

A fairer picture of the Riksbank's inflation forecasts

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The Riksbank's forecasts are evaluated regularly in the report Account of Monetary Policy. Similar assessments are also made by the Ministry of Finance and the National Institute of Economic Research. These assessments compare forecasts made by around ten or so of the larger Swedish analysts. The forecasts assessed are made up to two years prior to the outcomes and refer to the annual average of inflation, among other variables.² During the period 2008-2012, the Riksbank's forecasts for the CPIF (the CPI with a fixed interest rate) are ranked number three. The forecasts for the CPI have been less accurate, mainly due to the Riksbank's forecasts for the repo rate proving incorrect.³

The National Institute of Economic Research has recently assessed the forecasts of inflation made by the Riksbank since 2001 and compared these with its own forecasts.⁴ Essentially these are the same forecasts as assessed in the report Account of Monetary Policy, but there are some differences in methodology. One is that the Institute distinguishes between inflation forecasts at different time horizons. Another is that they only calculate average forecast errors. The National Institute of Economic Research says that the Riksbank has systematically overestimated inflation, but that that they themselves have not. On this basis, they draw the conclusion that the repo rate has on average been too high during the period assessed.

It is good that the Riksbank's forecasts are examined and assessed. But we show in this Economic Commentary that the National Institute of Economic Research's analysis has a number of flaws. A fairer assessment shows that the so-called bias that the Institute has found in the Riksbank's CPI forecasts does not mean that monetary policy has been too tight as a result of too high inflation forecasts. Rather, it is the unexpected cuts in the repo rate in times of economic turbulence that, via lower mortgage costs for owner-occupied housing, have pushed down the CPI inflation below the forecasts. The "systematic bias" that the Institute claims to have found in the Riksbank's forecasts for underlying inflation turns out not to be so systematic, but also arises in connection with the two crisis periods, when all of the larger Swedish analysts overestimated underlying inflation.

The National Institute of Economic Research draws premature conclusions

The National Institute of Economic Research has saved its inflation forecasts since 2001 and forecasts made by the Riksbank are available even further back in time. Thus, 2001 appears to be a possible starting point for an assessment if one wishes to compare the forecasts of inflation made by the Riksbank and the National Institute of Economic Research. However, we consider it more reasonable to assess the forecasts

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2. The reason for assessing the annual averages is that most analysts only publish these figures.

3. See Andersson and Palmqvist (2013).

4. See the article "The Riksbank has systematically overestimated inflation" in *The Swedish Economy*, August 2013.

The National Institute of Economic Research has assessed the inflation forecasts made by the Riksbank since 2001. They claim that the Riksbank has systematically overestimated inflation and draw far-reaching conclusions from this. We show in this Economic Commentary that the National Institute of Economic Research's analysis has a number of flaws. The "systematic bias" the Institute claims to have found in the Riksbank's forecasts of underlying inflation moreover does not prove to be systematic, but only arises during two periods of economic turbulence – periods when all of the major Swedish analysts overestimated inflation.

made in 2007 and onwards, as the Riksbank's earlier forecasts were so-called conditional forecasts.

But what do we mean by saying the forecasts were conditional? Well, let us imagine that you have just handed in your list of numbers for the national lottery. If you should win a million or so, you probably have a number of ideas of what you might want to do with the money – perhaps you would buy a new car? On the way out of the newsagent's, we ask you two questions.

1. Do you think you will buy a new car in the near future?
2. If you win a million Swedish kronor, will you buy a new car?

You answer no to the first question and yes to the second one. Your first answer is an example of an unconditional forecast and your second answer is an example of a conditional forecast. The difference is that the conditional forecast assumes that you will win a million.

