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The yield curve and the Riksbank's signalling

By Malin Andersson, Hans Dillén and Peter Sellin
Monetary Policy Department.

The Riksbank determines the repo rate with the aim of influencing the yield curve and thereby in turn economic activity and inflation. In this article we study to what extent the Riksbank's monetary policy signalling, that is to say, how future monetary policy intentions are communicated to market operators, may cause fluctuations in the yield curve. It appears that monetary policy signals from monetary policy speeches in particular, but also to some extent the minutes of Executive Board meetings and Inflation Reports, have influenced the short market rates. However, these effects are slight compared with the effects of changes in the repo rate. On the other hand, the monetary policy speeches appear to have had a greater effect than changes in the repo rate on the longer market rates. The role played by the speeches thus appears to have primarily entailed signalling monetary policy intentions in the slightly longer term. In addition, one can see that the speeches containing signals regarding a tightening of policy have had a much stronger effect on the yield curve than speeches signalling future interest rate reductions. As a result of this, the repo rate increases have influenced the market rates much less than the reductions. This can be interpreted as the Riksbank's monetary policy signalling being most effective when the repo rate is to be raised.

The importance of monetary policy signalling

Clear signalling can contribute to more predictable monetary policy.

Monetary policy aims to influence the economy and inflation through its effects on the yield curve. The size of the effect a central bank has on interest rates is not merely dependent on the instrumental rate it sets; it is also related to how monetary policy decision-makers express their intentions in, for instance, speeches and inflation reports. Clear signalling can contribute to

greater predictability in monetary policy. This in turn diminishes uncertainty and reduces exaggerated fluctuations in the yield curve in connection with the central bank's interest rate announcement. It is therefore in the interest of the Riksbank that market expectations should gradually adapt to monetary policy intentions.

In this article we study the connection between monetary policy signalling and the Swedish yield curve, while taking into account the effects of other factors that influence interest rates.[1] To begin with, we describe the Riksbank's monetary policy process and different forms of signalling. Then we describe how one can construct a model of the Swedish yield curve. Following a report of the results obtained from the model, we conclude with a more in-depth analysis of the monetary policy speeches and report our conclusions.

The Riksbank's monetary policy process and signalling

The speeches fulfil an important function by signalling the decision-makers' interpretation of new economic information.

In an ideal world, where the central bank slavishly follows a simple monetary policy rule that is understood by the general public, there is no need for signalling. In this type of world the market operators know how the central bank will react and directly adapt their expectations when new macroeconomic outcomes are published. These expectations are expressed in the yield curve. In reality, monetary policy decisions are of course more complicated. The speeches fulfil an important function by signalling the decision-makers' interpretation of new economic information. A skilful communication of monetary policy intentions probably contributes to minimising the fluctuations in the yield curve when the announcement of a change in the repo rate is made.[2]

The channels for monetary policy signalling are speeches, inflation reports, repo rate decisions and separate minutes of monetary policy meetings.

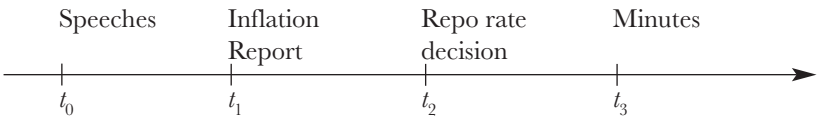
Figure 1 provides a general and very simplified picture of the policy process at the Riksbank. At the point in time marked t_0 the Riksbank analyses macroeconomic outcome and presents its view of future inflation in speeches. At t_1 the Riksbank publishes a more complete

[1] See Andersson, Dillén & Sellin (2002). Earlier studies of monetary policy effects on the yield curve have been made by, for instance, Cook & Hahn (1989), Buttiglione, Del Giovane & Tristani (1997), Lindberg, Mitlid & Sellin (1997), Favero, Iacone & Pifferi (1996), Haldane & Read (2000), Kuttner (2001) and Evans & Marshall (1998).

[2] In line with this reasoning, Woodford (2001) points out that it may be inappropriate to measure the efficiency of monetary policy in terms of how large an effect on the yield curve is caused by the implementation of a change in the instrumental rate.

analysis of the available macroeconomic news, together with an explicit inflation forecast, in its Inflation Report. At t_2 the Executive Board reaches a decision on the interest rate at a monetary policy meeting. The announcement of the interest rate coincides sometimes with the publication of the Inflation Report. At t_3 the separate minutes of the monetary policy discussion at the meeting are published. These contain a detailed account of the Executive Board members' discussions and individual views expressed at the meeting. The channels for the monetary policy signals are thus speeches, Inflation Reports, repo rate decisions and minutes from monetary policy meetings.

Figure 1. The policy process at the Riksbank



The new legislation applying from January 1999 entailed important changes in the Riksbank's signalling.

The process described here has been simplified considerably, as we said, and has also changed over time. One important change took place on 1 January 1999 when the new legislation came into force. This meant that it was no longer the Governor who made monetary policy decisions together with other members of the General Council, but a newly-appointed Executive Board. This Board consists of six members who have joint responsibility for ensuring that the Riksbank's overall objective, price stability, is attained. The new legislation also entailed important changes with regard to the Riksbank's signalling:

- The speeches that were held by the Governor and the then two deputy governors prior to 1999 comprised "pure" monetary policy signalling, while the speeches after this date more explicitly reflect the Executive Board members' personal views of monetary policy. For this reason, the speeches could be considered to have had greater effect on the yield curve prior to 1999. Similarly, monetary policy could have been perceived as clearer then, as the Governor and two deputy governors had greater insight into future changes in the instrumental rate then and they did not primarily express individual opinions.
- Prior to 1999 monetary policy conclusions were discussed in the Inflation Report and, if necessary, an announcement concerning the repo rate came after the Report was published. With effect from 1999, the Inflation Report reflects more a majority view of future inflation and there are no concrete mon-

etary policy conclusions. The repo rate is announced in a separate press release at the same time as the Inflation Report is published.[3] All in all, this may have contributed to the publication of the Inflation Report having less effect on the yield curve after 1999, primarily with regard to interest rates with short durations. On the other hand, the Inflation Report is now more detailed than it was before and also contains a quantitative risk assessment that can give some indication of monetary policy in the longer term.

- The new Executive Board introduced the system of monetary policy meetings, which take place eight to ten times a year. The separate minutes of these meetings are published with a two to three week delay. The minutes, like the speeches and Inflation Reports, can contain indications of future monetary policy changes that affect market operators' expectations as expressed in the yield curve.[4]

Model for the Swedish yield curve

In the model fluctuations in the yield curve are explained by unexpected monetary policy signalling.

To enable us to examine how monetary policy signalling affects expectations of future short interest rates, we have constructed a model in which each variable is stated, where possible, in terms of deviations from the expected value. We thus imagine that unexpected fluctuations in the Swedish yield curve are influenced by *unexpected monetary policy signalling. Deviations in the notified repo rate in relation to the expected change in the repo rate, unexpected outcomes for important domestic macro statistics, fluctuations in the international yield curve and unexpected changes in domestic market conditions* are also included as explanatory variables in the model.[5]

Fluctuations in the Swedish yield curve are represented in our model by the weekly change in nominal rates for treasury bills with 90 and 360 days duration respectively and for treasury bonds with two and five years duration respectively. To obtain the unexpected component in the change, we make some adjustment to the nominal rates.[6]

[3] With regard to the press release, we have only used information on how the repo rate level determined relates to the level expected by market operators immediately prior to the decision. Many press releases also contain signals regarding future monetary policy intentions. However, we have not taken these into account in our study.

[4] This conclusion is also reached by Gerlach-Kristen (2001) for the Bank of England.

[5] A more detailed and technical description of the model is given in Andersson, Dillén & Sellin (2002).

[6] The expected weekly change in market rates is in most cases very slight, so the correction is also slight. However, with regard to interest rates with short durations, the correction can have some importance; see Andersson, Dillén & Sellin (2002).

Unexpected monetary policy signalling

The signalling variables in the model consist of the Riksbank's inflation forecast two years ahead in relation to the inflation target of 2 per cent, the speeches held by members of the Executive Board and a minority view indicator that shows a possible deviating opinion from one or more members with regard to a decision on the instrumental rate.

Signalling in the Inflation Report is via the inflation forecasts.

The inflation forecast is expressed as the mode, or most probable outcome, for inflation two years ahead. It should be added that the main aim of the Inflation Report is to provide a foundation for the decision on the repo rate taken by the Executive Board in connection with the publication of the report, rather than to contribute further monetary policy signals.

The signalling effect of the speeches depends on the slope of the yield curve.

The classification of the speeches has been achieved through the following subjective, two-stage process. The first stage entails selecting the speeches that contain a monetary policy message.[7] We then create an indicator variable for these speeches and give it a value of 1 (–1) if the speech signals a more stringent (more expansionary) monetary policy and 0 if monetary policy is considered well-balanced. In a second stage we determine whether the speech can be said to have given rise to a change in the yield curve that is *not expected* by the market. This is done by studying the slope of the yield curve in terms of the difference between the interest rate on a 30-day treasury bill and the repo rate for the week prior to the speech. A new indicator variable is created on the basis of the earlier indicator variable and expectations. The new variable can take the value 1 (–1) in two cases: if the speech signals tightening (more expansionary) policy while the slope of the yield curve during the week before the speech was held was less than 5 (greater than –5) basis points or if the speech signals that the repo rate will be retained unchanged while the yield curve has a negative (positive) slope of 5 basis points or more. This procedure can be illustrated by the following example: Governor Urban Bäckström's speech on 8 November 2000 contained a message regarding tighter monetary policy (stage one), which was not expected by the market operators according to the definition above, as the slope of the yield curve was less than 5 basis points (stage two). On the other hand, the message regarding tighter monetary policy in the speech held by Deputy Governor Lars Heikensten the following week, on 17 November, was expected, as the yield curve had already taken on

[7] Members of the Executive Board also make speeches not concerning monetary policy. These are not included here.

a positive slope as a result of Urban Bäckström's speech the previous week. We thus do not classify the Heikensten speech as one containing unexpected monetary policy signals.

The minority variable reflects the Executive Board members' possible reservations against decisions on the instrumental rate.

The minority variable reflects the Executive Board members' possible reservations against decisions on the instrumental rate. These reservations can be seen in the minutes of the monetary policy meetings. The variable is defined as the deviation between the Executive Board's average wish to change the instrumental rate and the actual change in the rate. A positive (negative) value for the variable can thus be interpreted as the average preferences with regard to the repo rate among the members of the Board signalling a more stringent (expansionary) monetary policy than the majority of the members desire. If, for example, one member of the Executive Board advocates an unchanged repo rate while the other members advocate an increase of 0.25 percentage points, the minority indicator is given the value –0.04 (=(1/6 *0 + 5/6*0.25) –0.25). Here it may be worth noting that the publication of the minutes does not have the purpose of signalling future monetary policy in the same way as, for instance, the speeches, but is aimed at increasing transparency with regard to monetary policy decision-making.

Deviations between expected and actual changes in the instrumental rate

The model is supplemented with the unexpected change in the repo rate.

In addition to the signalling variables above, the model is supplemented with the unexpected change in the repo rate. This is measured as the deviation between the change in the repo rate and the expected change in the repo rate. An unexpected repo rate decision can in many cases be perceived as a signal of long-term monetary policy intentions. A decision not to change the repo rate can also be unexpected, but in this case it is less likely that it contains any long-term monetary policy signals. We therefore make a division between unexpected decisions to change the repo rate and unexpected decisions to retain the rate unchanged. The expected future repo rate is approximated with a two-week forward rate the week prior to the publication of the repo rate decision.

Surprising domestic economic news

Unexpected outcome for CPI and GDP also affects the yield curve.

Economic news is added to the model in terms of deviations between actual and, according to Reuters' surveys, expected out-

come for the Swedish consumer price index (CPI) and the Swedish gross domestic product (GDP). The variables are expressed as annual percentage inflation rate and growth rate respectively. We could of course also include other variables, but these two types of macro data are considered the most important determinants for future inflation.

Fluctuations in the international yield curve

The Swedish yield curve is also affected to a large degree by fluctuations in the international yield curve.

The Swedish yield curve is, of course, affected to a large degree by fluctuations in the international yield curve. In the model, these are represented by changes in nominal interest rates with durations corresponding to the Swedish ones. We have construed the international rate as a weighted average of estimated effective zero coupon rates for Germany, the UK and the USA.[8] Unexpected fluctuations in the international yield curve can be said to reflect economic information abroad that deviates from the expected as well as changes in global market conditions.

Unexpected changes in domestic market conditions

Changed domestic market conditions are expressed as changes for a ten-year forward rate towards other countries.

Fluctuations in the yield curve that are not captured by the variables for monetary policy signalling, actual changes in the interest rate, unexpected macroeconomic results or international interest rate fluctuations can often be connected to changes in domestic market conditions, such as the demand for liquidity or portfolio effects. During periods of financial unease, such as in 1998, investors wish to transfer their portfolio holdings from Swedish to foreign bonds, which increases the spread towards foreign long interest rates. Changed domestic market conditions are expressed as changes for a ten-year forward rate towards other countries.

In the study we use weekly data from 16 April 1996 to 25 September 2001. This time period is limited historically by two factors. Firstly, it is difficult to find suitable measures of expectations for inflation and growth further back in time than 1996. Secondly, Swedish interest rates were high and unstable during the first half of the 1990s, which is connected with the credibility problems faced by the Swedish economy. To make it easier to interpret the results, we have avoided

[8] The effective zero coupon rate is the annual rate for a bond adjusted for coupon dividends.

including data prior to 1996. For both Swedish and international interest rates we use effective zero coupon rates that are, with few exceptions, listed on Tuesdays. One week thus stretches from the final listing on one Tuesday to the final listing on the following Tuesday.

Results from the model

The model, with the variables we have described, shows a number of interesting results. These are reported in Table A1 in the appendix.[9] Most of the policy-related variables have significant and intuitively interpretable effects on interest rates with short durations. Some of the signalling variables also have effects on longer durations.

Future monetary policy actions are already largely discounted when the Inflation Report is published.

The effects of the publication of the inflation forecasts proves to be so slight that there is reason to believe that coming monetary policy actions have already been largely discounted when the Inflation Report is published. No effects on interest rates can be seen in the attempts to take into account the quantitative risk assessment made in the Inflation Report.[10] The greatest effect of the Inflation Report appears to be on one-year rates, which indicates that it primarily contains signals of monetary policy intentions beyond the immediate decisions.

The minority indicator only appears to affect interest rates with short duration.

On the other hand, the minority indicator appears only to affect interest rates with short duration. This indicates that the minority view to some extent cause market operators to adapt their expectations regarding the decisions at the next few monetary policy meetings.[11]

Unexpected signals from the monetary policy speeches prove to have significant effects, not merely in the short term, but also on the entire yield curve. In addition, speeches are the only one of the policy variables that has an effect on

[9] Andersson, Dillén & Sellin (2002) report the time-delayed (lagged) effects of different variables. These effects are, with few exceptions, slight and statistically insignificant and are therefore not shown here.

[10] There are also other reasons why it is difficult to measure signalling effects from the publication of the Inflation Reports. Publication has often coincided with the press release containing the monetary policy decision and it is difficult then to extract a signalling effect from the Inflation Report. Nor is it possible to exclude the possibility that the speeches held immediately prior to publication have prepared the market operators for the information then given. The analysis is also obscured by the fact that we do not know the expected value of the inflation forecast, which means that this variable contains some measurement error.

[11] However, this variable is also measured with some error as we do not have access to the market operators' expectations of a minority outcome.

the five-year rate. The result indicates that speeches have as great an effect on long rates as an unexpected change in the repo rate of approximately 30 basis points, which is a considerable effect. To some extent this is due to the fact that the speeches often contain a discussion of monetary policy in the longer term. However, one cannot rule out the possibility that a large part of the effect of the speeches on the yield curve can be explained by a few individual speeches preceding economic turnarounds and thereby shifts in the direction of monetary policy. A tentative conclusion is, nevertheless, that speeches comprise the variable with the strongest signalling effects to the market with regard to long-term monetary policy intentions.

Unexpected signals from monetary policy speeches prove to have significant effects on the entire yield curve.

It is clear from the results that the repo rate decisions, despite the monetary policy signalling, have not usually been completely discounted. The decisions appear to lead to the market revising its view of monetary policy for the near future. This is shown by the effect on the three-month treasury bills. In addition, one should bear in mind when interpreting Table A1 that unexpected changes in the repo rate are generally relatively large, around 20 basis points. This emphasises the impression that monetary policy signalling has not contributed to any great extent to making monetary policy more predictable in the short term. However, the effect of unexpected changes in the repo rate declines with the length of the duration and for durations of two years or more the effect of speeches is equally large. This is natural as the aim of the interest rate decision is primarily to implement monetary policy and not to signal long-term monetary policy intentions.

Despite the monetary policy signalling, repo rate decisions have not usually been completely discounted.

The total impression is that changes in the repo rate only to a limited extent cause market operators to revise their monetary policy expectations in the longer term, but that in the short-term perspective, operators are sometimes surprised by when interest rate changes occur. In this context, we would point out that the economic significance of delaying a change in the repo rate is relatively slight, given that the long-term monetary policy intentions remain the same. For this reason, it is easy that differing opinions arise as to *when* the repo rate should be adjusted. This is occasionally also visible in the minutes of the monetary policy meetings.

The announcement of an unchanged repo rate only has an effect on short rates. Although market operators sometimes appear to be surprised by a 'wait

and see' interest rate policy, these 'non-decisions' do not appear to be interpreted as indications of the long-term monetary policy direction.

With regard to the results for the non policy-related factors, a number of observations can be made.[12] The economic information proves to have limited effect on the long Swedish interest rates. Judging by the size, the effects do not support the idea of the Riksbank reacting mechanically to outcomes for Swedish GDP and CPI according to any simple monetary policy rule. The economic news can be expected to also influence expectations via speeches, depending on how the members of the Executive Board interpret the new information. If, for instance, an unexpectedly strong GDP growth could be associated to an increase in productivity rather than an increase in demand factors, one can expect limited effects on monetary policy and market rates. The effect of unexpected fluctuations in the international yield curve is relatively slight with regard to short durations. On the other hand, international fluctuations appear to be the dominant factor with regard to interest rates with longer durations. A possible monetary policy-related explanation is that shocks on an international level, in line with the increasingly internationally co-ordinated business cycles, would affect the long-term monetary policy direction in several countries in a similar manner, while short-term monetary policy measures could only to a minor extent be connected to foreign policy intentions. Unexpected changes in domestic market conditions can also explain to some extent the fluctuations in the Swedish yield curve.

Closer analysis of the monetary policy speeches

With regard to interest rates with a duration of up to one year the effect of speeches that within three weeks are followed by a change in the repo rate will be slightly greater than the effect of other speeches.

Given the significance of the monetary policy speeches in the monetary policy process, it may be interesting to analyse the effects of the speeches in greater depth.[13] An analysis of the speeches can be structured in many different ways. One way is to select the speeches that were followed within three weeks by a change in the repo rate, as these speeches can be assumed to contain monetary policy messages to a greater extent than the others. The result shows,

[12] See Table A1 in the appendix.

[13] Coefficients for the other variables are not reported in this section, as they are largely the same as the estimates in Table A1.

as expected, that the effect of these speeches is slightly greater with regard to interest rates with a duration of up to one year.[14]

A division of the Governor's speeches into before and after 1 January 1999 shows whether or not the effect of the speeches has become less with the establishment of the Executive Board and the consequently less clear channel for 'pure' monetary policy signalling for individual Board members. However, the result does not support the theory that the Governor has greater difficulty in communicating monetary policy messages after the establishment of the Executive Board – rather the opposite.[15]

The results do not support the theory that the Governor has greater difficulty in communicating monetary policy messages after 1999.

