are concrete examples of this. During these two decades stabilisation policy contributed to domestically generated imbalances. Such imbalances may mean that business cycle fluctuations in the outside world have a greater impact on activity in Sweden than necessary and that the problems last longer.

Given the problems with which fiscal policy has been associated in the past,

the Riksbank is of the opinion that the stabilisation policy framework would need to be strengthened before participating in the Eurosystem. A properly functioning framework for stabilisation policy and an economic policy that helps to increase the economy's flexibility may help to make fiscal policy more effective.

The Riksbank is of the opinion that the stabilisation policy framework would need to be strengthened before participating in the Eurosystem.

The ambitiousness of stabilisation policy

Considering the difficulties associated with a stability-oriented fiscal policy, the Riksbank shares the Committee's conclusion that discretionary fiscal policy measures should be used only for relatively large shocks. The high frequency of monetary policy decisions and the small increments normally used to adjust the repo rate should not be taken as an indication of particular confidence in the possibility of fine-tuning the economy. Changes are often made in small increments because uncertainty about future developments is great.

The Riksbank shares the Committee's conclusion that discretionary fiscal policy measures should be used only for relatively large shocks.

The Riksbank shares the Committee's opinion that "normal" cyclical fluctuations should be managed by the automatic stabilisers.[3] The Riksbank also shares the Committee's opinion that it is important to try to further increase the efficacy of the automatic stabilisers, but without increasing the distortion effects in the economy.[4]

The Committee's suggestion that it might be worth looking more closely at how the efficacy of the automatic stabilisers can be increased by basing local authority income on an average over several years is in line with this aim. However, it should be stressed that the balanced budget requirement should not be undermined.

[3] A tax system where taxes are income-dependent combined with income-related transfers has an automatic stabilising effect. The tax and benefits system can therefore have a stabilising effect even in the absence of discretionary stabilisation policy measures.

[4] As the Committee points out, even automatic stabilisers can be associated with various types of time lag. Automatic stabilisers do not kick in until the economy has already turned. They also react automatically without taking account of the type of shock affecting the economy. In the case of permanent productivity shocks, they can even help to delay the necessary structural adjustment to the new conditions.

Choice of fiscal policy instrument

The Riksbank shares the Committee's opinion that the fiscal policy instruments used to stabilise the economy should impact as generally as possible.

The Riksbank shares the Committee's opinion that the fiscal policy instruments used to stabilise the economy should impact as generally as possible. This means that measures should concentrate on broad expenditure or tax bases. Measures with extensive distribution effects should be avoided. General measures with limited distribution effects will be easier to reverse and can therefore be applied symmetrically over the business cycle. This reduces the risk of stabilisation policy helping to push up central government debt in the long term.

The Riksbank largely shares the Committee's opinion on the choice of suitable fiscal policy instruments but also believes that it would have been valuable if the Committee had discussed in more detail which instruments should be used for which type of shock and assessed the impact that the different instruments could have on both inflation and demand.

The need for institutional reforms that lend credibility to the national stabilisation policy

The need to build a credible framework for economic policy has been an important factor when central banks in a number of countries, including the Riksbank in Sweden, have been given greater independence in a formal sense. The government bill (1997/98:40) behind the new Riksbank Act in 1999 states: "By delegating responsibility for the formulation of monetary policy to an independent Riksbank with a clearly defined price stability target, policy can be given the long-term perspective needed for the target to be credible."

An equivalent argument to that behind the Riksbank's increased independence can be made for the formulation of a stabilisation policy regime if Sweden participates in Stage Three of EMU.

An equivalent argument to that behind the Riksbank's increased independence can also be made in a discussion of the formulation of a stabilisation policy regime if Sweden participates in Stage Three of EMU. There are several different institutional solutions that would increase the credibility of stabilisation policy decisions to varying degrees.

Institutional reforms that could lend varying degrees of credibility

An examination of the different forms for stabilisation policy would entail consideration of a variety of solutions.

The Riksbank shares the Committee's assessment of the need to find institutional solutions that can increase the credibility of stabilisation policy. A more detailed examination of the different forms for stabilisation policy, which the Riksbank believes to be necessary, would entail consideration of a variety of solutions. The emphasis should be on the following areas:

- *Clear targets and rules*: A stabilisation policy target will help to focus the policy and make it easier for the public to assess whether measures are in line with the long-term policy objective. As mentioned earlier, an inflation target is an idea that should be considered. Various forms of fiscal rule, such as the government net lending target and expenditure ceiling, are – alongside institutional reforms of the decision-making process – a way of increasing the credibility of fiscal policy (see also section "An effective stabilisation policy requires stable public finances" below).
- *Transparency and scrutiny*: One way of convincing the public that economic policy has a long-term objective is to pursue the policy with a high degree of transparency. Transparency is in fact essential for the policy to be evaluated. Different forms of continuous scrutiny should also be reviewed.
- *Clear decision-making processes*: Experience from reforms of the budget process in recent years suggests that the decision-making process itself can provide support for the long-term economic policy objective. The decision-making processes were analysed by a number of committees in connection with the reforms of the budget process. This review included the workings of the Riksdag, the government and various other institutions. The Riksbank believes that there are grounds to carry out a similar evaluation of the decision-making processes from a stabilisation policy perspective.
- *Delegation of instruments*: The Riksdag's delegation of responsibility for monetary policy to the Riksbank has helped to increase the credibility of stabilisation policy. Delegation to the government or another body that can help to reduce the decision lag should be considered.

At present the Riksbank is not in a position to claim that a particular combination of measures would be sufficient to create a credible framework for stabilisation policy after the introduction of the euro. A more detailed examination of this

should therefore be begun as soon as possible. It would be natural for measures to strengthen existing institutions to be in the foreground.

Transparency promotes credibility

General openness about fiscal policy is essential if it is to be possible to scrutinise stabilisation policy.

Fiscal and budget policy transparency can be achieved by (i) defining clear targets, (ii) having clear decision-making processes, and (iii) ensuring that public sector accounts are comprehensive, GAAP-compliant and published regularly. General openness about fiscal policy is essential if it is to be possible to scrutinise stabilisation policy.

Giving stabilisation policy a more important role in fiscal policy would also have a number of other aspects. Not least, as mentioned previously, it is important to define *stabilisation policy targets* and *instruments* and finds *means of scrutiny*. Since stabilisation policy measures should be based upon a forward-looking perspective, it is particularly important that the *forecasts* behind decisions are credible. Transparency gives the public an opportunity to ensure that these forecasts are based on science and proven experience.

The Committee's proposals for an expert advisory body would be another step towards transparency.

The transparency of public finances has improved in recent years. The Committee's proposals for an expert advisory body would be another step in this direction. The role of this "fiscal policy council" would be to monitor and analyse economic developments and suggest stabilisation policy measures to the government. According to the Committee's proposals, the government would be required to take a position on the council's recommendations. The Committee suggests that the council's experts be appointed using the same pattern as the Riksbank's executive board. These proposals would increase transparency as the forecasts and reasoning of the government and the council can be compared. Since the government must also respond to the council's recommendations, there is greater transparency in terms of whether the measures are sufficient. The council can also help to facilitate scrutiny.

The Riksbank believes that it should be possible to achieve the same benefits without creating a new body.

The Riksbank therefore favours the increased transparency that the Committee's proposals entail. However, the Riksbank believes that it should be possible to achieve the same benefits without creating a new body. One alternative might be to take various steps to ensure transparency in the work of the government, the Riksdag and the authorities concerned. A number of coun-

tries – including the UK, Australia and New Zealand – have chosen in recent years to establish fiscal policy transparency in law. Another solution might be to have one or more existing authorities contribute stabilisation policy assessments and recommendations along the same lines as the Committee's proposals for an independent body.

There should be special arrangements for parliamentary scrutiny of the government's stabilisation policy. This might, for example, mean the finance minister being questioned by the parliamentary finance committee following the pattern established for the Riksbank. There may be grounds for the authorities concerned to present the documentation underlying the Riksdag's deliberations in order to facilitate scrutiny. It might also be warranted to increase the Riksdag's human resources in this respect.

A decision-making process for the long term

If the government and the Riksdag are given more direct responsibility for stabilisation policy, the decision-making process should also be reviewed in other respects.

If the government and the Riksdag are given more direct responsibility for stabilisation policy, the decision-making process should also be reviewed in other respects. Reforms of the budget process have revealed that a clear decision-making process can provide support for the long-term economic policy objective. The finance ministry and parliamentary finance committee should play a major role in the preparatory work because experience from Sweden and other countries suggests that they show a greater tendency to prioritise a long-term stabilisation policy. The Riksbank believes that it could be valuable to look at how the fiscal policy decision-making process for stabilisation policy is organised in other countries.

One problem with pursuing a stabilisation policy with fiscal policy means is that the decision paths are long. One way of shortening these paths is for the Riksdag to delegate stabilisation policy powers to the government. The government would then be able to pursue its stabilisation policy without needing to bring bills before the Riksdag, which could substantially reduce the decision lag.

This delegation might take the form of the Riksdag authorising the government to make temporary adjustments to tax rates within a set interval. For example, the Riksdag could allow an interval of ±2 percentage points when setting the standard rate of value-added tax (VAT), so enabling the government to adjust the rate of VAT according to the state of the economy. Alternatively the government could adjust an economic parameter that impacts on the overall rate of taxation. Provided that taxes are raised and lowered symmetrically over the business cycle,

this stabilisation policy will not affect budget, distribution or structural policy in the long term.

