

SPEECH



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SPEAKER: First Deputy Governor Svante Öberg
LOCALITY: The Riksbank, Stockholm

SVERIGES RIKSBANK
SE-103 37 Stockholm
(Brunkebergstorg 11)

Tel +46 8 787 00 00
Fax +46 8 21 05 31
registratorn@riksbank.se
www.riksbank.se

■ Monetary policy's Catch-22 – uncertainty

Monetary policy has to be based on forecasts. But our ability to make forecasts is almost non-existent. This is what I call the Catch-22 of monetary policy.¹

This is, somewhat incisively, what my speech is about. One can also describe it as follows. Monetary policy acts with a lag and must therefore be based, at least partly, on forecasts. The problem is that our forecasting ability is very limited – small at one year ahead and almost non-existent at two and three years ahead. We should therefore put more energy into analysing the economy's initial position and making forecasts for the coming year. Further ahead it is more a question of producing possible scenarios for economic developments.

I intend to devote this speech to the subject of how to view uncertainty in monetary policy. I shall begin by describing my own earlier experiences of forecasts and uncertainty. I shall then go on to describe the uncertainty in the Riksbank's forecasts. After this, I shall discuss how one should view uncertainty and monetary policy, first in theory and practice, and then in nine suggestions for monetary policy. I shall conclude with some reflections on monetary policy and summarise my main message.

Forecasts are usually wrong

I learned how difficult it is to make forecasts during my time at the Ministry of Finance and at the National Institute of Economic Research. During different periods I was responsible for both medium-term forecasts and cyclical forecasts at the Ministry of Finance. The medium-term forecasts within the framework of the long-term surveys were to a great extent a more or less sophisticated projection of trends. They missed recessions and were only accurate when reality followed the previous trend (see Figure 1).²

¹ *Catch-22* is a novel by Joseph Heller first published in 1961.

² Ministry of Finance, *Long-term surveys 1990*, main report, SOU 1990:14, 1990.

■ The Ministry of Finance's cyclical forecasts are based on more information, including changes in taxes and expenditure in the government budget. Like the forecasts made at the Riksbank, they are used as a basis for policy decisions. But they are also usually wrong, which is a problem with regard to using fiscal policy to stabilise economic activity. Sometimes political aspects also have significance, such as when we deliberately had cautious forecasts as a basis for the budget consolidation in the 1990s (see Figure 2). It would be less of a problem if things turned out better than we were expecting than if they turned out worse.³

At the National Institute of Economic Research Professor Lars-Erik Öller and others systematically analysed the forecasting performance of the institute itself and others, with regard to both Sweden and other countries.⁴ The results showed that the forecasting errors for GDP growth and inflation were large, but that the forecasts in the autumn for the coming year were nevertheless better than simple (naïve) forecasts, such as using the average of earlier years as a forecast. The studies showed that there was a certain forecasting ability up to one year ahead, but no further than that. The same limitations have also been noted in many other studies, both in Sweden and abroad.

After these experiences I came to the Riksbank, where monetary policy is to a large extent based on forecasts several years ahead. It wasn't very easy dealing with this task, given my previous experiences. I have discussed the Riksbank's forecasting ability in an earlier speech, on the basis of an analysis made at the Riksbank.⁵ I shall in this speech describe how I now view monetary policy and uncertainty, after six years at the Riksbank.

Uncertainty in the Riksbank's forecasts

In this section I shall describe the uncertainty in the Riksbank's forecasts. At the same time, I would like to emphasise that the aim is not to assert that the Riksbank's forecasts are better or worse than anyone else's. My assessment is that the Ministry of Finance, the National Institute of Economic Research and the Riksbank make forecasts of roughly the same quality seen over time. My aim is to describe the uncertainty and then to discuss how it should be dealt with in conducting monetary policy. At the Riksbank we regularly report the uncertainty in our forecasts. We do this in the form of scenarios that describe developments under different assumptions, in report texts when we run through different areas and in fan charts, which show how accurate the forecasts usually are.

GDP and inflation - limited forecasting ability one year ahead, none at two and three years ahead

The Monetary Policy Reports and Updates include, for instance, four standard figures that show the uncertainty of the forecasts. Three of them refer to GDP

³ Ministry of Finance, "Convergence programme for Sweden", June 1995.

⁴ L.-E. Öller and B. Barot, "The accuracy of European growth and inflation forecasts", *International Journal of Forecasting* 16, pp. 293-315, 2000.

⁵ S. Öberg, "The Riksbank's forecasting performance", 26 November 2007 and M. K. Andersson, J. Svensson and G. Karlsson, "An evaluation of the Riksbank's forecasting performance", *Economic Review*, 2007:3, Sveriges Riksbank.

■ growth, CPI inflation and CPIX inflation. They show 50per cent, 75per cent and 90per cent uncertainty bands for the forecasts of up to three years ahead (see Figures 3-5). The uncertainty bands are based on the Riksbank's historical forecasting errors for these variables.⁶ The uncertainty increases as the forecast horizon lengthens.

When one evaluates forecasts, one usually compares the current forecasts with a naïve forecast. Here I shall use the average of the series as a naïve forecast. The forecasting error is measured as the standard deviation between outcomes and forecasts and the forecasting error for the naïve forecast is measured as the standard deviation for the outcomes themselves. The forecasting performance can then be expressed as how much smaller the actual forecasting error is than the forecasting error of the naïve forecast. This measure of the forecasting performance is 1.0 if our forecasts are perfect and 0.0 if our forecasts are no better than the historical average.

Figure 6 shows the forecasting performance for GDP growth and CPI inflation at 1-12 quarters ahead.⁷ As the figure refers to annual percentage changes, the first quarters are mixtures of known outcomes and forecasts. It is only four quarters after the most recent known outcome that we have pure forecasts. The figure shows that the forecasting error with regard to forecasts one year ahead is just over 20 per cent less than the forecasting error for the intended naïve forecast and not at all less two and three years ahead. There is thus some forecasting performance for GDP growth and CPI inflation up to one year ahead, but no forecasting performance in the longer run. At two and three years ahead we had on average made equally good forecasts if we had used the average growth or inflation rate instead of our own forecasts.⁸

Unemployment – better forecasting ability than for GDP and inflation

Unemployment is more sluggish than GDP growth. If unemployment is very high to start with, it is probable that it will also be high in a year's time. This should mean that the forecasting ability for unemployment, and other measures of resource utilisation, are better than for GDP growth and inflation. Our forecasting performance with regard to unemployment is quite rightly slightly better, with a forecasting error one year ahead that is 30-40 per cent lower than the forecasting error for the naïve forecast (see Figure 7).⁹ However, there is still no forecasting ability two and three years ahead.

6 See D. Kjellberg and M. Villani, "The Riksbank's communication of macroeconomic uncertainty", Economic Review, 2010:1, Sveriges Riksbank.

7 The calculations are based on forecasts from 1999 to 2010.

8 Prior to 2007 we first based the forecasts on a constant repo rate and then on estimated market expectations. It is possible that we could have made better forecasts with a different interest rate assumption. To be able to comment more strongly on forecasting ability, one should actually base the calculations on longer periods of time. One should also compare with the historical series available at the time the forecasts were made.