A third division shows, somewhat surprisingly, that speeches with an unexpected message of tighter monetary policy have had a much stronger influence on the yield curve than speeches with an expansionary monetary policy message.[16] On the other hand, it appears that unexpected decisions of a lower repo rate have had a much greater effect than the corresponding unexpected decisions to raise the interest rate.[17] This indicates that investors have had problems in perceiving signals regarding lowering interest rates and that these therefore came as a surprise when they were put into practice. However, we cannot rule out the possibility that there is an asymmetric confidence effect, that is to say, that a raise in the interest rate leads to a lower nominal rate via lower inflation expectations, but not vice versa. The result can also be connected to the fact that most interest rate reductions since 1996 have gone against the long-term trend; the rate has been lowered when the repo rate has been below its long-term level. It is also possible that an asymmetrical effect arises if market operators demand a premium as they expect the repo rate to be raised to guard against capital losses in connection with surprise raises in the repo rate.

Speeches with an unexpected message of tighter monetary policy have had a much stronger influence on the yield curve than speeches with an expansionary message.

[14] See panel A in table A2 in the appendix.
[15] See panel B in table A2 in the appendix.
[16] See panel C in table A2 in the appendix.
[17] See table A3 in the appendix.

Asymmetrical effect of monetary policy signalling

The Riksbank's intention is to use changes in the instrumental rate to influence the yield curve and thereby the economy and inflation. Monetary policy signalling fulfils an important function by preparing market operators for coming decisions on the repo rate and in this way reducing uncertainty regarding future monetary policy.

Monetary policy signalling has only to a very limited extent contributed to making monetary policy more predictable in the short term. However, the signalling increases in relative significance with regard to the longer market rates.

The total impression is that monetary policy signals, primarily from speeches, but to some extent also from minutes of monetary policy meetings and Inflation Reports, has influenced the Swedish yield curve. The effects on short durations are slight compared with the effects of unexpected changes in the repo rate. This indicates that the monetary policy signalling has only contributed to a limited extent to making monetary policy more predictable in the short term. However, monetary policy signalling increases in relative significance with regard to the effects on longer market rates, which is more important from an economic perspective. Monetary policy speeches appear to have as great an influence as actual changes in the repo rate with regard to interest rates with a duration of two years or more. This reinforces the impression that the main role of the speeches has been to signal monetary policy intentions in the slightly longer term.

Signalling of future interest rate raises appears to have had greater effect than signalling of a future lowering of the rate.

The market has had greater difficulty in perceiving signals of future repo rate reductions in speeches than signals of future increases. This could be one explanation why the reductions in the repo rate have had a much greater effect on the yield curve than increases in the repo rate. Signalling of future increases thus appears to have been more effective than signalling of future reductions.

Appendix

The result of the estimates for interest rates with four different durations, one three-month rate, one one-year rate, one two-year rate and one five-year rate, are shown in tables A1, A2 and A3.

The equations have been estimated with the use of SUR (seemingly unrelated regression estimator). GDP refers to actual minus expected annual percentage change in the gross domestic product, CPI refers to actual minus expected annual change in the consumer price index, REPO is the announced change in the repo rate minus the expected change, NOREPO refers to the REPO where no change has been announced, REPORT is the inflation forecast two years ahead minus 2 percentage points, SPEECH is a dummy variable that indicates the person holding the speech's stand on monetary policy, MINUTES reflects the minority view in connection with a change in the repo rate as expressed in the minutes of the Executive Board's monetary policy meeting, R* is the change in the international rate with the same duration as the dependent variable and RDIFF is the change in the spread between domestic and foreign forward rates.

Table A1. Effect on the yield curve of economic information, monetary policy and market factors

Variable	Treasury bill, 3-month	Treasury bill, 12-month	Treasury bond, 2-year	Treasury bond, 5-year
Constant	–0.006 (1.624)	–0.004 (0.873)	–0.004 (0.766)	–0.003 (0.567)
GDP	0.014 (0.766)	0.036 (1.530)	**0.058** (2.059)	**0.063** (2.162)
CPI	0.037 (1.048)	**0.151** (3.452)	**0.157** (2.960)	0.085 (1.555)
REPO	**0.589** (9.940)	**0.341** (4.642)	**0.268** (3.014)	0.127 (1.390)
NOREPO	**0.856** (3.096)	0.192 (0.562)	–0.175 (0.422)	0.094 (0.219)
REPORT	0.064 (0.850)	**0.161** (1.723)	0.136 (1.203)	0.104 (0.890)
SPEECH	**0.043** (3.111)	**0.054** (3.124)	**0.056** (2.661)	**0.038** (1.779)
MINUTES	0.342 (1.631)	0.039 (0.151)	0.085 (0.271)	0.223 (0.687)
R*	**0.234** (4.896)	**0.305** (7.496)	**0.420** (11.128)	**0.632** (15.950)
RDIFF	0.028 (1.345)	**0.125** (4.867)	**0.158** (5.057)	**0.119** (3.682)
R2/R2 adjusted	0.407/0.367	0.350/0.306	0.372/0.329	0.471/0.435

Note. Coefficients that are significant at a 10-per cent level are shown in bold. t-values are given in brackets.

Table A2. Alternative methods for measuring unexpected signals from speeches

Variable	Treasury bill, 3-month	Treasury bill, 12-month	Treasury bond, 2-year	Treasury bond, 5-year
A. Effect from speeches held during the three weeks prior to a change in the repo rate				
SPEECH	**0.047** (1.781)	**0.076** (2.366)	0.056 (1.447)	0.030 (0.744)
R2/ R2 adjusted	0.386/0.344	0.334/0.288	0.360/0.317	0.471/0.435
B. Effect from speeches made by the Governor prior to and after 1999				
SPEECH (prior to 1999)	**0.067** (2.935)	**0.047** (1.672)	0.022 (0.655)	–0.007 (0.186)
SPEECH (after 1999)	**0.061** (2.305)	**0.105** (3.214)	**0.124** (3.136)	0.052 (1.275)
R2/R2 adjusted	0.410/0.365	0.362/0.313	0.383/0.336	0.477/0.437
C. Effect from speeches with unexpected tightening or expansionary monetary policy signals				
SPEECH-tightening	**0.0944** (4.706)	**0.091** (3.651)	**0.116** (3.835)	**0.116** (3.736)
SPEECH-expansionary	–0.002 (0.117)	0.020 (0.822)	0.001 (0.048)	–0.031 (1.058)
R2/R2 adjusted	0.433/0.389	0.360/0.311	0.389/0.342	0.494/0.455

Note. Coefficients that are significant at the 10-per cent level are shown in bold. t-values are stated in brackets.

Table A3. Effect of unexpected increases and reductions in the repo rate

Variable	Treasury bill, 3-month	Treasury bill, 12-month	Treasury bond, 2-year	Treasury bond, 5-year
Repo rate increase	**0.571** (5.559)	0.084 (0.671)	–0.049 (0.323)	–0.049 (0.306)
Repo rate reduction	**0.604** (8.052)	**0.479** (5.223)	**0.436** (3.946)	**0.220** (1.916)
R2/R2 adjusted	0.413/0.368	0.363/0.315	0.385/0.338	0.474/0.433

Note. Coefficients that are significant at the 10-per cent level are shown in bold. t-values are stated in brackets.

References

Andersson, M., Dillén, H. & Sellin, P., (2002), "Monetary Policy Signalling and Movements of the Swedish Term Structure of Interest Rates", Working Paper No. 132, Sveriges Riksbank.

Buttiglione, L., Giovane, P. D. & Tristani, T., (1997), "Monetary policy actions and the term structure of interest rates: A cross-country analysis", Working paper 306/97, Banca D'Italia.

Cook, T. & Hahn, T., (1989), "The effect of changes in the federal funds rate target on market interest rates in the 1970s", *Journal of Monetary Economics* 24, pp. 331–351.

Evans, C. L. & Marshall, D. A., (1998), "Monetary policy and the term structure of nominal interest rates: evidence and theory", *Carnegie-Rochester Conference Series on Public policy* 49, pp. 53–111.

Favero, C. A., Iacone, F. & Pifferi, M., (1996), "Monetary policy, forward rates and long rates: Does Germany differ from the Unites States?", CEPR Working Paper No. 1456.

Gerlach-Kristen, P., (2001), "Is the MPC's Voting Record Informative about Future UK Monetary Policy?", unpublished manuscript, University of Basel.

Haldane, A. G. & Read. V., (2000), "Monetary policy surprises and the yield curve", Working paper No. 106, Bank of England.

Kuttner, K. N., (2001), "Monetary policy surprises and interest rates: Evidence from the Fed funds future market", *Journal of Monetary Economics* 47, pp. 523–544.

Lindberg, H., Mitlid, K. & Sellin, P., (1997), "Monetary Tactics with an Inflation Target: The Swedish Case", in BIS Conference papers vol. 3 — Implementation and Tactics of Monetary Policy, Bank for International Settlements, Basle.

Woodford, M., (2001), "Monetary Policy in the Information Economy", Paper presented at the 2001 Jackson Hole Symposium, August 30–September 1, 2001.

Consolidation in the Swedish banking sector: a central bank perspective

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The ongoing consolidation in the banking sector leads to a more concentrated system consisting of ever larger banks. This development entails a difficult balance for the authorities concerned. The objective of safeguarding competition and stability in the banking sector has to be weighed against the costs of limiting the banks' strategic flexibility and the inherent dynamics of the market.

Mergers and acquisitions in the banking sector have increased considerably in Europe and the USA since the early 1990s.

Mergers and acquisitions in the banking sector have increased considerably in Europe and the USA since the early 1990s. Together with the entry of new, 'niche' players, the consolidation has led to significant changes in the financial infrastructure. In the Swedish banking sector, consolidation has, despite a number of new players, reinforced the skewed market structure in some aspects. The four largest banks now control approximately 85 per cent of the banking sector's total assets, compared with around 70 per cent in 1990.[1]

Central banks must take account of stability aspects when assessing changes in the market structure.

The Riksbank has the task of promoting a payment system that is both efficient and *safe*. This means that the Riksbank's view of consolidation may to some extent differ from those of other authorities, such as the Swedish Competition Authority. The payment system and the banking sector are characterised by significant externalities[2] that require central banks to also take into account stability aspects when assessing changes in the market structure. In this article we bring up some of the issues

[1] The Swedish Bankers' Association (1991–1999).
[2] That is to say, a functioning payment system has a significant value for society as a whole in addition to its value for the participating banks.

that have arisen during the ongoing consolidation. What effects can we expect continued consolidation to have on competition, cost efficiency and stability in the financial sector?

Firstly, we provide a general outline of the Swedish consolidation process and its driving forces since 1970. This is followed by a discussion of the effects of consolidation on the banking sector's *efficiency*, on basis of the various motives that may lie behind the mergers. We then explain the effects of consolidation on the *stability* of the banking sector. Finally, we summarise the experiences from the 1990s and discuss how the authorities ought to act with regard to future changes in the Swedish financial market.

Major changes over the past 30 years

All industries undergo recurring sequences of growth, weakening, stagnation and consolidation. During the growth phase profit margins are (or are expected to become) high and many new companies enter the market. As demand is satiated, profit margins fall. When profitability declines, a process of consolidation begins, with inefficient companies disappearing from the market through bankruptcy or acquisition.

A distinguishing feature of the banking sector is the extensive regulations.

The banking sector is distinguished by extensive regulations that affect this natural dynamics – regulations that have arisen as a result of the sector's inherent instability.

Looking at developments in the Swedish banking sector in retrospect, one can conclude that the period between the banking crisis in the 1920s and the beginning of the 1970s was characterised by considerable stability.[3] Although a number of small co-operative and savings banks ceased to exist or merged, with the exception of these minor changes the Swedish banking sector consisted largely of the same banks in 1970 as in 1930.[4]

From the banking crisis of the 1920s to the beginning of the 1970s the structure of the Swedish banking sector was characterised by considerable stability.

[3] Although several Swedish banks faced major problems in connection with the Kreuger crisis and the depression in the early 1930s, there were no bank failures. The problems culminated in 1932 when the government was forced to provide emergency liquidity assistance to Skandinaviska Banken to avoid "a breakdown of the Swedish credit system". The government intervention can thus be assumed to have contributed significantly to the crisis not resulting in any actual structural transformation. For a detailed description of the crisis, see Söderlund (1978).

[4] The few takeovers that occurred between those years involved almost exclusively the two major banks, Skandinaviska Banken and Handelsbanken, buying up smaller banks. For instance, during the 1940s Sörmlandsbanken was taken over by Skandinaviska Banken, while Norrköpings Folkbank and Vänersborgsbanken were taken over by Handelsbanken. During the 1950s Handelsbanken also bought up SIGAB and Gotlandsbanken.

The factors behind consolidation have been new technology, globalisation and deregulation.

At the beginning of the 1970s the Swedish banking sector consisted of 15 commercial banks (one of which was state-owned), just under 200 savings banks and more than 400 co-operative banks. The merger in 1973 between Skandinaviska Banken and Stockholms Enskilda Bank can in retrospect be seen as the beginning of the consolidation phase that is still going on. The factors underlying consolidation have primarily comprised *new technology, globalisation* and *deregulation*. The computerisation of banking operations began in the 1960s and implied increasing fixed costs for development and maintenance of the systems. For such investments to be profitable, it is necessary that the bank has a sufficiently large customer base to spread its costs over. The element of technology in banking operations has increased constantly since then and technology-related rationalisation has also been an ever recurring argument for bank mergers. Technological developments have changed banking in terms of both input and output, which results in a change in the optimal size.

In the 1960s the globalisation of Swedish industry took off, with companies becoming increasingly active internationally. This meant that Swedish companies' need for, and requirements on, financial services increased *and* that they gained access to large foreign banks. To meet the increased demands and the new competition, and thus avoid losing their large corporate clients, Swedish banks realised that they needed to become larger. This process has since continued, hand in hand with the continued deregulation of national markets. Important events in this respect during the 1990s include Sweden's EU membership with the harmonising of regulations that followed, and the formation of the EMU, which further links together the European financial market.

Deregulation during the 1980s led to a radical change in conditions in the banking sector, in the form of increased competition and strategic freedom.

During the 1960s and 1970s, the Swedish credit market was strictly regulated. Government financing directives, liquidity quotas, foreign exchange controls and issue prohibitions led to financing problems within the Swedish banking sector. As market financing was costly, a high degree of internal financing was necessary. The absence of functioning capital markets proved a problem for commercial banks without a large deposit base.[5] If the existence of regulations was an important factor behind

[5] Getting access to household deposits was apparently an important motive for Stockholms Enskilda Bank to merge with Skandinaviska Banken (Ulf Olsson, SEB's website).

the mergers during the 1970s, the deregulation of the financial market during the 1980s and 1990s proved an even stronger catalyst.[6] The deregulation process in the 1980s led to a radical change in conditions in the banking sector, in the form of increased competition and strategic freedom. For the first time in a long period the banks were now able to design their own strategies with regard to volume, price and positioning.

Table 1. Historical account of consolidation

1970s	Three large mergers. Continuous consolidation within the savings bank and co-operative bank spheres.	Göteborgs Handelsbank–Smålands Bank (1972), Skandinaviska Banken–Stockholms Enskilda Bank (1973), Statliga investeringsbanken–Postbanken (1973).
1980s	Deregulation and consolidation at medium level. Growth of medium-sized, regional savings banks and restructuring of the co-operative bank movement.	Sundsvallsbanken–Uplands Bank (1986), Nordbanken–PKbanken (1988), Götabanken–Skaraborgsbanken–Wermlands Bank (1990), Handelsbanken–Skånska Banken (1990).
1990s	Bank crisis and reorganisation of savings banks and co-operative banks. Followed by top level consolidation, the entry of small banks and international expansion.	Sparbanken Sverige (1992), Föreningsbanken (1992), Nordbanken–Gota Bank (1992), Handelsbanken–Stadshypotek (1997), Föreningsbanken–Sparbanken (1997), SE-banken–Trygg Hansa (1997), Nordbanken–Merita Bank (1997), SEB–BfG (1999), MeritaNordbanken–Unidanmark (2000), Nordea–Kreditkassen (2000), Handelsbanken–SPP (2001).

The result today is a relatively concentrated bank system.

Today, the result of the driving forces discussed is a relatively highly concentrated bank system consisting of four major banks, a handful of minor challengers and around 50 independent savings banks. The government has reduced its involvement, but is still present through the mortgage institution SBAB and owner influence in Nordea. The co-operative banks and the regional provincial banks have disappeared entirely.

[6] Examples of areas that have been deregulated include housing financing in 1983, liquidity quotas in 1983, credit granting in 1985 and foreign exchange trading in 1989.

Consolidation and the efficiency of the bank system

Mergers that entail efficiency gains should be encouraged.

To begin with, it is worth pointing out that we think that bank services should be regarded as any other product; the "efficiency" of the bank system is thus equal to the sum of producer and consumer surplus in these services. This means that mergers entailing improvements in efficiency should be encouraged, even if the gains do not directly benefit the consumers. If there is free entry into this industry, the efficiency gains should sooner or later benefit the consumers in any case. Competition authorities probably make a different assessment, as they tend to focus on the immediate supply effects of a merger.[7]

In practice, there are of course very specific reasons as to why certain mergers get off the ground. We have chosen to divide the motives behind mergers into three categories: size, market power and other motives.

- **Size**

  Advantages of scale and scope

  i) *Economies of scale*: Fixed costs (for IT, head office, trade mark) can be divided across a larger customer base and overlapping functions (office networks) can be rationalised.

  ii) *Advantages of scope*: Cross-sales of products between different business areas.

  Other advantages of size

  iii) *Diversification*: All else being equal, a larger bank always has lower credit risk than a smaller bank, as the loan portfolio is more diversified. Extending operations to different sub-markets and segments can also prove beneficial if there is great uncertainty regarding the development of the industry (strategic positioning).

  iv) *Critical mass*: Competing for the most profitable deals in *corporate banking* and *investment banking* may require a certain size of organisation, capital and balance sheet (the capacity to debit the balance sheet with large commitments, presence on many markets etc.). Moreover, at a certain

[7] One example is the British Competition Commission's report on the merger between Lloyds TSB and Abbey National. The decisive issue there was not whether synergy effects existed, but how the consumers would be affected in the short term.

market value the share is included in the largest indices, which increases the liquidity (and therefore the value) of the share.

- **Market power**

  Entry barriers and lock-in effects mean that a large operator may be able to affect pricing to its own advantage. The classical theory is that the larger the market share, the greater the market power and monopoly gains.

- **Other motives**

  i) *Management advantage*: A new management can create value added in a company that has previously had a less efficient management. Drastic measures such as mergers or acquisitions may be necessary to bring about changes in a deficient corporate culture.

  ii) *Empire building*: Management may be driven by other objectives than maximising shareholders' profits (personal financial gain and prestige).

More efficient production is always in the best interests of society, even if the increase in efficiency does not immediately benefit customers.

More efficient production, resulting from economies of scale and scope, is always in the best interests of society, even if the increase in efficiency does not immediately benefit customers. The welfare effect of the other size motives is less clear. In several cases it should be positive, as the company overcomes a market imperfection. Greater market power should most often work in the opposite direction: a firm with market power can by definition charge a higher price for its services than it costs to produce them, which means that the service is produced on a too small scale (from society's point of view). If an acquiring firm manages to increase or change production in a company that has previously been mismanaged, this of course increases welfare. On the other hand, an empire-building strategy without the goal of creating value added should prove costly for both firm and society.

