

Introduction

This appendix describes and analyses the outcome of inflation and the monetary policy implemented by the Riksbank in the period 2000-2002. The purpose of the account is partly to provide a foundation for the Parliamentary Committee on Finance's annual assessment of monetary policy and partly to emphasise experiences that can be of use in the future formulation of monetary policy.

Monetary policy aims at keeping annual CPI inflation at 2 per cent. It is usually assumed that the effect of monetary policy measures is exerted with a certain time lag and that it takes one to two years for changes in the instrumental rate to impact fully on inflation. The Riksbank usually describes its inflation target policy with the aid of a simple rule of action: If forecast inflation, based on an unchanged repo rate, exceeds 2 per cent one to two years ahead, the repo rate will normally be raised in order to fulfil the inflation target, and vice versa if the forecast falls short of the target.

The March Inflation Reports over the past three years have included a basis for evaluating monetary policy during the periods 1997-1999, 1998-2000 and 1999-2001. This appendix provides the corresponding discussion for 2000-2002. As an analysis of inflation outcomes in 2000 and 2001 has already been performed, this appendix primarily examines inflation during 2002. Bearing this in mind, and in light of the Riksbank's future-oriented rule of action, it is therefore natural to concentrate on the forecasts and monetary policy decisions that relate to 2000-2001.

It should be underscored that the Riksbank, like other central banks, does not have an exact rule of action that is applied mechanically. One reason for this is that CPI inflation is affected by disturbances that are not possible to eliminate completely through monetary policy, but that nevertheless subside relatively quickly without any contagion effects on prices or inflation expectations. One example is changes to indirect taxes and subsidies, which are normally assumed to give rise only to one-off changes in the price level and not affect inflation expectations. Another example is that households' mortgage interest expenditure, and thereby CPI, is affected directly when the repo rate is raised or lowered. This expenditure, which comprises a considerable part of CPI, mean that if the Riksbank, for example, should try to counteract a fall in CPI

through interest rate cuts, the immediate effect could instead be even lower inflation (due to lower housing costs). Yet another reason against mechanical reactions to inflation forecasts is that the economy is sometimes hit by what are known as supply shocks, which simultaneously lead to a rise (or fall) in both inflation and economic activity. In such cases a quick return to the inflation target could give rise to major macroeconomic costs, especially in the event of a major deviation.²³

Like other forecasts, the inflation forecasts that guide monetary policy are inherently uncertain. For this reason evaluations of the forecasts' uncertainty are provided in addition to the assessment of economic and inflationary development in the main scenario (the most likely development). This is illustrated in the Inflation Reports with uncertainty intervals for the most likely development. Whether uncertainty is greater or lesser than usual and whether the risk is greatest for higher or lower inflation than in the main scenario are questions of pivotal importance for the formulation of monetary policy, in addition to the question of whether forecast inflation in the main scenario exceeds or falls short of the target.

Inflation exceeded the target in 2001 and 2002 partly due to some well-identified supply shocks, e.g. higher food prices as a result of mad cow disease and foot and mouth disease. The uncertainty in the inflation forecasts was so great at times that the Riksbank partly for this reason chose to delay any interest rate changes. As these phenomena – supply shocks and uncertainty – are also of great significance for monetary policy at present, a closer examination of how the Riksbank has managed such problems on previous occasions would appear particularly urgent, in addition to the usual need to evaluate monetary policy implementation.

Inflation in relation to the target

The Riksbank's inflation target includes a tolerance interval of plus/minus 1 percentage point. The purpose of this interval is to clarify both that deviations from the target are likely and that the Riksbank aims to limit these deviations.

CPI inflation averaged 1.8 per cent per year from 1993-2002. Since the target officially began to be applied in January 1995, inflation has averaged 1.4 per cent per year. There has therefore been a sharp decline in inflation compared with the 1970s and 1980s when it averaged just below 8 per cent per year.

²³ See "The Riksbank's inflation target – clarifications and evaluation", Sveriges Riksbank memorandum 1999-00351 DIR, 4 February 1999.

During the current evaluation period monetary policy was based to a large extent on assessments of inflation as measured by the UND1X index. This index excludes the direct effects on CPI of changes in households' mortgage interest expenditure and changes in indirect taxes and subsidies. The increase in UND1X has averaged 2.1 per cent per year during the period 1993-2002 and 1.9 per cent per year from 1995-2002.

Diagram B10 shows the monthly deviations in UND1X and CPI inflation from the inflation target. During the period 1997-2000 both CPI and UND1X fell short of the inflation target. The deviations were mostly within the tolerance intervals for UND1X, but were greater for CPI. In contrast, the inflation target was exceeded in 2001 and 2002. The deviations here were relatively sizeable until the beginning of 2002. The increase in CPI and UND1X averaged 2.4 per cent and 2.5 per cent for 2002.²⁴

Seen over the calendar years 2001 and 2002 as a whole, the deviations from the target were relatively small, although large deviations occurred in certain months. Given the Riksbank's limited