9 The figure is based on the period 2005-2010.

The repo rate – is sometimes outside of the uncertainty bands

The fourth standard figure in our Monetary Policy Reports and Updates refers to the forecast for the repo rate and the uncertainty concerning this (see Figure 8). There is an important difference of principle between the decision on the repo rate up to the next monetary policy meeting and the assessment of the repo rate path after that, that is, the forecast for the repo rate over the coming three years. We are careful to point out that the repo-rate path is “a forecast, not a promise”. The uncertainty bands shown in the figure are based on forecast errors for risk-adjusted market rates from 1999 to 2007 and after that on the Riksbank’s own forecast errors. The uncertainty increases as the forecast horizon lengthens, here, too. The figure shows, for instance, that the repo rate in three years’ time will with a 90per cent probability be between 0 and 7 per cent. And there is a 10per cent probability that it will be outside of this interval!

The fact that the repo rate is sometimes outside of the uncertainty bands is illustrated by the forecast in September 2008 just before the financial crisis hit Europe and Sweden with full force (see Figure 9). The repo rate was cut over the following three quarters to a much lower level than the lower limit for the 90per cent uncertainty band.

Uncertainty in theory

Our forecasting ability is thus very limited one year ahead and almost non-existent two and three years ahead. The best forecast we can then make is normally to assume that inflation will be 2 per cent in two and three years’ time. But that is not much help when shaping monetary policy. At the same time it is reasonable to assume that monetary policy will actually affect inflation two and three years ahead and that we therefore need forecasts as a basis for monetary policy. So what can we do to manage the uncertainty in monetary policy?

In a linear model, where inflation depends on the interest rate and an uncertainty term with a mean value of zero, where the parameters are known and constant, and with a quadratic objective function (loss function), the uncertainty does not matter with regard to which interest rate should be chosen to minimise the loss function.¹⁰ It is enough to take into account the mean value for the forecast: the uncertainty over future shocks does not affect the optimal monetary policy (in technical terms one says that certainty equivalence holds). The uncertainty then does not affect the decision on the repo rate, but it does affect target fulfilment.

However, there are several aspects that mean that one cannot rely on the results obtained in this type of model. The Riksbank reports a main forecast that is not merely a model forecast; it is based on both models and judgement. It is not easy to explicitly report all of the assessments and deliberations behind the overall results. However, it is possible to do this within the framework of a

¹⁰ See, for instance, L.E.O. Svensson, “Inflation targeting”, in B. M. Friedman and M. Woodford, (eds.), *Handbook of Monetary Economics*, vol. 3, pp. 1237-1302, Elsevier, 2010.

■ formalised model like the Riksbank's macro model Ramses.¹¹ But of course, this is not a perfect description of reality. There is uncertainty over both the structure of the model and its parameters. Other models would probably reach other results with regard to the most appropriate monetary policy.

Another question concerns the nature of the forecasts. The forecasts the Riksbank now reports are in principle intended to be unbiased forecasts. But as Goodhart and Rochet pointed out in their evaluation of the Riksbank's work, these assumptions do not hold in reality.¹² In practice, longer-term forecasts are rarely unbiased. They can rather be regarded as possible scenarios contingent on certain external conditions. Normally, there are several possible scenarios and there can be great uncertainty over which scenario monetary policy should be based on.

There is also uncertainty over which target variables should actually be used. I shall return to this question in the next section.

Nine suggestions regarding monetary policy

Although it may be simple in theory to determine how to manage uncertainty in monetary policy, it is not at all simple in practice. So how should the uncertainty surrounding our forecasts affect the monetary policy decisions? How should we deal with the Catch-22 of monetary policy, that monetary policy must be based on forecasts but that our forecasting ability is almost non-existent? This is what this section is about.

Be clear regarding the monetary policy objective

We should be clear about the objective of monetary policy. There should be no uncertainty about what this is. The Riksbank has worded it as keeping inflation measured in terms of the consumer price index (CPI) at 2 per cent a year and the Government and the Riksdag (the Swedish parliament) have expressed support for this. But the CPI is affected by our own decisions on the repo rate in that mortgage rates are included in the CPI. If we raise the repo rate to subdue inflation in the long run, this leads to inflation temporarily increasing instead of falling. We therefore also follow and analyse a large number of other measures of inflation, such as the CPI with a fixed interest rate (CPIF). These are better indicators of the underlying inflationary pressures. Moreover, in the longer run CPI inflation and CPIF inflation coincide.

But it has turned out that uncertainty sometimes arises as to which target variable the Riksbank uses, whether it is the CPI or the CPIF. Sometimes it has been said that target fulfilment would be better if CPIF inflation was closer to 2 per cent during the forecast period, even if this means that CPI inflation is further from 2 per cent. I don't believe this is correct. However, it is natural to highlight the CPIF as a measure of underlying inflation when the forecasts for

¹¹ For a description of the model see L. Christiano, M. Trabandt and K. Walentin, "Introducing financial frictions and unemployment into a small open economy model", Working Paper no. 214, Sveriges Riksbank, 2007.

¹² See C. Goodhart and J.-C. Rochet, "Evaluation of the Riksbank's monetary policy and work with financial stability 2005-2010", Sveriges Riksdag, August 2011, p. 66.

the CPI and the CPIF differ, and this is because of the Riksbank's own monetary policy.¹³

Be clear about resource utilisation

The Riksbank also endeavours to stabilise production and employment around sustainable paths of development. However, neither the Riksbank nor the Government and Riksdag have specified what are considered to be sustainable paths for production and employment. We usually try to ensure that resource utilisation is normal towards the end of the forecast period.

However, it is not entirely clear what we mean by resource utilisation. We use a broad approach to describe resource utilisation and make an overall assessment based on a number of different measures. Some measures are based on GDP, employment, the number of hours worked and unemployment related to a normal or sustainable level. For example, GDP is related to potential GDP and unemployment to a sustainable level. Other measures are based on business tendency surveys and other high-frequency data. But no forecasts are made for these. Uncertainty is not reported for any of these measures in the same way as for GDP growth and inflation, either at the starting point or during the forecast period.

We should be clearer about what we mean by resource utilisation. As things stand now, there is no unanimous agreement among the Executive Board regarding how to define resource utilisation as a target variable. Of course, it is an undesirable situation that something as important as a target variable for monetary policy is not clearly defined. It should not be a question for individual Executive Board members to determine the objective for monetary policy; it should be a question for the Riksbank as an institution, or even for the Government and Parliament.

I believe that we should use the GDP gap as the main measure of resource utilisation. This is despite the well-known difficulties in determining the GDP gap.¹⁴ I believe that one can make a fairly good assessment of the GDP gap by combining a production function approach with business tendency data and other short-term statistics.¹⁵ GDP is a central variable in the forecasting work and the variable that, despite its well-known deficiencies in measuring welfare, is most closely-related to welfare.¹⁶ We should also report fan charts with uncertainty bands for the GDP gap and other measures of resource utilisation, in particular unemployment, to illustrate the uncertainty in these measures, too.

It is important to make good judgements of resource utilisation at the outset and to endeavour to ensure it is neither too high nor too low in the coming

¹³ See the Executive Board's consultation response to the report "Evaluation of the Riksbank's monetary policy and work on financial stability 2005-2010" (2010/11:RFR5), Sveriges Riksbank, 30 November 2011.