Delegation to the government will reduce the decision lag but, as mentioned in section "Can fiscal policy take the place of monetary policy?", there are a number of factors in the political decision-making process that could still generate some uncertainty about stabilisation policy. However, clear forms of delegation, transparency and scrutiny will offset this problem to some extent.

Another more radical option, which is closer to the current system and has also been discussed in the economic literature, would be to delegate some fiscal policy instruments to an independent authority.[5] One alternative that is perhaps less far-reaching is for an independent authority to be given a certain degree of influence over the process of preparing and deciding on the annual targets for government net lending.[6] The Committee discusses these solutions but concludes that some parts of fiscal policy are a genuinely political matter and so cannot be delegated to an independent authority. However, the Riksbank believes that while such a solution would be complex, not least in terms of principle, it should not be ruled out without further consideration.

An effective stabilisation policy requires stable public finances

The need for budget discipline

To provide a flexible and long-term sustainable stability-oriented fiscal policy on participation in Stage Three of EMU, the Riksbank would stress the importance of good budget discipline.

The Riksbank shares the Committee's opinion that the various fiscal policy targets and rules introduced in recent years both nationally and in the EU may have reduced the risk of stabilisation policy failures of the kind seen in the 1970s and 1980s, even though recent developments in some euro countries suggest that the rules are not being followed as intended. To provide scope for a flexible and long-term sustainable stability-oriented fiscal policy on participation in Stage

[5] Ball, L., (1997), "A Proposal for the Next Macroeconomic Reform", *Victoria Economic Commentaries*, March, pp. 1–7; Blinder, A., (1997), "Is Government Too Political?", *Foreign Affairs*, vol. 76, and Hemming, R. & Kell, M., (2001), "Promoting fiscal responsibility – transparency, rules and independent fiscal authorities", mimeo, Fiscal Affairs Department, IMF.

[6] See Wyploz, C., (2002), "Fiscal policy: Institutions vs Rules", annex 5 to SOU 2002:16.

Three of EMU, the Riksbank would stress the importance of good budget discipline.

Like the Committee, the Riksbank has observed that the budget margin has come to be used for expenditure reforms and that it has been possible to circumvent the expenditure ceiling by substituting expenditure reforms with equivalent proposals on the income side. This kind of behaviour on a broad scale runs the risk of undermining the purpose of the expenditure ceiling and will also reduce the scope for pursuing a symmetrical stabilisation policy on participation in Stage Three. The Riksbank therefore supports the Committee's proposals for a special "margin for cyclical expenditure" below the expenditure ceiling even though its purpose does not differ materially from the original purpose of the budget margin. When it comes to the problem of tax cuts being used to circumvent the expenditure ceiling, it may be worth considering whether "tax expenditures" should be integrated into the budget process, in the sense that those tax benefits that could equally well have taken the form of subsidies and are introduced with the sole purpose of circumventing the expenditure ceiling should trigger a reduction in the expenditure ceiling.

The Riksbank supports the Committee's proposals for a special "margin for cyclical expenditure" below the expenditure ceiling.

In 2000 Sweden introduced a balanced budget requirement for local authorities that requires in principle that any budget deficit must be eliminated within two years of arising. The Committee believes that this balanced budget requirement can have a destabilising effect on the economy as deficits may need to be offset during a period of recession. The Riksbank shares this conclusion and therefore supports the Committee's proposals that those local authorities that have already achieved a high level of financial solidity should temporarily be allowed to budget for deficits when their income falls. However, the Riksbank would like to stress the importance of the balanced budget requirement for local authorities being complied with in other respects since it contributes to long-term sustainable public finances in the consolidated public sector.

The Riksbank supports the Committee's proposals that those local authorities that have already achieved a high level of financial solidity should temporarily be allowed to budget for deficits when their income falls.

The target for government net lending

The Committee believes that the target for government net lending needs to be raised from 2 per cent of GDP to 2½ or 3 per cent of GDP to provide a margin

for discretionary stabilisation policy measures if the risk of budget deficits exceeding 3 per cent of GDP (the Maastricht Treaty ceiling) during a recession is to be minimised. The Committee believes that this revised net lending target should apply in the first instance for the next decade and then be reviewed in the light of demographic developments and the state of public wealth.

The net lending target should initially be set at a level whereby the optimum size of central government debt is achieved within a reasonable period.

The Riksbank believes that the Committee has not convincingly demonstrated a need to raise the net lending target and that an assessment of the need to run budget surpluses cannot be undertaken separately from an analysis of the optimum size of central government debt. Such an analysis requires, among other things, that demographic developments are taken into account. The net lending target should initially be set at a level whereby the optimum size of central government debt is achieved within a reasonable period.[7] Once the optimum level has been achieved, it is reasonable to conclude that financial saving should be zero, since the public sector would otherwise build up unmotivated net claims on the general public. When it comes to the need for budget surpluses to counter the effects of demographic developments, the Riksbank would point out that reforms to increase the supply of labour and economic growth (e.g. tax and expenditure reforms, a higher retirement age and labour immigration) may be preferable to a high net lending target.

[7] A more rapid reduction in central government debt could have important implications for the efficacy of fiscal policy. There are research results to suggest that the efficacy of fiscal policy is limited when central government debt is high.

Appendix: Stabilisation policy in the monetary union – a summary of the Swedish Government Official Report 2002:16

Membership in the monetary union will mean a change in the stabilisation policy regime because domestic monetary policy will disappear as an instrument to stabilise the economy. Instead, Sweden will participate in a common European monetary and exchange rate policy. The opportunity to use interest rate changes to counteract macroeconomic shocks that specifically affect the Swedish economy will then be lost. Nor can exchange rate adjustments vis-à-vis euro countries take place in response to such country-specific shocks.

The primary purpose of this report is to analyse the problems which may arise in this new stabilisation policy regime and to propose how best to pursue fiscal policy under these new conditions.

The report focuses on two basic issues. The first issue is whether the need for stabilisation policy may ultimately change as a result of EMU membership.[1] This in turn depends on the extent to which macroeconomic shocks that affect the Swedish economy will be different in the monetary union and on the extent of changes in the economy's ability to adapt to these shocks. The labour market plays a central role, particularly in the latter aspect.

The second issue is what can be done to make the stabilisation policy instrument that remains available to the government in the event of country-specific shocks – fiscal policy – as effective as possible.

This summary discusses the above issues. First, it examines the spontaneous adjustments in the economy that may take place if Sweden joins the EMU. This is followed by a discussion of how domestic fiscal policy should be pursued so as to contribute in the best possible way to stable macroeconomic developments.

Macroeconomic stability

Macroeconomic shocks

It is difficult to know in advance whether macroeconomic shocks will be larger or smaller in the monetary union than they would have been outside it. As a member of the monetary union, Sweden will be affected by new types of shocks, but

[1] Throughout this report, the concept 'EMU membership' is used as a synonym for participation in the monetary union. Even if this usage is formally improper, it is practical and is generally accepted.

will also avoid other types. Empirical studies do not provide a clear picture. Furthermore, since these studies are inherently based on historical data – while participation in the monetary union constitutes a radical structural change – their results do not necessarily provide an accurate guideline to future developments.

Continued integration and increased trade with euro countries will increase the Swedish economy's dependence on, and probably also covariance with, European economic developments. Cyclical fluctuations in Sweden will probably largely follow those of the euro area. The monetary policy of the European Central Bank will in that case help to stabilise the business cycle in Sweden as well. Increased specialisation of production among euro countries may, however, entail a greater risk of shocks that affect individual economies only. In addition, macroeconomic shocks in other parts of the monetary union may bring about changes in the interest rate and the euro rate, which may destabilise the Swedish economy. All in all, a monetary policy formulated for a group of countries will inevitably be a less sharp policy instrument than a monetary policy formulated specially for one particular country.

Consequently, it is difficult to draw safe conclusions about how the pattern of macroeconomic shocks will change in the event of participation in the monetary union, both compared with the present regime with a floating exchange rate and compared with the previous regime with a fixed but adjustable exchange rate. In the opinion of the Government Commission, there should be a readiness for shocks that in the absence of a national monetary policy would entail a greater risk of increased macroeconomic instability. This increases the demands on labour market adjustment and on fiscal policy.

The labour market's ability to adjust

The absence of a national monetary policy can lead to problems in the event of major fluctuations in the demand for products and services that do not affect other euro countries in the same way and therefore do not result in an appropriate monetary policy for Sweden. In such a situation, an adjustment of wage costs in relation to other countries may be necessary to keep employment stable. In the monetary union, this kind of adjustment must take the form of changed nominal wage costs.

EMU membership may increase the incentives for the labour market parties to achieve higher nominal wage flexibility, for example through shorter contract periods, clauses that tie wage growth to macroeconomic developments, more frequent renegotiations of existing agreements, and less resistance to low nominal wage increases. However, there is reason to believe that changes in nominal wage

flexibility will be rather limited. This is related, not least, to difficulties in lowering the nominal wage level. At low rates of inflation there is limited scope for adjusting the wage level relative to other countries by lowering the rate of nominal wage increases.

It is possible that EMU membership will enhance the incentives for the labour market parties to co-ordinate their wage negotiations, since this is likely to increase nominal wage flexibility. This kind of development seems to have taken place in many EMU countries, for example through social pacts between labour market parties, in some cases with the government as a third party. However, it is doubtful whether this kind of co-ordination can work in the long run, since in a longer perspective strong forces seem to be working in the direction of more decentralised wage formation.

Our view is that changes in the degree of nominal wage flexibility are likely to compensate only to a minor extent for the loss of national monetary policy as an instrument of stabilisation policy.