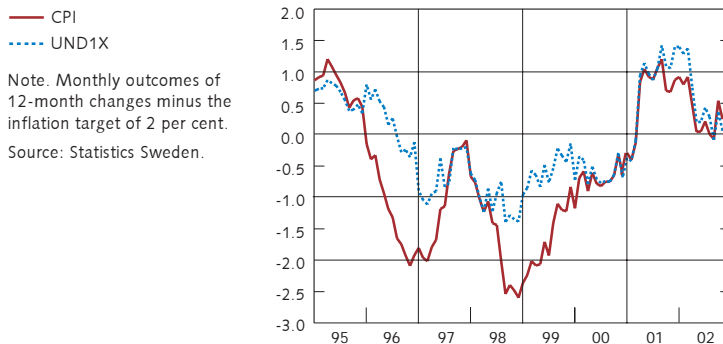
capacity for steering inflation in the short term, such deviations are to be expected from time to time. In addition, deviations from the target can be used for an analysis of other important questions. What forecasts did the Riksbank use as a basis for its monetary policy? On the basis of the available information, should the Riksbank have made a different assessment of the inflationary trend and thereby implemented a different monetary policy? An obvious question, for instance, is whether monetary policy ought to have been tighter during 2000-2001 given that inflation exceeded the target in 2001-2002. It should be underscored that the fact that the Riksbank has announced a clear target and a distinct, if somewhat simplified, rule of action and that it also regularly publishes its forecasts and the minutes of the Executive Board meetings, is an important condition for enabling such analyses to be performed in an effective manner.²⁵

Assessments behind monetary policy 2000-2001

Figure B11 shows the development of the instrumental rates of a select number of central banks. In 2000, interest rates were raised substantially in the rest of the world. The Riksbank increased the instrumental rate at the beginning and end of the year. In 2001, rates were cut in the euro countries, the United Kingdom and the United States, while the repo rate in Sweden was raised (until the cut that followed the terrorist attacks in the United States in September). At the beginning of 2000, instrumental rates in Sweden were marginally higher than that of the euro area though appreciably lower than those of the United States and United Kingdom. By the end of 2001, the United Kingdom was the only country with a higher instrumental rate than Sweden.

Table B6 summarises a number of key forecasts made together with the Riksbank's monetary policy decisions during the two years in question. Figures B12 and B13 show the forecast paths for UND1X and CPI inflation during the period 2000-2001. Up until the first Inflation Report of 2001 inclusive, the Riksbank forecast that inflation (according to the main scenario) would rise slowly but remain at or below the inflation target. Following the increase in inflation at the beginning of 2001, the Riksbank assessed that inflation

Figure B10. Deviation from the inflation target. Per cent



Note. Monthly outcomes of 12-month changes minus the inflation target of 2 per cent.

Source: Statistics Sweden.

²⁴ Other summary measures of the size of the deviations in Figure B10 can be used to describe the fulfilment of the target. RMSE ("Root mean square error") is the square root of the mean of the squared deviations. According to this measure, the deviations in UND1X inflation from the target have been largely of the same magnitude during 2002 (0.74 percentage points) as during the period 1995-2001 (0.76 percentage points). As regards CPI inflation the deviations during 2002 were less than half (0.50) compared with the period 1995-2001 (1.29).

²⁵ This is also something that has made the Riksbank one of the best ranked central banks in terms of openness and transparency, see Eijffinger, S.C.W. & Geerats, P.M. (2002), "How Transparent are Central Banks?", CEPR discussion paper 3188.

Table B6. The Riksbank's monetary policy decisions and selected forecasts.

Date of decision	UND1X inflation forecast Main scenario (annual average), 2000, 2001, and 2002	UND1X inflation forecast Main scenario (12-month figures), one to two years ahead of the forecast date	GDP-growth forecast Main scenario, 2000 and 2001	Uncertainty in inflation assessment	Risk-adjusted inflation forecast (12-month figures), one to two years ahead of the forecast date	Repo rate	Repo rate adjustment
2000-02-03						3.75	0.50
2000-03-22	1.6: 1.8: -	1.6: 2.1	4.0: 3.5	Normal	1.6: 2.1	3.75	0
2000-05-04						3.75	0
2000-06-07	1.2: 1.6: -	1.5: 1.9	4.3: 3.5	Normal	1.5: 2.0	3.75	0
2000-07-06						3.75	0
2000-08-16						3.75	0
2000-10-09	1.4: 1.5: -	1.5: 1.9	4.0: 3.7	Normal	1.6: 2.1	3.75	0
2000-12-06	1.4: 1.7: 1.8	1.8: 1.9	3.9: 3.4	More than normal	2.0: 2.3	4.00	0.25
Date of decision	UND1X inflation forecast Main scenario (annual average), 2000, 2001, and 2002	UND1X inflation forecast Main scenario (12-month figures), one to two years ahead of the forecast date	GDP-growth forecast Main scenario, 2000 and 2001	Uncertainty in inflation assessment	Risk-adjusted inflation forecast (12-month figures), one to two years ahead of the forecast date	Repo rate	Repo rate adjustment
2001-02-01						4.0	0
2001-03-26	1.5: 1.9	1.9	2.4: 2.4	More than normal	1.8	4.0	0
2001-04-26						4.0	0
2001-05-30	2.5: 2.1	1.8	2.2: 2.5	Normal	1.8	4.0	0
2001-07-05						4.25	0.25
2001-08-23						4.25	0
2001-09-17						3.75	-0.50
2001-10-15	2.8: 2.4	1.7	1.3: 2.2	Normal	1.7	3.75	0
2001-12-04	2.7: 2.1	2.0	1.2: 1.8	Normal	2.0	3.75	0