¹⁴ See, for example A. Orphanides, "Monetary Policy Lessons from the Crisis", Central Bank of Cyprus, 2010.

¹⁵ See earlier speeches: S. Öberg, "Monetary policy and the elusive resource utilisation", 25 May 2009; S. Öberg, "Potential GDP, resource utilisation and monetary policy", 7 October 2010; and S. Öberg, "GDP growth and resource utilisation", 6 October 2011.

¹⁶ See, for example, the main report and sub-reports from the Commission on the Measurement of Economic Performance and Social Progress headed by Professors Stiglitz, Sen and Fitoussi : "Report by the Commission on the Measurement of Economic Performance and Social Progress", September 2009.

period. This can contribute to stabilising inflation close to the target. Resource utilisation is namely not only a target variable, but also an indicator of future inflation. Figure 10 shows the correlations between some measures of resource utilisation – GDP gap, hours worked gap, labour shortages and the RU indicator¹⁷ – and CPI inflation.¹⁸ The correlation is highest for a lag of 4-6 quarters.

Also take into account credit expansion and asset prices

We should take credit expansion and asset prices into account more when we formulate our monetary policy. And we should develop and formally integrate the forecasts for credit growth and asset prices into the base for the monetary policy decisions, as well as reporting the uncertainty of the forecasts.

Far too many countries have allowed their expansion in credit to be too high for too many years and this has led to very large problems when the bubbles have burst. The low interest rates have been a contributory factor to this trend. There has also been a recent shift in opinions coming out of academic research, from a broad resistance to taking financial stability into account when shaping monetary policy¹⁹ to greater openness to the view that there may be good reasons for doing so.²⁰

Even before the financial crisis hit Europe and Swedish with full force in autumn 2008, there were concerns in the Executive Board that the credit expansion was too rapid and that housing prices were increasing too quickly so that a bubble might build up, and later burst to cause a severe recession. This was not the case in Sweden, but did happen in the United States and several countries in Europe. During the crisis years 2009-2010 the endeavour was instead to use low interest rates and liquidity assistance to the banks to avoid a credit crunch that could intensify the crisis. And we succeeded well in this. During the entire period, the banks' total lending to households and companies in Sweden increased (see Figure 11).

Put greater emphasis on the initial situation and the forecasts for the coming year

We should put greater emphasis on the initial position and the forecasts for the coming year than on the long-term forecasts. At the Riksbank, considerable resources are put into analysing the state of the economy. The statistics received are analysed and commented on regularly. A large number of models have been developed to assess the current situation (what is known as

¹⁷ For a description of the RU indicator, see C. Nyman, "An indicator of resource utilisation", Economic Commentary no. 4, 2010, Sveriges Riksbank.

¹⁸ The figure is based on quarterly data for the period 1997 – 2008 with regard to resource utilisation and a further 12 quarters ahead and back in time with regard to inflation (including the forecast for the fourth quarter of 2011).

¹⁹ See, for example, F. Giavazzi and F. S. Mishkin, "An evaluation of monetary policy in Sweden between 1995 and 2005", Sveriges Riksdag, November 2006.

²⁰ See, for example, the above-referred to Goodhart and Rochet and also M. Woodford, "Inflation Targeting and Financial Stability", speech at the conference "The Future of Central Banking," in Rome, September 2010.

■ nowcasting) and how we should revise our forecasts in the light of new statistics. We should continue with this work.

Personally, I have put a lot of time and energy into analysing the forces behind inflation. This has included analysing various measures of underlying inflation, understanding what affects the difference in inflation in the euro area and in Sweden, keeping up-to-date with what is happening in the wage bargaining rounds in the labour market, understanding how developments in the global economy affect the prices of food, commodities and energy, how inflation expectations develop, the level of resource utilisation when measured in different ways and how the measures of resource utilisation have been affected by the recession following on from the financial crisis.

Focus on the repo rate over the coming six months

Correspondingly, we should concentrate on assessing the repo rate in the coming period, as there is such great uncertainty over the repo rate in the longer run. The Riksbank sets the repo rate. This means that we normally have a fairly good idea of the repo rate level over the coming period, although the situation can sometimes change rapidly and radically as it did in autumn 2008. Market expectations prior to a monetary policy meeting also normally agree with the decision we make regarding the repo rate. Any surprises in the actual decision on the repo rate are normally very minor (see Figure 12).

However, there is great uncertainty over the repo rate in the longer run. This is illustrated by the fan chart showing the repo rate. Whether the repo rate path will agree with the forecast will of course depend on how the economy develops in the future. If inflation and resource utilisation develop in line with the main scenario, the repo rate should follow the repo-rate path outlined in the main scenario (the middle line in the figure). However, the uncertainty regarding the way the economy will develop leads to uncertainty over the future interest rate, too, which is reflected in the fan around the repo-rate path.

My impression is that there is normally very little opportunity to influence market expectations further than six months ahead by publishing a repo-rate path. Goodhart and Rochet also show in their evaluation that it is the Riksbank's repo-rate path that adjusts to market rates rather than vice versa, except in the short term, when the influence is mutual. But they also point out that the data period is so short that it is not possible to draw any far-reaching conclusions.²¹

Check against other monetary policy frameworks

We should check the repo rate produced in our forecasts and models against other monetary policy frameworks. Personally, I usually check to see whether the repo rate level is reasonable by looking at what the Taylor rule would imply. In the original Taylor rule, the policy rate is determined by inflation and the GDP gap.²² According to this rule, the policy rate shall be set equal to the

²¹ Op.cit., p 109.

²² J.B. Taylor, "Discretion versus policy rules in practice", Carnegie-Rochester Conference Series on Public Policy, North-Holland, 1993.

■ long-term level of the policy rate plus 1.5 times the deviation in inflation from target plus 0.5 times the deviation in GDP from potential GDP. The Taylor rule has the advantage that it is based solely on information in the current situation and not on forecasts. Measured inflation is used as an indicator of future inflation, which may be reasonable if there is some sluggishness in the inflation process. It may also be reasonable to include resource utilisation, as this affects future inflation.

The Taylor rule functioned well in connection with the financial crisis 2008-2009. It showed then that we should cut the repo rate at roughly the same speed and by roughly as much as we cut it. If we had instead relied on the Ramses model, we would have cut the repo rate much more slowly. Ramses has an estimated monetary-policy rule that is based on how the Riksbank has reacted earlier, and this has normally involved changing the repo rate in small steps. The starting point for the repo rate therefore has a strong influence as to what level the model will produce for the repo rate in the short term. The model's estimated rule was therefore far too sluggish in the exceptional situation that arose. It can also be mentioned that Norges Bank, because of the uncertainty of the models it uses, also gives some weight to simple monetary-policy rules such as the Taylor rule.²³

See longer-term forecasts than one year as potential scenarios

We should regard the forecasts for longer than one year ahead as potential scenarios rather than unbiased forecasts. It is quite simply impossible to make any reliable forecasts for two and three years ahead. My opinion is that it is normally fairly meaningless to have a firm opinion of what will happen in two and three years' time. But there are exceptions, particularly in situations where resource utilisation is very low. During 2008-2009 we assessed that the repo rate would be at an exceptionally low level for one year and we backed this up by lending around SEK 300 billion to the banks at this low interest rate for one year.