Economies of scale

Numerous surveys have been made to examine if and when economies of scale exist in the banking sector.[8] Most of these are traditional econometric studies, where a cost function is assumed and the bank's costs are estimated against differ-

[8] For a review of the academic research in this field, see Humphrey (1990) and Berger, Demsetz & Strahan (1999).

ent products, such as deposits, lending and derivative trading. It should be noted that this type of analysis is more difficult to make for the banking sector than many other industries. Several methodological problems arise, particularly with regard to bank deposits. Should they be regarded as an "input" or an "output" in banking? Another problem is that, in almost all cases, the studies assume that the value of the banks' production can be measured by the volume of loans, cash in the bank etc. Given a development towards increased disintermediation[9], which applies above all to larger banks, it is quite possible that such assumptions underestimate the value of the banks' production. In addition, technological developments have led to major changes in the conditions for banking, more so than for many other industries, which makes older studies less reliable.

Economies of scale appear to be pronounced for small banks, then to decline gradually and actually become negative for large banks.

Bearing in mind these methodological problems, it is still interesting to note that the academic research in this field, both old and new, is relatively unanimous: economies of scale appear to be pronounced for small banks then to decline gradually and actually become negative for large banks. With regard to Sweden, a study by Oxenstierna (2001) is interesting reading. Oxenstierna studied the five Swedish major banks between 1989 and 1997 and found that on the whole they had both negative economies of scope and negative economies of scale.[10] These results indicate that mergers involving major Swedish banks do not lead to more efficient production as a result of economies of scale per se.[11] An alternative interpretation is that economies of scale and scope do exist, but that the costs of handling the complexity of larger organisations "eat up" this profit.[12]

This conclusion does not necessarily apply to the development of the banks' joint systems, such as giro and ATM networks. Exploiting economies of scale and network effects in these systems requires large production units and market shares. The existence of dominant operators, and mergers between these, could therefore increase welfare. In contrast, unregulated competition in the common systems and networks would risk having unfortunate effects, with several parallel and non-compatible systems.[13] On the other hand, there is of course a risk that

[9] Disintermediation entails the allocation of savings and investment being handled by markets and not by intermediaries (banks). The banks' role then changes from earlier having managed capital allocation to providing corporate advisory, brokerage and asset management services.

[10] Oxenstierna estimates the average economies of scale to around 98.5 per cent and the economies of scope to 98.0 per cent.

[11] However, some US studies indicate that economies of scale may also exist for much larger banks. See Berger, Demsetz & Strahan (1999).

[12] See Boot (2000).

the established banks that dominate the systems will exclude newcomers and thereby limit entry opportunities.[14] This can in the long term lead to a deterioration in efficiency. These conflicting aspects of the common systems mean that the authorities must strike a trade-off when assessing market structure.

Market power

At the beginning of the 1950s the central government introduced a number of regulations on the Swedish credit market, including regulation of deposits and credit, investment and liquidity quotas and issue controls.[15] By regulating both prices and supply, the regulations probably caused a severe deterioration in competitive pressure in the banking sector. The regulations led not only to an undersupply of bank services, but also provided little incentive for innovation in the industry, which is perhaps even more serious.[16] In Sweden, as in many other countries, large areas of the financial market were liberalised during the 1980s. At the beginning of the 1990s there was another important legal change, namely that banks were allowed to own insurance companies, and vice versa. This was important to increase entry into the banking sector. During the 1990s around ten new banks were started in Sweden, four of them by insurance companies. Today, the formal entry barriers to the banking sector are small.[17]

During the 1990s around ten new banks were started up in Sweden, several of them by insurance companies.

Despite the large inflow of new players, Sweden still has one of the industrial world's most concentrated bank markets. Concentration within the sector, measured as the banking sector's Herfindahl index, has remained almost unchanged during the 1990s. However, when measured as the four largest banks' market share, the concentration has increased slightly. The explanation is

Despite a large inflow of new operators, Sweden still has one of the industrial world's most concentrated bank markets.

[13] See Guiborg (1998).

[14] In 1997-98 Finansinspektionen (the Swedish Financial Supervisory Authority) surveyed the market for payment services. The new, smaller banks launched substantial critique against the major, established banks. The critique concerned access rules and fees in the computerized payment clearing system and the ATM network. In their view, the established banks tried to block their access to these common systems. Eventually the disagreements have been worked out through negotiations.

[15] See Karlsson and Kragh (1997).

[16] A related issue here is the distortion created by the regulations with regard to the supply of payment services. It is well known that there was a substantial cross-subsidising between different products (see, for instance, the Bank cost commission (1989) and Flatraaker & Robinson (1995)). Payment services, which were much more exposed to competition than other products, were subsidised by the more protected deposits. The increased competitive pressure has led to an "adjustment" of pricing, which is most clearly noticeable in the banks' interest rate margins.

[17] See also the more detailed assessment in the Swedish Competition Authority (2000).

that the consolidation of the 1990s mainly took place among large, established banks and thus entailed a polarisation. The market structure has changed in nature – the medium-sized banks have disappeared and the market now consists of four large universal banks and a growing number of much smaller banks.

The number of bank offices increased during the entire 1990s in the USA. In Sweden, as we know, developments have moved in the opposite direction.

One misgiving prior to the deregulation in the USA was that small, local banks (community banks) would disappear when they were bought up by large groups. Gunther (1996) concludes that this was not the case. Acquisitions there have rather been part of a geographical expansion of former regional banks, that is to say, a means of diversifying the asset portfolio and realising economies of scale. As the merging banks were not previously active on the same markets, the mergers have not implied an increased market concentration. The fact is that the number of bank offices in the USA increased during the entire 1990s.

In Sweden, as we know, developments have moved in the opposite direction. Today, many communities often have only two universal banks, for instance Handelsbanken and Föreningssparbanken. The concern is, of course, that customer

Figure 1. Concentration on the Swedish deposit and lending market

Herfindahl index

Note. The index is calculated according to the formula $10.000 \times \sum_{x=i}^{n} X_i^2$ where X_i is bank i's market share and n is the total number of banks. A higher index value signifies higer market concentration.

Source: The Riksbank.

groups that are dependent on local banks, such as small companies, will face a poorer supply of services as the consolidation continues.[18] Indeed, the service to small companies was one of the decisive aspects when Lloyds TSB's acquisition of Abbey National was rejected by the British Competition Commission.

The question is how great an effect the skewed market structure has on competition in the banking sector. One answer, namely no effect at all, is offered by the theory of "contestable markets".[19] According to this theory, market structure has no significance as long as there is free entry to (and exit from) the industry, as potential excess profits will always attract new firms. Consolidation, according to this school of thought, is a consequence of altered conditions in the industry and not vice versa.[20] Such ideal conditions do probably not yet prevail in the Swedish banking sector. Rhoades (1997) points out that lock-in effects, partly created by the established banks themselves, mean that customers often hesitate to change bank. Shull and Hanweck (2000) claim that the too-big-to-fail problem (more about this later) benefits the major banks, in particular as they receive lower financing costs. This and other factors act in practice as entry barriers to the market.[21] However, it is difficult to distinguish these from legitimate competitive methods and the strength of established trade marks.

Other motives

Effects of mergers and acquisitions other than those deriving from economies of scale and scope and market power are difficult to measure. Merging banks are often eager to point out the possibility of using each bank's expertise in different areas to achieve a higher level of profitability in the new, merged bank. There are also studies that indicate that the competence of the acquiring bank's management is the most important explanatory variable as to whether or not a merger is successful. Gart & Knapp (2002) find that successful mergers are characterised by, for instance, good credit quality and cost control as well as limited customer flight, which are variables that should largely depend on the capacity of the management.

The competence of the acquiring bank's management is often the most important explanation for a successful merger.

However, if the transfer of knowledge were a driving force behind mergers,

[18] However, the US research does not show any clear connection between consolidation and lending to small companies. See Mishkin (1996) for a discussion of this.
[19] See Baumol, Panzar & Willig (1982).
[20] See, for instance, Bourke (1988) who finds that the connection between market structure and bank profits is weak.
[21] A new study, Oxenstierna (1999b), also indicates that the major Swedish banks still have considerable market power, particularly with regard to deposit.

this should be reflected in the fact that larger banks are on average more efficient than smaller ones. The lack of evidence for the existence of economies of scale and the relatively small differences in profitability between banks of different sizes can be seen as an indication that other motives often have an impact on mergers and acquisitions. One such motive is empire building, that is, managers' endeavours to attain the prestige and high salary that come from leading a much larger company.

Consolidation and the stability of the bank system

"The systemic risk" is the main reason why the Riksbank follows developments in the banking sector.

Traditional banking in the form of deposits and lending give rise to a fundamental stability problem: as deposited funds – often with the right to immediate withdrawal – are used for long-term investment, the bank becomes sensitive to liquidity disturbances. The situation is unstable as a mere rumour that the bank is insolvent can cause a bank run, which makes the rumour self-fulfilling. A bankruptcy caused by a liquidity shortage is ineffective if the bank is fundamentally solvent. If the payment system, which is entirely dependent on the banks' account systems, is disturbed by the failure, the costs to society may be very large. The latter aspect, the "systemic risk" is the main reason why the Riksbank follows developments in the banking sector.

The introduction gave a brief description of how we reached our current situation in Sweden, with four dominant bank groups. What consequences, if any, has this considerable market change had for risks in the bank industry? Here we discuss some risk aspects that may have been affected by the consolidation process, such as credit risk and operational risk in individual institutions, contagion risk and the too-big-to-fail problem.

Credit risk

One argument in favour of consolidation is that major banks are less dependent on individual loans and more resistant to macroeconomic disturbances.

A common argument in favour of consolidation is that large banks, with a bigger and more diversified asset mass, are less dependent on individual loans and more resistant to macroeconomic disturbances. The latter aspect has often been brought up in the American debate. For a long time there were considerable restrictions for banking groups that wished to establish themselves in several states. Following a gradual

deregulation during the 1980s, the regulations were abolished completely through two federal reforms in 1994, the Riegle-Neal Interstate Banking Act and the Branching Efficiency Act.[22] During the 1990s geographical expansion really took off in the USA and several American banking groups now operate in more than ten states. Advocates say that this leads to more stable banks; thanks to the fact that borrowers are spread over states with different industrial structure and in different phases of the business cycle, the overall risk in the banks' portfolios is reduced. Several studies indicate that geographic expansion can lead to considerable diversification.[23]

With regard to mergers within Sweden, credit risk has probably not been much reduced.

The same ought to apply on the European market, where cross-border mergers are, however, still rare. The Group of Ten (2001) concluded that it is difficult to assess the diversification potential in general, as it is largely dependent on the characteristics of the individual bank. With regard to mergers within Sweden, credit risk has probably not been much reduced, as the banks have similar customers and operate under the same macroeconomic conditions. The potential should be somewhat greater for mergers with banks in other Nordic countries. This applies in particular to Norway, as the business cycle there differs from that in the other Nordic countries because of its oil-dominated economy.

Operational risk

It is easy to imagine that operation risk increases with the size of the operations.

The Riksbank's Financial Stability Report 2000:2 defines a bank's operational risk as "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events". Operational risk is difficult to quantify but it is easy to imagine that it increases with the size of the operations; the distance between management and operational personnel is greater in large companies and the administrative systems are more complex. And even if the systems in themselves do not become more risky when the bank grows, more and more customers will be dependent on the same system. Despite the fact that this leads to efficiency gains, both for customers and the bank, at the same time the risk of a major system breakdown increases.

The risk of excessive dependence on an individual system was brought to the

[22] An individual state can still choose to limit the banks' geographical expansion.
[23] See Benston, Hunter & Wall (1995), Hughes, Lang, Mester & Moon (1996) and Demsetz & Strahan (1997).

The strong dependence on individual telecommunications and computer systems comprises a risk.

fore in connection with the financial difficulties experienced by the American telecommunications company WorldCom. This is because WorldCom is one of the largest suppliers of telecommunications and computer services to the Swedish financial sector. An uncontrolled bankruptcy at WorldCom could thus have serious consequences for the financial systems. Another example is the breakdown in Nordbanken's central computer system in January 2001. The breakdown was due to an incorrect operator command and resulted in the Internet, ATM and office services being inaccessible for several hours.

A further aspect is that the transparency of the operations deteriorates when an organisation becomes larger, particularly with regard to cross-border mergers. The increased complexity hampers the authorities' insight into the companies and makes it difficult to identify the functions that entail risk within the bank. The reduced transparency means that it will be difficult to detect potential crises in time. The increased complexity can also make risk management more costly.[24]

Contagion risk

The banks' large mutual positions constitute a considerable risk.

A bank can either bear systemic risk (be "system-critical") through its own functions or through the repercussions its failure would have on other institutions. By contagion risk we mean the risk that problems arising in an individual institution would spread to others. As the banks often have large positions against one another, particularly through the derivative and interbank markets, this could prove a significant risk factor.

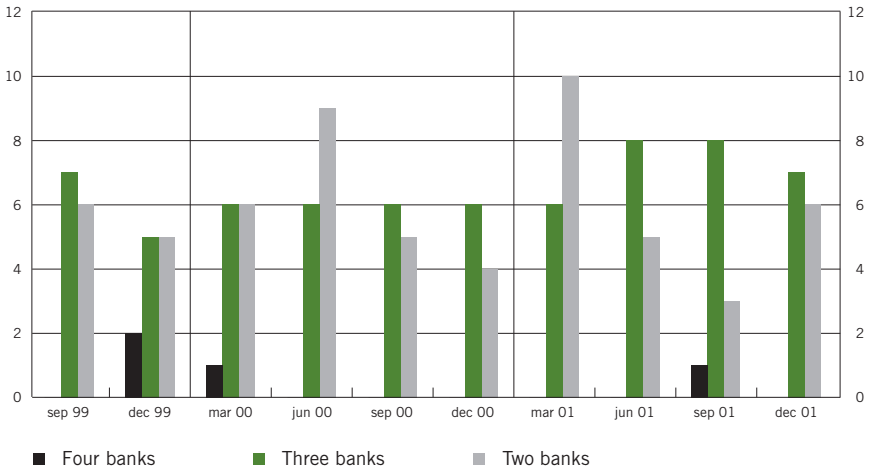
Consolidation has conflicting effects on contagion risk.

Consolidation has conflicting effects on contagion risk. Large, well-diversified banks in principle have less need to expose themselves externally, for instance, to borrow on the interbank market. All else being equal, the size of the banks' mutual positions, and thereby the contagion risk, should thus decline with the concentration in the banking sector. However, in that larger banks are more active in the financial markets, in practice the exposures tend to increase with size. Data from the USA also indicates that large, complex banks have greater exposures against one another, both through short-term loans and via derivative trading. If this is the case in general, consolidation may lead to greater systemic risk.[25]

[24] Group of Ten (2001), p. 141.
[25] Group of Ten (2001), p. 140.

In a banking system like the Swedish one, dominated by a small number of large banks, it is not particularly surprising that these banks have large exposures against one another. The mutual exposures are a result of the banks' activities in the financial markets and consist of deposits, securities and derivatives. However, it is concluded in the Riksbank's Financial Stability Report 2002:1 that the probability of a sudden default among one of the banks' most important counterparties (which includes themselves) is low. If such a failure were nevertheless to occur, it is noted that the exposures to an individual institution are often so large that there would be a significant contagion risk.[26]

Figure 2. Number of counterparties to which four, three and two major banks respectively are exposed at the same time



Note. Counterparties refers to each bank's fifteen largest individual exposures with regard to credit without collateral. For instance, in December 1999 there were two counterparties to which all four Swedish major banks were exposed.

Source: The Riksbank.

International bank mergers could have a destabilising effect because of the "home country principle".

The Group of Ten (2001) concludes that international bank mergers could have a destabilising effect due to the "home country principle". This principle implies, which is of course perfectly reasonable, that it is the central bank in the country where the bank has its headquarters that decides whether to take on the role of "lender of last resort". However, the result could be that the central bank in the home country finds no reason to intervene, despite the fact that the situation in the host country comprises a

[26] Sveriges Riksbank (2002), pp. 41-45.

threat to its bank system. Cross-border mergers are still unusual, however, and are often on a minor scale.[27] In Sweden, less than 10 per cent of banking sector assets are held by foreign banks and the largest one of them, Danske Bank, has only around 5 per cent of deposits.

The too-big-to-fail problem

The expectation that the government will assist a major bank in the event of problems can give rise to *moral hazard* among the bank's investors.

The major banks' importance for the payment system, and the costs to society that a bank failure would entail, mean that the general public expects that the government would intervene in some way to avoid such a failure, or at least minimise the consequences. Whatever the government may declare *ex ante*, it is not perceived likely that it would remain passive if a crisis actually occurred as it would then, *ex post*, be in the government's interest to intervene. This phenomenon is usually described as the bank having become *too big to fail*.[28] The expectation that the government will provide assistance to a major bank in the event of problems can give rise to *moral hazard* behaviour among the bank's investors. The perceived guarantee could lead investors not taking sufficient account of the downside risk in their strategies. They have everything to gain from a successful outcome, but hope that the loss in the event of a failure will be limited by the 'guarantee'. This can result in shareholders choosing to invest in riskier projects than would have been the case without a perceived guarantee. Creditors may have a weaker incentive to analyse and monitor the bank because of the perceived guarantee. The consequence of this will be a poorer pricing of risk in larger banks, which in turn can further reinforce the banks' incentive to increase their risk-taking.

The central government can limit the costs to society of certain banks being regarded as too big to fail by establishing a credible mechanism for managing problem banks.

It is, of course, difficult to try to assess or quantify the costs to society related to certain banks being considered too big to fail. Given the Swedish government's actions during the bank crisis and the relative importance of the major banks in the Swedish bank system, the

[27] A well-known exception is Nordea, which is the result of a number of mergers between banks from Denmark, Finland, Norway and Sweden.

[28] This expectation has also proved with experience to be correct, as in modern times there have been extremely few examples of major banks in industrial nations being allowed to fail in an "uncontrolled" fashion. On the other hand, there is plentiful documentation of government rescue operations, implemented either by the Finance Ministry or central banks, involving anything from guarantees and liquidity assistance to capital injections and nationalisation.

cost is probably more than negligible. One way for the government to limit this cost is to establish a credible mechanism for managing problem banks. Perhaps the most important component in such a mechanism is that shareholders and creditors should be forced to bear the costs of their mistakes. However, as the purpose of ensuring that major banks do not fail in an uncontrolled manner is to limit the effects on the financial system, there will always be some element of moral hazard.

What, then, is the connection between the too-big-to-fail problem and consolidation in the banking sector? An important question in this context is *when* a bank becomes too big to fail. Although it is not possible to formulate specific criteria, it can be concluded that there is a certain critical level with regard to the bank's importance in the economy and the financial system. The advantages of government intervention (short-term system stability) should be weighed against the costs (long-term loss of credibility) of such an action. Given that the Swedish bank system is already characterised by four major banks with significant market shares, it is unclear what further consolidation could entail. If two already systemically important banks merge, it is difficult to see the too-big-to-fail problem becoming any worse. If the consolidation is instead among the remaining small banks, on the other hand, it could result in a further systemically important bank, which might be negative from the point of view of stability and efficiency.

Conclusion

In this article we have provided an account of some aspects that the Riksbank takes into account when assessing mergers in the banking sector. It is worth repeating that the Riksbank's task is different from that of, say, the Swedish Competition Authority, in that the Riksbank perceives an efficient and safe production of financial services and further development of the joint systems to be equally important as fierce competition in the retail market.