Wage formation can also in itself constitute a source of shocks that could become more difficult to manage in a monetary union. There will no longer be any possibility of counteracting excessive Swedish wage cost increases by a tighter national monetary policy. As a result, the risk of wage cost shocks may increase. If wage formation is not functioning well, there is a risk of imbalances that can result in drawn-out adjustment processes with high unemployment. Parallels can be drawn to the effects that would have arisen if a depreciation of the krona had not taken place in connection with the transition to a floating exchange rate in 1992. In the absence of exchange rate adjustment, the adjustment of wage costs relative to other countries would instead have had to take place through a long period of smaller nominal wage increases than in other countries. Unemployment in the 1990s would then have been even higher than was now the case.

Buffer funds and other institutional changes

The Government Commission has had the task of analysing various instruments that can contribute to increased flexibility in wage costs. In the debate, special interest has been attached to so-called *buffer funds*. The idea is to build up funds that, in the event of a negative macroeconomic shock, could provide financial scope for lowering wage costs by reducing negotiated employer contributions to various insurance systems. In this way, wage costs can be redistributed over time.

In Finland, buffer funds have been set up primarily to prevent contributions to unemployment insurance and pension schemes being raised in recessions. This problem is not relevant in Sweden. The Swedish central government's budget

acts, to a much greater extent than in Finland, as a stabilising buffer. However, the option of lowering negotiated employer contributions in a recession is of interest.

Our opinion is that under the auspices of the labour market parties and if constructed properly, a system of buffer funds could increase the economy's ability to adjust, thereby helping to moderate cyclical fluctuations. If such funds are set up, they should be administered by the labour market parties themselves without any government involvement, so as to make the division of responsibilities between the government and the parties with respect to wage formation as clear as possible. Any such funds should be reserved for strong, negative shocks and should not be used routinely as a stabilising instrument. Furthermore, the funds should only be used for general reductions in contributions, so that they do not constitute support to particular sectors or regions, and thereby risk slowing down a necessary structural change. If the labour market parties agree upon such a system, it should be welcomed, but the advantages are not so great as to justify government subsidies.

Continued economic integration with other countries entails increased competition for Swedish companies, which in turn increases the demand for skills development and mobility between jobs. Mobility can be encouraged by existing instruments within education and labour market policy and by new instruments such as career change insurance (*omställningsförsäkring*) and learning accounts (*kompetenskonton*). Tax policy and the design of unemployment insurance are also of great importance in this regard. Increased mobility and improved opportunities for skills development can contribute to stabilising employment in the case of shocks that cause shifts in employment between sectors. EMU membership may speed up the integration process to a certain extent, but the Government Commission's opinion is that requirements for skills development and mobility will be similar regardless of whether Sweden joins the EMU or not.

According to its terms of reference, the Government Commission is to analyse whether instruments taking the form of performance-based wages, flexible working hours or learning accounts can enhance the economy's ability to absorb economic shocks. Based on the above opinion that requirements for skills development and mobility will be similar regardless of whether Sweden joins the EMU or not, our conclusion is that such instruments should be assessed on their own merits and cannot be viewed as special requirements raised by EMU membership.

However, if a system of individual learning accounts were to be introduced to structurally promote skills development and mobility, there are reasons for design-

ing it to allow stabilisation policy aspects to be taken into account when it comes to the timing of recurrent education. Our opinion is, however, that this instrument can only contribute marginally to stabilising employment. Adjustments to the business cycle can also take place within the framework of existing education systems.

Working hours are and should remain an issue for the labour market parties, besides the legislation that is warranted for working environment or safety reasons. Variations in working hours cannot serve as a general stabilisation instrument, since in a recession, for example, reducing working hours in sectors or personnel categories not subject to decreasing demand would be associated with considerable social costs. In our opinion, there is no justification for the government to undertake measures for stabilisation reasons aimed at increasing the variation in working hours over the business cycle.

There are several arguments supporting performance-based pay schemes. It is likely that such schemes are capable of leading to higher output and higher employment on average over the business cycle. However, it is less clear whether such schemes contribute to moderating fluctuations in output and employment.

Fiscal policy

The Government Commission's conclusion is that the changes that can be predicted in the pattern of macroeconomic shocks and the economy's ability to adjust will not be able to compensate for the loss of national monetary policy. In the future too, there will continue to be a need for national stabilisation policy, which in the event of EMU membership must be pursued through fiscal policy only.

The role of stabilisation policy

The Government Commission's view of the role of fiscal policy in stabilising the business cycle is to a great extent based on what currently appears to be the general perception of stabilisation policy. This can be summarised as follows. The experience of many countries has shown that a lack of a long-term perspective has tended to make stabilisation policy systematically too expansionary. Examples include the developments in Sweden in the 1970s and 1980s, and Germany's situation in the 1990s. Stabilisation policy has often not been tightened sufficiently in times of booms, which has consequently limited the room for manoeuvre during recessions. Also, fiscal policy changes have often been carried out at times that were inappropriate from a stabilisation policy point of view.

A tangible result of previous stabilisation policy experiences in most OECD countries is that the main responsibility for stabilisation of the economy has been transferred from fiscal to monetary policy, and that monetary policy has been delegated to independent central banks. The purpose of such delegation to a central bank, which operates 'at arm's length' from current politics, is to increase the credibility of a low-inflation policy and to decrease the risk of measures being undertaken at points in time that are inappropriate from a stabilisation policy standpoint. Greater credibility in turn creates more scope for measures to stabilise the economy.

In conjunction with this development, the long-term perspective of fiscal policy has also received more emphasis through commitments at both EU and national level. One example of this is the fiscal policy rule at the EU level that a deficit in public sector net lending may only in exceptional cases and temporarily exceed three per cent of GDP. Other examples are the target for general government net lending and the expenditure ceiling in Sweden. Consolidation of the formerly very strained public finances in many countries has also contributed to giving monetary policy the required scope for action.

These new institutional frameworks for stabilisation policy appear to have mitigated the problems that were previously associated with active economic stabilisation.

The changed role of fiscal policy in the monetary union

Participation in the monetary union means that Sweden leaves a situation where stabilisation of the domestic economy is primarily effected by an independent authority, that is, the Riksbank, which has this task as its main objective. Domestic stabilisation has instead to be managed through fiscal policy, which also has many objectives other than to stabilise economic activity. This entails a risk that the long-term perspectives of stabilisation policy may be set aside for more short-term considerations.

The various types of fiscal policy rules that have been introduced in recent years have reduced the risk of failures in stabilisation policy, but there is nevertheless a risk that fiscal policy discipline will gradually grow lax as the memory of previous deficit problems fades away. The current international debate on loosening the restrictions imposed by the Stability and Growth Pact, and the fact that several euro countries are having difficulty pursuing a sufficiently tight fiscal policy in times of prosperity, illustrate the point that many countries are under considerable pressure to pursue an excessively lax fiscal policy. In Sweden, the so-called budget margin – the difference between the government expenditure ceil-

ing and estimated expenditure – has come to be viewed more as 'room for new expenditure increases' than as a safety margin for dealing with uncertainty in expenditure forecasts. In addition, certain 'reforms' in recent years have taken the form of tax cuts ('tax expenditures') rather than spending increases so as to avoid the limitations that the expenditure ceiling is meant to impose. These tendencies give cause for concern since strong public finances, which provide scope for using fiscal policy during macroeconomic shocks, are of greater importance in the event of membership in the monetary union than now.

The formulation of a stabilisation policy target for fiscal policy

EMU membership should mean a change in the target for domestic stabilisation policy. In the case of participation in the monetary union, the need for a domestic anchor for the long-term rate of inflation disappears. The nominal anchor instead consists of the ECB price stability target. EMU membership can thereby partly be seen as a return to the stabilisation policy regime that Sweden attempted, but failed to maintain, through a fixed exchange rate in the 1970s and 1980s. The difference is that EMU membership would create a situation that would be basically the same as if Sweden had a completely credible exchange rate vis-à-vis other euro countries.

Since national stabilisation policy will no longer need to provide a nominal anchor in the event of EMU membership, the natural conclusion in our opinion is that fiscal policy, given a specified long-term target of general government net lending over the business cycle, should have as its primary stabilisation policy target to *counteract major fluctuations in the level of activity* both in the short and medium term. Expressed in more technical terms, the output gap (the difference between actual and potential GDP) must not grow too large. This target may also be interpreted as implying that policy is to counteract major fluctuations in employment and unemployment from their equilibrium levels. The target of stabilisation policy should be forward-looking, since it is difficult to influence the level of activity in the short term without great variations in taxes and government expenditure.

The target of domestic stabilisation policy in the case of EMU membership is of necessity more ambiguous than in the current monetary policy regime with an inflation target, since the assessment of the size of the output gap is relatively uncertain. However, if the aim of stabilisation policy is to stabilise the level of activity, this constitutes an unavoidable problem. In principle, similar difficulties also exist in the current monetary policy regime, since inflation forecasts are based on, among other things, estimates of the output gap. In practice, therefore,

such estimates are also crucial for monetary policy decisions. However, the difficulties in estimating the output gap provide a strong motive for undertaking fiscal policy measures to stabilise the economy only in the event of major shocks.

Even if the objective of stabilising the output gap can be construed as an objective to stabilise employment and unemployment, there are several reasons for formulating the target in terms of the output gap. One reason is that the output gap is a wider concept that reflects the level of activity in the economy as a whole and not only the situation in the labour market. A focus on stabilising the output gap therefore takes more stabilisation policy aspects into consideration than a target that only focuses on the labour market situation, particularly the stabilisation of the income level in the economy.

