

TIO ÅR MED SJÄLVSTÄNDIG
RIKSBANK



Policy Expectations and Policy Evaluations: The Role of Transparency and Communication

Lars E.O. Svensson

SEPTEMBER 2009

Förväntningar om och utvärderingar av penningpolitiken: Vilken roll har öppenhet och kommunikation?

Lars E.O. Svensson

Sveriges riksbank och Stockholm Universitet

Sammanfattning

I denna uppsats studeras utvecklingen av Riksbankens transparens och kommunikation sedan Riksbanken blev självständig år 1999. En analys av hur Riksbanken har lyckats med att styra marknadens förväntningar om framtida reporäntor sedan banken började publicera egna prognoser för reporäntebanan i februari 2007 genomförs, med fokus på de exceptionellt stora avvikelserna mellan marknadens förväntningar och Riksbankens publicerade räntebana som inträffat sedan april 2009. Bland möjliga förklaringar till dessa avvikelser diskuteras skillnader i synen på den framtida ekonomiska utvecklingen och de utmaningar för kommunikationen som uppstått vid mycket låga räntenivåer och förmodligen överdrivna problem vad gäller reporäntans lägre gräns. Konsekvenserna av de stora avvikelserna i marknadens förväntningar kan bli mycket stora och medföra att penningpolitiken kan bli mycket mer åtstramande än önskvärt. Vidare undersöks huruvida Riksbankens transparens och kommunikation är tillräckliga för att kunna utvärdera penningpolitiken och utkräva ansvar på ett effektivt sätt. Det visas att det finns verktyg för att en effektiv löpande utvärdering av Riksbankens penningpolitik i realtid. Slutligen föreslås vissa möjliga förbättringar av Riksbankens transparens och kommunikation.

Policy Expectations and Policy Evaluations: The Role of Transparency and Communication*

Lars E.O. Svensson

Sveriges Riksbank and Stockholm University

First version: July 2009
This version: September 2009

Abstract

The development of the Riksbank's transparency and communication since its independence in 1999 is reviewed. The Riksbank's record on the management of market expectations of future policy rates after the publication of policy-rate paths in February 2007 is examined, with a focus on the exceptional deviations of market expectations from published policy-rate paths since April 2009. The possible explanations discussed include differing views of future economic developments, communication challenges associated with very low interest rates and perhaps exaggerated lower-bound problems. The consequences of such large deviations of market expectations may be severe and potentially imply a much more restrictive monetary policy than intended. Whether the Riksbank's transparency and communication are sufficient for effective accountability and evaluation is assessed, and it is shown that tools are available for the effective real-time evaluation of the Riksbank's policy. Some conclusions and suggestions for possible improvements in the Riksbank's transparency and communication are offered.

JEL Classification: E52, E58

Keywords: Management of expectations, forecast targeting, flexible inflation targeting

* This paper has been prepared for the conference *Ten Years with an Independent Riksbank*, to be held in Stockholm on September 11, 2009. I am grateful to Malin Adolfson, Meredith Beechey, Claes Berg, Hans Dillén, Karolina Ekholm, Heidi Elmér, Neil Howe, Eric Leeper, Pernilla Meyersson, Irma Rosenberg, Anders Vredin, Barbro Wickman-Parak and, especially, Hanna Armelius for help with this paper. The views presented here are my own and not necessarily those of other members of the Riksbank's executive board or staff.

1. Introduction

The arguments in favor of transparency in monetary policy are strong and well known. Transparency will improve private-sector information, reduce uncertainty about central-bank information and policy intentions, and therefore contribute to better decisions by economic agents. Transparency permits a more effective external scrutiny and evaluation of monetary policy and thereby improves the incentive of central banks to achieve their targets. It may also improve the implementation of monetary policy by allowing central banks to affect private-sector expectations more effectively, especially about future policy rates. Transparency also strengthens the democratic accountability of independent central banks.

The Riksbank is ranked as one of the world's most transparent central banks (Dincer and Eichengreen 2007, Eijffinger and Geraats 2006).¹ The Riksbank is not only very transparent; it is also very transparent about its transparency and communication. After much internal work, the Riksbank's Executive Board adopted a revised communication policy for all the Riksbank's activities in May 2008 (Sveriges Riksbank 2008a). In particular, a new communication of monetary policy was introduced and is described in a separate appendix (Sveriges Riksbank 2008b). A separate document presents the Riksbank's detailed rules for communication (Sveriges Riksbank 2008c). These documents are all available on the Riksbank's website, www.riksbank.com. The Riksbank also publishes a separate document each year to assist the Parliament's Finance Committee in its assessment of monetary policy (Sveriges Riksbank 2009).² Appendix 1 lists the main events in the evolution of the Riksbank's transparency and communication.

The paper is outlined as follows. In section 2, I will very briefly describe how the Riksbank's transparency and communication have evolved since the Riksbank became independent in 1999.³ In section 3, I will examine to what extent the Riksbank has succeeded in managing expectations of future policy rates after it started publishing its own repo-rate path in February 2007. Since April 2009, there has been a large and unprecedented difference between market expectations of future repo rates and the published repo-rate path, and the Riksbank has hence faced substantial problems in managing such expectations and maintaining the credibility of the repo-rate path. Therefore, most of the discussion will focus on this very recent period. Then, in section 4, I will discuss to what extent the Riksbank's transparency and communication permit the effective accountability and evaluation of its monetary policy, with examples from a few of the recent policy decisions. In section 5, I will also use tools developed for evaluation purposes to discuss the possible consequences of a lack of credibility of the repo-rate path and thereby how important it is for a central bank to

¹ Geraats (2008) provides a survey of transparency trends in central banking. Blinder, Ehrmann, Fratzscher, De Haan, and Jansen (2008) provide a survey of theory of and evidence on central-banking communication and monetary policy.

² Previously, this material was included in one issue of the *Monetary Policy Report*.

³ Apel and Vredin (2007) provide a thorough account of the development of the Riksbank's transparency and communication up to the early spring of 2007.

achieve credibility for its policy-rate path. Finally, in section 6, I will end with some conclusions and suggestions for possible improvements in the Riksbank's transparency and communication. Appendix 1 lists the main events in the evolution of the Riksbank's transparency and communication.

2. How have the Riksbank's transparency and communication evolved?

In January 1999, changes in the Constitution and a new Riksbank Act made the Riksbank more independent. Since then, monetary policy decisions have been made by an Executive Board with six members. Minutes from the Board's monetary policy meetings were published from the start. In February 1999, the new Executive Board issued a "clarification" which noted that the inflation-targeting monetary policy that the Riksbank conducted before 1999 would continue and explained that monetary policy did not aim exclusively at achieving the inflation target but also took the real economy into account in the sense of avoiding excessive variability in the real economy. The Riksbank had announced an inflation target of 2 percent in January 1993, to be applied from January 1995, and had published an *Inflation Report* since October 1993 (initially it was called *Inflation and Inflation Expectations in Sweden* and was a publication of the Riksbank's Economics Department only). The *Inflation Report* gradually became more elaborate and informative with forecasts of inflation and the real economy. These forecasts were conditional on a constant policy rate.⁴

The Riksbank had developed a simple policy rule with a strong emphasis on the inflation forecast at a two-year horizon, conditional on the policy rate remaining constant within the forecast horizon. According to this rule, if the two-year inflation forecast was above the inflation target of two percent the policy rate was raised, and if it was below the target the policy rate was lowered. The clarification of February 1999 and later pronouncements emphasized that the horizon was not necessarily fixed at two years but could be adjusted depending on the real economy, in particular in order to avoid too much variability in output and employment.

The assumption of a constant policy rate was associated with numerous problems. It was often very unrealistic, led to inconsistent forecasts and made forecast evaluations difficult (see, for instance, Woodford 2007a).⁵ Therefore, from 2005, forecasts were instead conditional on a policy-rate path given by market expectations of future policy rates. Although this assumption was more realistic, it was not without problems. The Riksbank and the market did not necessarily share the same view of the future policy rate, especially when inflation forecasts conditional on market expectations of the policy rate deviated from the inflation target. In February 2007, following the previous practice of the Reserve Bank of New Zealand since 1997 and Norges Bank since 2005, the Riksbank started publishing its

⁴ Apel and Vredin (2007) provide a description of the Riksbank's inflation-targeting policy before 1999.

⁵ Jansson and Vredin (2004) provide a discussion of decision-making at the Riksbank and related problems before the introduction of the Riksbank's own repo-rate path.

own forecast for the policy rate and consequently made a conscious decision about what future policy rates were appropriate. The forecast horizon for published forecasts was also extended from two to three years (Rosenberg, 2007). The *Inflation Report* was renamed *Monetary Policy Report* and the new report included a more extensive monetary policy discussion and not just forecasts conditional on market expectations of future policy rates.⁶

Some central-bank observers remain sceptical about the value of publishing policy-rate forecasts, for instance, on the grounds that there is considerable uncertainty about future policy rates and that forecast errors will be large. However, because of the lags in the response of inflation and the real economy to policy-rate changes, good monetary policy requires that central banks base their policy decisions on forecasts. Furthermore, in order to make forecasts of inflation and the real economy, central banks need to condition forecasts on some interest-rate path. The whole policy-rate path matters, the policy rate for the first few months matters very little for the forecasts of inflation and the real economy. For a central bank, not to discuss and select a particular policy-rate path would entail an incomplete decision-making process. Not to publish the policy-rate path would be to hide the most important information.

In May 2007, the Riksbank announced that press conferences will be held after each monetary-policy meeting, that normally no information about the repo-rate decision (signaling) will be conveyed before monetary-policy meetings and that the minutes of the monetary policy meetings, which are published about two weeks after the meetings, will be attributed. In May 2008, the Riksbank announced an updated explicit communication policy for all Riksbank activities, including monetary policy. Before monetary-policy meetings, some public comments on data and outcomes relative to previous Riksbank forecasts and on policy trade-offs may be given, but Board members agreed to give no indication of the coming repo-rate decision since this would in effect bring the policy decision forward and arguably make it harder to hold the board accountable for its decisions. (The signaling practice is further discussed below.)

In April 2009, the Riksbank decided to publish how individual members had voted at the same time as the monetary-policy decision is announced. This makes it immediately apparent whether the decision was unanimous or whether there were any reservations. Furthermore, any reservations are published with names and brief explanations.

⁶ It may still be of interest to compute forecasts conditional on market expectations of future policy rates, in order to examine the possible consequences of a lack of credibility of the published policy-rate path, as we shall see in section 5.

3. How has the Riksbank succeeded in the management of policy-rate expectations?

A major ingredient in transparency about monetary policy is the publishing of a policy-rate path. The Reserve Bank of New Zealand started doing this in 1997. Norges Bank followed in 2005, the Riksbank in February 2007, the Sedlabanki Islands in March 2007 and the Czech National Bank in 2008. Monetary policy works through the expectations about future policy rates that it gives rise to and monetary policy is largely the management of expectations (Woodford 2005). Therefore, it would seem that publishing a policy-rate path is the best way to manage interest-rate expectations, especially since central banks should have better information about their own intentions than anyone else. Given this, it remains a bit of a mystery why still so few central banks choose to publish a policy-rate path.