Nevertheless, it is difficult to see that the consolidation in recent years has led to any significant economies of scale in the production of financial services. A number of studies indicate the reverse, that banks operate with negative economies of scale even at a relatively small size. Other factors, such as the transfer of knowledge and the need to attain a particular size, can better explain the mergers.

The consolidation in recent years has scarcely led to any significant economies of scale in the production of financial services.

The consolidation in the Swedish banking sector during the 1990s has fur-

The major banks' dominance in the market has been reinforced during the 1990s and there is a risk of further reinforcement.

ther reinforced the skewed market structure. However, the consequences of this on the efficiency of the banking sector differ depending on which segment is studied. It is likely that certain customer groups, for instance SMEs, have fewer banks to choose from now than they had ten years ago, while other segments, both large companies and small savers, have benefited from the entry of new operators. Also in the future the authorities' objective should be to eliminate entry and exit barriers in the banking sector, rather than to control the market structure or the behaviour of individual institutions. The fact that new players can enter the market, which several did during the 1990s, is the best guarantee that local monopolies do not arise. If entry barriers are sufficiently low, the banks can be allowed to choose size and business strategy as they see fit.

For mergers between Swedish banks, the diversification effect has probably been limited.

It is difficult to have an opinion on the consequences of consolidation for system stability. The diversification effect of mergers between Swedish banks has probably been limited – these have probably not reduced the credit risk in the bank system. With regard to operational risk, the sensitivity to disturbances in technical systems increases, but this can to some extent be counterbalanced by the major banks' better opportunities to invest in advanced security solutions.

One of the Riksbank's most important objectives is to maintain a clear and reliable mechanism for managing banks that become insolvent.

A more serious aspect of consolidation is that society risks becoming overly dependent on certain institutions. The major Swedish banks probably already have such a size that a failure could lead to serious consequences for the payment system. This insight gives rise to a moral hazard problem; a systemically important bank can take on greater risks and finance itself at a lower cost than is desirable from society's point of view, as creditors can expect the government to intervene if the bank should face difficulties. One of the Riksbank's most important tasks, together with other authorities, is therefore to maintain a clear and reliable mechanism for managing banks that become insolvent, a mechanism that give players in the financial market continued incentive to pursue sound lending practices and efficient mediation of payments.

References

Baumol, W., Panzar, J. & Willig, R., (1982), "Contestable Markets and the Theory of Industry Structure", New York: Harcourt Brace Jovanovich.

Benston, G., Hunter, W. & Wall, L., (1995), "Motivations for Bank Mergers and Acquisitions: Enhancing the Insurance Put Option Versus Earnings Diversification", *Journal of Money, Credit, and Banking*, 27 (3), pp. 777–788.

Berger, A., (1998), "The efficiency effects of bank mergers and acquisitions: A preliminary look at the 1990s data", in *Bank Mergers and Acquisitions*, eds Y.

Berger, A., Demsetz, R. & Strahan, P., (1999), The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future, *Journal of Banking and Finance*, 23.

Boot, A., (2000), "Consolidation and Strategic Positioning in Banking with Implications for Sweden", appendix to the commission into the future of the financial sector, SOU 2000:11.

Competition Commission, (2001), "Lloyds TSB Group plc and Abbey National plc. A report on the proposed merger".

Demsetz, R. & Strahan, P., (1997), "Diversification, Size, and Risk at Bank Holding Companies", *Journal of Money, Credit, and Banking*, 29, pp. 300–313.

Finansinspektionen, (1998), "Betaltjänster & Kundrörlighet" (Payment services and customer mobility).

Gart, A. & Knapp, M., (2002), "Why Do Some Banking Mergers Succeed While Others Fail?", FMA European Conference 2002.

Group of Ten, (2001), "Report on Consolidation in the Financial Sector".

Guiborg, G., (1998), "Efficiency in the payment system – a network perspective", *Sveriges Riksbank Quarterly Review*, 1998:3.

Gunther, J. W., (1996), "Bank Consolidation, When Less Means More", Financial Industry Studies, December 1996, Federal Reserve Bank of Dallas.

Lybeck, J., (1999), "Den svenska finansiella sektorns utveckling i modern tid" (The development of the Swedish financial sector in modern times), appendix to the committee directive 1997:119, The Swedish financial sector's international competitiveness, 1999.

Hanweck, G. A. & Shull, B., (1999), "The bank merger movement: efficiency, stability and competitive policy concerns", *The Antitrust Bulletin*, Summer 1999.

Hughes, J., Lang, W., Mester, L. & Moon, C., (1996), "Efficient Banking Under Interstate Branching", *Journal of Money, Credit, and Banking*, 28 (4), pp. 1043–1071.

Humphrey, D., (1990), "Why do Estimates of Bank Scale Economies Differ", *Federal Reserve Bank of Richmond Economic Review* (September/October 1990), pp. 38–50.

Karlsson, E. & Kragh, B., (1997), "Styrningen av kreditmarknaden – från 1950-talet till 1980-talet" (The government of the credit market – from the 1950s to the 1980s), in *Vem styr – politikerna eller marknaden? (Who governs – the politicians or the market?*), eds. Sohlman & Viotti.

"Konkurrens på bankmarknaden" (Competition in the bank market), (1999), Swedish Competition Authority's report series 1999:2.

Mishkin, F. S., (1996), "Bank Consolidation: A Central Banker's Perspective", NBER Working Paper 5849.

Oxenstierna, G., (1999a), "Do Swedish Banks Enjoy Economies of Scope or Economies of Scale?", Ph.D. thesis, Essay 2, Stockholm University.

Oxenstierna, G., (1999b), "Testing for Market Power in the Swedish Banking Oligopoly", Ph.D. thesis, Essay 3, Stockholm University.

Rhoades, S., (1997), "Have Barriers to Entry in Retail Commercial Banking Disappeared?" *The Antitrust Bulletin*; 42 (4), Winter 1997, pp. 997–1013.

Robinson, R. & Flatraaker, D-I., (1995), "Costs in the payment system", *Economic Bulletin*, Norges Bank.

SOU 1989:16, "Kostnadsutveckling och konkurrens i banksektorn" (Cost development and competition in the banking sector), Report by the bank cost commission, Allmänna Förlaget, Stockholm.

Swedish Bankers' Association, (1991–1999), "Den svenska kreditmarknaden" (The Swedish credit market), Volumes 1991–1999.

Sveriges Riksbank, (2001), Financial Stability Report, May 2001.

Sveriges Riksbank, (2002), Financial Stability Report, May 2002.

Söderlund, E., (1978), *Skandinaviska Banken 1914–1939*, Almqvist & Wiksell.

Thunholm, L-E., (1996), *Den stora fusionen* (The big merger), Fischer.

An evaluation of forecasts for the Swedish economy

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In this paper we use a comprehensive forecast database to address questions about forecasting performance for the Swedish economy. The size and scope of the database allows us to investigate questions that have so far received little attention: Which institutions make the best forecasts? What can we learn about the forecasting errors made? Does a high profile in one area go hand in hand with superior forecasting performance? Can model based methods shed more light on potential herd behaviour? We also provide an overall ranking for a large number of variables.

Introduction

Forecasts span over most walks of life and affect society in both direct and unknowable ways. Bad forecasts can lead to loss of business opportunities, missed investments or to misguided government macroeconomic policy; good forecasts, on the other hand, can lead to the opposite.

Forecasting is big business, but how well does it stand up to scrutiny? In this paper we address the question of how well the forecasters perform. In a previous article[1], about 52 000 GDP and inflation forecasts for several OECD countries were evaluated. The focus here, by contrast, is on forecasts for one country only, Sweden, but for a large range of variables, including wages, consumption, investment, public expenditure, unemployment, industrial production, imports, exports as well as GDP

The focus in this study is on forecasts for Sweden only, and for a large range of variables.

We thank Hans Dillén, Hans Lindblad and Staffan Viotti for comments.

[1] Blix et al. (2001).

and inflation. Altogether, we have about 20 000 forecasts in this evaluation (see Table D1 in the appendix).

Several other papers evaluate forecasts, such as Batchelor (1997), Gavin et al. (2000), Öller and Barot (2000) and National Institute of Economic Research (NIER) (2002) to cite a few. The contribution of this article is to be more comprehensive in scope while posing a few specific questions about the forecasts and how they are related. For example, we can decompose the forecasting error of GDP growth into its various components, which may provide information on which shocks have occurred in the economy as well as which area(s) of forecasting methodology need most improvement. We also show that virtually all forecasters were very wrong regarding the economic development for 2001. Connected to this is the question of herd behaviour. We use a model based approach to investigate the extent of herd behaviour among forecasters.

We investigate if a particular interest in certain variables leads to a superior forecasting performance.

Moreover, some forecasters have a particular interest in certain variables, either as a part of a policy choice, such as inflation for the Riksbank, or as a raison d'être, for example wages and unemployment for the labour unions. Our database allows us to investigate if having such a "special interest" in some variable leads to a superior forecasting performance.

Our method is based on root mean square errors and mean prediction errors.

All data on forecasts in the article comes from NIER and Consensus forecasts on a monthly frequency. The sample period is from 1993 to 2001 except where otherwise stated. Our method of evaluation is based on simple tools such as calculating root mean square errors (RMSE). This measure is based on the square of the forecasting errors and is a fairly standard tool for forecast evaluation. We also evaluate the forecasters using the mean prediction errors (MPE). This measure is a simple average of the forecasting errors and hence should be close to zero over a longer time period in order to be unbiased.

For some analysis we have used slightly non-standard techniques and these are outlined in the appendices. Also included is a comprehensive ranking for the different variables, while the main text is used to illustrate particular points that are of interest.

Similar to all evaluations, there are difficulties that place limits on the conclusions that can safely be drawn. The sample is rather short (1993–2001) and the economy has undergone significant structural changes during this time, not least the introduction of an inflation target. Moreover, some forecasters find reason to

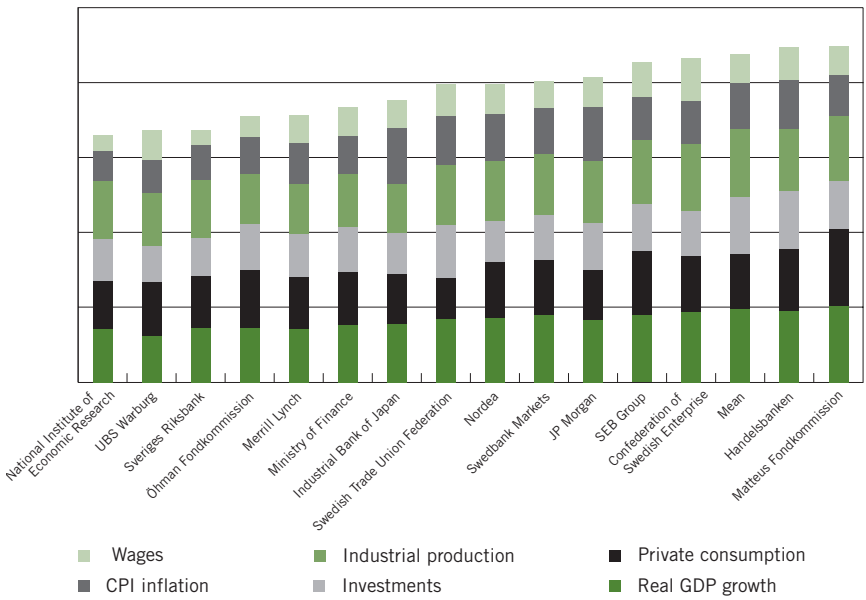
make technical assumptions that are known to be less than optimal predictions.[2] In addition, there are sometimes changes in variable-definitions so that the original forecast need not wholly correspond to the final version of the statistic in question. Notwithstanding these difficulties, we judge the conclusions presented in the main text to be fairly robust.

The economy has undergone significant structural changes during the sample period, 1993–2001, which may affect the forecasting performance.

Overall ranking of forecasters 1993–2001

Figures 1, 2 and 3 display the relative forecasting performance for several institutions during 1993–2001. The variables that are included are those that we deem

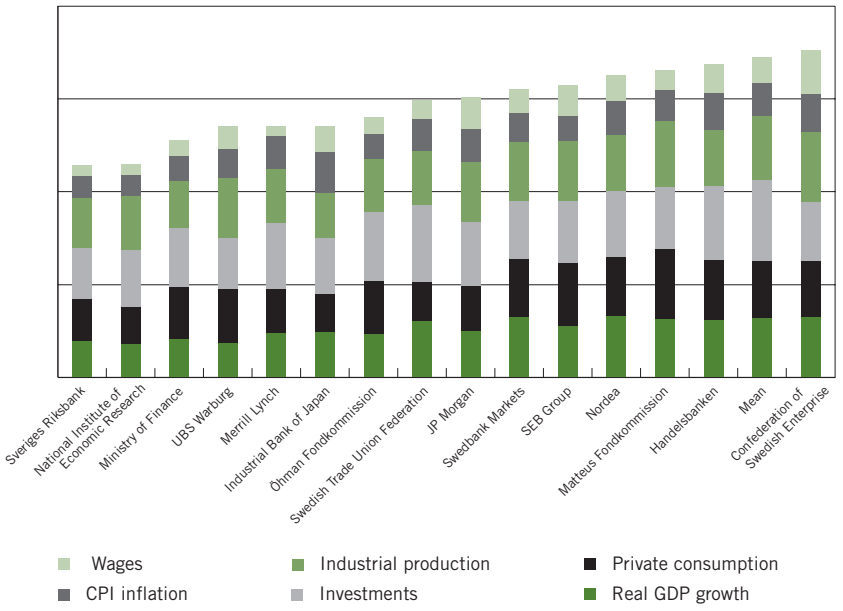
Figure 1. Average RMSE for both within-year and next-year forecasts (1–24 months horizon) normalised with standard deviation, 1993–2001



Note. The figure displays the RMSE for each variable divided by the standard deviation of all institutions' forecasting error. The institutes with the low bars are the better forecasters. Note that the scale is of little importance and therefore the units are omitted. Also note that small differences in bar length should not be overinterpreted.

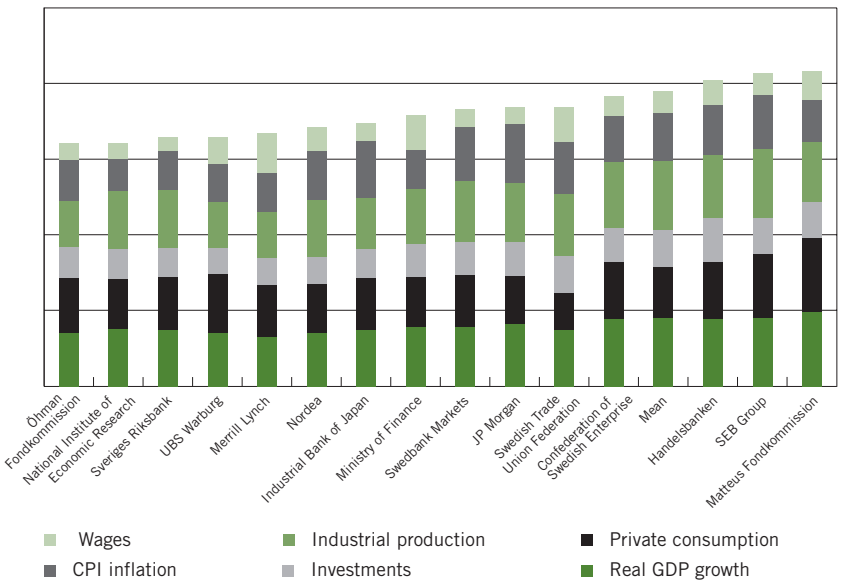
[2] For example, the Riksbank assumes a constant repo rate over its forecast horizon. Thus, if the forecast for 1–2 years ahead differs from the target level the repo rate is adjusted and hence the forecast is wrong ex post. The Ministry of Finance's forecasts for wages and unemployment tend to be more policy goals rather than forecasts. The NIER forecasts government expenditure based on parliamentary approved spending programs only – and so on.

Figure 2. Average RMSE for within-year forecasts (1–12 months horizon) normalised by the standard deviation, 1993–2001



Note. See note in Figure 1.

Figure 3. Average RMSE for next-year forecasts (13–24 months horizon) normalised by the standard deviation, 1993–2001



Note. See note in Figure 1.

to be both of particular interest and for which there are a large number of observations available: wages, CPI, industrial production, investments, private consumption and GDP. Other variables of interest (imports, exports, government expenditure and unemployment), for which the number of observations is an order of magnitude less than the other in Table D1, are shown in Appendix A.

The institutions with the smallest bars in the figures are by our measure the best forecasters.

Each variable included in the figures is based on evaluating the particular institutions' root mean square error and normalising this with the standard deviation. The normalisation is carried out so that a variable for which the RMSE is larger than for other variables should not be given undue weight in the overall ranking. By simply adding these normalised RMSE, we thus obtain an overall picture of an institution's forecasting performance. The institutions with the smallest bars are by this measure the best forecasters. Note, however, that small differences in bar lengths should not be overinterpreted.

The National Institute of Economic Research, UBS Warburg, Sveriges Riksbank and Öhmans are the overall best forecasters.

We find that NIER, UBS Warburg, Sveriges Riksbank and Öhmans are the overall best forecasters. The individual ranking for all institutions changes only slightly depending on whether the forecasting horizon is the whole sample of 1–24 months (see Figure 1), 1–12 months denoted "within-year forecasts" (see Figure 2) or 13–24 months denoted "next-year forecasts" (see Figure 3). The same picture of ranking emerges also with other methods.[3] Similar to Blix et al. (2001), we find that the mean does not give such a good forecast for Sweden, although it performs well for several other countries.

Are institutions with special focus better at "their" variable(s)?

Some institutions in the evaluation have a special interest or can be presumed to have special competence in some particular variable(s). Does this result in better forecasts for the variables concerned?

The Riksbank's monetary policy is guided by its inflation forecast.[4] It is therefore a variable that the Riksbank should excel in forecasting. Figure 4 shows

[3] For example, assigning relative rank to each forecaster and taking averages across variables leads to a similar picture. Another measure of evaluation, the Theil inequality coefficient, may also be informative, but we have not used it in this paper.

[4] Note that the Riksbank bases its policy decisions on UND1X-inflation, as this measure excludes mortgage interest payments and is less sensitive to the assumption of a constant repo rate.