The main reason for our recommendation to focus on the output gap instead of on the labour market situation per se as a target for fiscal policy is the ambiguity of macroeconomic objectives which could otherwise arise. This point is related to the fact that Swedish macroeconomic policy already works with targets for employment (80 per cent of the working-age population) and unemployment (4 per cent of the labour force). These targets must be viewed as targets for equilibrium levels (average long-run sustainable levels), which are to be achieved through a *structural* employment policy that leads to a well-functioning labour market. It might be problematic to simultaneously formulate a different short-term employment target for fiscal policy, that is, to stabilise employment at the currently prevailing equilibrium level, which may deviate from the long-term target.

An assessment of the output gap must be based on the careful appraisal of a number of indicators, such as the development of prices and wages, estimates of the long-term trend in GDP using statistical methods, and various measures of 'shortages' in the product and labour markets.

Price and wage cost developments relative to other countries are particularly relevant indicators of the possibilities of stabilising the level of activity. If price and wage cost increases are higher in Sweden than in other euro countries – and this is not balanced by long-term shifts in demand toward Swedish products or higher productivity growth – competitiveness will gradually be weakened. This will make it more difficult to achieve the target of stabilisation policy in the medium term. The reason for this is that the difficulty of adjusting wage cost increases downward means that drawn-out adjustment processes will be needed to correct for a cost level that has become too high. Accumulated cost problems due to faster cost increases than in other countries can therefore result in fiscal policy being unable to counteract major declines in output and employment in the medium term. Therefore, when formulating fiscal policy, great importance

should be attached to price and wage cost developments in relation to other euro countries.

Faster price and wage cost increases in Sweden than in other countries may often be due to an increase in demand that has caused actual GDP to exceed the potential (sustainable) level. A policy that dampens the economy relatively quickly will then improve the conditions for macroeconomic balance in the short as well as the medium term.

Another possibility is that a wage cost shock – an 'asymmetric supply shock' – will arise in the Swedish economy. For example, this may occur if wage negotiations in a situation not characterised by particularly high demand result in multi-year agreements with higher wage increases than in other euro countries. Since higher wage cost increases in a given economic situation can be interpreted as a decrease in sustainable employment and output levels, this could be interpreted as reflecting the existence of a positive output gap. Therefore, no conflict arises between stabilisation in the short and medium term. A tighter fiscal policy is justified by both the positive output gap and the higher wage cost increases relative to other euro countries.

A fiscal policy that reacts in this way to higher wage increases than in other euro countries should boost incentives for wage restraint, thereby exercising a positive influence on the long-run sustainable levels of output and employment. If fiscal policy is formulated in this way, it can, at least to some extent, take over the restraining effect that national monetary policy at present exerts on wage formation.

Discretionary fiscal policy and automatic stabilisers

As discussed above, there has earlier been a tendency to pursue an excessively expansionary fiscal policy in Sweden. With membership in the monetary union, such a tendency would primarily manifest itself in the form of large budget deficits and growing government debt, but also in a rise in the domestic price level relative to other countries. These risks explain why a discretionary fiscal policy – that is, a policy of active decisions to change tax rates and government expenditures with the aim of stabilising the economy – should be used with caution in the event of participation in the monetary union. In the EMU, fiscal policy should not be used as actively as national monetary policy in a regime with a floating exchange rate.

In the case of 'normal' shocks, stabilisation besides that which occurs through the monetary policy of the ECB, should primarily take place by means of the automatic stabilisers, that is, the changes in tax payments and government

expenditures that are automatically induced by variations in the level of activity. Discretionary fiscal policy should only be used for stabilisation purposes in the event of major macroeconomic imbalances. In the absence of major shocks, discretionary fiscal policy should focus on attaining the target for general government net lending over the business cycle, as laid down by the Riksdag (the Swedish parliament).

It is difficult to define when a shock is sufficiently large to justify discretionary fiscal policy measures. One reasonable way of characterising a 'major' shock would be as an output gap of at least plus or minus two per cent of potential output. On the basis of the limited evidence available on the link between the output gap and unemployment in Sweden, the Government Commission judges that a change in the output gap of two percentage points corresponds to a change in open unemployment of approximately one per cent.

At the same time, it is uncertain how the relation between fluctuations in output and fluctuations in (un)employment has been affected by the considerable structural changes in the Swedish economy in the past decade, and what effects will arise if Sweden joins the EMU. The definition of what can be considered a major shock may therefore need to be reviewed in the future. In addition, there may be reason to further study the issue of whether discretionary fiscal policy should be asymmetric, in the sense that measures should be triggered by smaller output gaps in booms (when they are positive) than in recessions (when they are negative). The reason for considering such asymmetry is that price and wage increases tend to accelerate relatively quickly in booms, but are more sluggish downwards in slumps.

Active labour market programmes, which can be seen as a form of 'semiautomatic' stabilisers, should continue to be used as an active stabilising instrument also during minor shocks. These measures seem on the whole to have been well timed, although the volume of measures during the crisis in the early 1990s was excessive. It is important that labour market programmes are not used to such an extent that they become ineffective and that they do not become permanent, but are phased out quickly in an economic upswing. Nor should labour market policy measures be used so as to keep open unemployment down at the expense of major negative effects on regular employment.

The target for government net lending

To create scope for automatic stabilisers as well as discretionary fiscal policy, public finances should show a surplus over the business cycle. The size of this surplus should depend to a great extent on the room required for fiscal policy to provide

stimulus during major negative shocks. The EU fiscal policy rule that a deficit in public finances may only in exceptional cases and temporarily exceed three per cent of GDP is an important restriction that must be taken into account. From a more general point of view, it is important that there is sufficient room for manoeuvre so that discretionary measures can be undertaken in slumps without risking developments in government finances that are seen as untenable, which would limit the effect of the stimulus.

Empirical estimates do not give a clear picture of the margins needed to provide room for automatic and 'semiautomatic' stabilisers without coming into conflict with the Stability and Growth Pact's deficit rule. A reasonable overall judgement is that a surplus of at least one per cent of GDP is required on average over the business cycle to provide room for the automatic and semiautomatic stabilisers to work.

To achieve the objective of maintaining output and employment near their potential levels, there should also be considerable room for discretionary expansionary fiscal policy in the event of major negative shocks. It is difficult to calculate exactly how much additional room may be required, since such discretionary stimulus measures lead to higher GDP and thereby higher tax receipts and lower expenditure on unemployment compensation, etc., than would otherwise have been the case.

In our opinion, there may be justification for increasing the target for government net lending over the business cycle from the current level of 2 to 2.5 or, alternatively, 3 per cent of GDP, so as to provide a satisfactory safety margin for discretionary fiscal policy stimuli in recessions. Maintaining the present target entails a greater risk to stabilisation policy.

A target for net lending of the size proposed should apply in the first place for the next ten-year period. A review should thereafter be conducted in light of demographic developments and changes in the state of public wealth. Furthermore, it is possible that the EU's fiscal policy rules will eventually change, which would then call for a revision of the Swedish target for net lending.

The expenditure ceiling

The central government expenditure ceiling plays an important part in securing the strong public finances required to make fiscal policy an effective stabilisation instrument. At the same time, the expenditure ceiling should not unduly constrain fiscal policy as a stabilisation policy tool. In order for the automatic stabilisers to achieve full effect in a recession, there must be enough room on the expenditure side of the central government budget. Appropriate fiscal policy measures

to stabilise the economy during major negative shocks may also include increased central government expenditure. There must be room for such expenditure increases too under the expenditure ceiling. The expenditure ceiling should therefore be constructed in such a way that there is always a margin for stabilising the economy through increases in expenditure should a major shock arise. This should be accomplished by creating a special *margin for cyclical expenditure*. This margin is not to be utilised for any purpose other than expenditure increases that derive automatically from cyclical developments, including labour market policy measures, or for discretionary fiscal policy decisions aimed at stabilising the economy during major shocks. Expenditure increases for other reasons ('reforms') should not be allowed to reduce the margin for cyclical expenditure.

In our opinion, the margin for cyclical expenditure should amount to approximately three per cent of the expenditures restricted by the ceiling. This would provide sufficient budget room for managing even a protracted recession.

Beside the margin for cyclical expenditure, there should be a *planning margin* to provide room for additional 'reforms' that will increase expenditure. The planning margin may also be negative, in which case it requires expenditure cuts. Expenditure deviations resulting from factors other than cyclical reasons, for example a change in the pattern of sick leave, should be included in the planning margin. The planning margin should therefore be determined so that it covers uncertainty in forecasts arising from factors other than the business cycle, to the extent that the government does not wish to balance increases in such expenditures by decreases in other expenditures.

Local governments and stabilisation policy

During an economic slowdown, the balanced budget requirement that has applied to municipalities and county councils since 2000 can result in a decrease in the level of activity and employment, thereby compounding the slowdown. This is not an argument for a revision of the balanced budget requirement. However, there are reasons for considering a system whereby municipalities' and county councils' incomes will be stabilised over the course of a business cycle. This would also be a way to strengthen the automatic stabilisers without any negative consequences for economic efficiency in the form of larger tax wedges. The model that should be primarily considered is to base the local government tax base on an average of taxable income over several years. Alternatively, the rules for central government grants can be formulated so that they compensate completely or partially for the effects of the business cycle on the local government tax base. These alternatives should be investigated further.