The Riksbank publishes and explains a forecast of the repo rate, inflation and the real economy after each policy meeting. What is the Riksbank's record on managing interest-rate expectations? The period from February 2007 until now is too short for any substantive empirical analysis. A simple way to examine the management of policy-rate expectations is to compare the published policy-rate path to market expectations immediately before and after the announcement.⁷ I made such a preliminary comparison in Svensson (2009c). The conclusion through 2008 is that the management of policy-rate expectations has been pretty good, but not a complete success. In many cases, expectations were already prior to publication in line with the repo rate path, which is a tribute to the market's ability to predict and understand monetary policy and to the Riksbank's ability to conduct a predictable policy. When there were some discrepancies, in most cases the market adjusted its expectations towards the policy-rate path after the announcement. There are a couple of exceptions, discussed in Svensson (2009c). The conclusion in that study is that, overall, the policy-rate path seems to be taken more seriously over time by the market and the credibility of the policy-rate path in the sense of proximity between the path and market expectations has mostly been good.

Signal or not?

One of the exceptions is February 2008. Then the Riksbank kept its repo-rate path unchanged and increased the repo rate in accordance with the path. The market had expected a constant repo rate and a shift down of the repo- rate path and was much surprised (see Svensson 2009c for a more detailed discussion). Particularly after the February 2008 surprise, the market was quite insistent about receiving more information about future decisions. In previous years, the market had become used to receiving some hints about the forthcoming decision and the

⁷ Market expectations are implied forward-rate curves that have been adjusted by the Riksbank staff for possible risk premia so as to be the staff's best estimate of market expectations of future repo rates. Depending on the maturity, the forward-rate curve is derived from the rates for STINA (Tomorrow-Next Stibor interest-rate swaps) contracts, FRAs (Forward Rate Agreements), or interest-rate swaps.

Riksbank had developed a practice of signaling the forthcoming decision. There are at least two problems with such signaling. First, it would require a decision by the Executive Board on what to signal. This would in practice move the policy decision to a point in time earlier than the final policy meeting. Alternatively, individual board members could signal for themselves, but this could turn into a cacophony before each meeting. Second, it would not necessarily reduce the element of surprise but rather move the surprise to an earlier date. Evaluating the predictability of monetary policy in terms of the degree of surprise at the official policy announcement would then be misleading, and the “true” predictability might not have improved. This does not exclude that there are some special situations when temporary signaling might be warranted, for instance, if market expectations of the future repo rate differ significantly from the Riksbank’s published repo rate, a situation that I will discuss further below.

During 2007, the Riksbank instituted changes in its Rules of Procedure and Instructions that, among other things, reinforce the principle that all Board members should have an equal influence not only on the monetary-policy decisions but also equal influence on and information about the whole decision-making process, thus strengthening the individualistic character of the Board and the individual accountability of its members. Since the majority decision is not made until the final policy meeting, any signaling by a member might pre-commit him or her and distort the final decision, and since the published repo-rate path should provide a fair amount of forward-looking information, the Riksbank decided in May 2007 not to signal future decisions between policy meetings unless there are exceptional changes in the economic situation. However, in order to accommodate the persistent demands from the market and other interested parties, in the new communication policy of May 2008 Board members agreed that they may comment on new developments in relation to previous Riksbank forecasts and the relevant tradeoffs, still without anticipating the member’s or Board’s position on upcoming decisions unless there are exceptional circumstances.

The credibility problem from April 2009

Whereas my conclusion from Svensson (2009c) was that the Riksbank’s management of policy-rate expectations had been pretty successful through December 2008, the experience so far during 2009 is different and quite interesting. Since April 2009, there has been a dramatic and unprecedented decrease in the credibility of the published repo-rate path, which in effect makes actual monetary policy tighter than intended, perhaps much tighter. Figure 1 shows the situation in February 2009. The solid step-shaped black line shows the actual repo rate. The gray dotted curve shows the previous repo-rate path, from the announcement on December 4, 2008. The black dotted curve shows the new repo-rate path published on February 11, 2009. The repo rate was lowered from 2 percent to 1 percent, and the path was shifted down by slightly more than 100 basis points. The yellow (gray on a black-and-white printer) solid curve shows market expectations of the repo-rate path at the end of the day before the announcement. Even though this was a big shift in the repo-rate path, it was anticipated pretty well by the market. The ability of the market to predict and understand monetary policy and the Riksbank’s ability to conduct a predictable policy both seemed good.

The red (black on a black-and-white printer) solid curve shows the market expectations after the announcement. The alignment between market expectations and the published path is pretty good, at least for the first two years. We can say that the repo-rate path published in February had good credibility.

Figure 1. Repo-rate path and market expectations: February 11, 2009

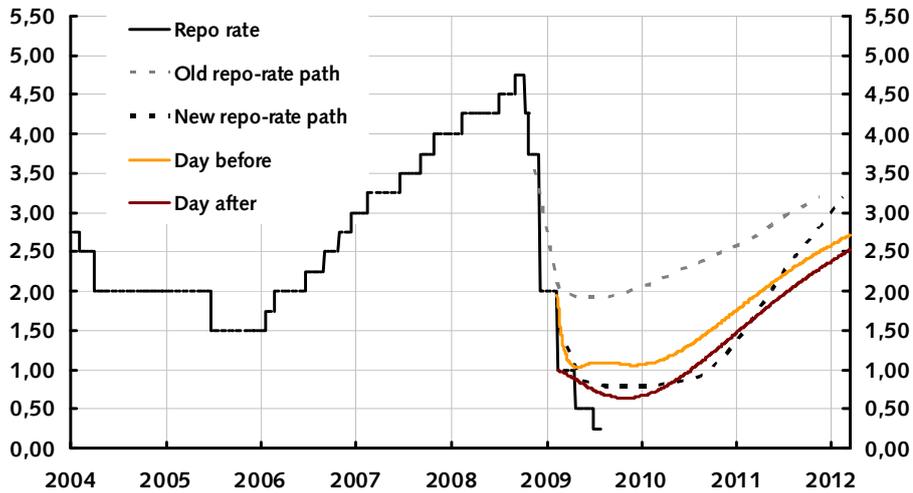


Figure 2. Repo-rate path and market expectations: April 21, 2009

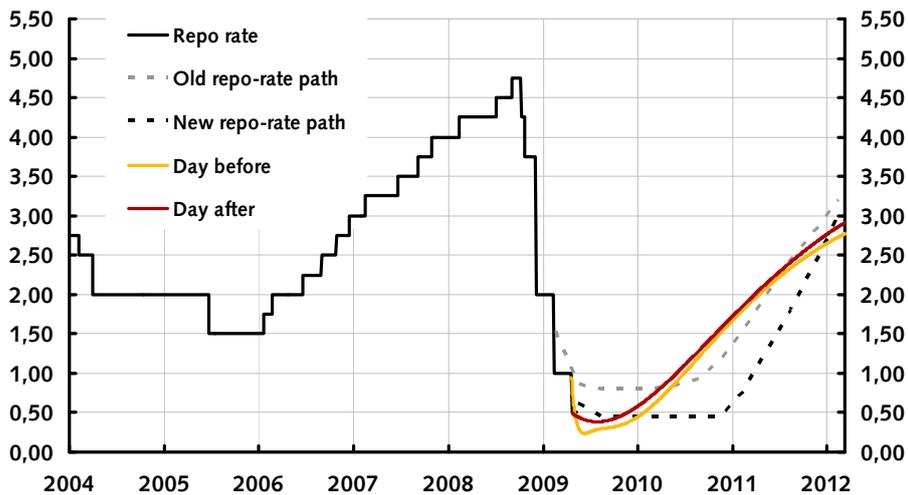


Figure 2 shows the situation when the new repo-rate path was published on April 21, 2009. The repo rate was lowered by 50 basis points to a new level of 50 basis points. The repo-rate

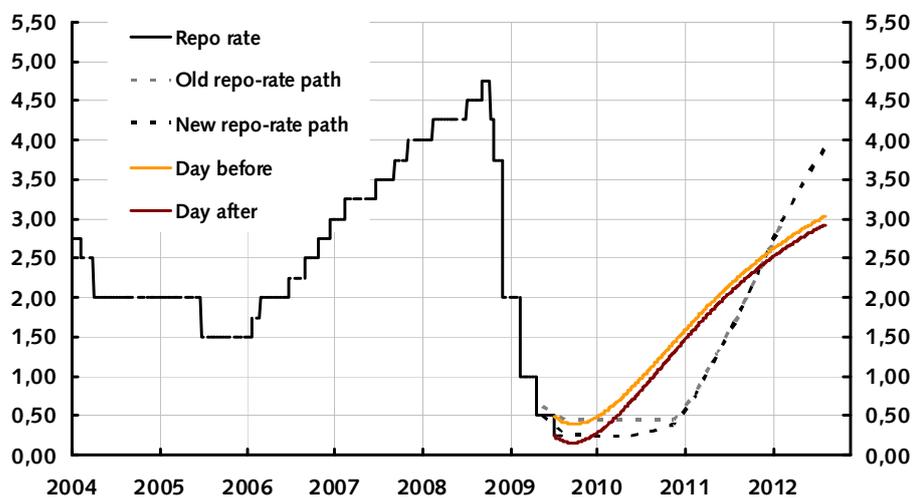
path was shifted down by about 50 basis points and remained flat at 50 basis points through 2010. The yellow (gray) curve shows that the market expected the repo rate to be lowered to 25 basis point and that expectations after the announcement shifted up a bit. Importantly, both before and after the announcement, the market expected a substantially higher repo rate during 2010 than the announced repo-rate path.

Hence, April 2009 represents a major exception to the Riksbank's previous mostly successful management of expectations. Since then, the market has⁸ expected a repo-rate path that after a few quarters is significantly above the published repo-rate path. This is the way expectations have been since the first day following publication in April. The credibility of the repo-rate path published in April has therefore been low and the Riksbank has failed to bring repo-rate expectations into line with the repo-rate path.

Figure 3 shows the situation in July 2009. The market expected the repo rate to remain at 50 basis points and was surprised that the repo rate was lowered to 25 basis points. The repo-rate path was shifted down by about 25 basis points. After the announcement, market expectations shifted down and agreed with the announced path through 2009 but, as after April, the market expected repo rates in 2010 to be much above the published path.

Figure 4 shows the situation in September 2009. The repo rate and repo-rate path were left unchanged from July. Market expectations of future repo rates remained higher than the published repo-rate path.

Figure 3. Repo-rate path and market expectations: July 2, 2009



⁸ Interestingly, there seems to be a discrepancy between the market expectations extracted from market prices and the predictions made by market analysts. The latter are closer to the Riksbank's repo-rate path.