Figure 4. RMSE for CPI, average of within- and next-year forecasts, 1993–2001

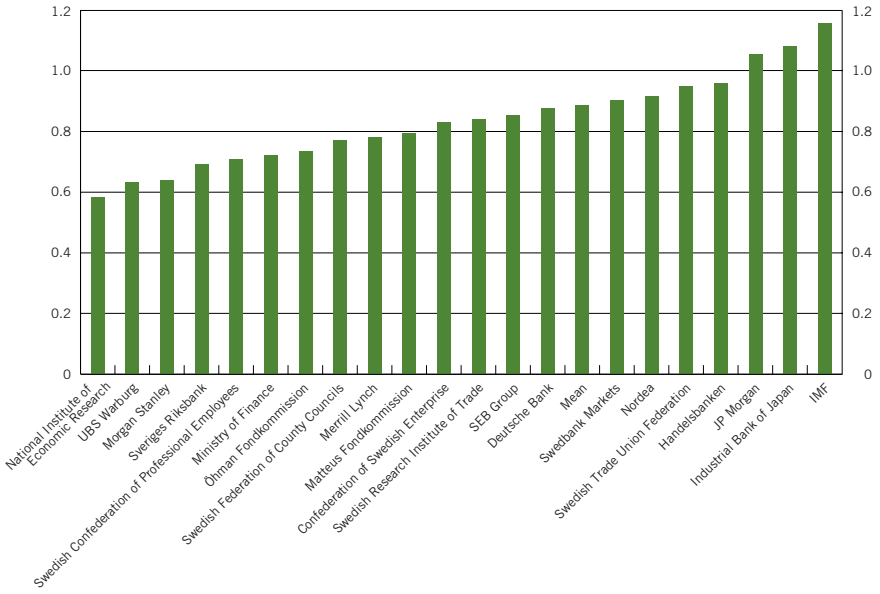
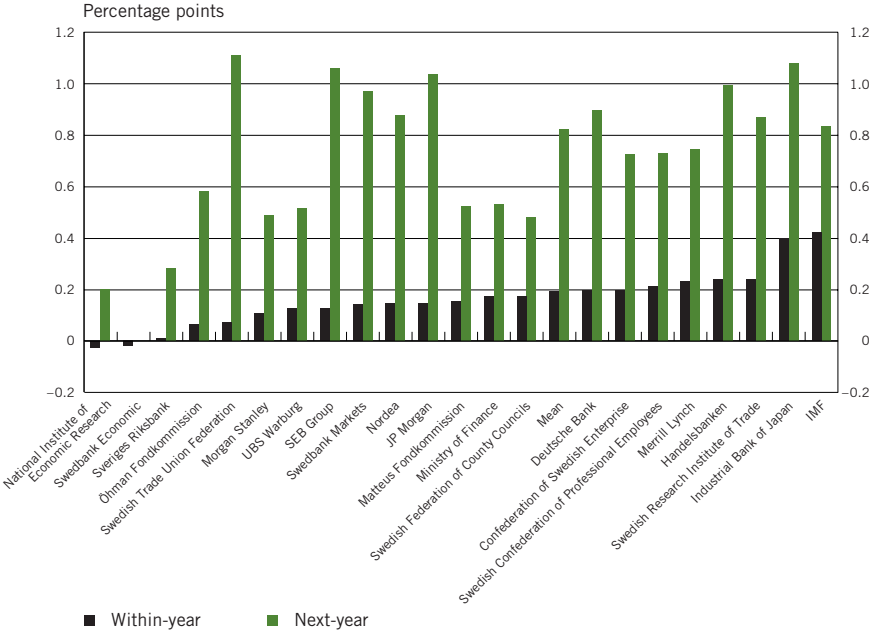


Figure 5. MPE for CPI forecasts, 1993–2001

Percentage points



that the NIER is the best CPI-forecaster, closely followed by the Riksbank.[5] The Swedish Trade Union Federation (LO) and the IMF are among the less successful CPI-forecasters. Underpinning the CPI-forecast is a considerable systematic error; most forecasters have on average overestimated inflation during the period (see Figure 5). For example, LO has overpredicted inflation by more than 1 percentage point for their next-year forecasts. The Riksbank and the NIER have almost no bias in their within-year CPI-forecasts and the least bias in their next-year forecasts among those surveyed. Öhman had the best CPI-forecasts in the study by Blix et al. (2001) and is still among the top forecasters.[6]

NIER is the best CPI-forecaster, closely followed by the Riksbank.

It should be noted, however, that the Riksbank's forecasts are conditioned on the assumption of an unchanged repo rate. We have computed a series of CPI-forecasts adjusted for this assumption (not displayed), but, as noted in NIER (2002), the Riksbank's performance does not improve: for within-year forecasts, the RMSE is unchanged; for next-year forecasts it is marginally worse.

For wage growth there are several institutions that can be presumed to have a special interest.[7] The LO gives high priority to its members' wage increases while institutions representing the employer side, the Swedish Federation of County Councils (Landstingförbundet) and the Confederation of Swedish Enterprise, have an interest in their members' nominal wage costs. Therefore, wage growth is at least to some extent a policy variable for these institutions. Figure 6 shows that Landstingsförbundet is best, closely followed by the Riksbank. Notably, for within-year forecasts and for next-year forecasts the Confederation of Swedish Enterprise and the Ministry of Finance are among the less successful forecasters by an order of magnitude. The Ministry of Finance and the LO have on average underestimated wage growth by more than 0.3 percentage points while the Confederation of Swedish Enterprise has overestimated it by more than 0.4 percentage points. (see Figure 7).[8]

For wage growth the Swedish Federation of County Councils is the best forecaster, closely followed by the Riksbank.

Unemployment is of special interest for several institutions, but perhaps in particular for the Ministry of Finance and the LO. The union wants to protect its

[5] It should be noted, however, that the top ten inflation forecasters have RMSEs that differ by only about 0.2 percentage points. Thus, the ranking may easily change if a different time period is considered.
[6] Öhmans is ranked below some institutions that were not included in the previous study.
[7] Note that some institutions may use the total wage sum divided by the number of persons employed as wage-measure rather than the one used here.
[8] The Ministry of Finance's wage forecasts are perhaps more of a "wage-growth assumption".

Figure 6. RMSE for wage-growth, average of within- and next-year forecasts, 1993–2001

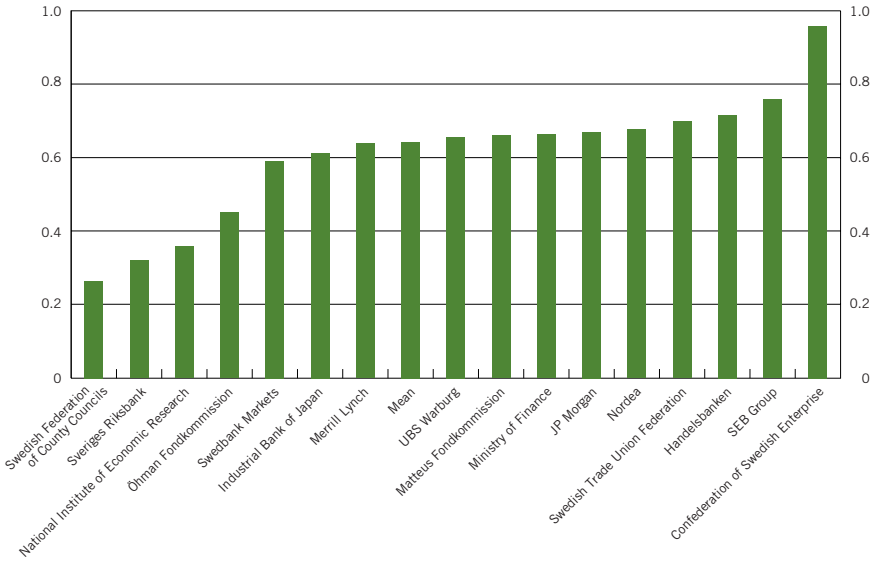
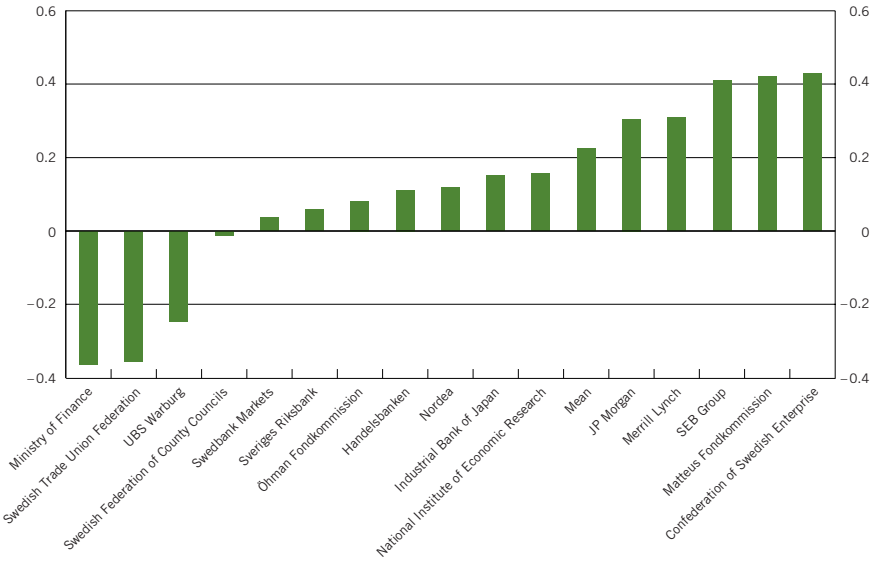


Figure 7. MPE for wage-growth forecasts, average of within- and next-year forecasts, 1993–2001

Percentage points



members interest, both in and out of employment; the Ministry of Finance has a political interest in achieving the government's goals for lowering unemployment. Figure 8 shows that it is the OECD that has the best forecasts for unemployment closely followed by the NIER and the Riksbank. The LO, the Confederation of Swedish Enterprise and the Ministry of Finance forecasts are in fact among the least accurate. Figure 9 shows that the LO and the Ministry of Finance have systematically underestimated unemployment while the Confederation of Swedish Enterprise and the Riksbank have a slight systematic upward bias in the forecast-error.

The OECD has the best forecasts for unemployment closely followed by the NIER and the Riksbank.

With regard to government expenditure, the Ministry of Finance presumably has considerable expertise about the current spending situation. For longer time horizons, its forecasts might contain more elements of political concerns. Although other explanations are of course possible, figure 10 is consistent with this hypothesis: the Ministry of Finance is a top forecaster only for one-year ahead forecasts; for next-year forecasts it is instead among the less successful. Landstingsförbundet is the best forecaster both for within-year and next-year forecasts. LO has the lowest rank, closely contested by the Riksbank and the NIER. Noteworthy is also that all the institutions have systematically underestimated government expenditure by a considerable amount (see Figure 11). LO has by far the largest bias in its forecasts while the Confederation of Swedish Enterprise, the Ministry of Finance and the Riksbank have the lowest.

For government expenditure the Ministry of Finance is a top forecaster but only for one-year ahead.

To summarise, we find that institutions that have a special interest in a particular variable are not necessarily the best forecasters for the variable concerned. Sometimes the explanation may be that the variable concerned is less of a forecast than a policy variable. A "policy variable" forecast may be useful in many ways, but as a forecast it has clear limitations. The Riksbank's inflation forecast, though in this sense being a policy variable, is still among the best forecasts.

One conclusion is that institutions that have a special interest in a particular variable are not necessarily the best forecasters for the variable concerned.

Figure 8. RMSE for unemployment, average of within- and-next year forecasts, 1993–2001

Percentage points

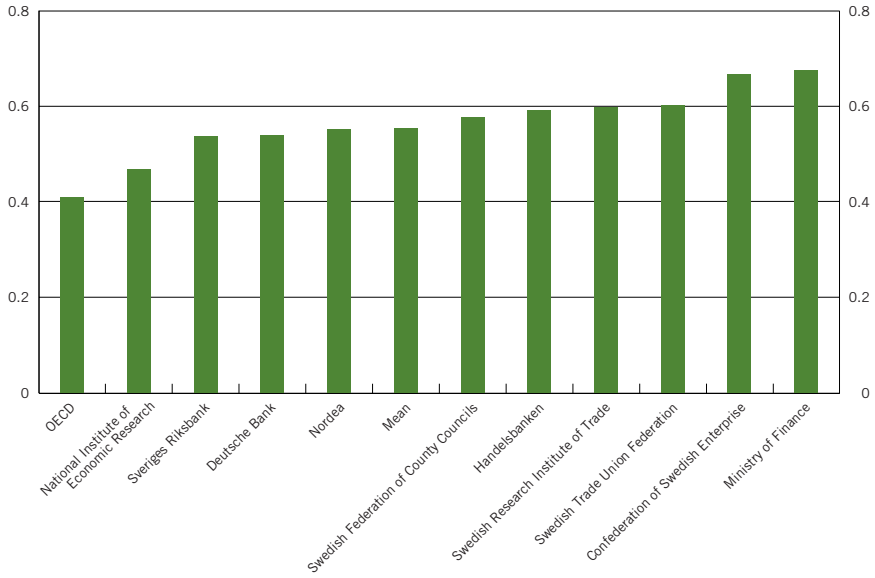


Figure 9. MPE for unemployment forecasts, average of within- and next-year forecasts, 1993–2001

Percentage points

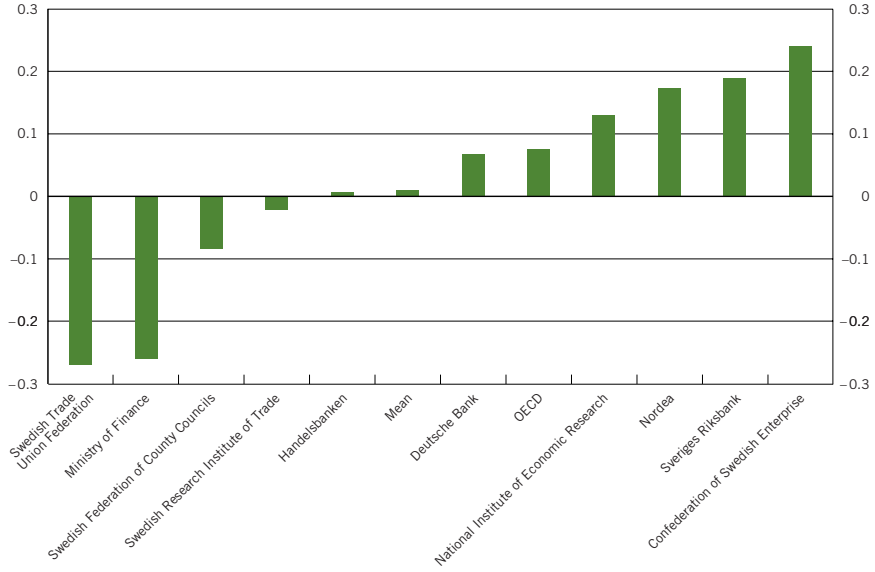


Figure 10. RMSE for government expenditure, average of within- and next-year forecasts, 1993–2001

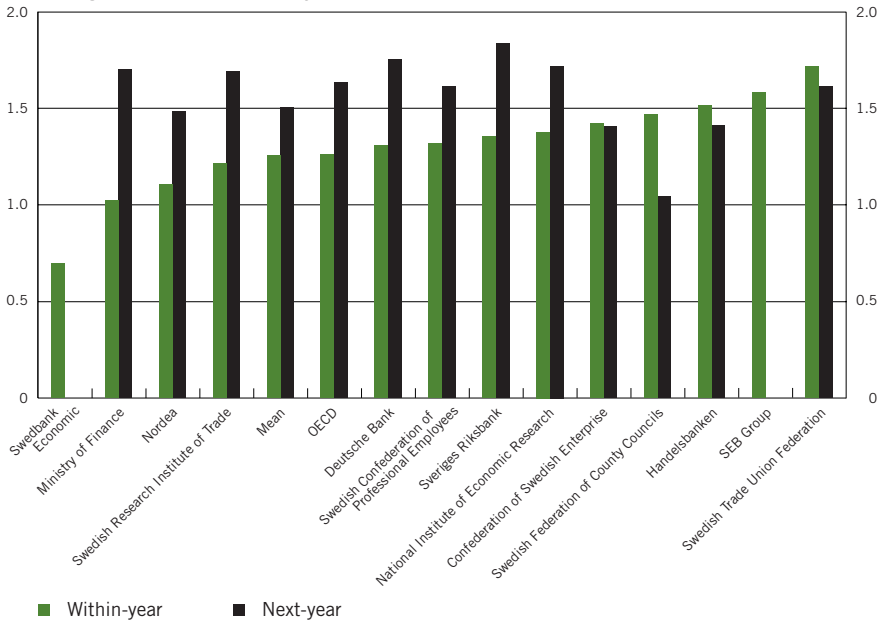
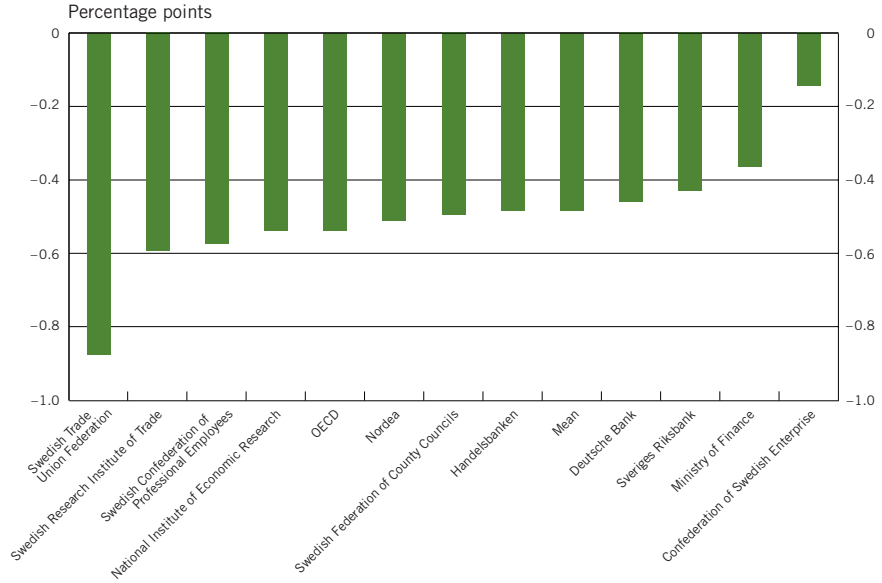


Figure 11. MPE for government expenditure forecasts, average of within- and next-year forecasts, 1993–2001

Percentage points



What explains the forecast error in GDP?

Decomposing the GDP forecast error into its components can provide useful information. Systematic patterns in forecasting errors can help improve future forecasts as well as provide information about the shocks that have occurred in the economy.

In this section there are fewer institutions than when the variables are evaluated one-by-one. This is because the database does not contain all the GDP components for some institutions, and all components are needed to make this decomposition. Moreover, we use data from 1994–2001 only, as 1993 is of a different base year compared to the rest of the data and is problematic for our decomposition. Altogether, we have about 3 000 observations in this section compared to about 13 500 for the GDP-components in the rest of the paper where we do not require a complete set of national accounts.

Tables 1 and 2 show that the largest forecasting bias for national income oc-

Table 1. MPE 1994–2001, contribution to GDP growth within-year forecasts
Percentage points

	Private consumption	Government expenditure	Investment	Stock-building	Net-exports	Exports	Imports	Total	Residual	GDP
Ministry of Finance	0.01	–0.06	0,10	0.00	–0.04	–0.25	–0.17	0.01	–0.25	–0.24
Swedbank Economic	–0.02	–0.01	0.18	0.00	–0.26	–0.45	–0.13	–0.12	–0.19	–0.31
Swedish Research Institute of Trade	–0.01	–0.10	0.04	0.00	–0.07	–0.58	–0.43	–0.14	–0.21	–0.34
Confederation of Swedish Enterprise	–0.05	–0.07	–0.01	0.00	–0.19	–0.85	–0.63	–0.32	–0.18	–0.50
National Institute of Economic Research	0.03	–0.12	0.12	0.00	–0.05	–0.23	–0.13	–0.02	–0.22	–0.24
Swedish Federation of County Councils	–0.06	–0.12	–0.12	0.00	–0.02	–0.12	0.02	–0.33	–0.19	–0.51
Swedish Trade Union Federation	0.12	0.01	0.08	0.00	–0.26	–0.14	0.18	–0.05	–0.02	–0.07
Nordea	–0.08	–0.12	–0.14	0.00	–0.04	–0.42	–0.33	–0.39	–0.20	–0.59
OECD	0.07	–0.15	0.05	0.00	–0.07	–0.39	–0.30	–0.09	–0.12	–0.22
Sveriges Riksbank	0.08	–0.13	0.12	0.00	–0.27	–0.44	–0.13	–0.19	–0.05	–0.24
Handelsbanken	0.13	–0.12	0.12	0.00	–0.12	–0.15	0.01	0.01	–0.11	–0.10
Swedish Confederation of Professional Employees	0.01	0.13	–0.10	0.00	–0.05	–0.15	–0.05	–0.27	–0.25	–0.52

Note. The table displays the sources of the forecast error in GDP.[1] The column "Total" is the sum of columns 2–6. The last column "GDP" gives the MPE of GDP. In principle, this should equal the column "Total", but this is not the case, giving rise to a residual. When the residual is large, this implies that only a small part of the forecasting error can be accounted for. The residual most likely arises from technical reasons, such as change of base year and changes in definitions. Forecasts for net exports are not available directly from our database and have been computed by the method outlined in Appendix C.