We should continue to report a main scenario for economic developments and the repo rate over the coming three years, a scenario where inflation approaches 2 per cent and resource utilisation approaches a normal level. But we should regard this merely as a potential scenario. It is important that monetary policy follows a predictable pattern. We endeavour to avoid surprising the market. This means that we normally change the repo rate and the repo-rate path in gradual small steps, where the steps are due to new information received since the most recent monetary policy meeting, and that we react in roughly the same way to the same type of changes in the new information. Such stability means that we can avoid causing problems on the financial markets, and that we can have a greater impact on the markets when an unexpected event occurs.

We should also continue to analyse the consequences of various sequences of events. This can be how monetary policy should be adjusted to the rate of the recovery from the financial crisis, how global market prices and exchange rates

²³ See the article "Criteria for an appropriate interest rate path" in Monetary Policy Report 2/2010, Norges Bank.

■ may affect monetary policy, the monetary policy consequences of alternative outcomes in central wage agreements, what will happen if the sovereign debt crisis in Europe worsens, and so on. We should therefore continue to make forecasts and draw up alternative scenarios as a basis for our monetary policy.

Report the uncertainty involved in comparisons of repo-rate paths

We should report the uncertainty involved in the comparisons of forecasts for economic developments with different repo-rate paths that we regularly describe in our Monetary Policy Reports.

Calculations of alternative scenarios are often made using Ramses, for practical reasons. My personal opinion is that the calculated effects of changes in the repo-rate path are unreasonably large. If this is the case, we would need to adjust the repo rate more so that monetary policy is well balanced. However, one can in theory show that the greater the uncertainty prevailing as to the effects of the interest rate on inflation, the less monetary policy should react when inflation deviates from the target.

Within the framework of Ramses it is possible to place in order of preference different monetary-policy alternatives in figures, based on their average squared deviations from the targets for inflation and resource utilisation during the forecast period (see Figure 13).²⁴ These figures, unlike the fan charts shown earlier, do not report the uncertainty. Goodhart and Rochet point out in their evaluation that the construction with mean squared deviations has its limitations, as it focuses on central expected outcomes and thus overestimates the certainty in comparisons of alternative outcomes and that the figures should be accompanied by fan charts that show the probability intervals for both production and inflation.²⁵ I consider it important to calculate and report the uncertainty in the comparisons, if this type of figure is going to be used to a greater extent.

Develop the models so they can process different repo-rate paths

We should develop our models so that they can process different repo-rate paths. One problem with regard to the base for monetary policy decisions is that the Ramses model can only process one repo-rate path. It cannot handle a situation where the Riksbank's repo-rate path differs from the market's repo-rate path. The repo-rate path used in a forecast with the Ramses model also implicitly determines the current longer-term interest rates along the entire yield curve, and these may differ from the interest rates currently observed in the market. This means that problems arise with regard to analysing developments, when the Riksbank's repo-rate path differs from the market's repo-rate path. Further development of the model would improve the base for monetary policy decisions.

²⁴ See the article "Evaluation of different monetary policy alternatives" in Monetary Policy Report, October 2009.

²⁵ Op.cit., p 66.

I think that monetary policy can best be understood in terms of the yield curve. The Riksbank implements its monetary policy by determining the repo rate, the interest rate the banks face when depositing money in accounts with the Riksbank overnight, or when borrowing money overnight. Thus, the Riksbank determines the short end of the yield curve. But the market determines the long end. Everything in between is a combination of the Riksbank's influence and market forces. The long end is affected by many factors, not merely expectations of the repo rate. It may, as recently, be a question of a flight to safety, which has pushed up, for instance, Greek interest rates and pushed down American, German and Swedish interest rates. The Swedish yield curve is currently much lower than is consistent with the Riksbank's repo-rate path (see Figure 14).

Moreover, the banks' lending rates are affected by other factors than the repo rate, which has led to increased spreads between the repo rate and the banks' lending rates. This means that what is known as the transmission mechanism – how the Riksbank's repo rate affects economic developments – has probably changed. But it is difficult to say how it has changed. On the whole, we should develop the financial part of our macroeconomic models to give greater consideration to the financial markets.

Conclusion

When I look back at monetary policy since the current monetary-policy regime, with a floating exchange rate and an inflation target, was introduced at the beginning of 1993, I think that it has on the whole functioned fairly well. One might possibly think that monetary policy was too tight in 1994-1995 when the Riksbank raised the repo rate at the same time as the budget consolidation work was holding back inflation. However, it was important to bring down inflation and inflation expectations to a much lower level than in the 1970s and 1980s. One might also think that the assumption of an unchanged repo rate that was used as a basis for the forecasts during the first years was too simple. On the other hand, one has to see this more as a part of the communication strategy that was being followed then. And it worked. Inflation expectations fell and have been established close to the target.

I also think that monetary policy has worked well during the six years, 2006-2011, that I have been a member of the Riksbank's Executive Board. CPI and CPIF inflation have on average been 1.7 and 1.8 per cent a year respectively. This is somewhat lower than the inflation target. However, given that the world has undergone the deepest recession since the 1930s during this period, it should nevertheless be regarded as a good result. Moreover, the Riksbank contributed to slowing down the fall in production and employment when the financial crisis hit Sweden with full force in autumn 2008. Partly by quickly and forcefully cutting the repo rate, and partly by supplying around SEK 500 billion in liquidity to the banking system.

I have in this speech discussed the uncertainty in monetary policy. As monetary policy acts with a lag, it must be based, at least partly, on forecasts. However, our forecasting ability with regard to GDP growth and inflation is very limited one year ahead and largely non-existent two and three years ahead. This is what I have called the Catch-22 of monetary policy.

■ We should therefore place greater emphasis on analysing the initial situation and making forecasts for the coming year. We should also concentrate on assessing the repo rate over the coming six months, as there is such great uncertainty over the repo rate in the longer run. The level of the repo rate should be checked against other monetary policy frameworks, such as the Taylor rule. And we should be clear about the objective of monetary policy.

We should regard the forecasts for longer than one year ahead as potential scenarios rather than unbiased forecasts. We should continue to report a main scenario for economic developments and the repo rate in the coming three years, in which inflation approaches 2 per cent and resource utilisation approaches a normal level, but we should regard it as such – a potential scenario. We should also continue to analyse the consequences of other sequences of events.