Figure 4. Repo-rate path and market expectations: September 3,

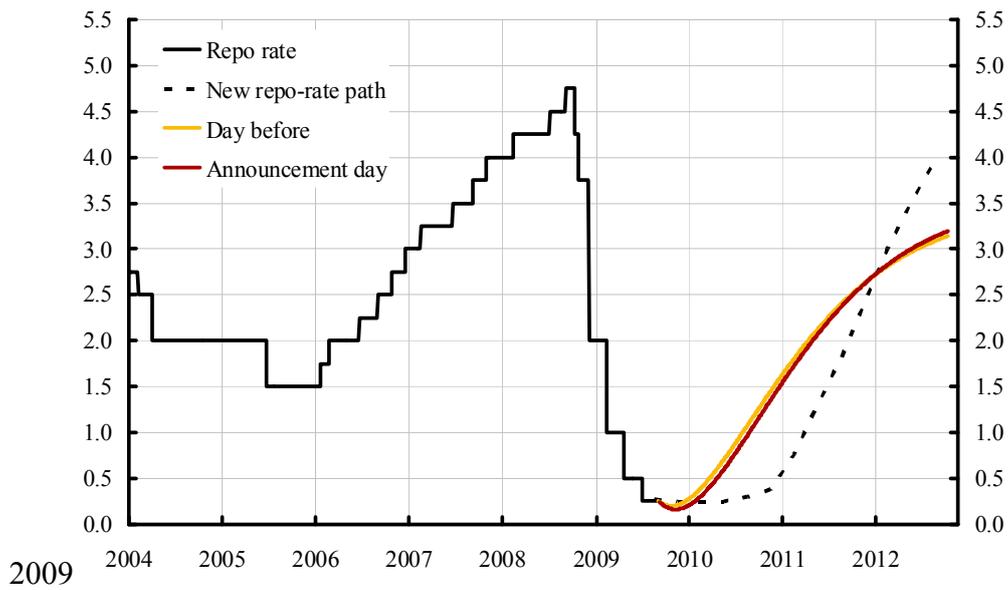


Figure 5. Differences between market expectations and the repo-rate path, February 2007 through July 2009
Per cent

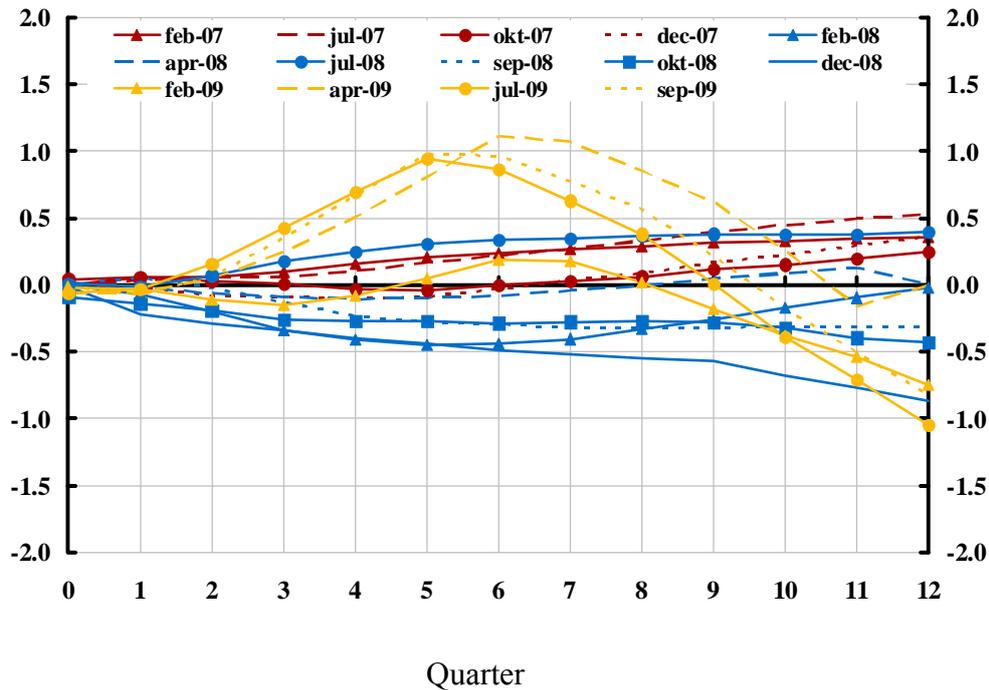


Figure 5 shows the difference between market expectations and the published repo-rate paths after the announcements of the policy decisions from February 2007 through September 2009, as a function of the number of quarters after the quarter of the policy decision. We see that April, July, and September 2009 stand out with exceptionally large positive differences 3-9 quarters ahead.

Why the lack of credibility of the April and later repo-rate paths?

What explains the lack of credibility since April, when the credibility of the repo-rate path at previous announcements, and in particular in February the same year, was much better? Why are repo-rate expectations for 2011 much higher than the published repo-rate paths in April, July, and September?

A more optimistic view of the economy by the market?

One possibility is that the market had a more optimistic view of the economy than the Riksbank in April and onwards. The market might have expected higher GDP growth and higher inflation, which might warrant a higher repo rate. However, the GDP and inflation forecasts of other forecasters and in the Consensus forecast in April and thereafter were not systematically higher than the Riksbank forecasts. One would then have to argue that the GDP and inflation forecasts of market participants were significantly higher in April and later than those of other forecasters. I am not aware of any evidence of this. One would also have to argue that such differences arose between February and April. In the absence of more specific information about the GDP and inflation forecasts of market participants as distinct from those of other forecasters, I believe the discrepancy between market repo-rate expectations and the published repo-rate path in April and later is unlikely to be due mainly to a more optimistic view of the economy.

Communication problems associated with very low repo rates and the effective lower bound for the policy rate?

Another possibility is that very low policy rates and the discussion about the effective zero lower bound for the policy rate posed exceptional communication challenges in April, July and September for the Riksbank.⁹ Since the February 2009 *Monetary Policy Report*, the forecasts that the Riksbank publishes are all supposed to be *mean* forecasts, including the repo-rate path. The Riksbank has frequently repeated the mantra that “the repo-rate path is a [mean] forecast, not a[n unconditional] promise” (my clarifying insertions) and emphasized that the future repo rate may therefore be above as well as below the repo-rate path, with the probability mean equal to the repo rate path.

However, the *Monetary Policy Update* and the minutes from April may have been interpreted to mean that the Riksbank was unlikely to lower the repo rate below 50 basis points.

Although the *Update* stated that there was “some probability of a further cut in the future”, it also emphasized that “[t]he repo rate is now close to its lower limit” and “[w]ith a repo rate at this level, the traditional monetary policy has largely reached its lower limit”. After the repo rate was lowered to 25 basis points in July, the *Monetary Policy Report* stated that “[t]he Riksbank’s assessment is that after cutting the repo rate to 0.25 per cent it will have reached its lower limit in practice”, indicating that a further cut was very unlikely.

⁹ See Söderström and Westermarck (2009) and Svensson (2003) for discussions of monetary policy with zero interest rates and references to the literature on the topic.

It is possible that the market effectively interpreted these statements to some extent in April, and more definitely in July, as an unconditional promise by the Riksbank not to cut the repo rate further, counter to the principle of the repo rate being “a forecast, not a promise”. If the current repo rate is perceived as a minimum, uncertainty about the future repo rate implies that the probability mean of the future repo rate is above the current repo rate. In such circumstances, it is not surprising if the market expects future repo rates to be above the published repo-rate path, and the Riksbank hence fails to gain credibility for the repo-rate path.

Arguably, by allowing the current repo rate to be interpreted as a minimum, the Riksbank’s *Update* and *Report* of April and July risked becoming contradictory. The forecasts of inflation and resource utilization were supposed to be contingent on the repo-rate path being a mean forecast, but if the current repo rate was effectively a minimum the true mean repo-rate path would be higher. If the forecasts of inflation and resource utilization were contingent on the higher true mean repo-rate path, they would then be lower than the published ones.¹⁰

Although unclear communication about means and lower bounds for the repo rate may explain some of the deviations of market expectations from the published repo-rate path in April and onwards, they can hardly explain all of the large deviations on those occasions.

One possibility that probably cannot be excluded is that market expectations make little sense. If this is the case, it is arguably even more important that the central bank is able to affect market expectations, if the difference between market expectations and the published repo-rate path matters.

Does the difference between market expectations and the repo-rate path matter?

If there is a difference between the repo-rate path that the Riksbank publishes and the path that the market expects, it is the expected path that counts. It is the expected repo-rate path that affects what the actual market rates at different maturities will be and that thus affects the real economy. All else being equal, an expected path that is higher than the published path means that the actual and effective monetary policy will be tighter than the published and intended one. All else being equal, the actual real interest rates will then be higher than the real interest rates published in the April and July *Update* and *Report*. A true forecast for inflation and resource utilization that takes account of this discrepancy will thus be lower than that in the April and July *Report* and *Update*. I will return to the issue of how serious a problem this is in section 5, after having developed some useful tools in section 4.

What can be done to improve the credibility of a low repo-rate path?

In the case of April, July, and September the credibility problem is that repo-rate expectations are too high, and improving credibility means moving repo-rate expectations down towards the repo-rate path. What can be done to improve the credibility of a low repo-rate path?

¹⁰ These issues were debated by the Board in the July minutes, available at www.riksbank.se.

Lending at longer maturities at a fixed rate?

Lending by the central bank at longer maturities at a fixed rate equal to the policy rate may reduce interbank rates of corresponding maturities and also indicate that the central bank takes the repo-rate path as a mean forecast seriously (under which assumption the expected cost for the central bank of this operation would be zero), which may shift repo-rate expectations towards the repo-rate path. In July, the Riksbank did provide 12-month loans at a fixed rate plus a term premium of 15 basis points. The effect on the interbank rate and repo-rate expectations may have been reduced by the fact that the volume was limited and that bids exceeded the volume. A new fixed-rate loan was announced in September.

Play down the effective lower bound? Is it actually soft and negative?

One possibility is that the effective lower bound and any associated problems for financial markets in handling negative interest rates have been overemphasized and could be played down. Perhaps the Riksbank could have acknowledged that the lower bound for the repo rate is soft, not hard, and may even be negative. Something of a zero interest-rate mystique seems to have arisen and exaggerated any problems with a zero rate for the financial markets.

It is possible to argue that the zero interest rate bound does not actually apply to financial markets; that they can handle substantial negative interest rates if necessary. It is the relative prices between financial assets that matter or, equivalently, the relative rates of return. Interest rates are only one way of expressing relative prices; the price today of kronor tomorrow. Take an example of a zero-coupon bond such as a 12-month Treasury bill of a nominal face value of 100 thousand kronor. There is no fundamental difference in the ability of financial markets to trade this asset whether its price is 99, 100 or 101 thousand kronor because securities are typically traded in price terms. If the bond has a price today of 99 thousand kronor, the nominal yield on the bond is 1 percent. If its price today is 101 thousand kronor, the nominal yield is -1 percent. In other words, there is nothing strange about negative nominal yields and interest rates.¹¹ Furthermore, it may be possible for commercial banks to introduce new charges on transactions accounts to make effective interest rates on deposits negative, thereby maintaining their margins.