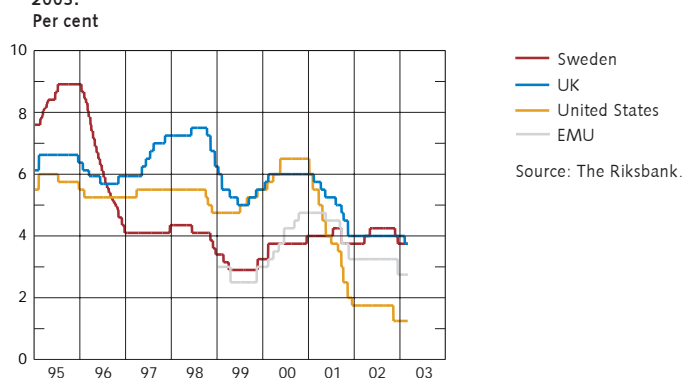
Note: Forecasts during the period were published only in the Inflation Report, which is issued four times a year. However, decisions on repo rate adjustments are not taken in conjunction with the publication of these reports only.

Source: The Riksbank.

would return to the target at the start of 2002, when the effects of a number of supply shocks had petered out. Expected GDP growth was relatively high in both 2000 and 2001 (until the autumn 2001). The repo rate was adjusted on four occasions during 2000 and 2001 for a net change of 0.5 percentage points.

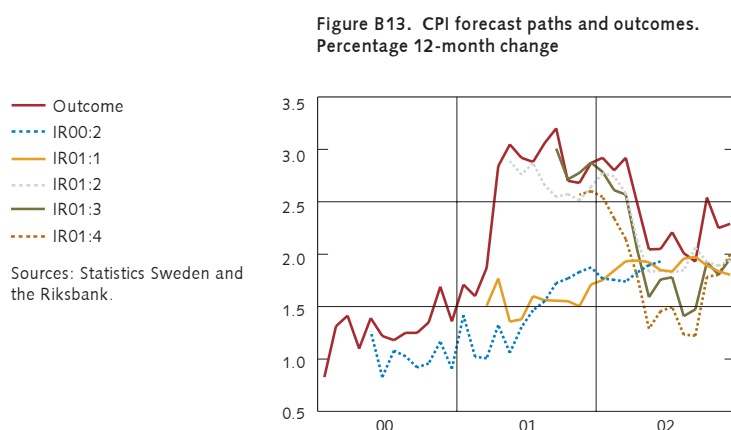
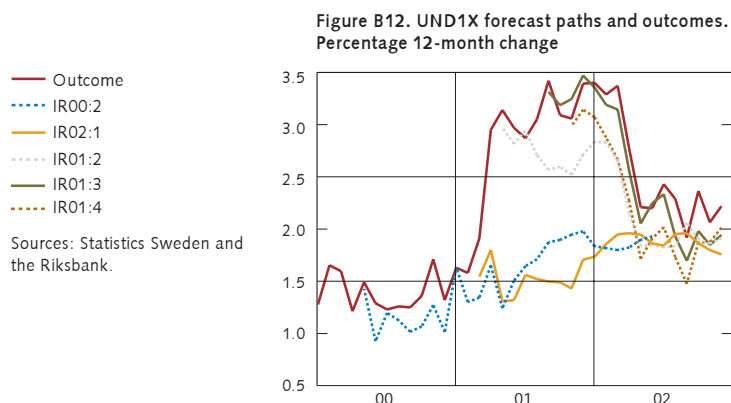
The motivations that guide the Riksbank's monetary policy are discussed in detail in the minutes of the Executive Board meetings, and these are normally published approximately two weeks after the meetings. An examination of these minutes for the period in question shows that monetary policy was faced with somewhat different problems during 2000 and 2001. The main issue in 2000 centred on how much growth the economy could withstand before inflation would gather pace, i.e. how high resource utilisation was and how quickly potential production would grow. Another relevant issue here is that inflation for a long time had fallen short of both the inflation target and the Riksbank's forecasts. The situation in 2001 was practically the opposite. The most important

Figure B11. The repo rate in selected countries 1995-2003.



Source: The Riksbank.

monetary policy question was what part of the rise in inflation was due to transitory effects of supply shocks and how much could be attributed to a more sustained increase because of greater resource utilisation and higher cost levels. Moreover, an analysis of inflation prospects in 2001 was complicated by unexpected negative developments, such as slackening international activity, falling oil prices, a weak krona and the terrorist attacks in the United States.



Monetary policy in 2000

At the Executive Board's first monetary policy meeting of the new millennium in February 2000, it was concluded that growth in oil prices over the past year had contributed to gradually rising inflation. This raised the question of whether it was due to supply shocks or whether the rise was caused by greater international demand. The Executive Board's assessment was that the effect of oil prices on the general price level could not be disregarded completely. In addition it was concluded that monetary policy was sufficiently expansionary that there was a risk of inflation eventually exceeding the target. It was therefore decided to raise the repo rate by 0.5 percentage points.

At the monetary policy meetings held between March and October 2000, the Executive Board decided to leave the repo rate unchanged. These decisions were complex, however, and a risk was foreseen that inflation may exceed 2 per cent (Table B6). One particular complication was the high valuation of the stock market. Concern that this could fuel inflation played a significant part, particularly in the June discussions.