One year later it turns out that you have not bought a new car. The unconditional forecast has been proved correct and we can observe that it was a good forecast. But what about the conditional forecast? It may appear to be a poor forecast, as you have not bought a new car, but this may be a premature conclusion. Perhaps you didn't win a million? In this example, we can only conclude that the conditional forecast was poor if you actually won a million Swedish kronor and still did not buy a new car. To determine whether or not a conditional forecast is good, one must know whether the conditions are met.

Prior to 2007, the Riksbank – to put it simply – made inflation forecasts that were conditional on the repo rate being held unchanged at the current level during the forecast period.⁵ If these forecasts deviated sufficiently from the inflation target 1-2 years ahead, the Executive Board decided to adjust the repo rate.⁶ The conditions for the forecasts were therefore often not met, which can be compared with not winning a million on the lottery in the example above. The Riksbank's ambition was of course to make good *conditional* inflation forecasts, but whether or not they really were good can not be assessed by using the average forecast error.⁷ It is thus not possible to draw the conclusion that monetary policy has been too tight or too expansionary on the basis of average forecast errors from this period in the way that the National Institute of Economic Research does in its article.⁸

Since 2007 the Riksbank has made its own forecasts of the repo rate and since then the aim is that the forecasts in the main scenario shall minimise the size of the forecast errors.⁹ The forecast for the repo rate is the path that is assumed to give a well-balanced monetary policy. Both the Riksbank's forecasting method and the monetary policy strategy thus look quite different than they did in the period 2001-2006. We therefore claim that 2007 would be a natural starting point for an assessment of the accuracy of the forecasts.¹⁰ But even if we restrict ourselves to the period since 2007, it is difficult to draw conclusions about monetary policy solely based on the average forecast errors.

5. From Inflation Report 1997:4 up to and including Inflation Report 2005:2 the forecasts in the Riksbank's main scenario were conditional on the assumption that the repo rate would remain unchanged at its current level throughout the forecast period. From Inflation Report 2005:3 up to and including Inflation Report 2006:3, the forecasts were instead based upon market expectations of future monetary policy, as measured by so-called implied forward rates. The assumed condition thus changed slightly during the later period, but the problems with assessing conditional forecasts remain.

6. See the article "Inflation assessments and monetary policy" in Inflation Report 1998:2.

7. The National Institute of Economic Research (2002) is an example of how one can assess such conditional forecasts.

8. For the same reasons, it is not possible to assess the Ministry of Finance's forecasts for general government net lending on the basis of average forecast errors. These are made under the assumption that regulations will remain unchanged and answer the question "What will general government net lending be if the Government does not make any new active decisions?" In the absence of these, public finances normally strengthen, which gives rise to some budget scope. When the Government subsequently implements fiscal policy measures, the actual general government net lending is (usually) lower than the forecast. This "bias" does not of course mean that the forecasts were poor or that fiscal policy has been too expansionary. Rather, the conditions for the forecast have once again not been realised.

9. See the article "Riksbank to publish its own forecast for the repo rate" in Monetary Policy Report 2007:1.

10. Moreover, the Riksbank's forecast errors from the period 2000-2006 for a large number of variables have already been assessed very thoroughly, see Andersson et al. (2007). These studies compare the Riksbank's forecast with those of the National Institute of Economic Research and those compiled by Consensus Economics. The results of the assessment show that the Riksbank and the National Institute of Economic Research had similar overestimates and underestimates in their inflation forecasts (CPI and CPIX). These results are also easy to confirm in the data the Institute uses in its article.

When the repo rate is cut, CPI initially falls

Should one assess forecasts for the consumer price index (CPI) or the underlying inflation rate? The inflation target is worded in terms of the CPI, so it may be natural to start by studying these forecasts.