The base for monetary policy has improved gradually since the current monetary policy regime, with a floating exchange rate and inflation target, was introduced. A large number of models have been developed and the forecasts are now based on the Riksbank's repo-rate path that can differ from the market's forward rate curve. However, the base should be developed further. I have taken up some such areas in this speech:

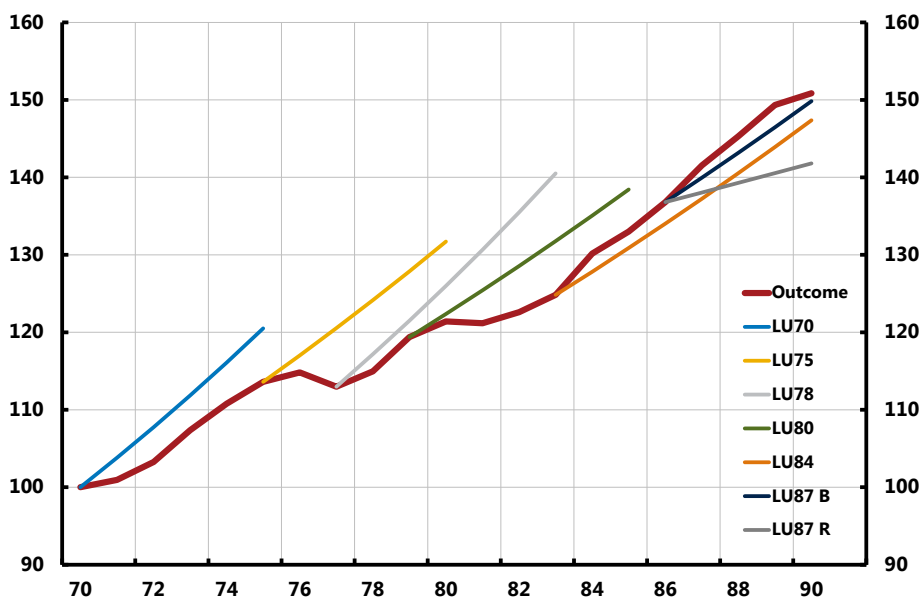
- The forecasts for the GDP gap and other measures of resource utilisation should be developed further and the description of the uncertainty in these forecasts should be shown in the same way as the uncertainty in the GDP growth and inflation forecasts.
- The Riksbank should also take into account credit expansion and asset prices in its monetary policy. The forecasts for credit growth and asset prices should be developed and formally integrated into the materials on which the monetary policy decisions are based. In this case, too, it is important to show the uncertainty in these forecasts.
- The Riksbank's models should be developed to be able to handle the difference between the Riksbank's repo-rate path and the market's forward rate curve. We should also describe the uncertainty in comparisons of different repo-rate paths.

Monetary policy is a more or less continuous process. We normally make decisions on the repo rate and renew our assessment of the repo-rate path every second month. There is always considerable uncertainty over economic developments, particularly in the longer run. But that does not matter so much. We gradually adapt our monetary policy to new information and new forecasts to be able to keep inflation close to the target and resource utilisation at a sustainable level.

Figures

Figure 1. GDP calculations in the Long-Term Surveys

GDP at fixed prices, index 1970=100

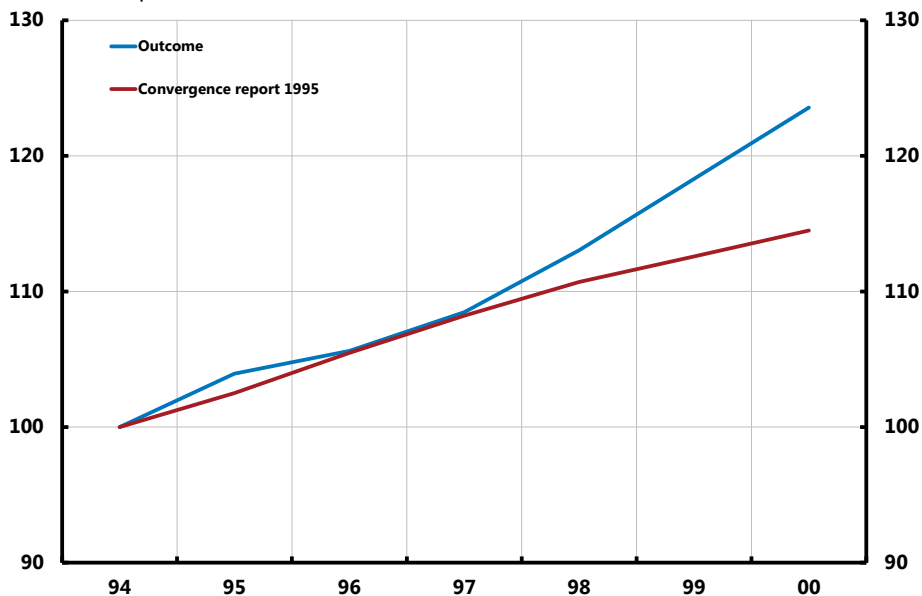


Note. R refers to the reference alternative and B to the balance alternative.

Sources: Ministry of Finance and Statistics Sweden

Figure 2. Forecast for GDP according to the Convergence programme

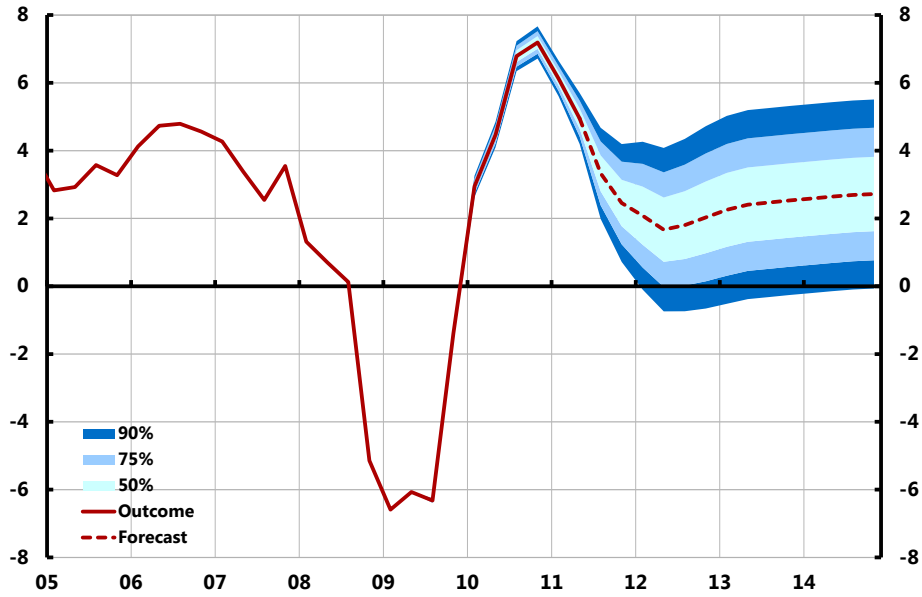
GDP at fixed prices, index 1994=100



Sources: Ministry of Finance and Statistics Sweden

Figure 3. GDP with uncertainty bands

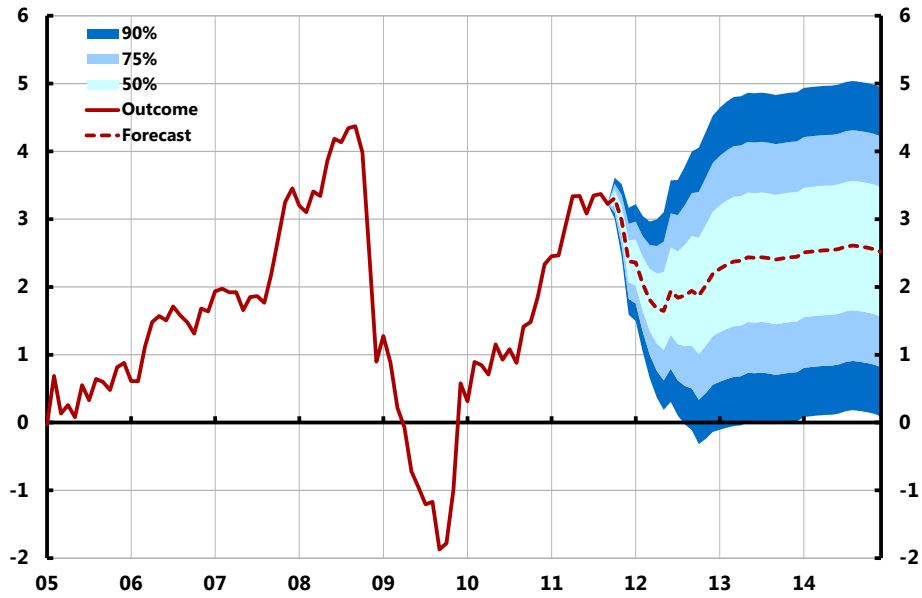
Annual percentage change, seasonally-adjusted data