Discretionary fiscal policy measures

A key issue is which stabilisation policy measures, that is, specific taxes and expenditures, the government should primarily utilise. One criterion should be that fiscal policy measures to stabilise the economy should have as *general* demand effects as possible, but at the same time as small effects on income distribution and resource allocation as possible. In addition, fiscal policy measures should be used only *temporarily*, that is, only for relatively limited periods, and *symmetrically*, so that tax cuts in recessions are compensated by equivalent increases during periods of high economic activity, etc. The aim is to ensure that the measures undertaken do not give rise to a systematic weakening of public finances or undesirable structural changes in the tax and expenditure systems.

To speed up decisions on discretionary fiscal policy measures and increase the chances that policies are indeed used countercyclically, it would be appropriate for the Riksdag to decide on a few appropriate fiscal policy measures in advance, which should be used to stabilise the economy in the event of macroeconomic imbalances.

In our view, the primary measures that should be considered for stabilisation policy purposes are variations in value-added tax, personal income tax, payroll taxes, government consumption, and government investment. In the case of a major fall in output and weak public finances, an *internal devaluation*, that is, a lowering of payroll taxes financed by rises in other taxes or charges could be considered.

The institutional framework of fiscal policy

As stated above, the institutional framework of fiscal policy in recent years has been reformed in a way that decreases the risk of stabilisation policy failures. However, as we have argued, EMU membership will make fiscal policy increasingly important as a stabilisation policy tool. This justifies further steps to ensure that fiscal policy is pursued in a way that is desirable from the perspective of stabilisation policy.

Therefore, in the opinion of the Government Commission, an independent advisory body, a *fiscal policy council*, should be set up. The role of this council would be to monitor cyclical developments and give recommendations on the stance of fiscal policy on the basis of guidelines laid down by the Riksdag and the government. The establishment of a fiscal policy council of this kind could be seen as a complement to the fiscal policy rules that were gradually introduced in the 1990s, particularly the target for net lending and the reformed budget process incorpo-

rating an expenditure ceiling. Similar advisory bodies already exist in several countries, for example Denmark and Germany.

A fiscal policy council could help to stimulate and give a better basis for the public debate on stabilisation policy, as has happened in the field of monetary policy.

Two conditions, above all, would probably need to be fulfilled for this type of advisory body to function satisfactorily. First of all, the council should be guaranteed a sufficient degree of independence. Secondly, it is essential that the government takes a public stand and comments on the recommendations that are given. One method of ensuring this is that the council's analyses and recommendations are published in public reports to which the government is obliged to react.

In our opinion, the fiscal policy council should be an authority under the government. Appointments to the council should be made according to a rolling schedule with overlapping mandate periods, as is the case with the Riksbank's Executive Board. A mandate period of three to five years seems appropriate. The fiscal policy council should consist of academic economists and experts with previous experience from bodies such as the Ministry of Finance, the Riksbank or international organisations that work with macroeconomic issues. The members must not have other assignments that could call the independence of the council into question. The members should have good insight into public finances and expertise in the fields of macroeconomics and stabilisation policy.

The analyses and recommendations of the fiscal policy council should be presented in the form of reports twice a year, once at the beginning of March to form the basis of government and Riksdag work on the Spring Budget Bill, and then in early August for the Budget Bill. The intention is that the recommendations of the fiscal policy council should serve as a basis for the government's budget negotiations in the spring and autumn.

Fiscal policy co-ordination within the EU

The current attempts at co-ordination of fiscal policies as a stabilisation policy tool in the EU are mainly of a supervisory and informal nature. They entail no binding regulations directing individual countries beyond the norms for budget discipline; instead, they manifest themselves in the form of recommendations, good examples, peer pressure, etc. From a theoretical point of view, it is unclear what effects co-ordination of fiscal policy stabilisation efforts would have on the countries in the euro area. The few empirical studies that have been made lend scant support to the idea that there are significant potential gains to such fiscal policy co-ordination. Moreover, there is reason to believe that considerable co-

ordination costs and practical problems may be associated with further fiscal policy co-ordination in the monetary union, while the difficulties in making well-balanced stabilisation policy decisions are probably even greater at the EU level than at the national level.

More extensive and formalised fiscal policy co-ordination at the EU level also risks limiting the scope for national action as regards undertaking measures quickly during serious macroeconomic shocks. We believe that it is of great importance to maintain national scope for fiscal policy action when participating in the monetary union, since fiscal policy will then be the only available instrument of stabilisation policy at a national level. Therefore, in our opinion, there is no reason to support any proposals for more formalised and more extensive co-ordination of discretionary fiscal policy within the EU. However, from a credibility standpoint, it is important to strictly follow the EU rules for fiscal policy that apply at any given time and not adjust them to each circumstance.

The Government Commission's proposals:

- The Riksdag (the Swedish parliament) should set a *basic framework* for pursuing fiscal policy in the event of Sweden's participation in the monetary union, with the following guidelines:
  - The stabilisation objective of fiscal policy shall be to counteract major deviations from the sustainable level of output (potential output) in the short and medium term. This is equivalent to stabilising employment and unemployment near their equilibrium levels. Assessments regarding the existence of an output gap, that is, a deviation of output from the sustainable level, are to be based on a number of indicators. Particular importance should be attached to price and wage cost developments in relation to other euro countries. Price and wage cost developments on a par with the developments in other euro countries are crucial to the chances of achieving macroeconomic stability in the medium term.
  - Discretionary fiscal policy shall only be used for stabilisation purposes during major shocks, roughly equivalent to an output gap of at least plus or minus two per cent. During minor shocks, stabilisation should take place through the automatic stabilisers. It should also be possible to vary the extent of labour market programmes in response to minor economic shocks.
  - To create room for automatic stabilisers and discretionary fiscal policy during major shocks, general government net lending should amount to 2.5, or, alternatively, 3 per cent of GDP on average over the business cycle. This

should create a satisfactory safety margin even during relatively protracted recessions.

– To ensure sufficient room for stabilisation policy, the budget margin below the expenditure ceiling should be divided into a margin for cyclical expenditure and a planning margin. The margin for cyclical expenditure must not be utilised for any purpose other than increases in expenditures deriving automatically from cyclical developments, including labour market policy measures, or for discretionary fiscal policy decisions to stabilise the economy in the event of major shocks. The margin for cyclical expenditure should amount to approximately three per cent of the expenditures restricted by the ceiling. The planning margin is to cover uncertainty in forecasts arising from factors other than the business cycle to the extent that the government wishes to avoid balancing increases in expenditure of this type by other changes that decrease expenditures. The planning margin should also include a specified room for increases or decreases in central government commitments, which means that it can be positive or negative.

- An advisory body, a *fiscal policy council*, should be set up with the task of analysing macroeconomic developments and making fiscalpolicy recommendations based on guidelines determined by the Riksdag. The design of the council and its activities should be regulated by specific legislation.
  – The fiscal policy council should be an authority under the government, but independent. Its members must therefore not be closely associated with the political system or interest groups. Nor should the members have other assignments that could call the independence of the council into question.
  – The council should consist of a balance of academic and practising economists with good insight into public finances and expertise in the fields of macroeconomics and stabilisation policy.
  – The council's analyses and recommendations should be presented twice a year, once at the beginning of March to serve as a basis of government and Riksdag work on the Spring Budget Bill, and then in early August to serve as a basis for the work on the Budget Bill. The council should also be empowered to propose stabilisation policy measures in between the half-yearly reports on its own initiative, if this is deemed necessary, for example in the event of a major macroeconomic shock.
  – The recommendations of the council should focus strictly on stabilisation policy. They should primarily refer to amounts for unfinanced tax and

expenditure changes, but could also cover other stabilisation aspects of fiscal policy, including changes in specific taxes and expenditures.

  – The government should take a stand on the recommendations of the council and justify deviations from them. It should be natural for the Riksdag to consult the council in connection with readings of the budget bill.

- The government should select a small number of appropriate fiscal policy measures in advance for use as policy tools during major macroeconomic shocks. These instruments should, as far as possible, be general and have as small effects as possible on income distribution and resource allocation. The aim is to shorten decision lags for discretionary fiscal policy measures by more clearly defining appropriate measures in advance that primarily give stabilisation policy effects and are thus politically uncontroversial in the sense that they do not have a major impact on income distribution or social efficiency. In the event of EMU membership, the choice of measures of this nature can be justified by the need to find a substitute for national monetary policy, which in itself is a general stabilisation policy tool. The measures that are undertaken are to be adapted to the type of shock that has arisen and should be used for a limited time period fixed in advance.

- To strengthen the automatic stabilisers, local government income should be stabilised over the business cycle. The primary model that should be considered is to calculate the local government tax base on the basis of an average of taxable income over several years. Alternatively, central government grants can be formulated so that they automatically compensate for the effects of the business cycle on the local government tax base. The exact model for such stabilisation of the incomes of local governments should be investigated further.

Notices

New Chief Legal Counsellor at the Riksbank

On 24 September 2002, the Executive Board of the Riksbank appointed Per Håkansson the new Chief Legal Counsellor. The Chief Legal Counsellor reports to the Executive Board on legal issues and drafts these issues together with the Governor.

Per Håkansson has worked at the Riksbank as advisor to the Executive Board since 2001. He has previously been assessor at the Svea Court of Appeal and worked in the Financial Market Department at the Ministry of Finance. His most recent post prior to joining the Riksbank was at Sweden's permanent delegation at the EU.

New appointments at the Riksbank

At its meeting on 3 October 2002, the Executive Board of the Riksbank decided to appoint the Head of the Monetary Policy Department, Claes Berg, advisor to the future Governor Lars Heikensten, with effect from 1 January 2003. The Board also decided that the Head of the Research Department, Anders Vredin, should succeed Mr Berg as Head of the Monetary Policy Department. Mr Berg and Mr Vredin will both continue to sit on the Riksbank's drafting committee for monetary policy, in which senior officials at the bank discuss the basis for the monetary policy decisions.