[1] Note that the MPE for GDP in these tables may differ from those presented in the appendix. This is because the calculations in this section are based on all GPD-components for which there are fewer observations. We use the sample with fewer observations, as the purpose in this section is to decompose a given forecast error rather than obtaining the best estimate of each components' MPE.

curred for exports and imports. The errors in exports and imports mainly go in the same direction thereby yielding a net effect on GDP that is somewhat smaller. Nevertheless, the underestimation of net exports significantly contributes to the downward bias for both within-year and next-year GDP forecasts. For many forecasters the underestimation goes hand in hand with a weaker than forecasted krona. But this explanation only contributes to understanding the underestimation of exports, as the effects on imports, all other things being equal, would go in the other direction.

The largest forecasting bias for national income occurred for exports and imports.

The forecasting error in net exports is one of the most significant factors explaining the overall forecasting error in GDP-growth (see Tables 3 and 4). The error in government expenditure forecasts, by contrast, explains only a small part – both for within-year and next-year forecasts. For next-year forecasts, the error in private consumption forecasts explains a sizable part of the error in GDP-growth forecasts.

It has been argued that some of the forecasting errors in GDP can be attributed to the quality of the official statistics. There has been a debate, particularly in the Swedish

Some of the forecasting errors in GPD may be attributed to the quality of the official statistics.

Table 2. MPE 1994–2001, contribution to GDP growth, next-year forecasts
Percentage points

	Private consumption	Government expenditure	Investment	Stockbuilding	Net-exports	Exports	Imports	Total	Residual	GDP
Ministry of Finance	–0.03	–0.17	0,22	0.00	–0.15	0.09	0.34	–0.12	0.22	0.10
Swedbank Economic	0.01	–0.17	0.27	0.00	–0.32	0.29	0.42	–0.21	0.51	0.30
Swedish Research Institute of Trade	–0.12	–0.17	0.15	0.00	–0.13	–0.74	–0.46	–0.26	0.06	–0.20
Confederation of Swedish Enterprise	0.17	–0.19	–0.05	0.00	–0.89	–0.61	0.16	–0.96	0.24	–0.72
National Institute of Economic Research	0.05	–0.16	0.24	0.00	–0.23	–0.11	0.24	–0.10	0.11	0.01
Swedish Federation of County Councils	–0.07	–0.24	0.31	0.00	–0.22	–0.34	0.22	–0.23	0.06	–0.17
Swedish Trade Union Federation	0.12	–0.24	0.30	0.00	–0.55	–0.19	0.22	–0.37	0.63	0.26
Nordea	–0.07	–0.15	0.11	0.00	–0.17	–0.65	–0.41	–0.27	0.18	–0.10
OECD	–0.08	–0.11	0.17	0.00	–0.49	–0.33	0.29	–0.51	0.13	–0.38
Sveriges Riksbank	0.16	–0.09	0.23	0.00	–0.49	–0.36	0.01	–0.20	0.14	–0.05
Handelsbanken	0.10	–0.12	0.43	0.00	–0.49	–0.28	0.22	–0.08	0.23	0.15
Swedish Confederation of Professional Employees	–0.14	–0.10	0.10	0.00	–0.32	–0.31	–0.02	–0.46	0.29	–0.18

Note. See note in Table 1.

Table 3. Contribution to MSE of GDP-growth forecasts, 1994–2001, current-year forecasts
Per cent

	Private consumption	Government expenditure	Investment	Stock-building	Net-exports	Exports	Imports	Total	Residual	GDP
Ministry of Finance	0.56	0.21	0,79	0.00	0.85	5.94	6.97	2.41	0.38	2.79
Swedbank Economic	0.99	0.28	1.26	0.00	1.20	8.93	8.51	3.74	1.62	5.36
Swedish Research Institute of Trade	0.94	0.28	1.34	0.00	1.20	6.56	8.70	3.76	0.76	4.52
Confederation of Swedish Enterprise	0.32	0.38	0.73	0.00	0.73	8.11	5.48	2.16	0.91	3.07
National Institute of Economic Research	0.45	0.34	0.74	0.00	0.99	5.94	6.28	2.51	0.32	2.83
Swedish Federation of County Councils	0.57	0.34	1.51	0.00	2.75	4.68	8.53	5.17	–0.59	4.58
Swedish Trade Union Federation	0.49	0.50	1.14	0.00	1.76	9.50	8.24	3.90	0.26	4.15
Nordea	0.89	0.27	1.40	0.00	1.12	6.15	7.74	3.67	1.66	5.33
OECD	0.64	0.33	0.68	0.00	1.39	8.36	7.76	3.03	0.18	3.21
Sveriges Riksbank	0.11	0.45	0.56	0.00	1.23	6.24	3.85	2.35	0.22	2.57
Handelsbanken	0.60	0.38	1.42	0.00	0.95	5.03	5.14	3.34	0.86	4.20
Swedish Confederation of Professional Employees	0.51	0.23	0.85	0.00	0.90	5.65	7.43	2.49	1.61	4.10

Note. The table displays variance terms rather than the square roots. The unexplained part, the residual, contains both covariance terms and whatever cannot be explained from the mean prediction error. The covariance terms are not judged to be of interest here. For details, see Appendices B and C.

Table 4. Contribution to MSE of GDP-growth forecasts, 1994–2001, next-year forecasts
Per cent

	Private consumption	Government expenditure	Investment	Stock-building	Net-exports	Exports	Imports	Total	Residual	GDP
Ministry of Finance	1.59	0.47	0.82	0.00	1.33	14.77	15.26	4.22	1.36	5.58
Swedbank Economic	2.50	0.60	1.31	0.00	1.68	14.74	18.04	6.08	0.34	6.42
Swedish Research Institute of Trade	1.70	0.58	1.30	0.00	1.19	16.69	16.13	4.77	1.69	6.47
Confederation of Swedish Enterprise	2.14	0.41	1.34	0.00	2.89	18.90	20.58	6.78	2.07	8.85
National Institute of Economic Research	1.66	0.60	0.92	0.00	1.34	15.10	16.92	4.53	0.63	5.15
Swedish Federation of County Councils	2.22	0.49	1.35	0.00	1.32	12.45	12.61	5.38	–0.80	4.58
Swedish Trade Union Federation	2.20	0.47	0.80	0.00	1.97	15.60	15.89	5.44	–0.38	5.06
Nordea	2.13	0.50	0.69	0.00	1.33	16.13	17.72	4.65	–0.15	4.50
OECD	3.59	0.66	0.96	0.00	4.24	13.21	18.56	9.46	–3.07	6.39
Sveriges Riksbank	2.30	0.68	1.22	0.00	1.67	17.76	22.48	5.88	–0.03	5.85
Handelsbanken	2.56	0.44	2.23	0.00	2.29	16.38	17.63	7.52	–0.69	6.83
Swedish Confederation of Professional Employees	1.62	0.52	0.81	0.00	1.66	11.58	11.02	4.60	2.67	7.27

Note. See Table 3.

media, about whether or not the official statistics are becoming less reliable. Points raised in the debate are: financial flows do not easily match exports and imports; official industrial production and hours worked do not always go hand in hand with results obtained from other sources. See for example SOU 2001:34 or the references cited in Appendix E.

As we discussed above, the track record of forecasting errors in net exports is one of the most significant explanations of the error in GDP-growth forecasts. Moreover, there are often large revisions from the initial publication to the final numbers, making forecasting more difficult. In essence, the starting point of the forecast is part of the forecasting uncertainty.

2001, anatomy of a missed turning point

Turning points in the economy are notoriously difficult to forecast (see for example IMF (2001)). Nonetheless, they are perhaps the most important feature of forecasting. For policy makers, a missed turning point could result in unnecessarily tight or loose policy, resulting in unnecessarily large swings in GDP growth, inflation or unemployment. For private institutions, missed turning points could imply losing money, for example if an incorrect assessment of medium to long term profits in firms leads to unsound investments.

Forecasts made during 2000 for 2001 grossly underestimated inflation and overestimated growth.

Nonetheless, the importance of getting turning points right does not stand in proportion to the track record of most forecasters. The year 2001 for the Swedish economy is a case in point (see for example Schück (2002)). In this section we analyse the type of forecasting errors that were made for 2001. Although this analysis is based on a sample of one turning point only and one should be careful not to generalise to other economic downturns, it may nevertheless hold important lessons. Figures 12 and 13 succinctly show just how far off forecasts were for 2001, especially forecasts made during 2000: inflation was grossly underestimated and growth was overestimated.[9]

The GDP-growth forecasts from some institutions made during 2000 were almost 3 percentage points too high.

Table 5 and Figure 14 show the mean prediction error of GPD-growth forecasts for 2001 decomposed into its components: Table 5 displays an average of forecasts made dur-

[9] If the GDP-forecasts had been closer to the actual outcome for 2001, many institutions would probably have had even lower forecasts for inflation – resulting in even more underestimation of inflation.

Figure 12. GDP forecasts for 2001 and outcome

Annual percentage changes

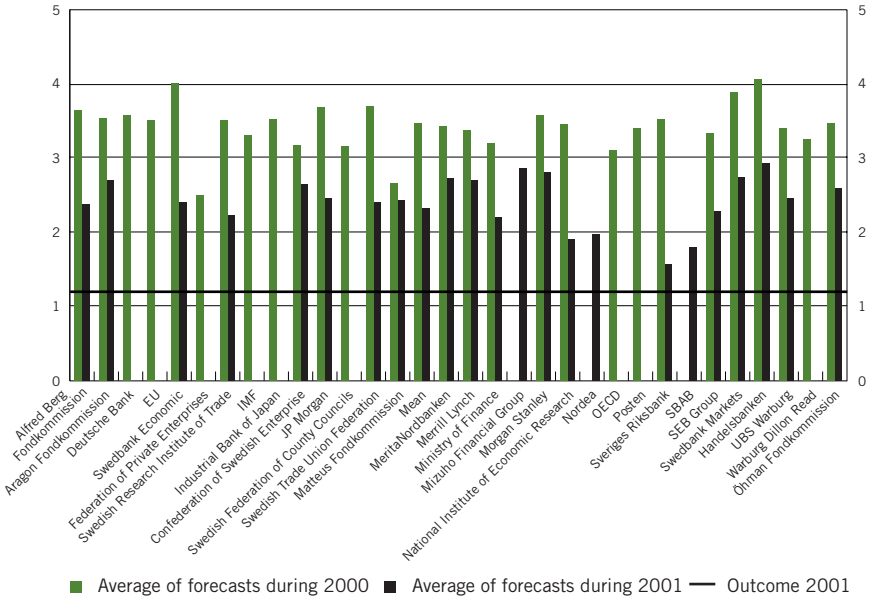


Figure 13. Inflation forecasts for 2001 and outcome

Annual percentage changes

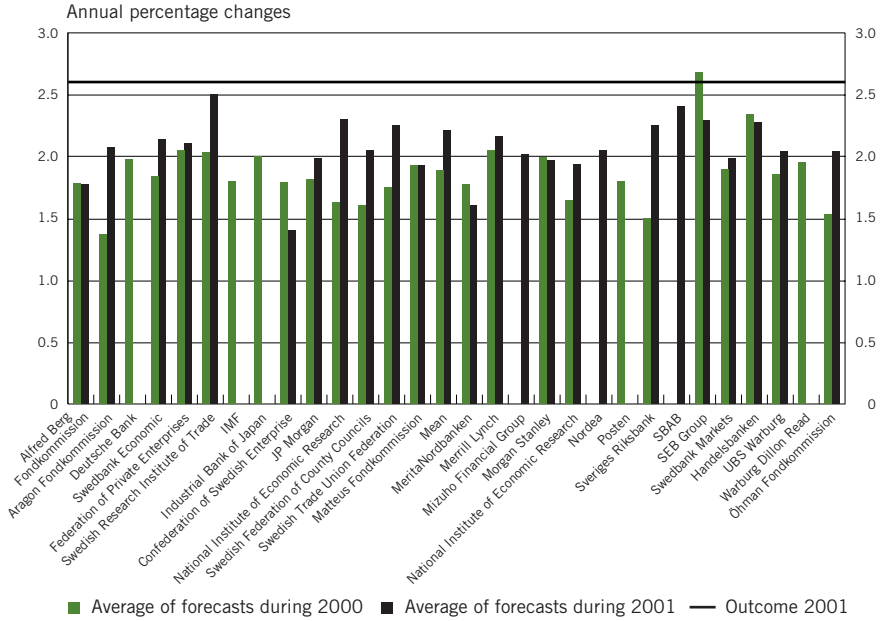
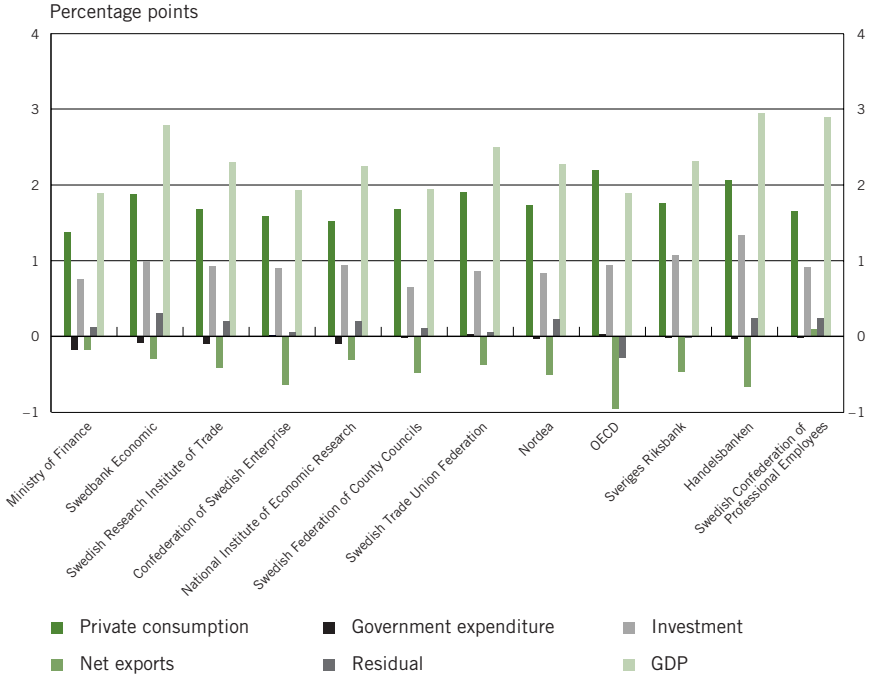


Table 5. MPE for 2001 from an average of forecasts made during 2000 and 2001, contribution to GDP growth
Percentage changes

	Private consumption	Government expenditure	Investment	Stock-building	Net-exports	Exports	Imports	Total	Residual	GDP
Ministry of Finance	1.19	–0.12	0.72	0.00	–0.28	3.21	3.75	1.51	0.02	1.53
Swedbank Economic	1.44	–0.07	0.80	0.00	–0.32	3.57	4.19	1.86	0.14	1.99
Swedish Research Institute of Trade	1.19	–0.07	0.62	0.00	–0.61	2.34	3.30	1.12	0.30	1.42
Confederation of Swedish Enterprise	1.07	–0.07	0.60	0.00	–0.51	2.36	3.18	1.09	0.02	1.11
National Institute of Economic Research	1.11	–0.09	0.74	0.00	–0.35	2.90	3.53	1.41	0.06	1.47
Swedish Federation of County Councils	1.23	–0.03	0.39	0.00	–0.86	2.61	3.93	0.74	0.55	1.29
Swedish Trade Union Federation	1.40	–0.03	0.72	0.00	–0.35	3.21	3.86	1.75	0.10	1.84
Nordea	1.30	–0.05	0.60	0.00	–0.44	2.70	3.44	1.41	0.11	1.52
OECD	1.57	–0.03	0.57	0.00	–0.62	2.66	3.71	1.49	–0.10	1.39
Sveriges Riksbank	1.27	–0.07	0.75	0.00	–0.45	3.09	3.88	1.49	–0.05	1.44
Handelsbanken	1.49	–0.07	0.85	0.00	–0.46	2.91	3.69	1.81	0.19	1.99
Swedish Confederation of Professional Employees	0.97	–0.12	0.41	0.00	–0.12	2.58	2.85	1.14	0.12	1.26

Figure 14. MPE for 2001 from forecasts made during 2000 only, contribution to GDP growth
Percentage points



ing 2000 and 2001, while Figure 14 displays forecasts made during 2000 only. Both show essentially that the large overestimation occurred primarily for private consumption and, to some lesser extent, for investment. The GDP-growth forecasts from some institutions made during 2000 were too high by almost 3 percentage points (see Figure 14). This is about three times as much as the average forecasting error for the many institutions reported in Blix et al. (2002). The error would have been even larger had it not been somewhat mitigated by underestimation of government expenditure and net exports.

Forecasters tend to make similar forecasting mistakes particularly when it comes to turning points.

Even though it is important to consider whether there are wider lessons that can be drawn from the downturn in 2001, we believe this necessitates further research. One lesson, however, does emerge. It seems that most forecasters tend to make similar forecasting mistakes and this is particularly evident for the above turning point. Is this evidence of herd behaviour among forecasters?

Herd behaviour in revision of GDP and inflation forecasts

Forecasts seldom differ by more than a few tenths of a percentage point.

Forecasters have access to a large number of different data and news sources. The wide variety of information and the multitude of models that are available might lead one to presume that different forecasters would have widely different views of the economy. Nevertheless, apart from a few rare exceptions, this does not appear to be the case. It may be that the arguments in the presentation of forecasts differ widely, but in the end forecasts seldom differ by more than a few tenths of a percentage point. This raises the question of potential herd behaviour in the markets. Are forecasters unduly influenced by other forecasters and do they avoid departing "too far" from the consensus mean or mainstream?

Blix et al. (2001) found some evidence to support the existence of herd behaviour. However, the available methods make it difficult to distinguish between herd behaviour and "legitimate" revisions arising from new data pointing in the same direction.

The last section above gives more corroborating indication of herd behaviour, since forecasters missed the turning point in the economy 2001. Had they been subject to a standard normal distribution, at least some of them would have predicted the downturn.

We have used a model-based approach to investigate potential herd behaviour.