Sources: Statistics Sweden and the Riksbank

Figure 4. CPI with uncertainty bands

Annual percentage change



Sources: Statistics Sweden and the Riksbank

Figure 5. CPIF with uncertainty bands

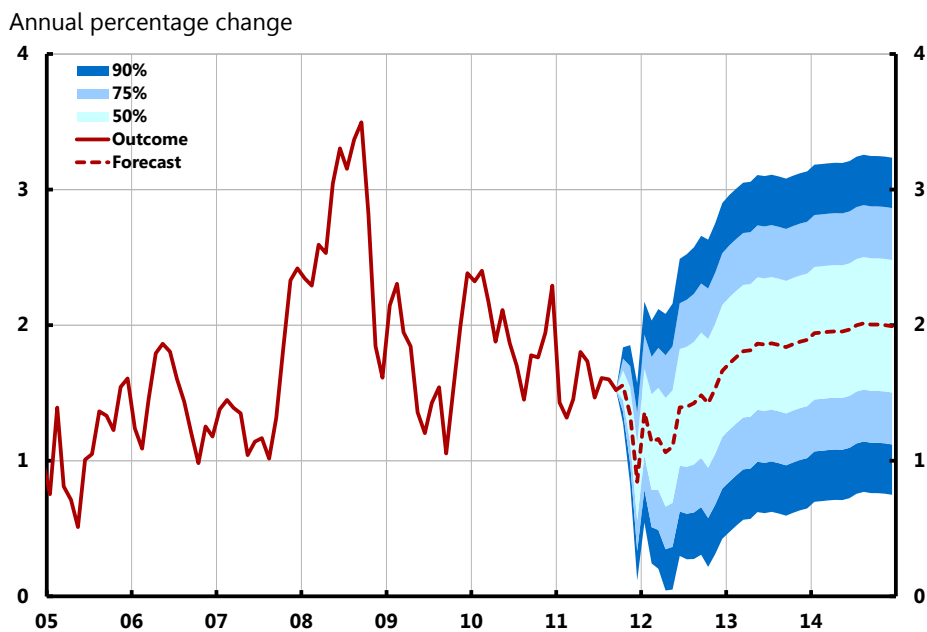
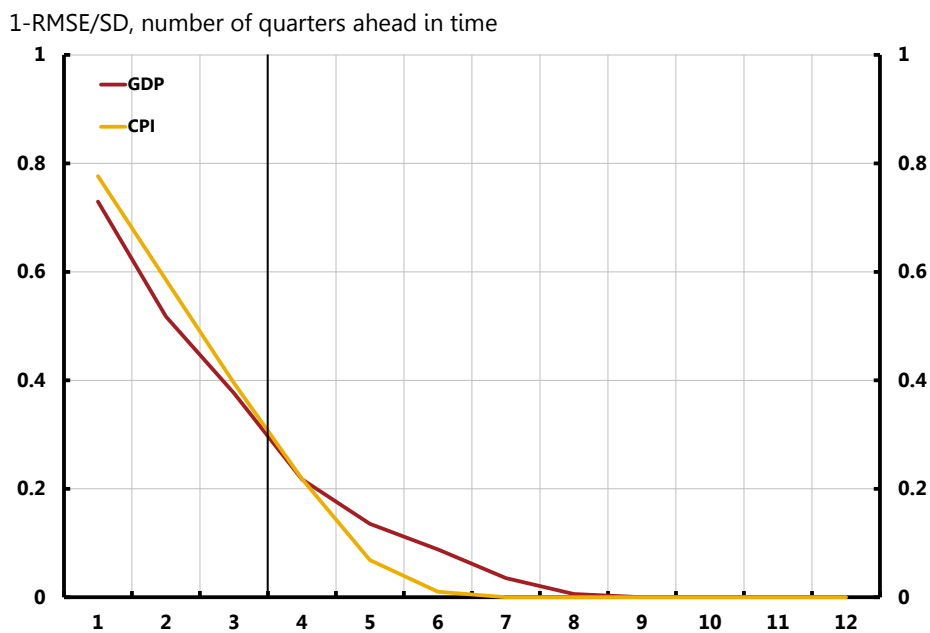


Figure 6. Forecasting performance for GDP and CPI

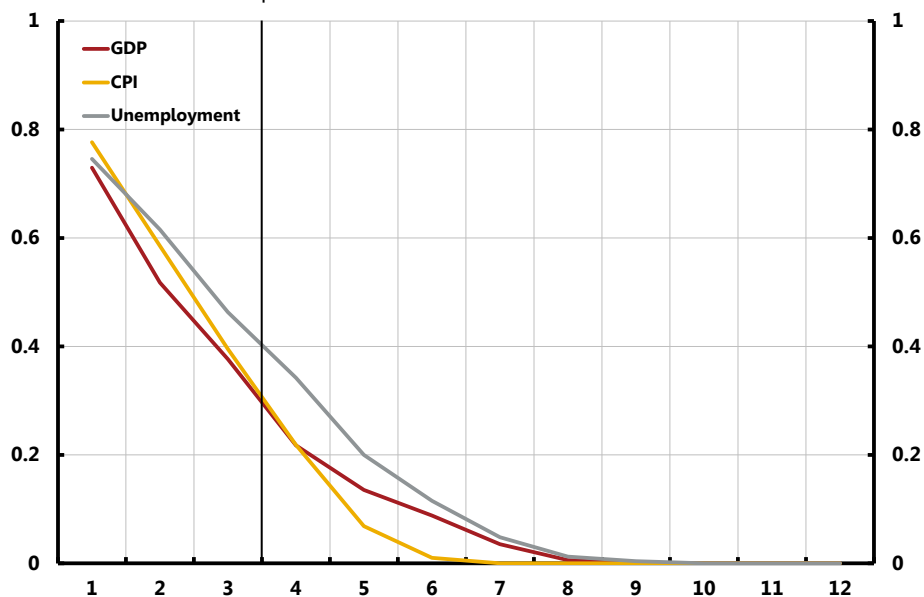


Note. Prior to the vertical line, the forecasts partly contain outcomes.