Mr Berg has a PhD and has been Head of the Monetary Policy Department since 1996. Prior to that, he was deputy head of the department for three years. Mr Vredin has been Head of the Research Department from its foundation in 1996. He is an associate professor in economics and has previously worked as

researcher at the Stockholm School of Economics and at the Trade Union Institute for Economic Research (FIEF).

The general public's confidence in the Riksbank

The Riksbank's credibility among the general public remains at a high level. This is the conclusion of a survey commissioned by the Riksbank on the general public's knowledge of, and attitudes to, the Riksbank. The percentage of respondents who considered the Riksbank to have good or very good credibility has increased steadily from 37 per cent in 1996 to 67 per cent in 2002.

The survey shows that seven out of ten respondents consider monetary policy to be conducted in a proper manner. Almost half of those included in the survey were familiar with the Riksbank's main tasks, that is to say, to promote a safe and efficient payment system and to safeguard price stability. Almost one in four knew that the inflation target is 2 per cent. The percentage who believe that this target will be attained within the next few years has increased from 45 per cent in 2001 to 49 per cent this year.

The survey was carried out by Ipsos-Eureka AB. 1,006 persons in the age group 16–74 years were interviewed by telephone during the period 26 August–3 September. The Riksbank has commissioned similar surveys since 1996. The results of the survey can be found, although only in Swedish, on the Riksbank's website (www.riksbank.se).

Jan Bergqvist new Chairman of the General Council

At the inaugural meeting of the General Council on 18 October 2002, Jan Bergqvist was appointed Chairman of the council. Johan Gernandt was appointed Vice Chairman. The General Council of the Riksbank consists of 11 members and 11 deputies, all of whom are elected by the Riksdag.

The members of the council are: Jan Bergqvist, Sinnika Bohlin, Johan Gernandt, Bengt Westerberg, Lennart Nilsson, Kjell Nordström, Mats Odell, Kenneth Kvist, Susanne Eberstein, Peter Egardt and Karin Pilsäter.

The deputies are: Carin Lundberg, Sonia Karlsson, Stephan Tolstoy, Camilla Dahlin, Lars U. Granberg, Marianne Carlström, Göran Hägglund, Siv Holmia, Tomas Eneroth, Margareta af Ugglas and Tommy Waidelich.

New Head of the IT Department

On 7 November 2002, the Executive Board of the Riksbank appointed Marie Rudberg the new Head of the IT Department, with effect from 1 February 2003. Ms Rudberg is currently Head of the Internal Auditing Department. She joined the Riksbank from a position as authorised public accountant and office manager at KPMG.

Monetary policy calendar

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

1999-02-12 The *fixed repo rate* is lowered by the Riksbank to 3.15 per cent as of 17 February 1999. The Riksbank also 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 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 at 1.0 per cent as of 6 April 1999.

1999-07-01 The *reference* (official discount) *rate* is confirmed by the Riksbank at 1.0 per cent (unchanged).

1999-10-01 The *reference* (official discount) *rate* is confirmed by the Riksbank at 1.5 per cent as of 4 October 1999.

1999-11-11 The *repo rate* is increased by the Riksbank from 2.90 per cent to 3.25 as of 17 November 1999.

2000-01-03 The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.0 per cent as of 4 January 2000.

2000-02-03 The *repo rate* is increased by the Riksbank from 3.25 per cent to 3.75 as of 9 February 2000.

2000-04-03 The *reference* (official discount) *rate* is confirmed by the Riksbank at 2.5 per cent as of 4 April 2000.

2000-12-07 The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 13 December 2000. The Riksbank also increases its *deposit* and *lending rates* in each case by 0,5 percentage points. The deposit rate is set at 3.25 per cent and the lending rate at 4.75 per cent. The decision takes effect on 13 December 2000.

2001-07-05 The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 11 July 2001. The Riksbank also increases its *deposit* and *lending rates* in each case by 0.25 percentage points. The deposit rate is set at 3.5 per cent and the lending rate at 5.0 per cent. The decision takes effect on 11 July 2001.

2001-09-17 The *repo rate* is lowered by the Riksbank from 4.25 per cent to 3.75 per cent as of 19 September 2001. The Riksbank also lowers its *deposit* and *lending rates* in each case by 0.50 percentage points. The deposit rate is set at 3.0 per cent and the lending rate at 4.5 per cent. The decision takes effect on 19 September 2001.

2002-03-18 The *repo rate* is increased by the Riksbank from 3.75 per cent to 4.0 per cent as of 20 March 2002. The *deposit rate* is accordingly adjusted to 3.25 per cent and the *lending rate* to 4.75 per cent.

2002-04-25 The *repo rate* is increased by the Riksbank from 4.0 per cent to 4.25 per cent as of 2 May 2002. The *deposit rate* is accordingly adjusted to 3.5 per cent and the *lending rate* to 5.0 per cent.

2002-06-28 The *reference rate* is confirmed by the Riksbank at 4,5 per cent for the period 1 July 2002 to 31 December 2002.

2002-11-15 The *repo rate* is lowered by the Riksbank from 4.25 per cent to 4.0 per cent as of 20 November 2002. The *deposit rate* is accordingly set at 3.25 per cent and the *lending rate* to 4.75 per cent.

2002-12-05 The *repo rate* is lowered by the Riksbank from 4.0 per cent to 3.75 per cent as of 11 December 2002. The *deposit rate* is accordingly set at 3.0 per cent and the *lending rate* to 4.5 per cent.

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 website of the International Monetary Fund (IMP) (http://dsbb.imf.org). Dates of publication can also be obtained from the Information Centre at Sveriges Riksbank.

1 Riksbank's assets and liabilities

Assets. Period-end stock figures. SEK million

		Gold	Government securities	Lending to banks	Fixed assets	Other	**Total**
2001	Jan	15 428	19 218	46 861	144 875	3 734	230 116
	Feb	15 428	19 218	47 199	146 900	3 057	231 802
	March	15 428	19 218	45 686	151 422	5 122	236 876
	April	15 428	19 218	47 648	153 379	1 799	237 472
	May	15 428	19 218	46 018	145 454	1 888	228 006
	June	15 428	–	56 904	137 037	6 830	216 199
	July	15 428	–	60 215	131 003	3 004	209 650
	Aug	15 428	–	67 658	125 724	3 331	212 141
	Sept	15 428	–	69 951	126 611	2 177	214 167
	Oct	15 428	–	65 779	133 427	1 897	216 531
	Nov	15 428	–	58 678	140 723	3 160	217 989
	Dec	17 436	–	69 135	147 698	1 263	235 532
2002	Jan	17 436	–	59 249	153 172	3 008	232 865
	Feb	17 436	–	56 564	154 218	3 266	231 484
	March	17 436	–	55 400	157 307	1 749	231 892
	April	17 436	–	53 522	151 943	3 902	226 803
	May	17 436	–	35 455	165 959	2 881	221 731
	June	17 436	–	21 635	161 820	2 233	203 124
	July	17 436	–	21 631	159 602	2 381	201 050
	Aug	17 436	–	23 176	163 286	2 360	206 258
	Sept	17 436	–	22 393	157 865	2 280	199 974
	Oct	17 436	–	22 233	157 437	2 234	199 340

Liabilities

		Notes and coins in circulation	Capital liabilities	Debts to monetary policy counterparts	Debts in foreign currency	Other	**Total**
2001	Jan	91 489	62 988	290	9 761	65 588	230 116
	Feb	91 145	62 988	404	11 119	66 146	231 802
	March	92 281	62 988	61	6 843	74 703	236 876
	April	93 210	62 988	77	14 455	66 742	237 472
	May	94 123	70 890	107	11 179	51 707	228 006
	June	94 956	70 890	83	16 207	34 063	216 199
	July	94 018	70 890	408	8 439	35 895	209 650
	Aug	95 540	70 890	71	8 629	37 011	212 141
	Sept	95 520	70 890	127	11 171	36 459	214 167
	Oct	96 599	70 890	132	12 943	35 967	216 531
	Nov	98 295	70 890	75	10 488	38 241	217 989
	Dec	107 111	70 890	48	9 024	48 459	235 532
2002	Jan	98 571	70 890	402	10 203	52 799	232 865
	Feb	97 395	70 890	89	11 090	52 020	231 484
	March	98 790	70 890	59	10 991	51 162	231 892
	April	97 023	70 890	525	7 823	50 542	226 803
	May	97 140	82 943	204	9 666	31 778	221 731
	June	97 931	62 943	52	9 640	32 558	203 124
	July	96 728	62 943	413	8 085	32 881	201 050
	Aug	98 367	62 943	133	10 450	34 365	206 258
	Sept	97 648	62 943	79	4 699	34 605	199 974
	Oct	97 411	62 943	117	3 675	35 194	199 340