The CPI forecasts made by the Riksbank during 2007 and until the financial crisis broke out in 2008 overestimated inflation outcomes in 2009 (see the upper panel in Figure 1). This is connected to the fact that the Riksbank cut the repo rate from 4.75 to 0.25 per cent. This pushed down CPI outcomes through lower mortgage costs for home-owners. The repo-rate cuts were not in line with the Riksbank's earlier repo-rate forecasts (see the lower panel in Figure 1). After this follows a period of relatively accurate CPI forecasts from the end of 2009 until the end of 2011. The repo rate develops in line with the forecasts during this period. Towards the end of 2011, the sovereign debt crisis in the euro area deepened and the Riksbank began to cut the repo rate again in a way that did not match the earlier forecasts. The unexpectedly low mortgage costs for home-owners also lead to the CPI outcomes from the end of 2011 being lower than the earlier forecasts. The fact that the Riksbank has on average overestimated CPI inflation since 2007 is thus a direct consequence of these two episodes with unexpected repo-rate cuts.

What conclusions can we draw from this? One is that the Riksbank has not been good at predicting crises. Another is that the repo rate has been cut when crises have occurred. This has meant that the inflation outcomes have been lower than the forecasts, particularly as the CPI effect initially goes "the wrong way" when the repo rate is adjusted. The so-called bias the National Institute of Economic Research has found in the Riksbank's CPI forecasts thus does not mean that monetary policy has been too tight as a result of too high inflation forecasts. Rather, it is the unexpected cuts in the repo rate that have pushed down CPI inflation below the Riksbank's forecasts.

It is good that the accuracy of the Riksbank's CPI forecasts is assessed, but we have just shown that the conclusions can easily be wrong if one does not at the same time take into account how changes in the repo rate affect CPI outcomes.

All major Swedish forecasters were surprised by the low CPI inflation in 2009 and 2012

As mentioned above, the Riksbank has not been good at predicting crises. But the Riksbank is not alone in this. It is rather the case that the Riksbank's forecast assessments in the report Account of Monetary Policy imply that all of the major Swedish forecasters overestimated both GDP growth and CPI inflation in 2009 and 2012 (see Figure 2).¹¹

Andersson and Palmqvist (2013) showed that the Riksbank's ranking for CPI forecasts 2008-2012 was strongly influenced by the forecasts for 2009. Although all analysts overestimated CPI inflation for this year, the Riksbank's average forecast error was the largest of all (see Figure 2). This is why the forecasts for 2009 lower the Riksbank's ranking in an assessment of CPI forecasts during the period 2008-2012 as a whole.

All forecasters also overestimated CPI inflation in 2012. In that year the Riksbank did not have the poorest rating, but was ranked fifth. So although the Riksbank overestimated CPI inflation by around the same amount in 2012 as in 2009, this does not affect the relative ranking of the forecasts as several other analysts overestimated CPI inflation in 2012 even more.

11. Overestimates are shown as negative forecast errors in Figure 2. Forecast errors are not shown by horizon in Figure 2. This is because most of the forecasters only publish full-year forecasts for inflation in a particular year.

A small average forecast error can hide large forecast errors

If one wishes to draw conclusions regarding the direction of monetary policy, one should study the forecasts of underlying inflation that have guided monetary policy. The National Institute of Economic Research also studies such forecasts. Let us therefore begin by looking at the forecasts of underlying inflation during the period 2008-2013 in greater detail.¹²

The Riksbank's CPIF forecasts were higher than the outcomes at the beginning and end of the period (see the upper panel in Figure 3). In the middle of the period the forecasts are fairly good and sometimes above, sometimes below, the outcomes. The National Institute of Economic Research's CPIF forecasts have also exceeded the outcomes recently, but also at the beginning of the period there are tendencies towards overestimates (see the lower panel in Figure 3).

As both 2009 and 2012 were notable in that all analysts overestimated inflation, we choose to report the average forecast errors both for the period as a whole and divided up into "normal years" and "turbulent years", where the latter refers to the outcomes in 2009 and 2012. We then see that the Riksbank's average forecast error for underlying inflation was fairly close to zero at most forecast horizons during "normal years" (see the blue curve in the upper panel in Figure 4). It was thus primarily during the crisis years 2009 and 2012 that the Riksbank clearly overestimated inflation (see the yellow curve in the upper panel in Figure 4). As during the assessed period the Riksbank has sometimes made accurate forecasts and sometimes overestimated inflation (during the crisis years), the average for the whole period will thus also be an overestimate (see the red curve in the upper panel in Figure 4).