The minutes of the meeting show that one board member entered a reservation against the decision to leave the repo rate unchanged, proposing instead that the rate be raised by 0.5 percentage points. According to the minutes of the March meeting, the member's motivation for this proposal was that there was a higher inflationary propensity in the Swedish economy than that depicted in the Inflation Report, partly due to lower flexibility in the Swedish labour market. This could therefore soon lead to rising inflation, according to the board member, when unutilised resources in the Swedish economy were no longer available. However, the majority of the Executive Board members agreed with the picture of a stable, strong cyclical upswing in the Swedish economy, where an increasing amount of the economy's unutilised resources would be employed. Although there was an increase in resource utilisation during the period, the minutes of the October meeting contained the assessment that there was a higher degree of unutilised resources than was previously assumed. The low rate of inflation, among other things, supported this. Several board members therefore preferred to delay any potential rate rises, while also underscoring that there were many indications that a rise in the repo rate would eventually be required.

Autumn 2000 was marked by instability in the financial markets and poorer prospects for the international economy. At the monetary policy meeting in December 2002, the Executive Board concluded that fresh statistics indicated a slowdown in global activity. At the same time it was concluded that developments in oil prices and the exchange rate constituted greater upside risks for future inflation. All in all, inflation two years ahead was judged to be slightly higher than the target. In light of this the Executive Board decided to raise the repo rate by 0.25 percentage points.

Monetary policy in 2001

Spring 2001 was also characterised by complex monetary policy considerations, but this time of a different nature. Measured inflation exceeded the target, and the question was now what was causing it and what conclusions could be drawn in terms of monetary policy. The Riksbank's analysis indicated that the rise in inflation was temporary but also that a more sustained effect in connection with demand could not be ruled out. Furthermore, the exchange rate was weak. Inflationary pressure from supply shocks and the exchange rate were counteracted to some extent, however, by unexpectedly weak economic activity in the rest of

the world. During the first half of 2001 the Executive Board decided to leave the repo rate unchanged, despite the fact that the overall inflation forecast (i.e. taking into account the risk spectrum) spoke for a potential cut in interest rates in both March and May (Table R6). The considerable uncertainty, in particular over the strength of the inflationary tendencies in the economy, marked the assessment and was considered grounds to wait with such a decision.

The substantial weakening in the krona seen in early summer 2001 prompted the Executive Board to intervene in the currency market. The weak exchange rate was judged to constitute a risk of inflation two years ahead exceeding the bank's target, given that inflation was close to 3 per cent and that there were tendencies towards higher inflation expectations. All in all, the interventions in the currency market involved the Riksbank selling euro and USD for kronor to the amount of approximately SEK 12 billion between 15 and 25 June. One Board member entered a reservation against the currency interventions, arguing that the intervention process ought to have a more distinct connection to the Riksbank's strategy for inflation target policy so as not to raise question marks over the formulation of monetary policy. Short-term interest rates moved higher and prices in the money market indicated that market players were expecting the repo rate to be raised in July. At the July meeting the Executive Board decided to raise the repo rate by 0.25 percentage points, partly because of the weak exchange rate and partly due to signs that a high level of resource utilisation would lead to rising inflation even after the transitory effects of supply shocks had petered out. The rise in the repo rate resulted in a firmer krona and an easing of inflation expectations. Three Board members entered a reservation against the majority decision and maintained that the repo rate should be left unchanged. The members believed that the rise was inappropriate given the increasingly weaker economic picture.

As a result of the terrorist attacks in the United States, Autumn 2001 was marked by tremendous uncertainty as to the development of the global economy. In September the Executive Board decided to lower the repo rate by 0.50 percentage points following an extraordinary monetary policy meeting called in the wake of events in the United States. This move coincided with rate cuts in the United States, the euro area and a number of other countries.

In the months following the terrorist attacks, weak economic activity in the rest of the world was balanced by a continuation of high domestic inflationary pressure. In light of this, the Executive Board decided to leave the repo rate unchanged at its remaining monetary policy meetings in 2001. These meetings were also marked by great uncertainty as to the duration of the rise in inflation and it was therefore considered appropriate to take a cautious approach to monetary policy. One Board member entered a reservation against the decision to leave the repo rate unchanged at the December meeting. The member contended that there were more unutilised resources in the economy than assumed by the majority and that this justified a rate cut of 0.25 percentage points.

Has the Riksbank acted consistently?

One important question is whether the Riksbank's decisions were understandable given its forecasts. For example, how did the Riksbank act in relation to its simple rule of action of normally adjusting the repo rate on the basis of expected inflation one to two years ahead? It is also interesting to compare the Riksbank's policy with other simple but common rules, e.g. the Taylor rule. Common to these rules is that they postulate a systematic connection between interest rate decisions on the one hand and macroeconomic developments, and inflation in particular, on the other. Investigating whether a systematic relationship exists between the Riksbank's interest rate decisions and its forecasts is one way of analysing the consistency of interest rate policy. The Riksbank has for that matter emphasised that it does not apply its rule of action mechanically, but to the extent to which large deviations from a systematic rule can be shown it ought to be possible to find explanations for these deviations in the minutes of the monetary policy meeting.

The section entitled "Monetary policy and simple rules" compares the actual interest rate policy implemented by the Riksbank with the policy inferred by an application of some simple rules. The results indicate that the Riksbank has pursued a monetary policy that in general has been consistent and understandable in the sense that the calculated interest rate deviations have been relatively small (See Table B7 and Fig. B14). Figure B14 shows that the rate cut in September 2001 entailed an unusually low level of interest rates, although this originated from a situation of relatively high interest rates initially.