Sources: The Riksbank and own calculations

Figure 7. Forecasting performance for GDP, CPI and unemployment

1-RMSE/SD, number of quarters ahead in time

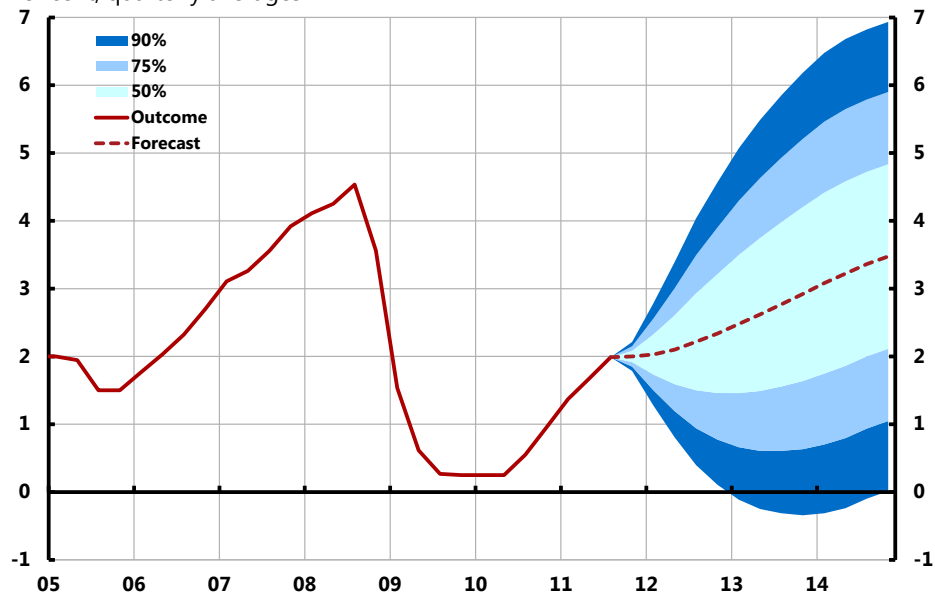


Note. Prior to the vertical line, the forecasts partly contain outcomes.

Sources: The Riksbank and own calculations

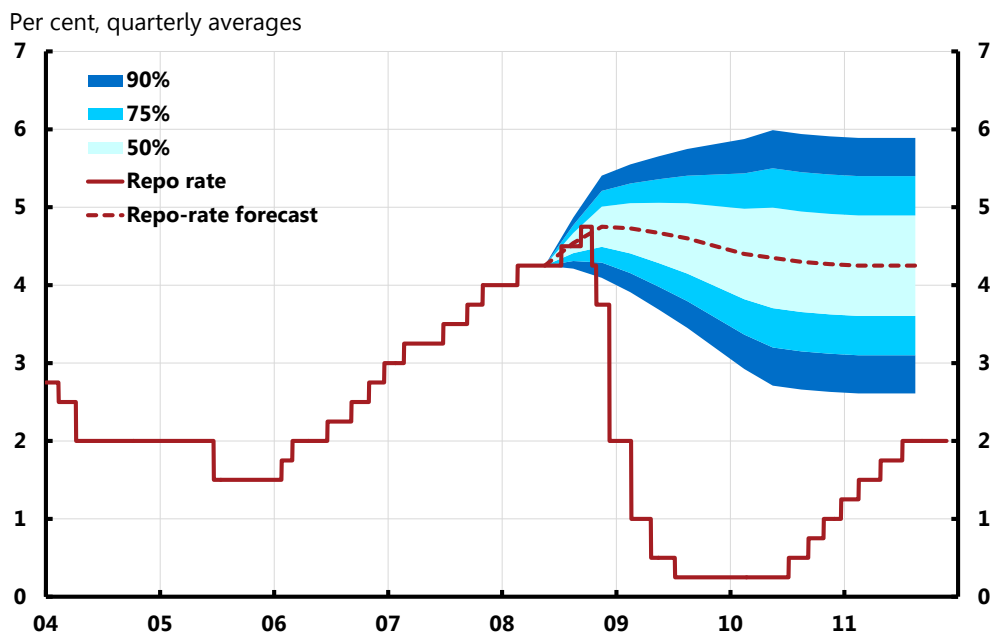
Figure 8. Repo rate with uncertainty bands

Per cent, quarterly averages



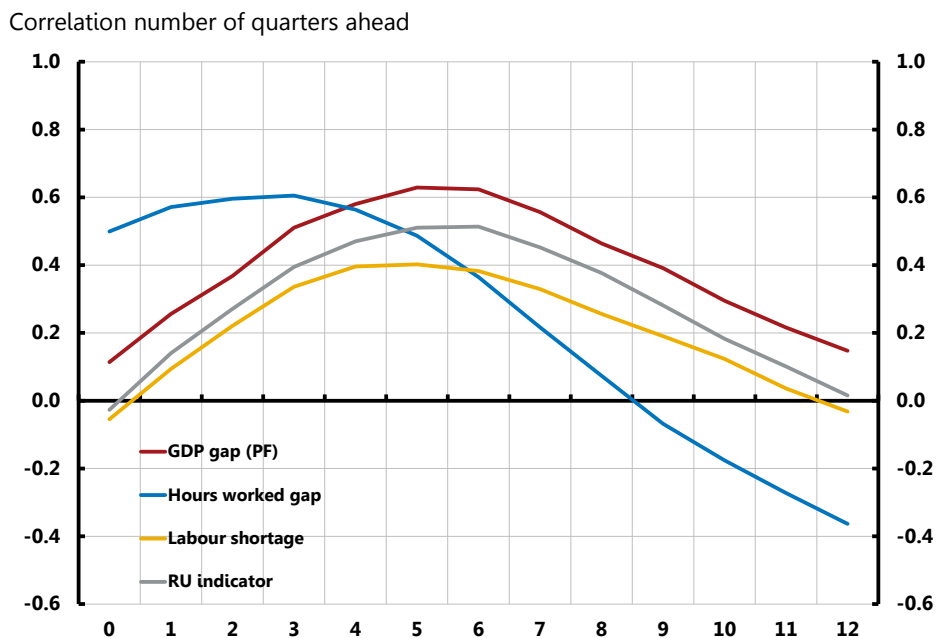
Source: The Riksbank

Figure 9. Repo rate with uncertainty bands



Source: The Riksbank

Figure 10. Correlation between resource utilisation and inflation

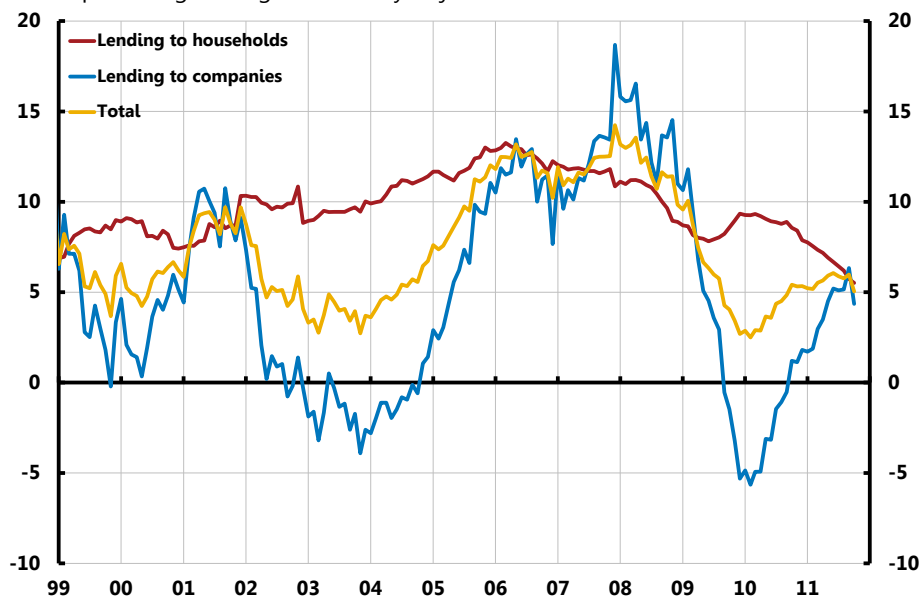


Note. PF stands for production factor approach. Sample period 1997-2008.