The National Institute of Economic Research has also overestimated inflation during the years marked by financial turmoil (see the yellow curve in the lower panel in Figure 4). However, during more normal circumstances they instead underestimated underlying inflation (see the blue curve in the lower panel in Figure 4). These forecast errors cancel each other out when one examines the average forecast errors for all years, which means that the Institute's average forecast error is close to zero for the period as a whole (see the red curve in the lower panel in Figure 4).

Other measures of accuracy indicate that the forecasts are equivalent

In the section above we noted that forecast errors that go in different directions – overestimates on some occasions and underestimates on others – may lead to a small average forecast error which in turn can give the impression that the forecasts are accurate. But determining the average forecast error does not provide a complete description of the forecast errors as they also vary around their average. The accuracy of the forecasts is therefore usually assessed with the aid of the mean square error. The mean square error captures both the forecasts' average deviation from the outcomes and the dispersion of the forecast errors around this average.

The forecasts of underlying inflation of the National Institute of Economic Research and the Riksbank had similar mean square errors in the period 2007-2013 (see Figure 5).¹³ In general, the inflation forecasts of both the Institute and the Riksbank hold up well in a comparison with those of other forecasters.¹⁴

12. We assess the same measures of underlying inflation as the National Institute of Economic Research does, that is, CPIX up to the middle of 2008 and CPIF thereafter. As two different measures of underlying inflation are being assessed, it is difficult to gain an idea of the forecast errors on the basis of a figure that links together the forecasts for these two measures. We therefore use the CPIF forecasts, which have guided the monetary policy decisions for most of the period we are assessing, in the graphical analysis of the forecasts. The calculations of average forecast errors use a spliced series, which consists of forecast errors for the two different measures of underlying inflation.

13. We cannot reject the hypothesis that the forecasts of the Riksbank and the National Institute of Economic Research have the same RMSE in the forecast population for any of the horizons.

14. See Andersson and Palmqvist (2013).

The Riksbank has revised its forecasts in the light of the low level of inflation

The unexpectedly low level of CPIF inflation since the end of 2011 has led the Riksbank to gradually revise its inflation forecasts downwards. As a consequence, the repo rate has also been cut by a total of one percentage point. The repo-rate forecasts have also been gradually revised downwards. Despite this, the Riksbank's own assessment of the forecasts in the document *Account of Monetary Policy 2012* indicated that there was still an overestimation. The Riksbank therefore conducted a major review of the inflation forecasts in which the model forecasts from the period concerned were evaluated and the links between the different variables were studied in detail. As a result of this review, there was a substantial downward revision of the CPIF forecast in connection with the *Monetary Policy Update* published in April 2013. The repo-rate path was also revised downwards.

It is difficult to predict crises – and their effects on the economy

The National Institute of Economic Research believes that the Riksbank has systematically overestimated inflation since 2001 and draws far-reaching conclusions from this. In this Economic Commentary we have pointed out a number of weaknesses in this analysis. One is that the Institute has included forecasts from the period 2001-2006. These forecasts were conditional on an assumption regarding the repo rate that was not often fulfilled. It is therefore not possible to determine whether these forecasts were actually good based on the average forecast error. Another weakness is the considerable emphasis the National Institute of Economic Research places on the Riksbank having overestimated CPI inflation. The fact that the CPI has been lower than the Riksbank had forecast is a direct consequence of two periods of unexpected cuts in the repo rate – in connection with the financial crisis in 2008 and in connection with the worsening of the sovereign debt crisis in the euro area at the end of 2011. This pushed down CPI outcomes, through lower mortgage costs for home-owners, so they were lower than the Riksbank had forecast.