2 Money supply

End-of-month stock

		SEK million			Percentage 12-month change	
		M0	M3		M0	M3
1999	Jan	74 679	875 690	Jan	6.0	4.4
	Feb	74 360	873 807	Feb	6.0	6.1
	March	75 074	874 305	March	8.3	6.5
	April	75 305	882 538	April	7.6	7.0
	May	76 304	889 713	May	8.1	6.9
	June	76 154	900 500	June	7.5	5.9
	July	76 790	893 644	July	8.0	4.4
	Aug	77 820	910 577	Aug	6.9	6.4
	Sep	78 234	921 217	Sept	9.1	7.1
	Oct	79 168	951 975	Oct	8.7	9.7
	Nov	80 436	937 100	Nov	9.2	7.2
	Dec	87 161	947 814	Dec	11.9	9.7
2000	Jan	82 276	949 834	Jan	10.2	8.5
	Feb	81 072	951 449	Feb	9.0	8.9
	March	81 105	944 846	March	8.0	8.1
	April	81 606	966 643	April	8.4	9.5
	May	81 866	984 906	May	7.3	10.7
	June	81 399	953 349	June	6.9	5.9
	July	81 370	944 491	July	6.0	5.7
	Aug	82 232	949 502	Aug	5.7	4.3
	Sept	82 947	966 556	Sept	6.0	4.9
	Oct	82 758	970 565	Oct	4.5	2.0
	Nov	84 004	975 144	Nov	4.4	4.1
	Dec	88 881	974 091	Dec	2.0	2.8
2001	Jan	84 327	960 545	Jan	2.5	1.1
	Feb	84 282	947 276	Feb	4.0	–0.4
	March	85 188	969 559	March	5.0	2.6
	April	86 379	975 366	April	5.8	0.9
	May	86 711	983 764	May	5.9	–0.1
	June	87 288	1 012 094	June	7.2	6.2
	July	86 705	977 812	July	6.6	3.5
	Aug	87 693	985 811	Aug	6.6	3.8
	Sept	87 892	1 008 439	Sept	6.0	4.3
	Oct	88 809	1 022 639	Oct	7.3	5.4
	Nov	89 947	1 039 646	Nov	7.1	6.6
	Dec	96 743	1 038 972	Dec	8.8	6.7
2002	Jan	89 737	1 031 807	Jan	6.4	7.4
	Feb	88 950	1 014 905	Feb	5.5	7.1
	March	89 998	1 033 020	March	5.6	6.5
	April	88 666	1 049 030	April	2.6	7.6
	May	88 818	1 025 757	May	2.4	4.3
	June	89 376	1 052 175	June	2.4	4.0
	July	88 624	1 035 427	July	2.2	5.9

3 Interest rates set by the Riksbank

Per cent

	Date	Repo rate	Deposit rate	Lending rate		Date	Discount rate	Refers to	Reference rate[2]
1999	02-17	3.15	2.75	4.25	1999	01-05	1.50		
	03-31	2.90				04-06	1.00		
	11-17	3.25				10-04	1.50		
2000	02-09	3.75			2000	01-04	2.00		
	12-13	4.00	3.25	4.75		04-04	2.50		
2001	07-11	4.25	3.50	5.00		07-01[1]	2.00		
	09-19	3.75	3.00	4.50					
2002	03-20	4.00	3.25	4.75				2002:2	
	05-02	4.25	3.50	5.00				July–Dec	4.50
	11-20	4.00	3.25	4.75					
	12-11	3.75	3.00	4.50					

[1] 1 July 2000 the National Debt Office took over the Riksbank's task of setting and publishing the discount rate.
[2] On 1 July 2002 the discount rate was replaced by a reference rate confirmed by the Riksbank at the end of June and December each year for the coming six months (see page 76).

4 Capital market interest rates

Effective annualized rates for asked price. Monthly average, per cent

		Bond issued by:					
		Central government				Housing	
		3 years	5 years	7 years	9–10 years	2 years	5 years
2000	July	5.05	5.32	5.34	5.31	5.48	6.06
	Aug	4.91	5.25	5.32	5.31	5.31	5.97
	Sept	4.69	5.08	5.21	5.26	5.05	5.74
	Oct	4.56	5.01	5.18	5.23	4.90	5.66
	Nov	4.51	4.90	5.04	5.13	4.81	5.46
	Dec	4.39	4.60	4.74	4.92	4.69	5.19
2001	Jan	4.22	4.56	4.72	4.89	4.51	5.08
	Feb	4.15	4.51	4.71	4.86	4.41	5.04
	March	4.01	4.33	4.59	4.75	4.28	4.87
	April	4.12	4.51	4.78	4.93	4.36	5.03
	May	4.43	4.82	5.12	5.27	4.63	5.33
	June	4.75	5.03	5.26	5.38	4.98	5.59
	July	4.78	5.08	5.30	5.42	5.01	5.65
	Aug	4.49	4.77	5.01	5.16	4.71	5.29
	Sept	4.23	4.74	5.04	5.26	4.45	5.26
	Oct	3.98	4.60	4.92	5.17	4.16	5.10
	Nov	3.92	4.49	4.76	4.96	4.34	5.13
	Dec	4.21	4.90	5.09	5.24	4.67	5.49
2002	Jan	4.53	5.01	5.17	5.27	4.71	5.40
	Feb	4.76	5.18	5.28	5.36	4.94	5.57
	March	5.05	5.46	5.55	5.63	5.22	5.83
	April	5.10	5.46	5.56	5.69	5.28	5.85
	May	5.10	5.45	5.56	5.69	5.25	5.85
	June	4.94	5.27	5.39	5.52	5.09	5.65
	July	4.73	5.06	5.20	5.37	4.90	5.45
	Aug	4.52	4.83	4.96	5.13	4.69	5.21
	Sept	4.42	4.62	4.77	4.97	4.53	5.03
	Oct	4.29	4.62	4.80	5.07	4.34	5.07

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
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	3.24	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		3.32	3.77
	Sept	2.90	3.00	3.05	3.28	3.91	3.27	3.75
	Oct	2.90	3.00	3.23	3.55		3.87	4.00
	Nov	3.06	3.16	3.38	3.63	4.28	3.83	3.91
	Dec	3.25	3.35	3.41	3.73	4.24	3.71	3.95
2000	Jan	3.25	3.35	3.57	3.86		3.77	4.05
	Feb	3.61	3.71	3.90	4.22		4.11	4.43
	March	3.75	3.85	4.06	4.29	4.74	4.27	4.53
	April	3.75	3.85	3.99	4.16		4.21	4.45
	May	3.75	3.85	3.96	4.09	4.57	4.21	4.43
	June	3.75	3.85	3.94	4.04	4.56	4.15	4.44
	July	3.75	3.85	4.03	4.21		4.31	4.66
	Aug	3.75	3.85	4.00	4.21	4.59	4.23	4.50
	Sept	3.75	3.85	3.94	4.04	4.51	4.14	4.36
	Oct	3.75	3.85	3.99	4.09		4.15	4.31
	Nov	3.75	3.85	4.00	4.09	4.50	4.14	4.26
	Dec	3.89	3.99	4.07	4.22	4.37	4.19	4.38
2001	Jan	4.00	4.10	4.07	4.12		4.17	4.26
	Feb	4.00	4.10	4.01	4.07		4.14	4.23
	March	4.00	4.10	4.06	4.02	4.11	4.24	4.23
	April	4.00	4.10	3.94	3.98	4.01	4.12	4.11
	May	4.00	4.10	4.01	4.06	4.28	4.16	4.20
	June	4.00	4.10	4.17	4.27	4.48	4.39	4.46
	July	4.17	4.27	4.31	4.42		4.50	4.58
	Aug	4.25	4.35	4.28	4.31	4.37	4.45	4.48
	Sept	4.05	4.15	4.01	4.06	4.15	4.18	4.22
	Oct	3.75	3.85	3.70	3.72		3.90	3.91
	Nov	3.75	3.85	3.71	3.74	3.91	3.89	3.87
	Dec	3.75	3.85	3.71	3.76	3.97	3.96	3.96
2002	Jan	3.75	3.85	3.74	3.81		3.94	3.97
	Feb	3.75	3.85	3.87	3.99		4.01	4.14
	March	3.84	3.94	4.09	4.29	4.64	4.27	4.43
	April	4.00	4.10	4.25	4.41		4.52	4.69
	May	4.25	4.35	4.29	4.48	4.79	4.64	4.79
	June	4.25	4.35	4.28	4.42	4.71	4.88	5.00
	July	4.25	4.35	4.26	4.37		4.89	4.95
	Aug	4.25	4.35	4.19	4.29	4.43	4.83	4.87
	Sept	4.25	4.35	4.17	4.21	4.29	4.82	4.84
	Oct	4.25	4.35	4.07		4.14	4.67	4.64