It seems that the only reason why a zero interest rate has attracted so much attention is that there is cash in the form of banknotes. Banknotes yield zero interest. If households, firms and investors think that the rate of interest on their accounts is too low they can withdraw cash from these accounts and instead keep large amounts of banknotes in their safes, suitcases and mattresses. However, taking the handling costs into account, including crime-prevention measures, storage costs and so on, banknotes provide an actual yield that corresponds to a negative interest rate. The effective lower limit for the policy rate is thus not dependent on the financial markets but is determined by the interest rates at which households, firms and

¹¹ Moreover, it is mainly real interest rates and not nominal interest rates that are important when making economic decisions (although nominal interest payments do matter for liquidity-constrained households and firms). With an expected inflation rate of 2 percent, the real price of 100 thousand real kronor in the example above will be 101, 102 and 103 thousand kronor. That is, the real interest rate will be -1, -2 or -3 percent, respectively.

investors would begin to hoard large volumes of cash in the form of banknotes. Interest rates will probably have to become negative before this happens, but it is difficult to know precisely where the lower limit is. It is possible to draw the conclusion that a policy rate of zero percent would not entail any significant problems (or any problems at all) for banks and financial markets, especially in the light of the experience in Japan, where the policy rate has been 0 and is at the time of writing (September 2009) 10 basis points, in Switzerland, where the Swiss National Bank has a target for the three-month Libor rate of 25 basis points and has had a repo rate of 5 basis points, and in the USA, where the Fed has restricted the federal funds rate to the interval between 0 and 25 basis points. After the repo rate was lowered to 25 basis points in Sweden in July, there has been no report of any related problems in the financial markets.¹² Besides, any large withdrawals of cash would show up very quickly in weekly data on the outstanding currency in the Riksbank's balance sheet.

A consistent probability distribution of the future policy rate?

The uncertainty intervals normally published around the repo-rate path have traditionally been based on the distribution of historical market forecast errors. There are yet too few repo-rate paths to compute a distribution of Riksbank repo-rate forecast errors. From a Bayesian decision-theory point of view, the most consistent and informative role of the uncertainty intervals would be as the executive board's subjective probability distribution of future repo rates. However, normally the uncertainty intervals do not matter for policy considerations, only the mean repo-rate path matters, so there may not be much point in an elaborate determination of uncertainty intervals and we should instead just use them as a reminder that forecasts are uncertain. However, with very low repo rates, the probability distribution of future repo rates takes on some special significance.

In order to maintain the principle of the repo rate being a mean forecast, the explicit or implicit distribution of the future repo conveyed by the Riksbank must be consistent with the published mean repo-rate path. If there is some probability of a higher repo rate, there must also be a probability of a lower repo rate. This may require positive probabilities for negative repo rates and small probabilities for repo rates much above the repo-rate path. Although I am generally all in favor of transparency, one has to be aware of indicating false precision about everything, including where the effective lower bound for the repo rate is. Perhaps with regard to the effective lower bound for the repo rate, there are good reasons for some ambiguity!

Another possibility is to accept a probability distribution of future repo rates that implies that the mean repo-rate path differs from the published repo-rate path and temporarily interpret the latter as a modal repo-rate path, that is, the repo-rate path that has the highest probability.

¹² Repo transactions by the National Debt office and other traders have occurred at rates down to minus 40 basis points.

Then both should be published, and the forecast of inflation and resource utilization should be conditional on the higher mean repo rate.¹³

¹³ Consciously using the probability distribution of the repo rate as a policy instrument raises many new questions and brings inflation targeting into the realm of “distribution forecast targeting” rather than “mean forecast targeting” (Svensson and Williams, 2007).

4. How can the Riksbank's policy be evaluated?

Transparency is necessary for the more effective external scrutiny and evaluation of monetary policy and thereby increases the Riksbank's incentive to achieve its objectives. Transparency also strengthens the democratic accountability of independent central banks. Given the independence of the Riksbank, it is important that external observers can evaluate whether the Riksbank is doing a good job and, in particular, achieving a "well-balanced" monetary policy.¹⁴

When evaluating monetary policy with an inflation target, why is it not enough to simply compare outcomes and targets for inflation? One reason is that inflation reacts with varying time lags and to different degrees to monetary policy measures. Inflation is also affected by shocks that are difficult to identify or that occur at a later date. The central bank therefore has *incomplete control* over inflation. Inflation can be on target even if the central bank has acted wrongly but been lucky, or deviate from the target even if the central bank has acted correctly but been unlucky.

A second reason why a simple comparison of outcomes and targets for inflation is inadequate is that the Riksbank and all the other inflation-targeting central banks conduct *flexible* inflation targeting rather than *strict* inflation targeting. Flexible inflation targeting means that monetary policy aims at stabilizing *both* inflation around the inflation target and the real economy, whereas strict inflation targeting aims at stabilizing inflation *only*, without regard to the stability of the real economy, what Mervyn King (1997) has described as being an "inflation nutter".^{15 16}

In many situations, a conflict may arise between stabilizing inflation and stabilizing the real economy. Let us assume that a shock, such as a sharp rise in the oil price, has driven up inflation at the same time as production has slackened significantly. If, in such a case, the aim of monetary policy is to quickly bring inflation back to the target, a significant policy-rate increase may be required which will dampen production even further. By quickly stabilizing

¹⁴ This section builds on Svensson (2009a).

¹⁵ The terms "strict" and "flexible" inflation targeting were to my knowledge first introduced and defined in a paper of mine presented at a conference at the Bank of Portugal in 1996, later published as Svensson (1999). The term "inflation nutter" for a central bank that is only concerned about stabilizing inflation was introduced in a paper by Mervyn King at a conference in Gerzensee, Switzerland, in 1995, later published as King (1997).

¹⁶ Heikensten and Vredin (2002) state that "[s]ince the mid- 1990s, however, the Riksbank has explicitly declared that it is not a 'strict' but a 'flexible' inflation targeter (like most other central banks today)." They also clarify that this is consistent with the Riksbank's mandate: "This policy also has legal support. In the preparatory documents on [the law on] the Riksbank's independence it is said that the 'Riksbank, as an agency under the Riksdag, should accordingly have an obligation to support the general economic policy objectives to the extent that these do not conflict with the price stability objective'. The task of the Executive Board is thus to implement this notion of 'flexible' inflation targeting."

inflation – which would be the case with strict inflation targeting – the central bank would destabilize the real economy. By not aiming to bring inflation back to the target as quickly as possible, the central bank would help to stabilize the real economy. How long it should take to return inflation to the target depends, among other things, on the type, magnitude, and duration of the shock that has occurred and the importance that the central bank attaches to stability of the real economy.

A difference between the outcome and the target for inflation may thus be deliberate. It may be part of an appropriate compromise between stabilizing inflation and stabilizing the real economy. It is, therefore, simply not good enough to just compare outcomes and targets for inflation when evaluating monetary policy.

What does flexible inflation targeting entail?

Before I begin to discuss what evaluations of monetary policy should focus on, let me go into a little more detail about what characterizes flexible inflation targeting.

As I have already said, flexible inflation targeting entails the central bank striving to stabilize inflation around the inflation target and at the same time to stabilize the real economy. Stabilizing the real economy may be more precisely described as stabilizing resource utilization at a normal level.

There is an asymmetry between the impact of monetary policy on inflation and its impact on the real economy that it is very important to understand. Monetary policy can affect both the average level and the variability of inflation. Monetary policy cannot, on the other hand, affect the average and long-run level of real quantities such as production, employment, resource utilization, and growth (although bad monetary policy can arguably hurt long-term growth). Historically, attempts to use monetary policy to affect the average level of real variables such as production or employment have led to serious mistakes and high inflation. In the case of the real economy, monetary policy can only affect, and to a certain extent dampen, fluctuations in real variables around their average levels. For monetary policy, it is thus meaningful to select a certain target for average inflation, but it is not meaningful and in fact counterproductive to select a certain target for average production or employment, other than the normal level that is determined by the workings of the economy and factors other than monetary policy.

Because of the lags between monetary-policy actions and the effect on inflation and the real economy, effective flexible inflation targeting has to rely on forecasts of inflation and the real economy. Flexible inflation targeting can be described as “forecast targeting”. The central bank chooses an instrument-rate path so that the forecast of inflation and resource utilization “looks good.” By a forecast that looks good I mean a forecast in which either inflation is already on target and resource utilization is already normal, or in which inflation is approaching the target and resource utilization is approaching a normal level at an appropriate pace. To be more precise, it means a forecast for inflation and resource utilization that as effectively as possible stabilizes inflation around the inflation target and resource

utilization around its normal level and, in the event of conflicting objectives, achieves a reasonable compromise between inflation stability and resource utilization. Different central banks express this in slightly different words. The Riksbank has often used the term “well-balanced” monetary policy.¹⁷

We can formalize and specify this reasoning somewhat by saying that it is a case of selecting a policy-rate path that minimizes an intertemporal forecast loss function, written as the following standard quadratic form:

$$\sum_{\tau=0}^{\infty} (\pi_{t+\tau,t} - \pi^*)^2 + \lambda \sum_{\tau=0}^{\infty} (y_{t+\tau,t} - \bar{y}_{t+\tau,t})^2 .$$

Here, $\pi_{t+\tau,t}$ denotes the mean forecast in quarter t for inflation in quarter $t+\tau$, π^* denotes the inflation target, λ is a constant weight placed on the stabilization of resource utilization relative to the stabilization of inflation, $y_{t+\tau,t}$ denotes the mean forecast for (the logarithm of) production, and $\bar{y}_{t+\tau,t}$ denotes the mean forecast for (the logarithm of) potential production.

The output gap $y_{t+\tau,t} - \bar{y}_{t+\tau,t}$ is thus used as a measure of resource utilization here. Let us call the difference between inflation and the inflation target the inflation gap. It is then a case of minimizing the sum of squares of the inflation-gap forecast, $\sum_{\tau=0}^{\infty} (\pi_{t+\tau,t} - \pi^*)^2$, plus the weight λ times the sum of squares of the output-gap forecast, $\sum_{\tau=0}^{\infty} (y_{t+\tau,t} - \bar{y}_{t+\tau,t})^2$.^{18 19}

In its *Monetary Policy Reports*, the Riksbank usually presents alternative scenarios with a different repo-rate path in addition to the main scenario. These generate other paths for inflation and the output gap. Figures 6, 7, and 8 show examples from February 2008, February 2009, and July 2009. Panel a in each figure shows the alternative repo-rate paths (with “Main” denoting the majority decision and what is called the main scenario in the corresponding *Monetary Policy Report* or *Update*), panel b shows the corresponding inflation forecasts (the underlying CPI inflation measure CPIX is shown for February 2008 whereas CPIF, the CPI with housing costs calculated for a constant interest rate, is shown for February and July 2009), and panel d shows the corresponding output-gap forecasts (with the output