The "systematic bias" the Institute claims to have found in the Riksbank's forecasts of underlying inflation moreover does not prove to be systematic, but only arises in connection with the two crisis periods. None of the major Swedish analysts predicted these crises and they all overestimated underlying inflation in 2009 and 2012. The Riksbank's analyses indicate that unexpectedly weak development abroad, surprisingly low domestic cost pressures and the fact that the companies reduced their margins more than expected lie behind the forecast error for CPIF inflation in 2012.¹⁵

The Riksbank has thus not overestimated inflation in general. The conclusion is rather that no analyst was able to predict the crises. The Riksbank's studies also imply that it is not only an unexpectedly low GDP growth that lies behind the forecast errors for inflation. In addition, these two crises have had a greater dampening effect on inflation than a normal fall in demand would have had. This conclusion is supported by the fact that companies seem to have found it more difficult than normal to compensate for increasing costs by raising prices.¹⁶ To better predict inflation we would therefore need more in-depth studies of how companies' price mark-ups are affected by economic activity and examine whether pricing behaviour alters in times of financial unease.

¹⁵ See the *Account of Monetary Policy 2012*.

¹⁶ See the article "Cost developments and inflation" in the *Monetary Policy Report* of July 2013.



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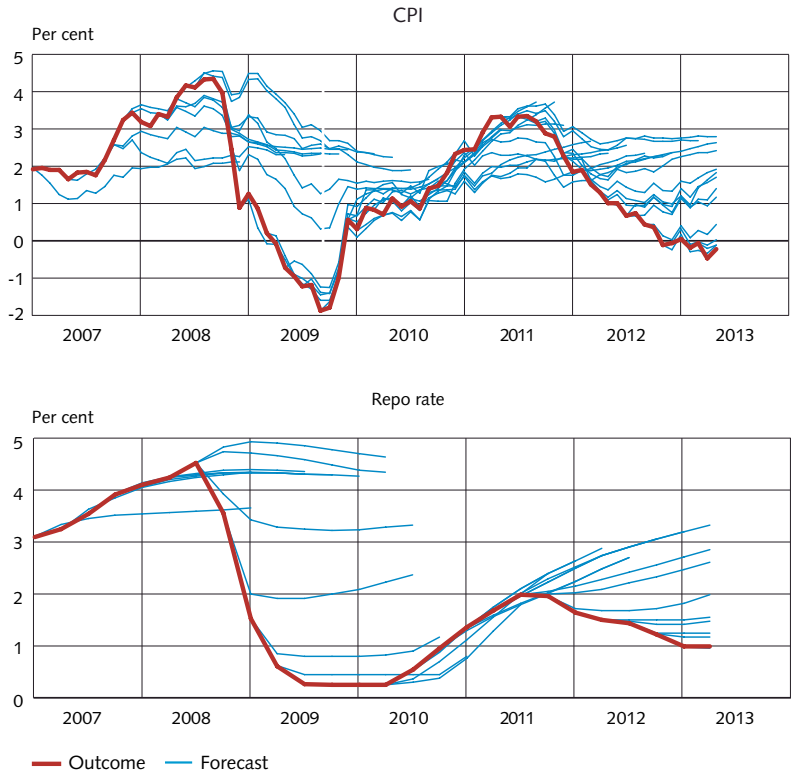
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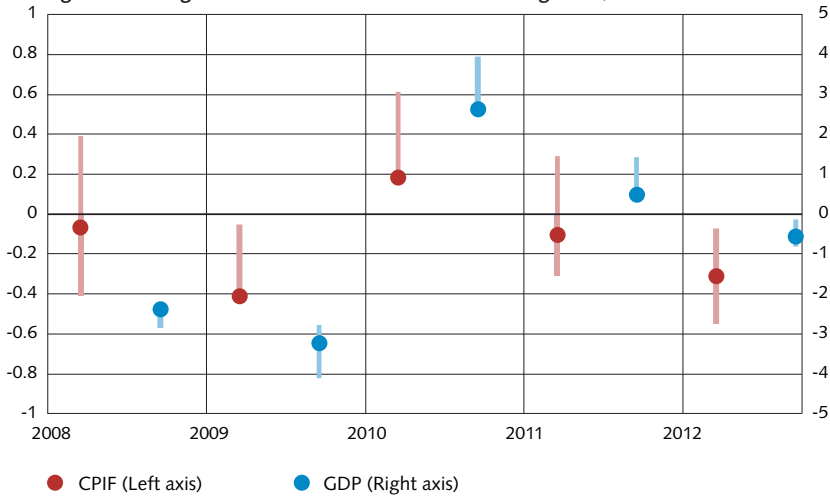
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Figure 1. The Riksbank's forecasts for the CPI and the repo rate