In this section we use a new approach to investigating potential herd behaviour that is more model-based. It is based on the following argument. Although forecasters may have widely different models for inflation forecasts, one common approach is to assume that the difference between potential output and actual output gives a measure of the degree of "free" resources in the economy, a measure often denoted as the output-gap. The output-gap is presumed to indicate the inflation pressure in the economy. This relationship can be written as

$$(1) \qquad \pi_{t+1} = \beta_0 + \beta_1 (y_t - y_t^*) + \varepsilon_{t+1}$$

where, in the usual notation, π_{t+1} is inflation, y_t is output, y_t^* is potential output, β_0, β_1 are parameters and ε_{t+1} is an unpredictable shock. Forecasters may have widely different views on the parameters of the model and of potential output, and hence the model cannot be used directly. However, by taking first differences of (1) we obtain

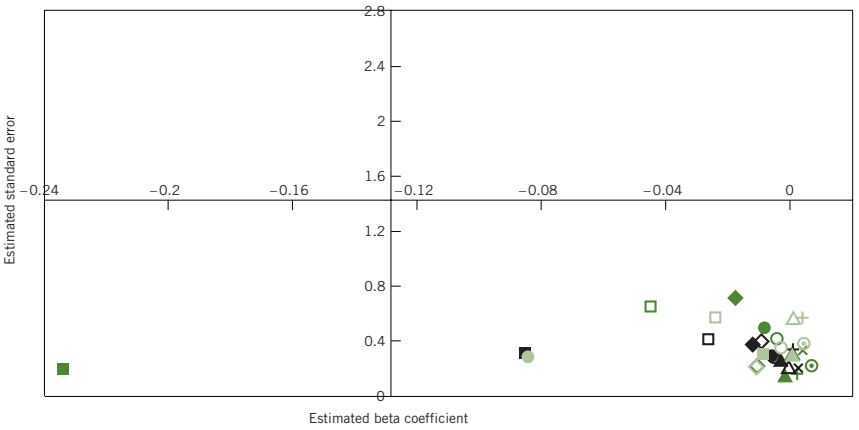
$$(2) \qquad \Delta\pi_{t+1} = \beta_1 \Delta y_t + \Delta\varepsilon_{t+1}, \ \sigma^2 = E[\Delta\varepsilon_{t+1}^2],$$

if $y_t^* = y_s^* \ \forall t, s$. In other words, if we assume that potential output is constant over the time period concerned, we can reduce the number of unobserved variables by one. Even though many forecasters believe potential output changes over time (2) may still be a sensible approximation as long as it moves "sufficiently" slowly over time, which may not be an unreasonable assumption. Although there are of course many reasons to revise the inflation forecast, equation (2) holds that the GDP-growth forecast should be of help in forecasting the revision in the inflation forecast.

Figure 15 shows a plot of ordinary least squares (OLS) estimates of different institutions' β_1 and σ^2 based on their *forecasts* of GDP-growth and (the revision in) inflation on a yearly frequency. In a sense, this is akin to assigning the same model to all forecasters but allowing them to have different views of the parameters that guide the relationship. The *origin* of Figure 15 represents the estimates of σ and β_1 based on *actual* GDP and inflation data. Thus, if there were no herd behaviour, one would expect the different institutions' estimates to be clustered around the origin.

The figure shows that this is not the case; instead almost all the institutions are clustered together in the lower right-hand quadrant, indicating a systematic

Figure 15. A plot of actual estimated parameters as origin and implied coefficients by the institutions' GDP and inflation forecast revisions, annual data, 1993–2001



- Deutsche Bank
- IMF
- ITEM Club
- Industrial Bank of Japan
- Swedish Research Institute of Trade
- Confederation of Swedish Enterprise
- MIzuho Financial Group
- Mean
- Aragon Fondkommission
- Handelsbanken
- Alfred Berg Fondkommission
- Volvo Group Finance
- Hagströmer & Qviberg
- Swedbank Economic
- Swedish Trade Union Federation
- Swedbank Markets
- Warburg Dillon Read
- Öhman Fondkommission
- Merrill Lynch
- Sveriges Riksbank
- UBS Warburg
- National Institute of Economic Research
- Finanskonsult
- Swedish Confederation of Professional Employees
- UBS Limited
- JP Morgan
- Nordea
- Matteus Fondkommission
- Ministry of Finance
- Swedish Federation of County Councils
- SEB Group

The forecast revisions tend to be fairly correlated.

overestimation of β_1 and a systematic underestimation of σ. In other words, the forecast revisions tend to be fairly correlated and not display the patterns one would expect if the forecast errors were uncorrelated and normally distributed. A similar result (not displayed) is obtained if we use quarterly frequency instead.

There may of course be other potential explanations for this pattern. For example, forecasters may use an entirely different model than (1). But if this were the case, one would expect a much more heterogeneous distribution of parameter outcomes for β_1 and σ in relation to the actual outcomes. Another potential explanation, as discussed above, may be problems with and large revisions of the official GDP-statistics.

The pattern could also be due to a structural shift in the relationship between inflation and output, an argument frequently made in, for instance, the "new economy" debate. Since it may take time to discover such a shift this may explain part of the pattern. But note that almost all institutions have made a similar type of mistake, which would be unlikely to happen if there were no herd behaviour. Altogether, the evidence while not conclusive, again points to the most likely explanation being herd behaviour.

Altogether, the evidence points to the most likely explanation being herd behaviour.

Conclusions

In this paper we find that having a special interest in some particular variable does not necessarily lead to good forecasts. We also find that some of the best forecasters for Sweden are those that have the most resources devoted to forecasting, such as the NIER and the Riksbank. However, Öhmans has little resources devoted to forecasting and yet is among the top forecasters. It therefore seems, as concluded in Blix et al. (2001), that amount of resources devoted to forecasting is not connected to superior forecasts in an obvious way.

Even institutions with little resources for forecasting can compete with large institutions.

We also find more evidence of herd behaviour among forecasters. The differences in forecasts often amount to only a few tenths of a percentage point and often tend to go in the same direction. The rhetoric tends to be much larger than the real differences among forecasters.

We also find more evidence of herd behaviour.

The largest forecasting errors from all institutions are for exports and imports. The error in net exports is one of the most important explanatory factors in the GDP-growth forecast error. The error is made somewhat less, however, by some of the error in exports being compensated for by error in imports. Private consumption, due to its large share of GDP, also contributes significantly to the error for next-year GDP-growth forecasts.

The largest forecasting errors are for exports and imports.

Appendix A: RMSE and MPE for different forecast variables

Table A1. GDP; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	1.10	22	1.57	17	19	–0.58	–0.56
Deutsche Bank	1.24	24	1.14	1	14	–0.58	0.04
Swedbank Economic	1.02	16				–0.18	
Swedish Research Institute of Trade	1.05	18	1.45	16	18	–0.19	–0.09
IMF	1.01	15	1.35	11	13	–0.23	–0.05
Industrial Bank of Japan	0.83	7	1.31	8	7	–0.23	0.29
JP Morgan	0.84	8	1.44	15	8	0.03	0.53
Swedish Federation of County Councils	1.00	12	1.32	9	11	–0.22	–0.09
Swedish Trade Union Federation	1.01	14	1.30	6	9	–0.38	–0.06
Matteus Fondkommission	1.05	19	1.71	22	23	–0.37	–0.87
Mean	1.08	20	1.58	19	21	–0.32	–0.30
Merrill Lynch	0.80	6	1.15	2	3	0.13	–0.02
Ministry of Finance	0.70	4	1.37	13	6	0.07	0.13
Morgan Stanley	1.01	13	1.36	12	10	0.29	0.73
National Institute of Economic Research	0.59	1	1.33	10	2	0.04	0.07
Nordea	1.12	23	1.23	4	12	–0.40	0.05
OECD	0.85	9	1.59	20	15	–0.13	0.00
Sveriges Riksbank	0.67	3	1.31	7	4	–0.06	0.16
SEB Group	0.93	11	1.59	21	16	–0.07	0.17
Swedbank Markets	1.09	21	1.38	14	17	–0.09	0.44
Handelsbanken	1.03	17	1.57	18	20	0.03	0.10
Swedish Confederation of Professional Employees	0.85	10	1.83	23	22	–0.55	–1.10
UBS Warburg	0.61	2	1.24	5	1	0.14	0.14
Öhman Fondkommission	0.78	5	1.23	3	5	0.09	0.23
Average	0.93		1.41				

Table A2. CPI; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	0.52	20	1.30	12	11	0.20	0.72
Deutsche Bank	0.37	9	1.38	14	14	0.19	0.90
Swedbank Economic	0.12	1				–0.02	
Swedish Research Institute of Trade	0.42	13	1.26	11	12	0.24	0.87
IMF	0.81	23	1.50	18	22	0.42	0.83
Industrial Bank of Japan	0.55	22	1.62	21	21	0.40	1.08
JP Morgan	0.44	16	1.67	22	20	0.15	1.03
Swedish Federation of County Councils	0.52	21	1.02	2	8	0.17	0.48
Swedish Trade Union Federation	0.44	17	1.45	17	18	0.07	1.11
Matteus Fondkommission	0.42	12	1.17	10	10	0.15	0.52
Mean	0.43	14	1.34	13	15	0.19	0.82
Merrill Lynch	0.44	15	1.12	8	9	0.23	0.74
Ministry of Finance	0.35	8	1.10	7	6	0.17	0.53
Morgan Stanley	0.34	5	1.03	3	3	0.11	0.49
National Institute of Economic Research	0.28	2	0.88	1	1	–0.03	0.20
Nordea	0.45	18	1.39	15	17	0.14	0.87
Sveriges Riksbank	0.30	3	1.09	6	4	0.01	0.28
SEB Group	0.33	4	1.52	19	13	0.13	1.06
Swedbank Markets	0.38	10	1.53	20	16	0.14	0.97
Handelsbanken	0.50	19	1.42	16	19	0.24	0.99
Swedish Confederation of Professional Employees	0.34	7	1.07	5	5	0.21	0.73
UBS Warburg	0.39	11	1.06	4	2	0.13	0.51
Öhman Fondkommission	0.34	6	1.17	9	7	0.06	0.58
Average	0.41		1.28				

Table A3. Private consumption; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	1.01	15	1.91	17	15	–0.25	–0.41
Deutsche Bank	0.80	6	1.56	3	3	–0.42	0.11
Swedbank Economic	0.95	12				0.02	
Swedish Research Institute of Trade	1.08	19	1.40	2	7	–0.17	–0.31
Industrial Bank of Japan	0.67	2	1.76	12	6	–0.42	–0.14
JP Morgan	0.82	8	1.60	4	5	0.20	0.36
Swedish Federation of County Councils	0.93	11	1.86	14	17	–0.15	–0.01
Swedish Trade Union Federation	0.71	4	1.27	1	1	–0.40	–0.07
Matteus Fondkommission	1.27	23	2.54	22	22	–0.34	–0.91
Mean	1.02	16	1.72	9	16	–0.28	–0.33
Merrill Lynch	0.81	7	1.73	10	9	0.00	–0.12
Ministry of Finance	0.92	10	1.69	8	10	–0.09	–0.17
Morgan Stanley	0.86	9	1.88	15	11	0.17	0.52
National Institute of Economic Research	0.68	3	1.69	7	4	0.07	0.03
Nordea	1.05	17	1.67	5	13	–0.34	–0.28
OECD	1.09	20	2.13	20	21	–0.20	–0.26
Sveriges Riksbank	0.75	5	1.79	13	8	0.18	0.32
SEB Group	1.15	22	2.16	21	20	0.01	–0.22
Swedbank Markets	1.06	18	1.74	11	14	–0.08	–0.02
Handelsbanken	1.09	21	1.91	18	19	0.11	–0.13
Swedish Confederation of Professional Employees	0.60	1	1.68	6	2	–0.39	–1.18
UBS Warburg	0.98	14	1.97	19	12	0.15	0.17
Öhman Fondkommission	0.96	13	1.89	16	18	0.01	0.04
Average	0.92		1.80				

Table A4. Investment; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	3.15	7	4.64	14	9	–0.22	–0.13
Deutsche Bank	4.42	23	3.49	1	14	–0.83	0.30
Swedbank Economic	3.46	13				0.46	
Swedish Research Institute of Trade	3.98	19	4.74	15	17	0.78	0.35
Industrial Bank of Japan	3.00	4	3.90	6	4	0.23	1.47
JP Morgan	3.38	12	4.63	13	15	0.27	1.04
Swedish Federation of County Councils	2.71	3	4.10	8	3	–0.19	1.88
Swedish Trade Union Federation	4.09	21	4.85	18	18	–0.15	–0.11
Matteus Fondkommission	3.29	11	4.80	17	16	–0.28	–2.03
Mean	4.33	22	5.10	19	20	0.07	–0.39
Merrill Lynch	3.47	15	3.68	4	7	0.73	0.04
Ministry of Finance	3.15	8	4.35	10	10	1.31	0.49
Morgan Stanley	4.07	20	5.36	20	19	1.53	3.21
National Institute of Economic Research	3.00	5	4.01	7	5	0.90	0.64
Nordea	3.50	16	3.53	2	6	–0.21	0.19
OECD	3.20	9	4.55	12	11	0.71	–0.07
Sveriges Riksbank	2.68	1	3.86	5	2	0.67	1.18
SEB Group	3.26	10	4.79	16	13	0.38	1.28
Swedbank Markets	3.06	6	4.51	11	8	0.57	1.75
Handelsbanken	3.87	18	5.97	21	21	1.25	1.73
Swedish Confederation of Professional Employees	3.47	14	8.31	22	22	–0.68	–4.07
UBS Warburg	2.70	2	3.56	3	1	0.92	0.50
Öhman Fondkommission	3.64	17	4.12	9	12	1.43	1.67
Average	3.43		4.58				

Table A5. Industrial production; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	3.31	18	4.20	15	16	–2.17	–1.49
Swedbank Economic	2.88	13				–0.65	
Swedish Research Institute of Trade	2.75	10	3.52	5	7	–2.00	–1.38
Industrial Bank of Japan	2.14	1	3.21	4	1	–1.40	0.34
JP Morgan	2.88	14	3.80	10	12	–1.12	0.46
Swedish Trade Union Federation	2.55	5	4.03	14	10	–1.65	–1.58
Matteus Fondkommission	3.17	17	3.84	11	15	–1.76	–1.32
Mean	3.07	16	4.42	16	17	–1.31	–1.47
Merrill Lynch	2.58	6	2.95	2	3	–0.06	–0.68
Ministry of Finance	2.24	2	3.58	6	4	–0.54	–0.08
National Institute of Economic Research	2.59	7	3.74	8	8	–0.76	–0.61
Nordea	2.73	9	3.69	7	9	–1.49	–0.80
OECD	4.26	19	4.56	18	18	–2.43	–2.03
Sveriges Riksbank	2.42	3	3.77	9	6	–0.86	–0.43
SEB Group	2.88	12	4.44	17	14	–0.72	–0.13
Swedbank Markets	2.85	11	3.89	12	11	–0.51	1.05
Handelsbanken	2.70	8	4.01	13	13	–0.34	–0.39
UBS Warburg	2.89	15	2.97	3	5	–0.89	–1.08
Öhman Fondkommission	2.55	4	2.92	1	2	–0.44	0.36
Average	2.81		3.75				

Table A6. Wages; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	1.25	17	0.52	8	17	0.52	0.28
Industrial Bank of Japan	0.76	13	0.46	7	6	0.26	0.05
JP Morgan	0.91	16	0.42	5	12	0.33	0.28
Swedish Federation of County Councils	0.21	1	0.32	1	1	0.04	–0.07
Swedish Trade Union Federation	0.51	7	0.88	16	14	–0.25	–0.46
Matteus Fondkommission	0.58	8	0.74	14	10	0.35	0.49
Mean	0.74	11	0.55	9	8	0.20	0.24
Merrill Lynch	0.30	3	0.98	17	7	0.00	0.62
Ministry of Finance	0.45	5	0.87	15	11	–0.27	–0.46
National Institute of Economic Research	0.29	2	0.42	4	3	0.01	0.30
Nordea	0.75	12	0.61	12	13	0.14	0.10
Sveriges Riksbank	0.30	4	0.34	2	2	–0.08	0.20
SEB Group	0.88	15	0.56	10	16	0.44	0.35
Swedbank Markets	0.71	10	0.45	6	5	–0.01	0.10
Handelsbanken	0.82	14	0.61	11	15	0.16	0.06
UBS Warburg	0.64	9	0.68	13	9	–0.35	–0.07
Öhman Fondkommission	0.49	6	0.41	3	4	0.02	0.15
Average	0.62		0.58				

Table A7. Exports; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	3.74	12	6.54	13	13	–2.67	–2.21
Deutsche Bank	3.76	13	5.30	4	9	–2.53	–1.52
Swedbank Economic	2.73	4				–0.87	
Swedish Research Institute of Trade	3.34	8	5.63	9	8	–1.67	–1.94
Swedish Federation of County Councils	2.66	3	5.68	11	3	0.10	–1.26
Swedish Trade Union Federation	3.64	11	5.50	6	10	–2.27	–1.95
Mean	3.55	10	5.40	5	7	–1.65	–1.78
Ministry of Finance	3.38	9	5.83	12	11	–0.87	–1.02
National Institute of Economic Research	3.27	7	5.64	10	6	–1.06	–0.99
Nordea	2.99	5	5.03	3	2	–1.92	–0.37
OECD	3.80	14	4.89	2	5	–1.57	–1.81
Sveriges Riksbank	3.82	15	5.56	8	12	–1.12	–0.95
SEB Group	2.15	1				–0.65	
Handelsbanken	3.09	6	5.52	7	4	–1.47	–1.11
Swedish Confederation of Professional Employees	2.48	2	3.91	1	1	–1.53	–2.73
Average	3.23		5.42				

Table A8. Imports; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	3.37	5	7.43	13	3	–2.13	–0.88
Deutsche Bank	4.37	15	5.86	2	5	–2.72	–0.87
Swedbank Economic	3.59	6				–0.31	
Swedish Research Institute of Trade	4.37	14	6.66	6	12	–1.60	–2.04
Swedish Federation of County Councils	4.18	12	6.52	4	7	0.10	0.63
Swedish Trade Union Federation	2.98	3	6.17	3	2	–2.45	–1.54
Mean	4.17	11	6.57	5	8	–1.38	–1.46
Ministry of Finance	3.86	9	7.13	11	11	–0.78	–1.36
National Institute of Economic Research	3.72	8	7.07	10	9	–1.10	–0.35
Nordea	3.62	7	6.75	7	6	–1.57	–0.23
OECD	4.03	10	6.77	8	10	–1.49	–0.98
Sveriges Riksbank	4.26	13	7.28	12	13	–0.54	–0.29
SEB Group	2.68	2				0.15	
Handelsbanken	3.34	4	6.86	9	4	–1.19	–0.63
Swedish Confederation of Professional Employees	2.64	1	5.78	1	1	–1.18	–3.13
Average	3.68		6.68				

Table A9. Government expenditure; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	1.42	11	1.40	2	5	–0.26	0.03
Deutsche Bank	1.31	7	1.75	12	10	–0.34	–0.58
Swedbank Economic	0.70	1				–0.07	
Swedish Research Institute of Trade	1.22	4	1.69	9	7	–0.51	–0.68
Swedish Federation of County Councils	1.47	12	1.04	1	1	–0.62	–0.37
Swedish Trade Union Federation	1.72	15	1.61	7	13	–0.59	–1.16
Mean	1.25	5	1.51	5	4	–0.50	–0.47
Ministry of Finance	1.02	2	1.70	10	3	–0.26	–0.47
National Institute of Economic Research	1.38	10	1.72	11	11	–0.61	–0.47
Nordea	1.10	3	1.48	4	2	–0.56	–0.46
OECD	1.26	6	1.63	8	6	–0.67	–0.40
Sveriges Riksbank	1.35	9	1.84	13	12	–0.49	–0.37
SEB Group	1.58	14				–0.53	
Handelsbanken	1.51	13	1.41	3	8	–0.59	–0.38
Swedish Confederation of Professional Employees	1.32	8	1.61	6	9	–0.87	–0.28
Average	1.31		1.57				

Table A10. Unemployment; RMSE, rank and MPE

	RMSE					MPE	
Institute	Within-year	Rank within-year	Next-year	Rank next-year	Overall rank	Within-year	Next-year
Confederation of Swedish Enterprise	0.50	15	0.91	12	11	–0.02	0.64
Deutsche Bank	0.26	6	0.81	6	4	0.03	0.10
Swedbank Economic	0.17	3				–0.02	
Swedish Research Institute of Trade	0.34	12	0.85	9	9	–0.04	0.00
Swedish Federation of County Councils	0.31	9	0.85	8	7	0.00	–0.17
Swedish Trade Union Federation	0.32	10	0.88	10	10	–0.13	–0.41
Mean	0.30	7	0.81	5	6	–0.04	0.06
Ministry of Finance	0.45	14	0.90	11	12	–0.22	–0.30
National Institute of Economic Research	0.21	4	0.72	2	2	0.04	0.22
Nordea	0.30	8	0.80	4	5	0.12	0.23
OECD	0.23	5	0.59	1	1	–0.06	0.21
Sveriges Riksbank	0.33	11	0.75	3	3	0.07	0.31
SEB Group	0.12	1				0.07	
Handelsbanken	0.35	13	0.84	7	8	–0.07	0.08
Swedish Confederation of Professional Employees	0.16	2				–0.04	
Average	0.29		0.81				

Appendix B: Decomposing the MPE:s of GDP-growth

Tables 1 and 2 in the paper are calculated from the expression

$$(1)\quad T^{-1}\sum_{t=1}^{T}\hat{Y}_t = T^{-1}\sum_{t=1}^{T}\sum_{i=1}^{n}\alpha_{i,t-1}\left(\hat{X}_{i,t}-X_{i,t}\right) + T^{-1}\sum_{t=1}^{T}\delta_t,$$

where $\hat{Y}_t$ is the forecast error in GDP, $\hat{X}_{i,t} - X_{i,t}$ is the forecasting error in the ith component, n is the number of GDP components, and $\alpha_{i,t-1}$ is its corresponding weight as share of GDP. Note that the weight needs to be from the previous period for the decomposition to be mathematically correct.