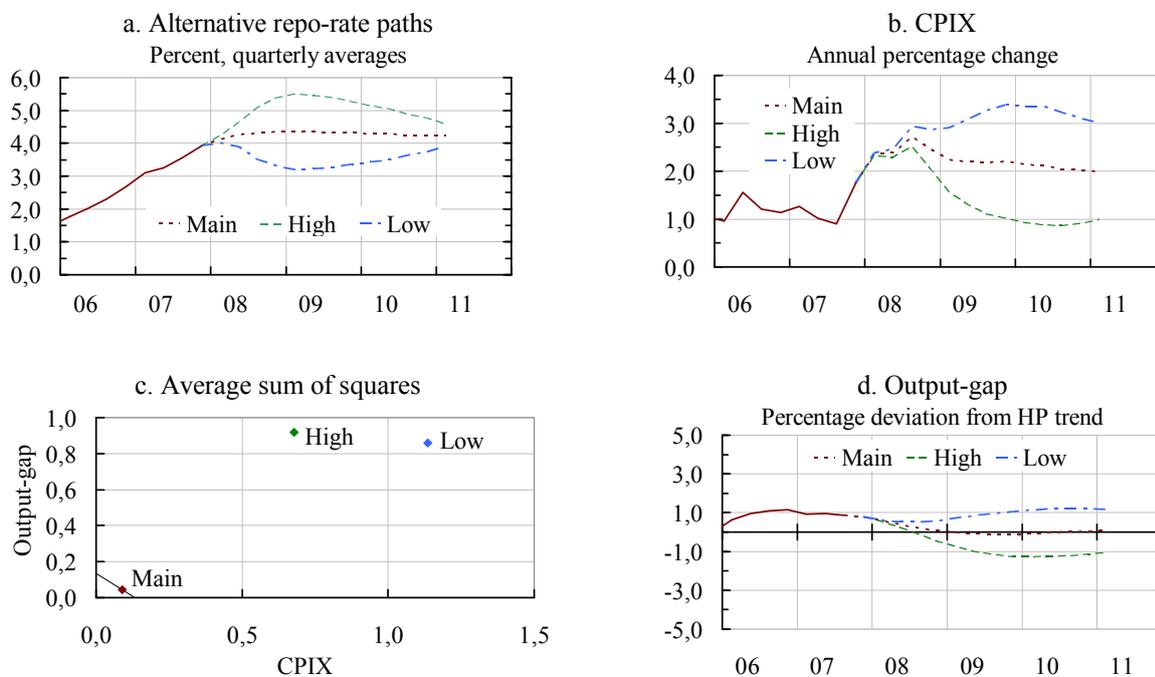
¹⁷ The idea that inflation targeting implies that the inflation forecast can be seen as an intermediate target was introduced in King (1994). The term “inflation-forecast targeting” was introduced in Svensson (1997), and the term “forecast targeting” in Svensson (2005). See Svensson and Woodford (2005) and especially Woodford (2007a, b) for more discussion and analysis of forecast targeting.

¹⁸ For simplicity there is no discount factor in the sums of squares, but such a discount factor can easily be added. The sums of squares of the mean forecast gaps normally converge also for a discount factor equal to one.

¹⁹ The loss function should be minimised under commitment in a timeless perspective in order to ensure consistency over time of policy. The former Deputy Governor of Norges Bank, Jarle Berge, has discussed this in a pedagogical manner in Berge (2007). For a more technical approach see, for example, Woodford (2003), Svensson and Woodford (2005), Adolfson, Laséen, Lindé and Svensson (2009), or Svensson (2009a).

gap measured as deviation from an HP trend).²⁰ Panel c shows the corresponding average sums of squares (calculated over the forecast horizon of normally 12 quarters).²¹

Figure 6. Forecasts for the repo rate, inflation, and output gap with average sums of squares, February 2008



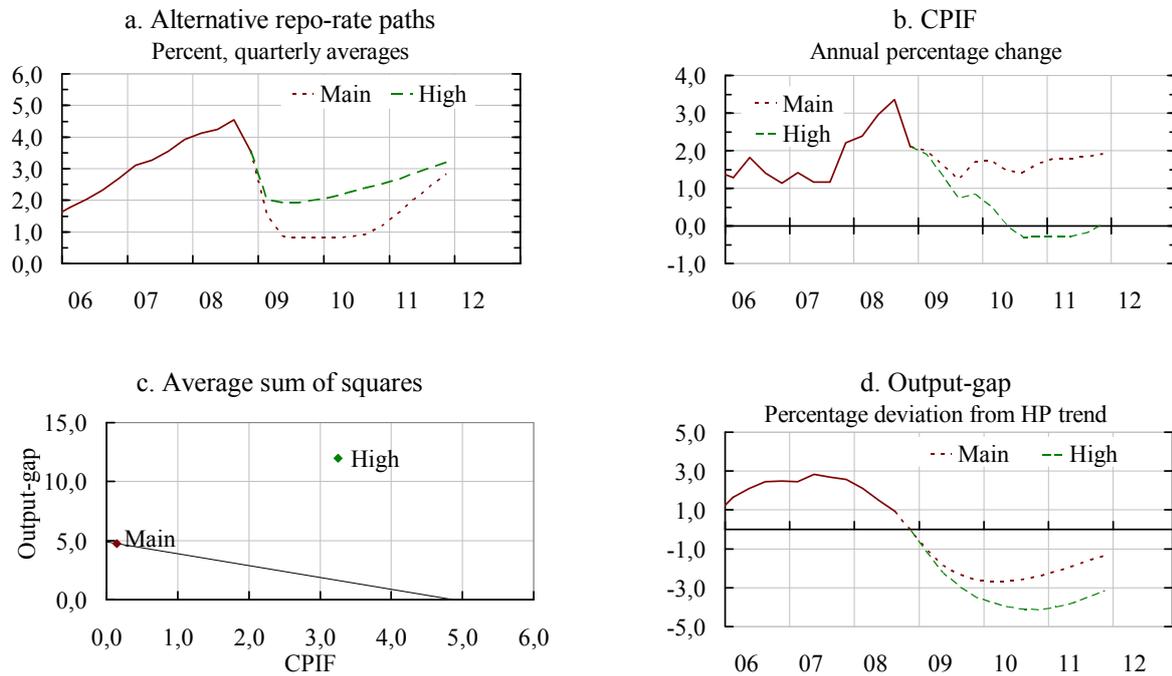
Sources: Statistics Sweden and the Riksbank

²⁰ Before June 2008, the Riksbank emphasized the CPIX, a core inflation price index that excludes mortgage costs and effects of indirect taxes and subsidies from the CPI. After June 2008, the Riksbank has downgraded the role of the CPIX and increased the emphasis on the CPI. During 2009, when the repo rate has been adjusted in large steps, the interest-rate effects on the CPI have been large and the Riksbank has therefore increased the emphasis on the CPIF, the CPI adjusted for a constant interest rate (see Wickman-Parak 2008).

²¹ The average sums of squares for the inflation-gap and output-gap forecasts are calculated as

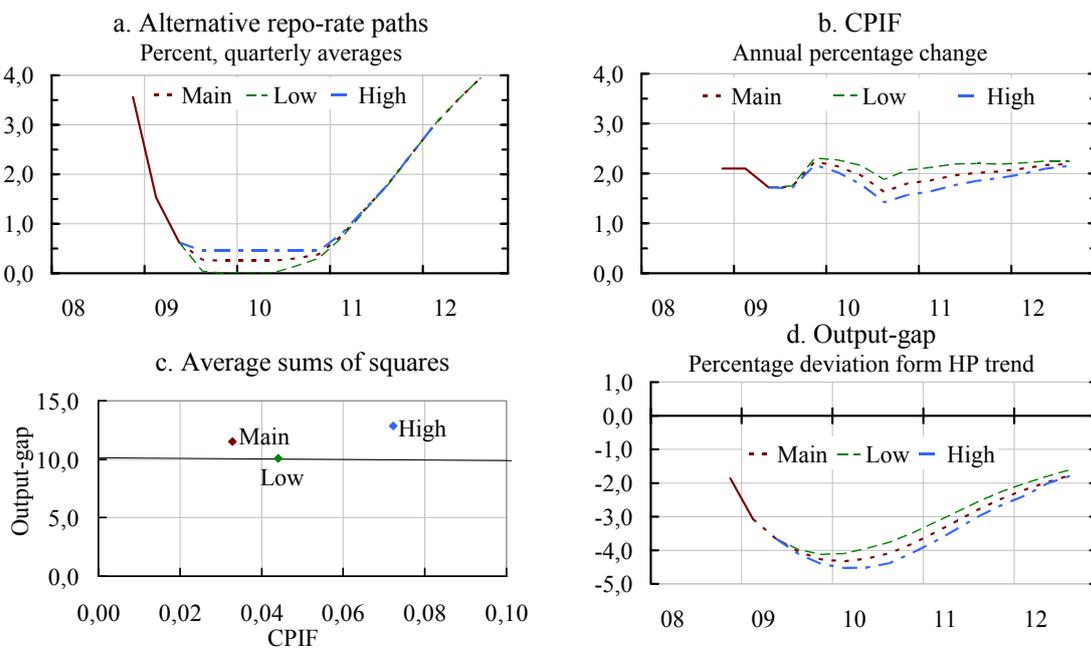
$\sum_{\tau=0}^T (\pi_{t+\tau,t} - \pi^*)^2 / (T+1)$ and $\sum_{\tau=0}^T (y_{t+\tau,t} - \bar{y}_{t+\tau,t})^2 / (T+1)$, where T is the forecast horizon (normally 12 quarters).

Figure 7. Forecasts for the repo rate, inflation, and output gap with average sums of squares, February 2009



Sources: Statistics Sweden and the Riksbank

Figure 8. Forecasts for the repo rate, inflation, and output gap with average sums of squares, July 2009



Sources: Statistics Sweden and the Riksbank

Figure 9 shows the average sums of squares from these examples in the same figure. Several observations can be made here. First, for February 2008 and 2009, the average sums of squares for the main scenario are smaller than in the alternative scenarios; the main scenario is closer to the origin of the axes. The main scenario is thus more successful in terms of stabilizing both inflation and resource utilization. The alternative repo-rate paths are clearly inefficient compared to the main scenario.

The concept of *efficient* monetary policy can be clarified further. Given the information available at the time the decision was made, would it have been possible, by selecting a different policy-rate path, to have stabilized inflation or the real economy better without stabilizing the other less well? Would it even have been possible to achieve a better stabilization of both?²² If this is not possible, the policy is efficient. This means that it is not possible to choose an instrument-rate path that results in sums of squares of the inflation- and output-gap forecast that is to the left or below it, or both, in figures 6-8, panel c.²³ The fact that the alternative repo-rate paths are clearly inefficient compared with the main scenarios in February 2008 and 2009 does not necessarily mean, however, that monetary policy is efficient in those cases. There may be a repo-rate path that would stabilize inflation and resource utilization even better. Excluding this possibility requires a comparison with more alternative repo-rate paths.

In this context, as discussed in more detail Svensson (2009a, 2009b), it would be a great advantage to generate policy alternatives by constructing forecasts of the repo rate, inflation and resource utilization that are optimal for alternative values of λ . Then the policy alternatives to choose between would all be efficient. Such techniques to generate policy alternatives have been in use at Norges Bank for several years (Holmsen, Qvigstad, and Røisland 2007).²⁴

Second, for July 2009, the main and alternative repo-rate paths are very similar with regard to the degree of inflation-gap stabilization, although the main repo-rate path results in a slightly smaller average sum of squares for the inflation gap, as can be seen in panel c of figure 8.

²² Norges Bank has specified a few criteria for an appropriate interest-rate path that are reported in each issue of its *Monetary Policy Report* and were developed by Qvigstad (2006) further elaborated by Holmsen, Qvigstad, and Røisland (2007).