Monetary policy and simple rules

The original Taylor rule, applied by John Taylor to analyse the US Federal Reserve's monetary policy, was as follows:²⁶

$$r_t = r_0 + \alpha(\pi_t - \pi^*) + \beta(y_t - y_t^*)$$

Here r_t denotes the interest rate set by the central bank for a certain period (period t), π_t and y_t denote inflation and GDP respectively in the same period, π^* the inflation target, y_t^* a targeted level of GDP and r_0 the average interest rate (which is attained when the average targets for inflation and GDP are reached). Taylor made certain assumptions about the Fed's inflation target, the potential growth in GDP (the rate of increase in y^*) and the average interest rate (r_0), as well as about the parameters a and b in the rule of action. In order to enable a meaningful analysis of whether a certain central bank's interest rate policy can be described consistently using a simple rule such as Taylor's, it is important to make two adjustments in relation to the original rule. Firstly, it is important to allow the interest rate to even out to a certain degree over time, as all central banks appear to pursue an interest rate policy with considerably smaller rate fluctuations than the rules that do not allow this involve. Secondly it is necessary to estimate the rule using data from each country and not simply to apply the parameters chosen for the United States by Taylor.

Table B7 shows that if a variant of the Taylor rule had been followed consistently, the Riksbank would have implemented a slightly tighter monetary policy than that pursued during 2000 and 2001. This conclusion is based on a variant of the Taylor rule that was estimated using Swedish data and that was formulated as follows:

$$r_t = 0,25 + 0,81r_{t-1} + 0,42(\pi_t - 2) + 0,27y_t$$

Here y is more a denotation of GDP growth than the level of GDP. The rule has been estimated using data on the repo rate and the Riksbank's forecasts since 1993, and depicts how the bank's average policy can be described, given the assumption that the bank has followed a rule similar to Taylor's.

One rule that is somewhat closer in nature to the rule of action communicated by the Riksbank describes the repo rate as a function of the forecasts of inflation one to two years ahead (p_{t+1}^F and p_{t+2}^F), as opposed to inflation and GDP growth for the year in question. The rule is formulated as follows:

$$r_t = 1,33 + 0,48(\pi_{t+1}^F - 2) + 0,27(\pi_{t+2}^F - 2) + 0,66r_{t-1}$$

Compared with the interest rate levels implied by such a rule, the actual repo rate was relatively high during 2002, in line with the rule during the first half of 2001 and relatively low at the end of 2001.

Figure B14 shows the deviations between the actual repo rate and the interest rate levels produced when policy is described exactly by the estimated rules (i.e. the residuals from each regression equation). The interest rates used to calculate the deviations are those in Table B7.

Table B7. Repo rate calculations using different rules.

Forecast period	Taylor	Forecast-based rule	Actual repo rate
2000 Q1	3.74	3.18	3.75
2000 Q2	4.10	3.46	3.75
2000 Q3	4.06	3.53	3.75
2000 Q4	4.07	3.76	4.00
2001 Q1	3.98	3.95	4.00
2001 Q2	4.32	3.95	4.00
2001 Q3	4.11	3.78	4.25
2001 Q4	4.29	4.19	3.75

Note. Rules using estimated coefficients are taken from Berg, C. Jansson, P. & Vredin, A., (2002), "How useful are simple rules for monetary policy?", unpublished manuscript, The Riksbank, 2002. Inflation refers to CPI.

Source: The Riksbank.

²⁶ See Taylor, J.B., "Discretion versus Policy Rules in Practice", Carnegie-Rochester Conference Series on Public Policy 39, 1993, pp. 195 -214.

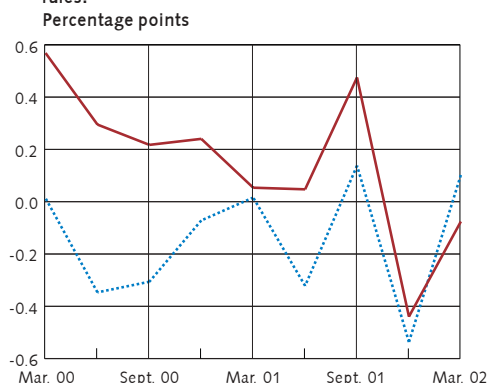
Evaluation of forecasting errors for 2002

Put simply, the Riksbank's monetary policy is based on adjusting the repo rate to ensure that forecast inflation meets the inflation target. If the inflation forecasts are accurate, the procedure ought to result in an actual inflation rate that is close to the target. In the event of large forecasting errors, however, there is a risk that inflation will deviate markedly from the target.²⁷

Figure B15 shows that UND1X inflation rose sharply during spring 2001 and exceeded the Riksbank's upper tolerance interval of 3 per cent, where it remained into the initial months of 2002. In order to understand the inflationary trend in 2002 it is necessary to also discuss parts of the course of inflationary events during 2001.