6 Treasury bills and selected international rates

Monthly average, per cent

		3-month deposits				6-month deposits			
		USD	EUR	GBP	SSVX	USD	EUR	GBP	SSVX
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
	Sept	5.48	2.66	5.29	3.05	5.87	3.03	5.68	3.28
	Oct	6.11	3.29	5.85	3.23	6.02	3.33	5.95	3.55
	Nov	6.01	3.38	5.72	3.38	5.96	3.40	5.88	3.63
	Dec	6.07	3.38	5.91	3.41	5.09	3.46	6.10	3.73
2000	Jan	5.93	3.28	6.00	3.57	6.14	3.50	6.25	3.86
	Feb	5.99	3.47	6.09	3.90	6.24	3.67	6.27	4.22
	March	6.12	3.70	6.10	4.06	6.34	3.89	6.29	4.29
	April	6.24	3.88	6.16	3.99	6.48	4.02	6.32	4.16
	May	6.66	4.29	6.16	3.96	6.93	4.48	6.31	4.09
	June	6.70	4.43	6.09	3.94	6.87	4.61	6.20	4.04
	July	6.63	4.52	6.05	4.03	6.83	4.76	6.16	4.21
	Aug	6.59	4.72	6.08	4.00	6.74	4.95	6.20	4.21
	Sept	6.58	4.78	6.05	3.94	6.67	4.96	6.15	4.04
	Oct	6.65	4.98	6.01	3.99	6.63	5.04	6.12	4.09
	Nov	6.64	5.03	5.95	4.00	6.61	5.06	5.97	4.09
	Dec	6.41	4.85	5.83	4.07	6.26	4.85	5.80	4.22
2001	Jan	5.62	4.71	5.69	4.07	5.47	4.62	5.59	4.12
	Feb	5.25	4.70	5.61	4.01	5.11	4.61	5.53	4.07
	March	4.87	4.64	5.41	4.06	4.72	4.51	5.31	4.02
	April	4.53	4.64	5.25	3.94	4.40	4.53	5.14	3.99
	May	3.99	4.58	5.09	4.01	3.99	4.50	5.07	4.06
	June	3.74	4.40	5.10	4.17	3.74	4.28	5.18	4.27
	July	3.66	4.41	5.11	4.31	3.69	4.33	5.18	4.41
	Aug	3.48	4.30	4.87	4.28	3.49	4.17	4.88	4.35
	Sept	2.92	3.91	4.56	4.01	2.89	3.78	4.49	4.06
	Oct	2.31	3.54	4.27	3.70	2.25	3.39	4.25	3.72
	Nov	2.01	3.32	3.88	3.71	2.02	3.20	3.86	3.74
	Dec	1.84	3.27	3.94	3.71	1.90	3.19	3.96	3.76
2002	Jan	1.74	3.28	3.94	3.74	1.85	3.28	4.04	3.81
	Feb	1.81	3.30	3.94	3.87	1.94	3.33	4.08	3.99
	March	1.91	3.34	4.03	4.09	2.15	3.45	4.23	4.29
	April	1.87	3.39	4.06	4.25	2.11	3.47	4.26	4.41
	May	1.82	3.40	4.05	4.29	2.01	3.56	4.26	4.48
	June	1.79	3.41	4.06	4.28	1.93	3.52	4.27	4.42
	July	1.76	3.34	3.94	4.26	1.82	3.40	4.07	4.37
	Aug	1.69	3.28	3.90	4.19	1.69	3.31	3.91	4.29
	Sept	1.73	3.24	3.88	4.17	1.71	3.18	3.89	4.21
	Oct	1.71	3.20	3.88	4.07	1.67	3.08	3.87	

7 Krona exchange rate: TCW-index and selected exchange rates

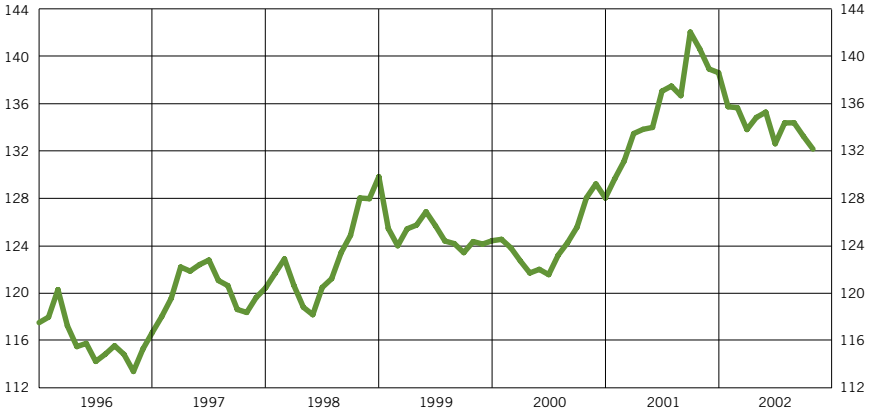
Monthly average

			SEK per				
		TCW-index	USD	EUR	GBP	CHF	JPY
1999	Jan	125.4590	7.8243	9.0838	12.9184	5.6597	0.0692
	Feb	123.9963	7.9459	8.9096	12.9408	5.5731	0.0682
	March	125.4263	8.2166	8.9447	13.3099	5.6089	0.0687
	April	125.7457	8.3244	8.9162	13.4085	5.5666	0.0697
	May	126.8676	8.4428	8.9766	13.6316	5.6011	0.0693
	June	125.6872	8.5069	8.8338	13.5850	5.5403	0.0705
	July	124.3973	8.4575	8.7485	13.3053	5.4538	0.0707
	Aug	124.1746	8.2568	8.7584	13.2647	5.4732	0.0729
	Sept	123.4162	8.2200	8.6330	13.3373	5.3898	0.0767
	Oct	124.3492	8.1462	8.7289	13.5044	5.4767	0.0769
	Nov	124.1392	8.3378	8.6305	13.5386	5.3771	0.0796
	Dec	124.4227	8.4831	8.5892	13.6905	5.3647	0.0827
2000	Jan	124.5383	8.4725	8.5956	13.8900	5.3370	0.0807
	Feb	123.8107	8.6462	8.5112	13.8519	5.2965	0.0791
	March	122.7089	8.6946	8.3950	13.7382	5.2317	0.0816
	April	121.6993	8.7208	8.2700	13.8088	5.2545	0.0828
	May	122.0044	9.0894	8.2388	13.7098	5.2930	0.0841
	June	121.5567	8.7433	8.3118	13.1997	5.3268	0.0824
	July	123.2005	8.9346	8.4080	13.4783	5.4206	0.0828
	Aug	124.2636	9.2702	8.3962	13.8107	5.4137	0.0858
	Sept	125.5703	9.6569	8.4121	13.8431	5.4968	0.0905
	Oct	128.0479	9.9618	8.5266	14.4711	5.6348	0.0919
	Nov	129.2156	10.0780	8.6271	14.3730	5.6705	0.0925
	Dec	128.0290	9.6607	8.6629	14.1196	5.7238	0.0862
2001	Jan	129.6612	9.4669	8.8963	14.0052	5.8170	0.0811
	Feb	131.1553	9.7350	8.9736	14.1555	5.8438	0.0838
	March	133.4701	10.0316	9.1254	14.4988	5.9416	0.0828
	April	133.8280	10.1987	9.1103	14.6320	5.9593	0.0824
	May	133.9895	10.3333	9.0536	14.7412	5.9019	0.0848
	June	137.0501	10.7753	9.2010	15.0876	6.0421	0.0882
	July	137.4779	10.7666	9.2557	15.2105	6.1150	0.0864
	Aug	136.6723	10.3343	9.3036	14.8466	6.1433	0.0851
	Sept	142.0389	10.6089	9.6670	15.5179	6.4799	0.0894
	Oct	140.6226	10.5630	9.5798	15.3446	6.4725	0.0871
	Nov	138.9180	10.5965	9.4131	15.2278	6.4196	0.0866
	Dec	138.6116	10.5594	9.4436	15.2024	6.4006	0.0832
2002	Jan	135.7390	10.4398	9.2292	14.9642	6.2594	0.0788
	Feb	135.6543	10.5603	9.1869	15.0223	6.2179	0.0791
	March	133.8096	10.3396	9.0600	14.7064	6.1690	0.0789
	April	134.8265	10.3105	9.1331	14.8742	6.2300	0.0788
	May	135.2764	10.0519	9.2236	14.6763	6.3300	0.0796
	June	132.6093	9.5591	9.1190	14.1612	6.1959	0.0774
	July	134.3652	9.3400	9.2705	14.5199	6.3380	0.0791
	Aug	134.3777	9.4641	9.2524	14.5486	6.3235	0.0795
	Sept	133.2278	9.3504	9.1735	14.5449	6.2617	0.0775
	Oct	132.1625	9.2793	9.1053	14.4489	6.2156	0.0749

Note. The base for TCW-index is 18 November 1992. TCW (Total Competitiveness Weights) is a way of measuring the value of the krona against a basket of other currencies. TCW is based on average aggregate flows of processed goods for 21 countries. The weights include exports and imports as well as "third country" effects.

8 Nominal effective TCW-index

Index: 18 November 1992 = 100



Note: TCW (Total Competitiveness Weights) is a way of measuring the value of the krona against a basket of other currencies. TCW is based on average aggregate flows of processed goods for 21 countries. The weights include exports and imports as well as "third country" effects.

9 Forward foreign exchange market. Forward net position with authorized currency dealers

SEK million, end of period

		Non-bank public		Bank abroad	Riksbank	Total
		Resident (1)	Non-resident (2)	Net (3)	Net (4)	(1+2+3+4)
2001	Jan	–465 225	–16 547	317 823	0	–163 949
	Feb	–503 678	–12 293	278 249	0	–237 722
	March	–493 323	–17 304	350 014	0	–160 613
	April	–495 192	–15 971	293 878	0	–217 285
	May	–483 697	–14 993	238 561	0	–260 129
	June	–473 712	–28 931	326 895	0	–175 748
	July	–341 744	–30 030	190 190	0	–181 584
	Aug	–451 257	–25 654	221 546	0	–255 365
	Sept	–455 862	–18 079	244 130	0	–229 811
	Oct	–308 376	–18 025	170 595	0	–155 806
	Nov	–404 895	–16 742	196 365	0	–225 272
	Dec	–390 156	–16 763	198 322	0	–208 597
2002	Jan	–380 368	–29 553	229 071	–5 753	–186 603
	Feb	–378 895	–20 566	197 130	–4 226	–206 557
	March	–364 779	–14 558	170 705	–3 144	–211 776
	April	–357 495	–23 805	173 232	0	–208 068
	May	–359 267	–20 295	192 173	0	–187 389
	June	–360 494	–10 409	194 312	0	–176 591
	July	–352 252	–10 076	136 339	0	–231 989

Note. A positive position indicates that purchases of foreign currencies exceeds sales. A negative position indicates that sales of foreign currencies exceeds purchases.

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