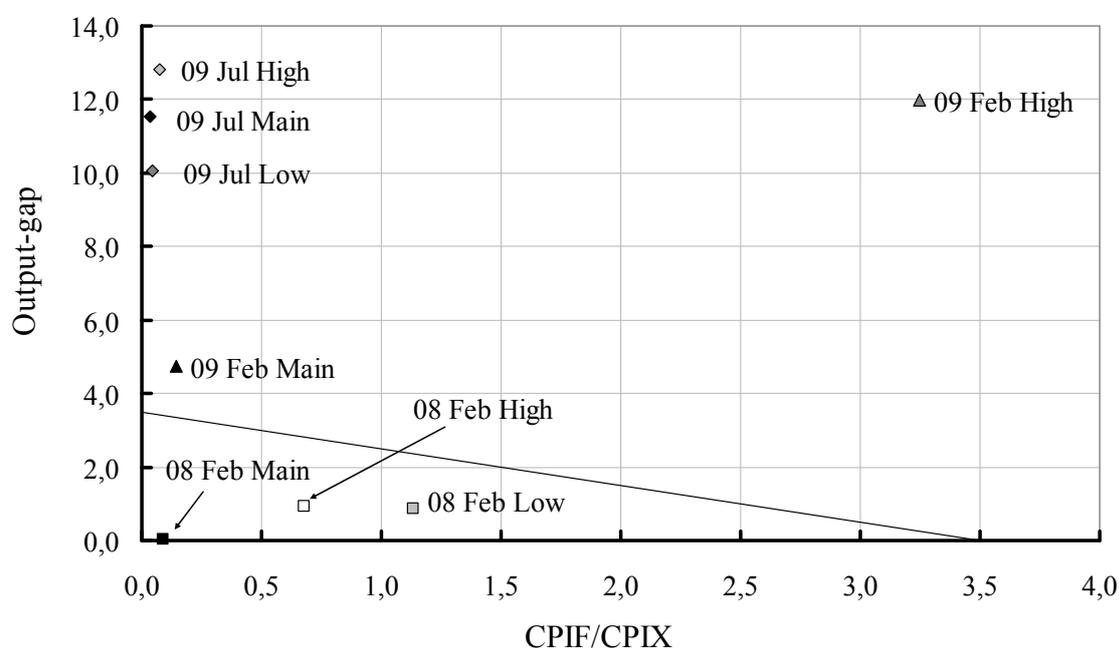
²³ In Svensson (2009a) efficient monetary policy is illustrated in terms of what I call a modified Taylor curve, the forecast Taylor curve. The original Taylor curve illustrates the efficient tradeoff between the unconditional variances of inflation and output (Taylor 1979). The modified Taylor curve, what I call the forecast Taylor curve, illustrates the efficient tradeoff between the conditional variability of the inflation- and output-gap forecasts. The original figure in Taylor (1979) plotted the unconditional standard deviation of the output deviation from trend against the unconditional standard deviation of inflation. Svensson (2009b) provides more details on the forecast Taylor curve and shows how evaluation with the help of the forecast Taylor curves can be adjusted to take into account commitment in a timeless perspective, following Svensson and Woodford (2005).

²⁴ See Adolfson, Laséen, Lindé and Svensson (1979) for how this can be done with the Riksbank's model Ramses.

However, the repo-rate paths result in different degrees of output-gap stabilization, where the low repo-rate path stabilizes the output-gap better and the high repo-rate path worse than the main scenario. The high repo-rate path results in an inefficient outcome with higher average sums of squares for the inflation- and output-gap forecasts.

Third, the tradeoff between stabilizing the inflation-gap and output-gap forecasts may vary considerably depending on the initial state of the economy. The situation in July 2009 was worse than that in February 2009, which was worse than that in February 2008. The point in figure 9 that corresponds to February 2008 is not far from the origin, while the points that correspond to February 2009 and July 2009 are much further away from the origin.

Figure 9. Sums of squares of inflation-gap and output-gap forecasts: February 2008, February 2009, and July 2009.



Sources: Statistics Sweden and the Riksbank

Assessing whether monetary policy has been efficient thus entails attempting to determine whether monetary policy could have stabilized the inflation-gap or output-gap forecast better without stabilizing the other less. The analysis is *ex ante*, in the sense that the starting point is the central bank's forecast for inflation and resource utilization rather than the actual outcomes. In practice it is of course difficult to perform a more precise analysis, it becomes rather a question of determining to what extent monetary policy has been clearly inefficient in the sense that it is easy to find another policy-rate path that would stabilize inflation more without stabilizing resource utilization less, or that would even stabilize both more. A factor that can make the analysis even more complicated is if the central bank, apart from inflation and a measure of resource utilization, also includes other targets or limitations in its monetary policy deliberations. One such conceivable factor is so-called interest-rate smoothing, in

other words that the central bank also chooses to even out the changes in the policy rate and ensure that they are made in relatively small and regular steps, for example by 25 basis points at a time. With such a restriction, an additional axis and thus an additional dimension are required that correspond to the sum of squared changes in the policy rate, so that the trade-off becomes three-dimensional. A separate issue is whether there is any good reason for such implicit or explicit interest-rate smoothing. During the dramatic events of last year, several central banks have adjusted their policy rates in larger steps than usual, and it remains to be seen whether there will be less interest-rate smoothing during more normal times in the future.

A major difficulty in this analysis is that it may be unclear what is meant by stabilizing the real economy. From a monetary policy perspective it is the stabilization of resource utilization rather than GDP growth that is relevant. This means stabilizing resource utilization around a normal level. The problem is that resource utilization can be measured in several ways. A reasonable and commonly used measure of resource utilization is the so-called output gap; that is the difference between actual production and potential production. However, potential production is not a magnitude that can be observed directly – it must be estimated. There is considerable uncertainty, both theoretically and empirically, about the best way to define, estimate, and forecast potential production. The output gap shown in the figures are output deviations from an HP trend, which has significant weaknesses. It is important and desirable from several points of view that the Riksbank and other central banks develop better measures of resource utilization and potential production and that they publish their measurements and forecasts. Such work is underway at the Riksbank.

Was monetary policy well-balanced?

Assuming, however, that we nevertheless conclude that monetary policy has not been clearly inefficient in the sense that I described earlier, the next step is to focus on what combination of the stabilization of inflation and the real economy the central bank actually selected. There are many different efficient monetary policy alternatives to choose between every time a monetary policy decision is made. But did the central bank make a good choice? In the event of a conflict between stabilizing inflation and stabilizing the real economy, did the combination chosen by the central bank represent a reasonable balance between the two? Did the central bank attach reasonable importance to the stabilization of the real economy in relation to the stabilization of inflation?

In the literature, as in the case of the forecast loss function I presented earlier, the relative weight that the central bank gives to the stabilization of the real economy in relation to the stabilization of inflation is often denoted by the Greek letter lambda, λ . In figures 6-8, panel c, and figure 9, we can show the intertemporal forecast loss function with the help of isoloss curves for combinations of sums of squared inflation-gap and output-gap forecasts that generate equally large losses. Such isoloss curves are in this case downward-sloping, straight lines with a slope of $1/\lambda$, the reciprocal of lambda. Isoloss lines closer to the origin correspond to lower losses. The ideal, but normally unattainable, situation would be an isoloss line at the origin, which represents a loss of zero and means that the forecast for

inflation is exactly on target and that the forecast for resource utilization is exactly equal to the normal level. The best monetary policy entails selecting a point such that the isoloss line through that point is as close to the origin as possible.

A central bank that has a low numerical value for λ , that is a lower weight placed on the stability of the real economy, has steeper isoloss lines. A central bank with a high numerical value for λ , that is a high weight placed on the stability of the real economy, has isoloss lines that are flatter.

Neither the Riksbank nor other central banks, except Norges Bank, have yet announced whether they apply a specific λ and if so what this λ is.²⁵ In those cases where the decisions are made by a committee made up of several members, as at the Riksbank, it is possible that different members attach different degrees of importance to the stability of the real economy.

It is possible to plot the policy alternatives as in figures 6-8, panel c, and figure 9 and assess whether the policy alternative is extreme in any respect with regard to the deviation of inflation from the target and the deviation of resource utilization from the normal level. It is possible to assess whether the choice of policy-rate path was extreme in either direction in the sense that the central bank gave considerable or very little relative weight to the stability of the real economy. It is also possible to investigate whether the weight attached to the stability of the real economy actually has been constant over time. Given a voting record of individual committee members, it is possible to assess what weight a particular member reveals in his or her votes on different policy alternatives and whether the weight is consistent over time.

As a reference point, I here take an equal weight on the stability of the inflation and output gaps, that is a λ equal to one. The solid negatively sloped lines in figures 6-8, panel c, and in figure 9 hence show an isoloss line for a forecast loss function with equal weight on inflation- and output-gap stabilization.²⁶

Figures 8 and 9 and the situation in July 2009 can be studied more closely in the light of this discussion. For July 2009, the main and alternative repo-rate paths are very similar with regard to the degree of inflation-gap stabilization, although the main repo-rate path results in

²⁵ Bergo (2007) and Holmsen, Qvigstad and Røisland (2007) report that optimal policy with $\lambda = 0.3$ has replicated policy projections published by Norges Bank (with a discount factor of 0.99 and a weight on interest-rate smoothing of 0.2).

²⁶ As an example of the use of an equal weight, in the Bluebook for the Federal Reserve's FOMC meeting in May 2002 (Federal Reserve Board 2002) there is a description of a method involving what is arguably somewhat misleadingly called a "Perfect Foresight Policy" that minimizes an intertemporal forecast loss function with equal weight on inflation-gap and output-gap stabilization (and with a small weight on interest-rate smoothing). This method was used in the Bluebooks at the time to present policy alternatives for the FOMC. Svensson and Tetlow (2005) provide a detailed description of this method, which calculates optimal policy in the Federal Reserve's FRB/US model using information from the Greenbook forecast. They argue that "Optimal Policy Projections" is a better name, since perfect foresight need not be assumed. Bluebooks and other material from the FOMC meetings are published with a five-year lag and are available at www.federalreserve.gov.

a slightly smaller average sum of squares for the inflation gap, as can be seen in panel c of figure 8. However, the repo-rate paths result in different degrees of output-gap stabilization, where the low repo-rate path stabilizes the output-gap better and the high repo-rate path worse than the main scenario.²⁷

For an equal weight on inflation- and output-gap stabilization the low repo-rate path results in lower intertemporal forecast loss. This is apparent from the isoloss line for λ equal to one that is shown in both figures 8 and 9 (in figure 8 the isoloss line looks horizontal because the scales for the horizontal and vertical axes are so different). For the main repo-rate path to give a lower loss than the low repo-rate path, one needs a value of λ lower than 0.08.

At the policy meeting of July 2009, the main repo-rate path entailed lowering the repo rate from 50 basis points (from the April 2009 decision) to 25 basis points and keeping it there through 2010. The low repo-rate path entailed lowering the repo rate to zero. The detailed discussion at the meeting is published in Riksbank (2009b), including arguments about the lower bound for the repo rate.²⁸

Finally, I would like to emphasize that these *ex ante* evaluations have the major advantage that they can be carried out on an ongoing basis in real time and that you do not need to wait several years to see the outcomes for inflation and the real economy. It is hence possible to evaluate whether monetary policy *is* well-balanced currently, not only whether it *was* well-balanced in the past. I would like to see competent *ex ante* evaluations become a lasting feature of the ongoing public debate on monetary policy so that they could constantly encourage the central banks to improve their policy and analysis.