Large parts of the substantial price rises during spring 2002 were judged to be caused by supply shocks that have only transitory effects on inflation. A detailed discussion of this is presented in the appendix of the March 2002 Inflation Report.²⁸ The main features of the trend included an unexpectedly high rise in meat prices due to mad cow disease and foot and mouth disease. Electricity prices also rose more than expected, due in part to a normalisation that followed the sharp fall in prices after the deregulation of the market. Furthermore, weather conditions in Sweden and Europe during autumn 2001 contributed to higher prices for electricity as well as fruit and vegetables. Figure B16 shows UND1X inflation including and excluding the categories that were affected most by the supply shocks. Excluding these price increases, inflation nevertheless exceeded the Riksbank's forecasts and inflation target. One explanation could be that the economy had already reached a high level of resource utilisation beforehand. An indication of this is that unit labour costs were underestimated in 2001. On the other hand, a unanimous picture of resource utilisation and productivity for 2001 does not even exist today. The National Accounts are revised gradually. In light of the new information, the Riksbank has been forced to slightly revise its assessment of resource utilisation on several occasions in recent years. It appeared initially that the amount of unutilised resources had been underestimated in

Figure B14. Deviations from monetary policy rules.



Note. Deviations are measured as the actual repo rate minus the repo rate specified by the rule, i.e. positive (negative) values indicate that the rule was below (above) the actual repo rate.

Source: The Riksbank.

Figure B15. CPI and UND1X outcomes.

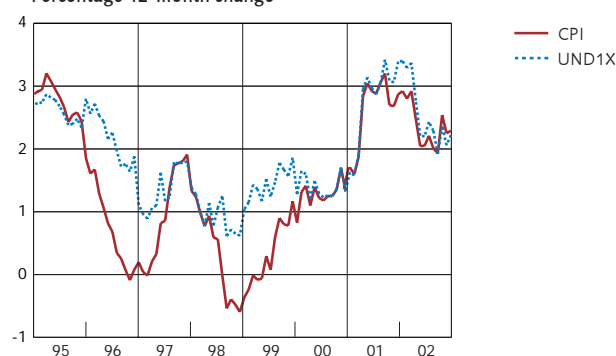
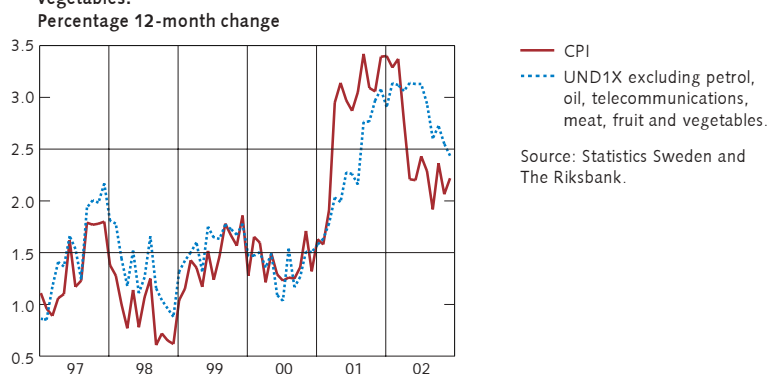


Figure B16. UND1X-including and excluding petrol, oil, telecommunications, meat, fruit and vegetables.



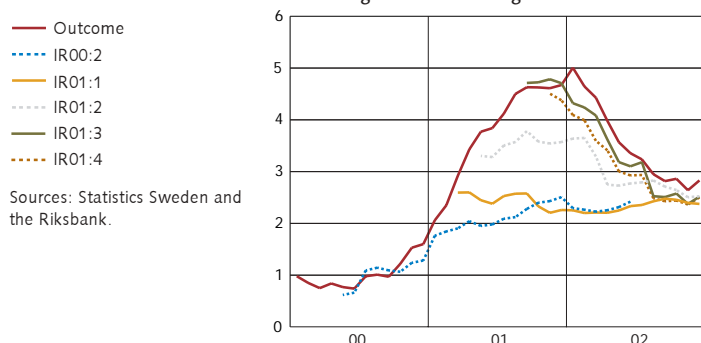
Source: Statistics Sweden and The Riksbank.

2001 and overestimated thereafter. The most recent figures point once again to an underestimation, i.e. that the first assessment was not unreasonable.

27 One complication here is that the Riksbank's forecasts differ from those of other forecasters through its assumption of a constant repo rate throughout the forecast period. This means that if the repo rate has been adjusted the forecasts should prove incorrect. There are various ways of dealing with this when performing evaluations. One is to quite simply disregard the assumption of a constant repo rate and evaluate the forecasts in the customary way. This approach seems more reasonable the smaller the repo rate adjustments have been during the period. Another is to attempt to make some kind of adjustment for the assumption. The text below gives an account of the first approach only, as simple adjustments to rules of thumb for the assumption of a constant repo rate have only a marginal effect on forecasts for the actual evaluation period. This in turn is due to the small nature of the repo rate adjustments.

28 See the appendix "Material for assessing monetary policy 1999-2001", in the March Inflation Report 2002.

Figure B17. UNDINHX forecast paths and outcomes.
Percentage 12-month change



Sources: Statistics Sweden and the Riksbank.

The rise in prices that occurred in spring 2001 continued to affect inflation outcomes during a number of months in 2002. Both CPI and UND1X inflation were underestimated that year by approximately 0.3 and 0.5 percentage points respectively on an average annual basis. Although these may not constitute major forecasting errors it is important to understand their cause. For example, large forecasting errors in one direction could be offset by errors in the opposite direction.