We also use (1) as starting point when calculating root mean square errors (RMSE) presented in Tables 3 and 4. Define

$$\tilde{\alpha}_{t,i} = \frac{\alpha_{t,i}}{\sqrt{\alpha_{t,1}^2 + \cdots + \alpha_{t,n}^2}}$$

so that the new weights sum to one. The MSE can thus be expressed as

$$T^{-1}\sum_{t=1}^{T}\hat{Y}_t^2 = T^{-1}\sum_{t=1}^{n}\sum_{i=1}^{n}\hat{\alpha}_{i,t-1}^2\left(\hat{X}_{i,t}-X_{i,t}\right)^2 + \text{“covariance terms”} + T^{-1}\sum_{t=1}^{n}\delta_t^2$$

The covariance terms are omitted from the tables as we do not judge them to be of particular interest here as there is no structural interpretation and we have not identified the shocks.

Appendix C: Forecasts for net exports

Forecasts for net exports are not available directly in our data base; they have to be computed from the forecasts for imports and exports. Let x_t and m_t denote the level of exports and imports respectively. Let r_t^x and r_t^m denote the growth rates, for the year exports and imports respectively. Let hats denote forecasts for respective variable. Then we have that net exports for within year forecasts are given by

$$\widehat{nx}_t = \frac{x_{t-1}\left(1+\hat{r}_t^x\right) - m_{t-1}\left(1+\hat{r}_t^m\right)}{x_{t-1} - m_{t-1}}.$$

Replacing growth forecasts with actual growth rates of imports and exports gives the actual percentage growth of net exports. The difference between the actual and the forecast is displayed in the tables 1 and 2. It is measured in percentage points. For next year forecasts, we have that

$$\widehat{nx}_{t+1} = \frac{x_{t-1}\left(1+\hat{r}_t^x\right)\left(1+\hat{r}_{t+1}^x\right) - m_{t-1}\left(1+\hat{r}_t^m\right)\left(1+\hat{r}_{t+1}^m\right)}{x_{t-1}\left(1+\hat{r}_t^x\right) - m_{t-1}\left(1+\hat{r}_t^m\right)}.$$

The actual outcome and the forecast error are obtained in the same way as for within-year forecasts. Notice that next-year forecasts are dependent on the within-year forecasts. It is also possible to evaluate the above expression with the actual outcomes in the denominator in which case the forecast error from the first period does not affect the forecast error for the next period. We have chosen not to do this, primarily as we view the forecast as a path rather than as point estimates only.

Appendix D: A note on the data

All raw data on forecasts is from the NIER and Consensus Forecasts, the number of forecasts in the database are displayed in Table D1. The actual outcomes are from the official statistics published by Statistics Sweden.

Table D1. Number of observations

	Within-year	Next-year	Total
GDP	1 460	1 439	2 899
CPI	1 428	1 408	2 836
Private consumption	1 440	1 419	2 859
Investment	1 432	1 410	2 842
Industrial production	1 234	1 218	2 452
Wages	1 187	1 171	2 358
Exports	535	531	1 066
Imports	534	530	1 064
Government expenditure	533	529	1 062
Unemployment	533	525	1 058
Total	**10 316**	**10 180**	**20 496**

Some institutions have changed names during the evaluation period. We have chosen to use the current name for ease of exposition. Nordea includes forecasts from Nordbanken and MeritaNordbanken. Forecasts for the Confederation of Swedish Enterprise come from the Confederation of Swedish Employers (SAF) and the Federation of Swedish Industries.

For the Riksbank's forecasts, we have chosen to treat forecasts published close to an "evaluation month" as belonging to that month: the forecast from 1996-07-01 is treated as being made in June 1996; 1997-09-23 as October 1997; 1998-09-28 as October 1998; 2001-05-31 as June 2001.

For wages, as there is no official outcome for the overall total from Statistics Sweden, we have used an average of NIER's and the Riksbank's as outcomes.

For the calculation of RMSE and MPE, we use the same method as discussed in Appendix A2 of Blix et al. (2001) to filter out institutions for which there are "too few" forecasts to obtain robust results.

Appendix E: A selection of references about the quality of statistics in Sweden

Affärsvärlden, (2000-08-15), ”Missvisande statistik styr räntan” (Misleading statistics govern the interest rate).

Affärsvärlden, (2000-08-30), ”SCB famlar och fabulerar” (Statistics Sweden fumbles and invents facts).

Affärsvärlden, (2001-10-03), ”SCB: Goda nyheter för pessimister” (Statistics Sweden: Good news for pessimists).

Fager, J., (2001-01-31), ”Statistiken blir osäkrare” (Statistics are becoming more uncertain), *Finanstidningen*.

Munkhammar, V., (2000-10-28), ”Amerikaner ska lära SCB att räkna” (Americans to teach Statistics Sweden how to count), *Dagens Industri*.

Munkhammar, V. & Örn. G., (2000-10-27), ”SCB underskattade Sveriges tillväxt” (Statistics Sweden underestimated growth in Sweden), *Dagens Industri*.

SOU 2001:34, ”Behovet av ekonomisk statistik” (The need for economic statistics).

Svanström, S., (2001-03-15), ”Värdelöst vetande” (Worthless knowledge), *Finanstidningen*.

Svanström, S., (2001-03-22), ”Tidspress ger osäkra BNP-siffror” (Pressure of time leads to uncertain GDP figures), *Finanstidningen*.

Törnqvist, A., (2001-01-31), ”För låg tillväxt” (Growth too low), *Finanstidningen*.

Öberg, S., (2000-11-08), ”Obetydlig underskattning av BNP-tillväxt” (Insignificant underestimate of GDP growth), *Dagens Industri*.

Örn, G., (2000-11-08), ”Det får vi väl se” (We’ll just have to wait and see), *Dagens Industri*.

References

Batchelor, R., (1997), "How useful are the forecasts of intergovernmental agencies? The OECD and IMF versus the Consensus", Working paper, City University Business School, London, UK.

Blix, M., Wadefjord, J., Wienecke, U. & Ådahl, M., (2001), "How good is the forecasting performance of major institutions?" *Sveriges Riksbank Economic Review*, 2001:3, pp. 37-67.

Gavin, W. T. & Mandal, R. J., (2000), "Forecasting inflation and growth: do private forecasts match those of policymakers?", Federal Reserve Bank of St. Louis, Working Paper No. 2000-026A.

IMF, (2001), World Economic Outlook 2001, "Box 1.1 How well do forecasters predict turning points?", pp. 6-8.

National Institute of Economic Research, (2002), " Underlag för utvärdering av penningpolitiken 1999-2001" (Assessing the monetary policy), 2002-03-26.

OECD, Economic Outlook, (1991-2002).

Schück, J., (2002), "Fiasko för prognosmakare" (Forecasters' failure), *Dagens Nyheter*, 2002-03-16.

Öller, L-E. & Barot, B., (2000), "The accuracy of European growth and inflation forecasts", Working Paper No. 72, *National Institute of Economic Research*, Stockholm, Sweden.

Notices

Riksbank issues commemorative coin on Stockholm's 750th anniversary

To commemorate Stockholm's 750th anniversary the Riksbank has issued a 200-krona coin in silver and a 2,000-krona coin in gold. The coins are priced at SEK 250 and SEK 2,500 respectively.

Both of the coins' obverse sides show the large tower of Stockholm city hall, with the towers from the southern and eastern façades on either side. The reverse of the gold coin shows the City of Stockholm's oldest seal, which depicts a wall with towers and pinnacles. The seal dates back to the 1280s and has been preserved in around ten impressions from 1296-1324. The reverse of the silver coin shows the City of Stockholm's seal, which depicts a castle with walls, towers and pinnacles. The seal dates back to 1326 and was last used in 1607.

The artist, Bo Thorén, has previously designed a number of commemorative coins and medals. The coins are manufactured by Nordic Coin AB Svenska myntverket in Eskilstuna.

Lars Heikensten new Governor

On 13 June 2002, the General Council of the Riksbank unanimously appointed Lars Heikensten Governor of the Riksbank to succeed Urban Bäckström. Mr Heikensten was appointed for a period of six years with effect from 1 January 2003. At the same time, the General Council unanimously agreed to appoint Eva Srejber as member of the Executive Board for a period of six years with effect from 2003. Mrs Srejber was at the same time appointed First Deputy Governor, with effect from 1 January 2003.

The choice of a sixth member of the Executive Board, as well as the possible

appointment of a second deputy governor, will be made by the General Council that takes office after the parliamentary elections in the autumn.

Lars Heikensten is 51 years old and has been Deputy Governor of the Riksbank since 1995. He has a PhD in Economics and his previous posts have included chief economist at Handelsbanken and the Swedish National Debt Office, as well as heading the economic department at the Ministry of Finance.

Eva Srejber is 50 years old and has been Second Deputy Governor since 1999. She has earlier been Head of the Riksbank's Monetary and Foreign Exchange Policy Department, a member of the board at the International Monetary Fund (IMF) and been responsible for EMU issues at Föreningssparbanken.

Reference rate to replace discount rate

On 1 July the discount rate was replaced by a reference rate that will be set by the Riksbank every six months. This reference rate corresponds to the Riksbank's repo rate at the end of the previous six-month period, rounded up, where necessary, to the nearest half a percentage point.

The discount rate, which ceased to apply on 30 June 2002, was set quarterly by the Swedish National Debt Office and calculated as the average of six-monthly and five-year interest rates during the previous quarter, deducted by 2.5 percentage points and rounded off to the nearest half a percentage point.

Björn Hasselgren new Head of the Secretariat of the Executive Board

On 4 July 2002, the Executive Board of the Riksbank appointed Björn Hasselgren head of the bank's Secretariat of the Executive Board with effect from 15 August 2002.

Mr Hasselgren has worked at the Riksbank since 1993 and was previously deputy head of the Secretariat. He has also worked in what were the Financial Markets Department and the Financial Statistics Department at the Riksbank, as well as working at the National Audit Office. In his new post, Mr Hasselgren will continue to be project manager for the Riksbank's EMU preparations.

Exchange with the Swedish National Debt Office

As a consequence of the Government decision to allow the National Debt Office, as of 1 July 2002, to choose currency transaction counterparties other than the Riksbank, the role of the Riksbank as the Office's foreign exchange agent has come to an end.

In the first half of 2002 the Riksbank purchased foreign currency for the equivalent of SEK 11.4 billion for the Office's account and paid out foreign currency worth SEK 4.4 billion to the Office. On 24 July 2002, the remaining amount in foreign currency that had been purchased for the Office's account was exchanged by the Riksbank with the National Debt Office. The transaction should be seen as an isolated measure for concluding the undertaking to act as the Office's agent.

The Riksbank has neutralised most of the currency exchange's effect on krona liquidity by performing a currency market swap whereby Swedish kronor are sold spot for foreign currency at the same time as the same amount in kronor is repurchased in a forward transaction.

Counterfeit thousand krona notes

Counterfeit thousand krona banknotes with imitations of the watermarks, security thread and UV security details, have been reported in Malmö and Gothenburg since late August. A police investigation is under way and the banknotes are currently being analysed by the National Laboratory of Forensic Science.

A genuine 1000-krona note can be recognised by the fixed watermark showing a portrait of Gustav Vasa, the same as the portrait on the front of the note, and a security thread, which can be seen as a dark line if the note is held up to the light. The banknote paper is of raw cotton, which gives the note a special texture. The portrait on the front is in intaglio print, which gives a raised surface.

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.

Statistical appendix

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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

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

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	1 049 028	April	2.6	7.6

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:	
	05-02	4.25	3.50	5.00				July–Dec	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 2000 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

		Bonds issued by:					
		Central government				Housing	
		3 years	5 years	7 years	9–10 years	2 years	5 years
2000	Jan	5.20	5.68	5.87	5.95	5.61	6.22
	Feb	5.36	5.76	5.86	5.90	5.81	6.35
	March	5.17	5.44	5.49	5.51	5.66	6.11
	April	5.04	5.36	5.41	5.42	5.50	6.04
	May	5.02	5.34	5.37	5.34	5.48	6.13
	June	4.94	5.16	5.17	5.13	5.39	5.94
	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	5.83
	May	5.10	5.45	5.56	5.69	5.25	5.79
	June	4.94	5.27	5.39	5.52	5.09	5.59
	July	4.73	5.06	5.20	5.37	4.90	5.38
	Aug	4.52	4.83	4.96	5.13	4.69	5.15

5 Overnight and money market interest rates

Monthly average, per cent

		Repo rate	Inter-bank rate	SSVX			Company certificates	
				3 months	6 months	12 months	3 months	6 months
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

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

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

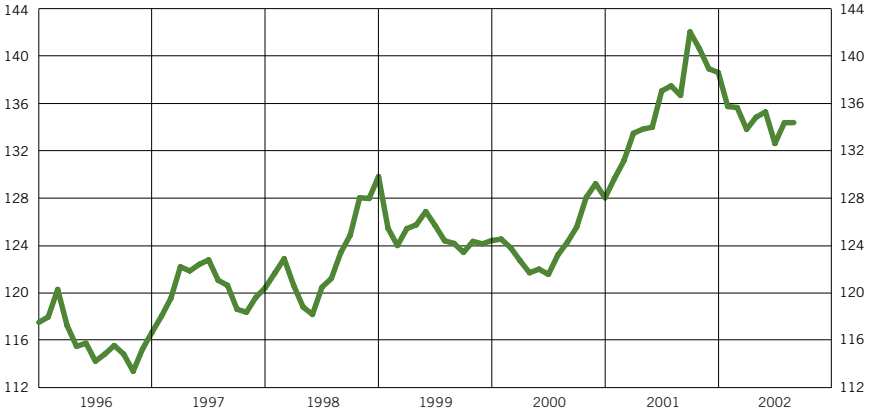
Monthly average

			SEK per			USD per	
		TCW-index	USD	EUR	100 JPY	EUR	JPY
1999	Jan	125.46	7.82	9.0838	6.92	0.8615	113.16
	Feb	124.00	7.95	8.9096	6.82	0.8924	116.72
	March	125.43	8.22	8.9447	6.87	0.9189	119.64
	April	125.75	8.32	8.9162	6.97	0.9343	119.72
	May	126.87	8.44	8.9766	6.93	0.9410	122.05
	June	125.69	8.51	8.8338	7.05	0.9636	120.76
	July	124.40	8.46	8.7485	7.07	0.9663	119.54
	Aug	124.17	8.26	8.7584	7.29	0.9432	113.25
	Sept	123.42	8.22	8.6330	7.67	0.9524	107.01
	Oct	124.35	8.15	8.7289	7.69	0.9341	106.03
	Nov	124.14	8.34	8.6305	7.96	0.9674	104.70
	Dec	124.42	8.48	8.5892	8.27	0.9891	102.59
2000	Jan	124.54	8.47	8.5956	8.07	0.9867	105.10
	Feb	123.81	8.65	8.5112	7.91	1.0170	109.45
	March	122.71	8.69	8.3950	8.16	1.0370	106.38
	April	121.70	8.72	8.2700	8.28	1.0564	105.53
	May	122.00	9.09	8.2388	8.41	1.1040	108.28
	June	121.56	8.74	8.3118	8.24	1.0536	106.11
	July	123.20	8.93	8.4080	8.28	1.0643	107.90
	Aug	124.26	9.27	8.3962	8.58	1.1062	108.13
	Sept	125.57	9.66	8.4121	9.05	1.1469	106.76
	Oct	128.05	9.96	8.5266	9.19	1.1698	108.45
	Nov	129.22	10.08	8.6271	9.25	1.1678	108.91
	Dec	128.03	9.66	8.6629	8.62	1.1149	112.11
2001	Jan	129.66	9.47	8.8963	8.11	1.0659	116.78
	Feb	131.16	9.74	8.9736	8.38	1.0851	116.18
	March	133.47	10.03	9.1254	8.28	1.0999	121.35
	April	133.83	10.20	9.1103	8.24	1.1212	123.72
	May	133.99	10.33	9.0536	8.48	1.1442	121.81
	June	137.05	10.78	9.2010	8.82	1.1722	122.24
	July	137.48	10.77	9.2557	8.64	1.1622	124.57
	Aug	136.67	10.33	9.3036	8.51	1.1108	121.45
	Sept	142.04	10.61	9.6670	8.94	1.0978	118.78
	Oct	140.62	10.56	9.5798	8.71	1.1040	121.28
	Nov	138.92	10.60	9.4131	8.66	1.1258	122.35
	Dec	138.61	10.56	9.4436	8.32	1.1207	127.06
2002	Jan	135.74	10.44	9.2292	7.88	1.1324	132.60
	Feb	135.65	10.56	9.1869	7.91	1.1494	133.60
	March	133.81	10.34	9.0600	7.89	1.1419	131.02
	April	134.83	10.31	9.1331	7.88	1.1290	130.75
	May	135.28	10.05	9.2236	7.96	1.0906	126.37
	June	132.61	9.56	9.1190	7.74	1.0470	123.33
	July	134.37	9.34	9.2705	7.91	1.0080	118.05
	Aug	134.38	9.46	9.2524	7.95	1.0228	118.96

Note. The base for TCW-index is 18 November 1992.

8 Nominal effective TCW exchange rate

Index: 18 November 1992=100



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)
2000	Jan	–316 818	14 641	186 082	0	–116 095
	Feb	–311 986	12 019	198 174	0	–101 793
	March	–305 951	7 131	201 270	0	– 97 550
	April	–308 822	10 696	190 084	0	–108 042
	May	–344 256	8 940	214 764	0	–120 552
	June	–333 512	8 125	198 414	0	–126 973
	July	–337 305	10 218	206 364	0	–120 723
	Aug	–366 627	5 903	175 860	0	–184 864
	Sept	–396 430	3 818	177 540	0	–215 072
	Oct	–420 862	1 528	221 120	0	–198 214
	Nov	–446 831	– 6 231	282 909	0	–170 153
	Dec	–405 651	–14 207	281 242	0	–138 616
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

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