²⁷ I use expressions such as “stabilizing the inflation gap” and “stabilizing the inflation-gap forecast” interchangeably. The conditional variance of the future inflation gap equals the squared inflation-gap forecast plus the variance of the forecast errors and the variance of the forecast errors is here considered exogenous.

²⁸ At the meeting, I dissented in favor of the low repo-rate path, on the grounds that it would entail a better-balanced monetary policy, with higher resource utilization and without inflation deviating too far from the target.

5. Consequences of low credibility of the repo-rate path

What are the consequences of market expectations of future repo rates that are higher than the published repo rate, the possible problem that I mentioned above at the end of section 3?

Does it matter if market expectations differ significantly from the repo-rate path? Figure 10 shows an attempt to answer that question. It also uses the graphs of average sums of squares that I have introduced in section 4.

In panel a of figure 10, the short-dashed curve labeled Main shows the repo-rate path in the main scenario in the *Monetary Policy Update* of April 2009. The short-dashed curves labeled Main in panels b and d show the corresponding inflation and output-gap forecast, respectively, in the main scenario of the *Update*. The main-scenario forecasts reported by the Riksbank are conditional on the assumption that they are credible with the private sector, that is, that both the Riksbank and the private sector have equal mean forecasts of the repo rate, inflation, and the output gap. The short-dashed inflation- and output-gap forecast in panel b and d can hence be interpreted as the Riksbank's mean forecast under the assumption that it is believed by the private sector, in particular that the published repo-rate path is also the private sector's mean forecast of the future repo rate.

As we have seen, the repo-rate path published in April was not credible with the market. Instead, the market's mean forecast was higher. Let me now for the sake of the argument assume that the market's mean forecast is representative of the whole private-sector's mean forecast of future repo rates. The long-dashed curve shown in panel a is similar to those private-sector (and market) expectations. We can now make three possible thought experiments. The *first* thought experiment is that the Riksbank publishes the repo-rate path of the Main scenario, that the private sector believes in this repo-rate path, and that the Riksbank intends to implement the published repo-rate path, so the repo-rate path is the best mean forecast of future repo rates. Then the best mean forecasts of inflation and the output gap are given by the short-dashed curves of panel b and d, respectively. This is the main scenario of the April 2009 *Update*.

However, this first thought experiment is contra-factual, since the published repo-rate path is not credible. A *second* thought experiment is that the Riksbank would publish a repo-rate path in line with market expectations, that is a repo-rate path like the long-dashed curve labeled Market in panel a. Furthermore, I assume that the private sector continues to believe in this path, and finally that the Riksbank intends to implement the path, so that the path is the best mean forecast of the future repo rate. Finally, I assume that the economy's sensitivity to changes in the repo-rate path, and indeed the whole transmission mechanism, is correctly represented by the Riksbank's DSGE model Ramses (Adolfson, Laséen, Lindé, and Villani, 2007). This is hence an example of constructing forecasts conditional on market expectations of the future policy rate, something that the Riksbank was doing before it started publishing its own repo-rate path in February 2007.

The Market repo-rate path is higher than the Main repo-rate path and hence represents a tighter monetary policy. This will result in a lower inflation and output-gap forecast. The long-dashed curves labeled Market in panel c and d show the corresponding inflation and output-gap forecast. Since the Market repo-rate path is substantially higher than the Main repo-rate path and given the sensitivity to interest-rate changes in Ramses, the inflation forecast falls to almost minus 2 percent in 2010. The output-gap forecast falls to almost minus 7 percent in 2010.²⁹

The consequences for the inflation and output-gap forecast of this thought experiment are dramatic. One interpretation is that the market expectations of the future repo rate are so much higher than the Riksbank's published repo-rate path that they are difficult to reconcile with a rational-expectations equilibrium of the Riksbank's DSGE model Ramses. They require an extremely low inflation and output-gap forecast to make sense. That market expectations are extreme from the point of view of Ramses does not contradict but rather underscores the possibility that they are very problematic.

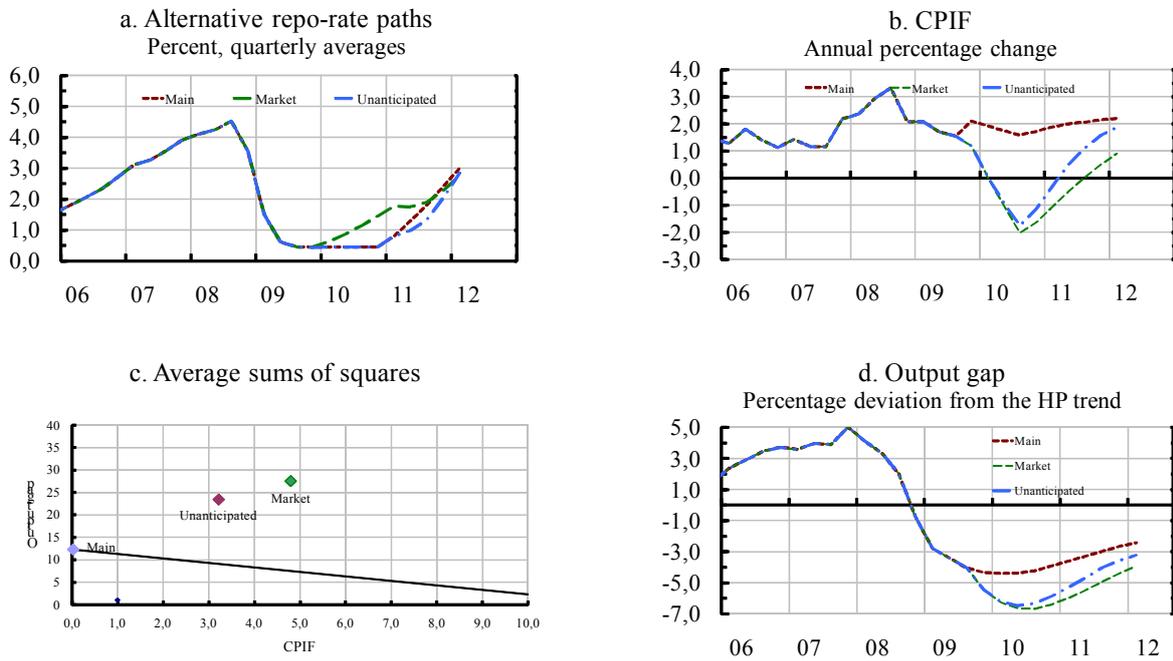
This second thought experiment is also contra-factual, since it assumes that the Riksbank intends to implement the Market repo-rate path. The *third* thought experiment is instead that the Riksbank publishes the Main repo-rate path and intends to implement it, but that the private sector does not believe so but instead believes in the Market repo-rate path. Under the assumption that the Riksbank actually implements the Main repo-rate path, the market will then be surprised in the beginning of 2010 when the Riksbank continues to follow the Main repo-rate path. Assume now that the market expectations shift down a bit but that the market still believes the Riksbank will follow a higher repo-rate path than the Main path, so that the market continues to be surprised when the Riksbank follows the Main repo-rate path. Under this assumption, the surprises of a lower repo rate and the gradual downward shifts of market expectations of the future repo-rate path will imply a less tight monetary policy. The best mean inflation and output-gap forecast is then given by the dash-dotted curves labeled Unanticipated in panels b and d.³⁰

This third thought experiment, where the Riksbank implements its announced repo-rate path but the private-sector remains sceptical, is probably the most realistic one of the three. In panel c, the average sums of squares for the inflation- and output-gap forecasts for the three thought experiments are plotted. The negatively sloped line shows an isoloss line corresponding to λ equal to unity. We see that the Main thought experiment stabilizes inflation and the output gap best, while Unanticipated is much worse, and Market is even worse. The difference between Unanticipated and Main shows the cost of low credibility of the repo-rate path and points to the importance of making the announced repo-rate path credible so that market expectations are in line with it.

²⁹ The second thought experiment is constructed using the techniques of Laséen and Svensson (2009).

³⁰ The third thought experiment is constructed using the techniques of Waggoner and Zha (1999).

Figure 10. Consequences of high repo-rate expectations, April 2009



6. Conclusions and possible improvements

I have reviewed the development of the Riksbank's transparency and communication since its independence in 1999. This development has led to the Riksbank being considered one of the world's most transparent central banks. I have also examined the Riksbank's record on the management of market expectations of future policy rates after the publication of policy-rate paths in February 2007, with a focus on the new problems present since April 2009 and on possible explanations, consequences and remedies. Finally, I have discussed whether the Riksbank's transparency and communication are sufficient for the effective accountability and evaluation of its monetary policy and demonstrated that tools are available for effective real-time evaluation of the Riksbank's policy.

What can be learned from the recent experience on how to make and keep the published repo-rate path credible with the market and the private sector? In my review of the Riksbank's record on managing expectations in Svensson (2009c), which included developments up to and including December 2008, I concluded that the Riksbank had overall been quite successful in managing expectations. Now, from April 2009 and thereafter, the record is different, with market expectations of future repo rates in 2010 much above the repo-rate path. The new situation with a deep recession and very low repo rates has posed exceptional communication challenges for the Riksbank. The good principle of the repo-rate forecast being a mean forecast and not an unconditional promise has been difficult to maintain. Statements about the lower bound for the repo-rate may have been interpreted as unconditional promises, and the explicit or implicit probability distribution of future repo rates that has been communicated has arguably been inconsistent with the published repo-rate path being the mean.

One solution to such a problem might be to acknowledge that the lower bound for the repo rate is not known, that it is probably negative, and that it is soft and not hard. Given this, one could then communicate a probability distribution that is consistent with the published repo-rate path being the mean (the required probability distribution is likely to be asymmetric). Alternatively, one could acknowledge that the published repo-rate path temporarily should be seen as a modal repo-rate path and that the mean repo-rate path is higher, and then condition the forecasts of inflation and the real economy on that higher mean repo-rate path (in which case they would be lower). Lending at longer maturities at a fixed rate may serve to bring down both interbank rates and repo-rate expectations in a situation like this, although any limits on the lending and oversubscription may reduce the effect.

However, the market expectations for the repo rate in 2010 and the beginning of 2011 are so much above the published path that they can hardly be explained by lower-bound issues alone. By publishing a forecast for inflation and the real economy conditional on those market expectations, an exercise similar to the second thought experiment in section 5, the Riksbank could perhaps convincingly show that such a monetary policy would lead to very undesirable outcomes for inflation and the real economy and therefore was unlikely to be followed by the Riksbank. Maybe there are good reasons to regularly publish forecasts

conditional on both market expectations and the Riksbank's own repo-rate path when there are risks of a sizeable difference between the two.

Standard forecasts at the Riksbank and by the main model Ramses are explicitly or implicitly made under the assumption of rational expectations, including that the Riksbank's and the private sector's expectations and views of the economy are the same and based on the same information. The discrepancy between market expectations and the repo-rate path after April 2009 points to the need to be able to analyze, explain, and handle situations with non-rational and non-heterogeneous expectations. Situations with different private-sector views from those of the Riksbank about inflation and economic developments also call for such analysis, as well as situations with heterogeneous expectations between different private-sector agents. More information about the expectations and forecasts of different economic agents would be useful, for instance in the form of more questions asked in the surveys that the Riksbank commissions from Prospera.