Attempting to discern the causes of forecasting errors is a very complicated process, although certain conclusions can nevertheless be drawn from Table B8. Domestic inflation was underestimated in 2002 which was partly due to price developments for rents and food. The underestimation of domestic inflation for 2002 (in the assessment in the December Inflation Report 2000) can also be

explained by the fact that fees for daycare centres were expected to be included in CPI in 2002; this never happened however. Otherwise a fall in inflation from the introduction of maximum fees for childcare would have been registered (Table B8). Another factor fuelling inflation in 2001 and 2002 was the unexpectedly large rises in unit labour costs during 2001, which were mainly a result of an overestimation of corporate sector productivity. Figure B17 shows a pattern in the forecasting errors in so far as the upward revisions of the forecast domestic inflation were made too slowly, thus entailing that forecast UND1X inflation was also revised upward too slowly.

Resource utilisation

An important issue for the Executive Board meetings during 2000 and 2001 was the level of resource utilisation in the economy and the inflationary pressure this may give rise to. An interesting question therefore is whether differences between the forecasts and outcomes for GDP growth and potential growth could be the reason for the slight underestimation of inflation in 2002.

Table B8 shows that the GDP assessments for 2001 that were made from the end of 2000 were overly optimistic. This did not apply to the Riksbank only, however, but also to most other forecasters (Figure 18).²⁹ It is only towards the end of 2001 that the forecasts contain errors of a reasonable size.

Table B8. Key variables: forecasts and outcomes 2001 and 2002.
Annual average

	IR 2000:4	IR 2001:1	IR 2001:2	IR 2001:3	IR 2001:4	Outcome
Forecasts for 2001						
GDP growth	3.4	2.4	2.2	1.3	1.2	1.1
GDP OECD growth 2001	3.0	2.2	2.0	1.0	1.0	0.9
Unit labour costs 2001, corporate sector	1.4	2.4	2.8	3.5	3.4	4.7
Forecasts for 2002						
Oil price USD	25.5	23.9	23.9	23.0	20.0	25.0
Exchange rate	121.0	123.7	125.6	138.6	133.8	133.7
Dollar exchange SEK/USD	8.4	8.4	8.3	9.1	10.0	9.7
International export prices	1.3	1.0	1.0	0.5	0.2	-0.4
Import prices, producers	-2.8	-2.3	-2.5	-0.8	-4.0	-0.2
Corporate sector wage costs	4.6	3.9	3.9	3.7	3.6	4.1
Corporate sector productivity	2.4	2.1	2.3	2.3	2.2	4.1
Unit labour costs, corporate sector	2.2	1.8	1.6	1.4	1.4	0.0
UNDINHx	2.0(2.5)	2.3	2.9	3.2	3.0	3.5
UNDIMPX	1.1	1.0	0.6	0.7	0.4	0.5
UND1X	1,8(2.1)	1.9	2.1	2.4	2.1	2.5
CPI	1,8(2.1)	1.9	2.1	2.0	1.8	2.4

Note. Unit labour costs are based on preliminary outcomes for productivity from the National Accounts. UNDINHx represents domestic inflation while UNDIMPX is imported inflation. The figures in parentheses show the forecasts exclusive of the maximum fees for childcare. The reason for this clarification is that childcare fees were originally expected to be included in the calculations of CPI.

Sources: Statistics Sweden and the Riksbank.

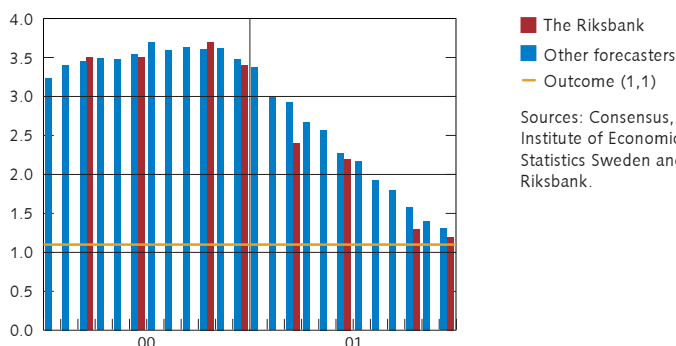
29 See Blix, M., Friberg, K. & Åkerlind, F., "An evaluation of forecasts for the Swedish economy", *Sveriges Riksbank Economic Review* 3, 2002, pp. 39-74.

There is, however, no simple correlation between GDP growth and inflation. Inflationary pressure is not determined by GDP growth in itself, but rather by the relationship between actual GDP and the potential production capacity in the economy, i.e. the output gap. If an overestimation of measured GDP is caused by an overestimation of potential GDP, this could result in an underestimation of resource utilisation and inflationary pressure. As stated above, analyses of these issues are complicated further by revisions of data.

Figure B19 shows that the Riksbank was not alone in underestimating inflation during 2002. Most participants seem to have expected an inflation rate at or just below the target up until the third quarter 2001, and no information in the expectations suggests a higher inflation rate than that forecast by the Riksbank. The same conclusions can be drawn for the inflation forecasts of other forecasters.³⁰ On the other hand, the majority of these were based on expectations of tighter monetary policy, although an analysis of expectations of the repo rate indicate that small rises were foreseen. One should also bear in mind that expectations of tighter monetary policy were probably based on a more optimistic view of economic activity than what later proved to be the case.