Sources: Statistics Sweden and the Riksbank.

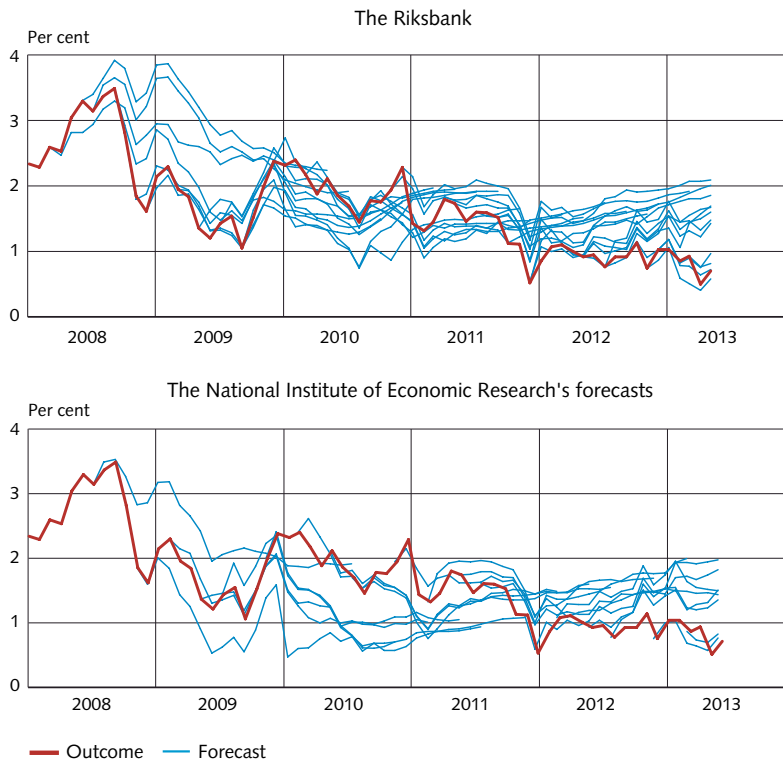
Figure 2. Average forecast errors for the CPI and GDP growth, 2008-2012



Note. The figure shows the Riksbank's average forecast error together with an interval comprised of the largest and the smallest forecast errors from ten Swedish analysts' forecasts for the annual average figures for the CPI and GDP. See the Account of Monetary Policy 2012 for more information on these calculations.