Sources: Statistics Sweden and the Riksbank

Figure 11. Lending to households and companies

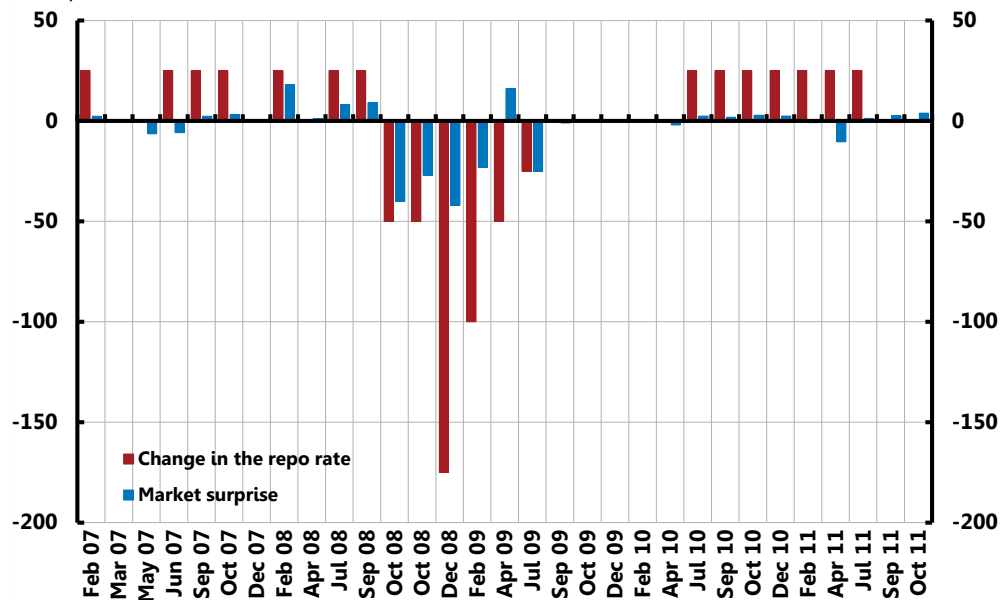
Annual percentage change, seasonally-adjusted



Source: The Riksbank

Figure 12. Market surprise at repo-rate decision

Basis points

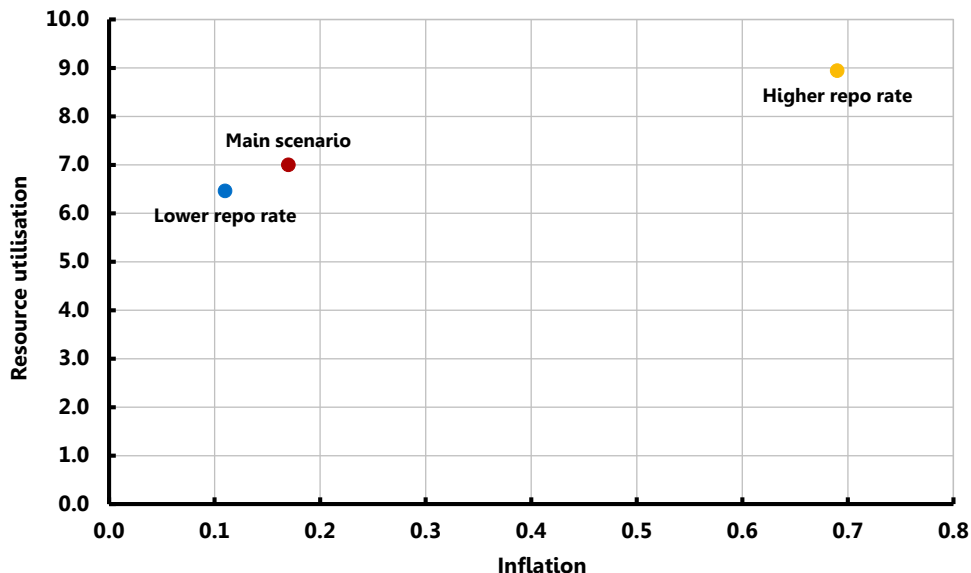


Note. The market surprise is measured on the basis of the change in the interest rate for a 1-month STINA swap in connection with the publication of the repo-rate decision.

Sources: Reuters and the Riksbank

Figure 13. Mean squared gap for inflation and resource utilisation forecasts

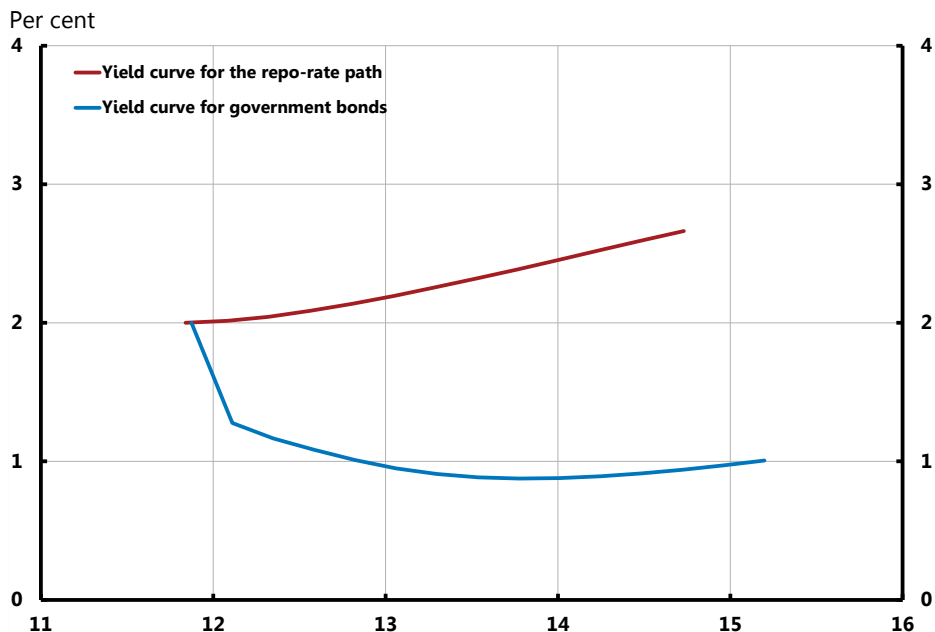
Average values of squared deviations during the forecast period



Note. Resource utilisation is measured as the deviation in GDP from the HP trend and the inflation deviation as the CPIF's deviation from the inflation target.

Source: The Riksbank

Figure 14. Yield curves



Note. The yield curve for the repo-rate path is calculated using the expectations hypothesis and the government bonds curve is a zero coupon curve

Sources: Reuters and the Riksbank