In conclusion the Riksbank underestimated inflation slightly for 2002. This was probably due in part to an underestimation of the effects of a number of specific supply shocks during spring 2001, but also because of the growth of unit labour costs, for example. As regards cost developments, a part of the forecasting error could possibly be a result of an underestimation of the economy's resource utilisation. The underestimation of inflation during 2001 in particular but also during 2002 should also be seen in the light of the Riksbank's previous overestimations of inflationary pressure on a number of occasions. Developments in the latter half of the 1990s indicated a more favourable relationship between growth and inflation than was witnessed in earlier periods, which the current discussion on the New Economy demonstrates.

Figure B18. GDP forecasts for 2001: Average for different forecasters and the Riksbank. Per cent



■ The Riksbank
■ Other forecasters
— Outcome (1,1)

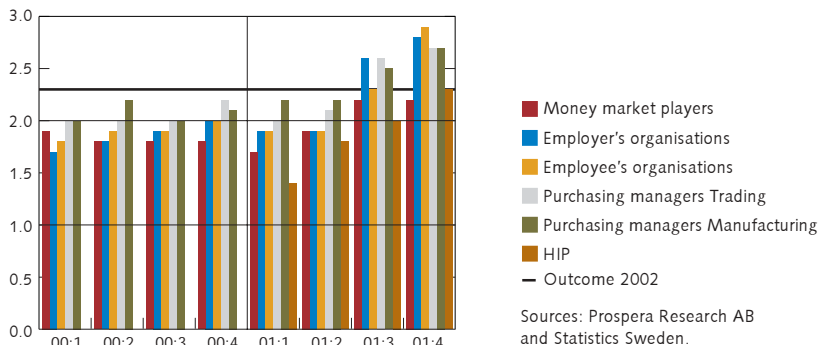
Sources: Consensus, National Institute of Economic Research, Statistics Sweden and the Riksbank.

Conclusions

Given that monetary policy works with a time lag, and with the aim of not contributing to large fluctuations in the real economy, the Riksbank has decided to base monetary policy on future expected inflation rather than observed inflation. Monetary policy during 2000 and 2001 appears consistent in light of the Riksbank's forecasts for 2002 and using the Riksbank's normal pattern of action as a standard. Meanwhile, a forecast-based rule of action would mean that forecasting errors could be of great significance in monetary policy.

Unusually large deviations from the inflation target were registered during 2001, the causes of which also had an impact on inflation in 2002. The Riksbank made an assessment in 2001 that this constituted a temporary rise in inflation, which proved to be largely correct. There were fears that the increase in inflation was partly attributable to excessive resource utilisation, and

Figure B19. Inflation expectations for 2002 during 2000 and 2001. Per cent



■ Money market players
■ Employer's organisations
■ Employee's organisations
■ Purchasing managers Trading
■ Purchasing managers Manufacturing
■ HIP
— Outcome 2002

Sources: Prospera Research AB and Statistics Sweden.

³⁰ The only exception is Handelsbanken, which overestimated inflation by approximately 1 percentage point.

estimates of this were also revised upward during 2001 and 2002. Later figures, however, suggest that that the original assessments were not unreasonable. Revisions of historical data illustrate the difficulties inherent in assessing economic activity and forecasting inflation.

While the forecasts that guided monetary policy during the period 2000-2001 contained forecasting errors, they were nevertheless among the more successful when compared with other forecasters.³¹ The errors that were present the Riksbank's inflation forecasts appear to be derived, for example, from an underestimation of unit labour costs during 2001, mainly due to an unexpected development of production. Part of this forecasting error could be a result of an underestimation of the economy's resource utilisation and/or that excessively optimistic assumptions were made about the effects of resource utilisation on inflation.

Analyses performed by the Riksbank in 2000 and 2001 indicated that the economic climate would continue to be strong and that repo rate rises would therefore be required. Had the economic picture remained favourable, such rises would most certainly have been necessary. Instead the Riksbank implemented a number of minor rises, mainly to signify when inflation expectations had moved higher. In June and July of 2001, the picture was complicated further by the rapid and relatively sharp deterioration in the exchange rate. Following the events of 11 September 2001, and the resultant effect these had on views of future economic developments, the repo rate was lowered once again.

The minutes of the Executive Board's meetings indicate that the Riksbank was concerned by the high inflation outcomes during the period 2001-2002, but that the bank decided to follow its simple forecast-based rule of action: that it is primarily the assessment of inflation one to two years ahead that shall form the basis of monetary policy formulation. Had the Riksbank decided to base monetary policy on observed rather than forecast inflation, e.g. according to the Taylor rule, monetary policy would have been tighter during 2001 and 2002.

In conclusion, Sweden entered the period in question with relatively low instrumental rates compared with other countries. Furthermore, the instrumental rate was raised to a lesser extent in the initial stages of the same period. The backdrop to this was a very low rate of inflation, which had fallen short of the Riksbank's target for several years, and a positive assessment of the economy's capacity to grow while also keeping inflation down. When inflation rose at a faster rate than anticipated during 2001, question marks were raised over earlier assessments of the inflation propensity in the economy. Although the Riksbank judged most of the rise in inflation to be transitory, policy was based on a relatively high level of resource utilisation. Consequently, the repo rate was not lowered as much as in other countries during the period 2001-2002. Of relevance in this regard is that the krona was relatively weak during both 2001 and 2002, while fiscal policy was expansionary.

31 See Blix, M., Friberg, K. & Åkerlind, F., "An evaluation of forecasts for the Swedish economy", Sveriges Riksbank Economic Review 3, 2002, pp. 39-74.