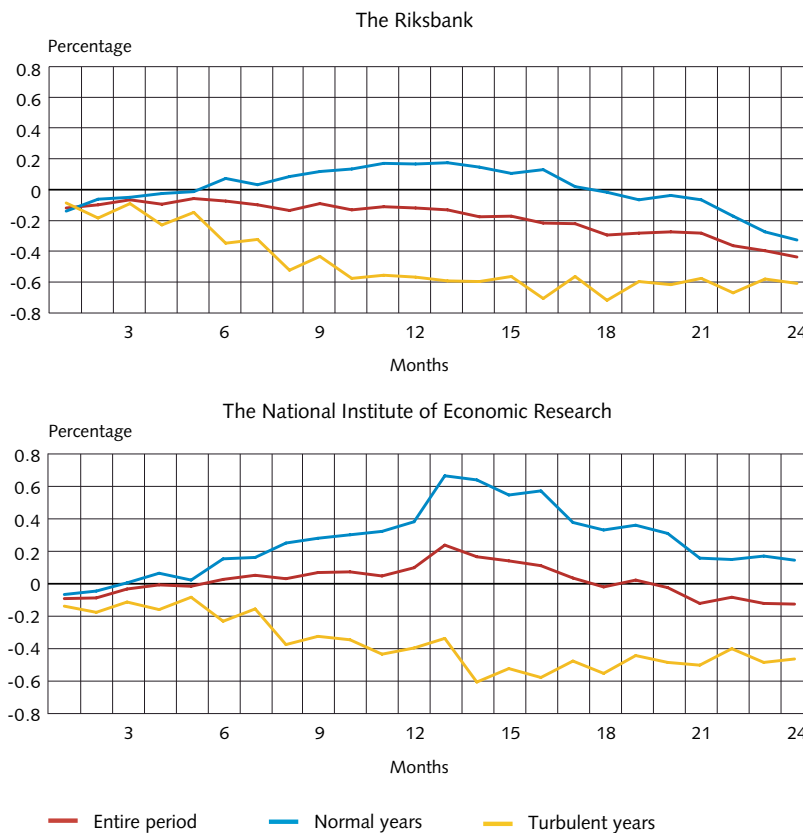
Sources: Swedish Ministry of Finance, HUI Research (GDP only), the National Institute of Economic Research, the Swedish Trade Union Confederation, Nordea, the Riksbank, SEB, Handelsbanken, Statistics Sweden, the Confederation of Swedish Enterprise and Swedbank.

Figure 3. The CPIF forecasts of the Riksbank and the National Institute of Economic Research



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

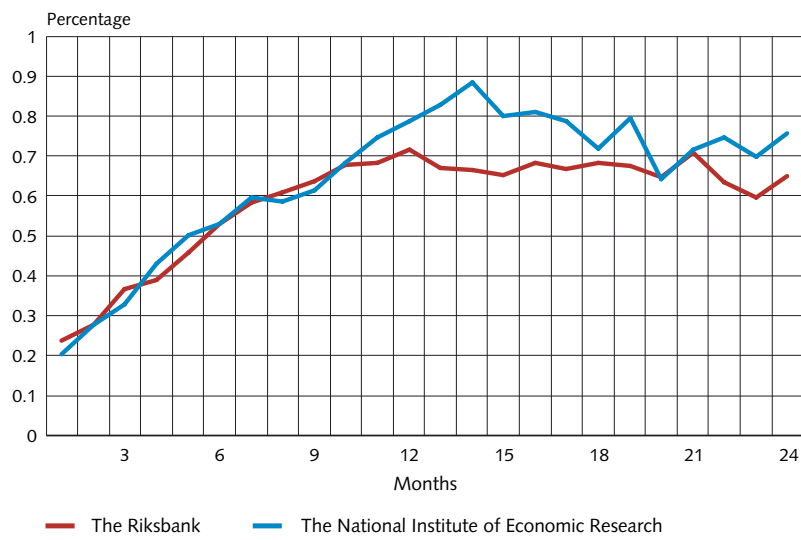
Figure 4. The mean forecast errors for underlying inflation forecasts of the Riksbank and the National Institute of Economic Research



Note. The mean forecast errors relate to the CPIX up to mid-2008 and to the CPIF thereafter.

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

Figure 5. Root mean square error for forecasts of underlying inflation 2007-2013



Note. The average forecast errors relate to forecasts for the CPIX up to mid-2008 and to forecasts for the CPIF thereafter.

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