Regarding whether Riksbank transparency and communication is sufficient for the effective accountability and evaluation of its monetary policy, I have shown that policy alternatives can be illustrated in a graph with average sums of squares of the inflation-gap and output-gap forecasts along the axes. This makes it possible to assess how alternative repo-rate paths succeed in stabilizing inflation around the target and resource utilization around a normal level, conditional on the initial state of the economy and the outlook for important exogenous variables. In particular, it can be assessed whether the Riksbank's policy decision is *efficient*, in the sense of not wasting an opportunity to stabilize inflation without destabilizing resource utilization, and vice versa, and whether the policy decision results in a *well-balanced* policy, in the sense of a reasonable compromise between the stability of inflation and the stability of resource utilization. In particular, such evaluations can be performed in real time by outside observers. For this, it is crucial that the Riksbank publishes forecasts for alternative repo-rate paths and not just one main scenario. The Riksbank may also want to follow the example of Norges Bank (and the Federal Reserve, to judge from five-year old bluebooks) and generate policy alternatives by optimal policy projections.

In this context, and in general, since flexible inflation targeting aims at stabilizing both inflation around the target and resource utilization around a normal level, I believe that it is very important that the Riksbank develops better estimates and better forecasts of resource utilization, including estimates and forecasts of potential output, and transparently publishes and explains them.

Appendix 1. Major Events in Riksbank Communication

January 1993. The Riksbank announces the inflation target of 2 percent, to be applied from 1995.

October 1993. The Riksbank starts to publish the report *Inflation and Inflation Expectations in Sweden*, which includes a discussion of the inflation pressures.

June 1995. The Riksbank starts to publish approximate inflation forecasts under the assumption of a constant repo rate in *Inflation and Inflation Expectations in Sweden*.

March 1996. The report *Inflation and Inflation Expectations in Sweden* is renamed *Inflation Report*.

December 1997. The Riksbank starts to publish more precise inflation forecasts in the *Inflation Report*.

January 1999. The new Executive Board announces that the minutes of the monetary-policy meetings shall be published.

February 1999. The Riksbank publishes a clarification of the monetary-policy framework.

March 2005. The Riksbank starts to publish an alternative forecast under the assumption of a repo-rate path given by implied market forward interest rates. The horizon for this forecast is lengthened to three years.

October 2005. The Riksbank starts to publish a main scenario in the *Inflation Report* under the assumption of implied forward rates and a horizon of three years.

May 2006. The Executive Board publishes the document *Monetary Policy in Sweden*, which describes the monetary-policy objectives and strategy and replaces the clarification of February 1999.

February 2007. The Riksbank starts to publish a repo-rate path. The *Inflation Report* is renamed *Monetary Policy Report* and includes an extensive explanation of the monetary-policy decision. The Riksbank also starts to publish more explicit and extensive alternative scenarios for the repo-rate path and under alternative assumptions about the future development of important national and international variables.

May 2007. The Riksbank announces that press conferences will be held after each monetary-policy meeting, that no information about the repo-rate decision will normally be conveyed before monetary-policy meetings and that the minutes of monetary policy meetings will be attributed.

September 2007. The Riksbank announces that it will, from December 2007, publish a repo-rate path at each of the six monetary-policy meetings, not only after the three meetings at which a *Monetary Policy Report* is published.

May 2008. The Riksbank announces an updated communication policy for all Riksbank activities, including monetary policy. Before monetary-policy meetings, some public comments on data and outcomes relative to previous Riksbank forecasts and on policy trade-offs may be now given, but no indication of the coming repo-rate decision.

April 2009. The Riksbank decides to publish how individual members voted at the same time as the monetary-policy decision is announced. This makes it immediately apparent whether the decision was unanimous or whether there were any reservations. Any reservations are published with names and short explanations.

References

- Adolfson, Malin, Stefan Laséen, Jesper Lindé, and Lars E.O. Svensson (2008), “Optimal Monetary Policy in an Operational Medium-Sized DSGE Model,” working paper, www.princeton.edu/svensson.
- Adolfson, Malin, Stefan Laséen, Jesper Lindé, and Mattias Villani (2007), “RAMSES – A New General Equilibrium Model for Monetary Policy Analysis,” *Sveriges Riksbank Economic Review* 2007:2, 5-39.
- Apel, Mikael, and Anders Vredin (2007), “Monetary-Policy Communication: The Experience of the Swedish Riksbank”, *Czech Journal of Economics and Finance* 57, 499-520.
- Bergo, Jarle (2007), “Interest Rate Projections in Theory and Practice,” speech at the Foreign Exchange Seminar of the Association of Norwegian Economists at Sanderstølen, 26 January 2007, www.norges-bank.no.
- Blinder, Alan S., Michael Ehrmann, Marcel Fratzscher, Jakob De Haan, and David-Jan Jansen (2008), “Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence,” *Journal of Economic Literature* 46.
- Czech National Bank (2007), “The CNB’s New Inflation Target and Changes in Monetary Policy Communication,” Monetary Policy Strategic Document, March 8, 2007, www.cnb.cz.
- Dincer, N. Nergiz, and Barry Eichengreen (2007), “Central Bank Transparency: Where, Why, and with What Effects?” NBER Working Paper 13003.
- Eijffinger, Sylvester C., and Petra M. Geraats, (2006), “How Transparent Are Central Banks?” *European Journal of Political Economy* 22, 1-21.
- Federal Reserve Board (2002), “Monetary Policy Alternatives,” May 2, 2002, www.federalreserve.gov.
- Geraats, Petra M. (2008), “Trends in Monetary Policy Transparency,” working paper, University of Cambridge.
- Heikensten, Lars, and Anders Vredin (2002), “The Art of Inflation Targeting,” *Sveriges Riksbank Economic Review* 4/2002, 5-34.
- Holmsen, Amund, Jan F. Qvigstad and Øistein Røisland (2007), “Implementing and Communicating Optimal Monetary Policy,” Norges Bank Staff Memo No. 2007/3, www.norges-bank.no.

Jansson, Per, and Anders Vredin, (2004), "Preparing the Monetary Policy Decision in an Inflation Targeting Central Bank: The Case of Sveriges Riksbank," in *Practical Experiences With Inflation Targeting*, Czech National Bank, 73-94.

King, Mervyn (1994), "Monetary Policy in the UK," *Fiscal Studies* 15(3), 109-128.

King, Mervyn (1997), "Changes in UK monetary policy: Rules and discretion in practice," *Journal of Monetary Economics* 39, 81-97.

Laséen, Stefan, and Lars E.O. Svensson (2009), "Anticipated Alternative Instrument-Rate Paths in Policy Simulations," working paper, www.larseosvensson.net.

Rosenberg, Irma (2007), "Riksbank to Introduce Own Path for the Repo Rate," speech on January 17, 2007, www.riksbank.com.

Sedlabanki Islands (2007), *Monetary Bulletin* 9(1), March 2007, www.sedlabanki.is.

Söderström, Ulf, and Andreas Westermarck (2009), "Monetary Policy when the Interest Rate is Zero," *Sveriges Riksbank Economic Review* 2/2009, 5-30.

Svensson, Lars E.O. (1997), "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," *European Economic Review* 41, 1111-1146.

Svensson, Lars E.O. (1999), "Inflation Targeting: Some Extensions," *Scandinavian Journal of Economics* 101, 337-361.

Svensson, Lars E.O. (2002), "Monetary Policy and Real Stabilization," in *Rethinking Stabilization Policy, A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, Federal Reserve Bank of Kansas City, 261-312.

Svensson, Lars E.O. (2003), "Escaping from a Liquidity Trap and Deflation: The Foolproof Way and Others," *Journal of Economic Perspectives* 17(4) (Fall 2003), 145-166.

Svensson, Lars E.O. (2005), "Monetary Policy with Judgment: Forecast Targeting," *International Journal of Central Banking* 1(1), 1-54.

Svensson, Lars E.O. (2006), "Social Value of Public Information: Morris and Shin (2002) Is Actually Pro Transparency, Not Con," *American Economic Review* 96, 448-451.

Svensson, Lars E.O. (2007), "Optimal Inflation Targeting: Further Developments of Inflation Targeting," in Mishkin, Frederic, and Klaus Schmidt-Hebbel (eds.), *Monetary Policy under Inflation Targeting*, Banco Central de Chile, 187-225.

Svensson, Lars E.O. (2009a), "Evaluating Monetary Policy," In Koenig, Evan, and Robert Leeson, eds., *From the Great Moderation to the Great Deviation: A Round-Trip Journey Based on the Work of John B. Taylor*, forthcoming, www.larseosvensson.net.

Svensson, Lars E.O. (2009b), "Inflation Targeting," in Friedman, Benjamin M., and Michael Woodford, eds., *Handbook of Monetary Economics, Volume 3a and 3b*, North-Holland, forthcoming.

Svensson, Lars E.O. (2009c), "Transparency under Flexible Inflation Targeting: Experiences and Challenges," *Sveriges Riksbank Economic Review* 1/2009, 5-44, www.riksbank.com.

Svensson, Lars E.O., and Noah Williams (2007), "Monetary Policy with Model Uncertainty: Distribution Forecast Targeting," working paper, www.larseosvensson.net.

Svensson, Lars E.O., and Michael Woodford (2005), "Implementing Optimal Policy through Inflation-Forecast Targeting," in Bernanke, Ben S., and Michael Woodford, eds., *The Inflation-Targeting Debate*, University of Chicago Press, 19-83.

Sveriges Riksbank (2008a), "The Riksbank's Communication Policy," www.riksbank.com

Sveriges Riksbank (2008b), "Monetary Policy Communication," Appendix to the Riksbank's Communication Policy, www.riksbank.com.

Sveriges Riksbank (2008c), "The Riksbank's Rules for Communication," www.riksbank.com.

Sveriges Riksbank (2009), "Material for Assessing Monetary Policy," www.riksbank.com.

Waggoner, Daniel F., and Tao Zha (1999), "Conditional Forecasts in Dynamic Multivariate Models," *Review of Economics and Statistics* 81, 639-651.

Wickman-Parak, Barbro (2008), "The Riksbank's Inflation Target," speech on June 9, 2008.

Woodford, Michael (2003), *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press.

Woodford, Michael (2005), "Central-Bank Communication and Policy Effectiveness," in *The Greenspan Era: Lessons for the Future: A Symposium Sponsored by the Federal Reserve Bank of Kansas City*, Federal Reserve Bank of Kansas City, 399-474.

Woodford, Michael (2007a), "The Case for Forecast Targeting as a Monetary Policy Strategy," *Journal of Economic Perspectives*, Fall 2007.

Woodford, Michael (2007b), "Forecast Targeting as a Monetary Policy Strategy: Policy Rules in Practice," paper presented at the conference *John Taylor's Contributions to Monetary Theory and Policy*, Federal Reserve Bank of Dallas.

Sveriges riksbank
103 37 Stockholm
Brunkebergs torg 11
tel 08-787 00 00
fax 08-21 05 31
registratorn@riksbank.se
www.riksbank.se

