

The Riksbank's CPI forecasts have been rated among the poorest in assessments covering a longer period of time and this has caused people to question the Riksbank's forecasting ability. This Economic Commentary ranks the forecasters during the entire period 2007-2012 and also during each individual year. The analysis shows that the Riksbank's forecasts for unemployment, GDP and the CPIF hold up well. The CPI forecasts have also been good, with the exception of one individual year. The large forecast errors for 2009 bring down the Riksbank's rating in the assessment of the period as a whole. It is thus wrong to say that the Riksbank's inflation forecasts are poor. Rather, the results of this analysis suggest that the Riksbank's forecasting ability is good.

## The Riksbank's forecasts hold up well

Michael Andersson and Stefan Palmqvist<sup>1</sup>

The authors work in the Monetary Policy Department of the Riksbank.

FC Barcelona is a very successful football team. Over the past five years they have won the Spanish league four times, the Spanish cup twice and the Spanish super cup three times. International successes during this period include two Champions League titles and as many UEFA Super Cup and FIFA Club World Cup titles. Moreover, the team's players form the backbone of the Spanish national team that won gold in the World championships in 2010 and in the European championships in 2008 and 2012. Barcelona is thus also ranked as the best club team by UEFA, whose ratings are based on the results achieved over the past five years.

There is no Champions League for forecasters to compete in; nor any national league or cup. But it is nevertheless common to assess forecasts, rank forecasters and announce the best and worst forecasters. For example, the Riksbank's inflation forecasts have recently been pointed out as being among the poorest.<sup>2</sup> This has led people to question the Riksbank's forecasting ability.<sup>3</sup>

In this Economic Commentary we show that the Riksbank's forecasts hold up well in a comparison with other forecasters.<sup>4</sup> This applies in particular to the forecasts for GDP, unemployment and inflation in terms of the CPIF (the CPI with a fixed mortgage rate). However, the forecasts for the CPI have also shown good accuracy, with the exception of the year 2009.

### How does one assess forecasts?

The basic material available for making an assessment is the various analysts' forecasts. The forecasts used in this study refer to the annual average for the annual percentage growth rate in the CPI, CPIF and GDP, the annual average for unemployment and the repo rate at the end of the year. The forecasts were made the year before or the same year the forecast covers.

Obtaining a complete picture of each forecaster's ability would require the analysis of every single forecast error. In practice, this is only possible if the number of forecasters and forecasts is limited. In our case, the data is too comprehensive to be able to present it in full. We have therefore chosen to initially analyse the forecast errors for the years 2007-2012, taken together. After that, we break down the analysis into individual years.

The difference between outcome and forecast gives a forecast error. One can then calculate the following measures for each forecaster and each variable. They provide slightly different information on how well the respective forecaster has succeeded in its forecasts.

- Mean error – average of the forecast errors
- Mean absolute error – average of the absolute value of the forecast errors
- Mean square error – average of the squared forecast errors

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2. See Munkhammar (2013), whose article is based on the box "Assessment of macroeconomic forecasts" in the 2013 Spring Fiscal Policy Bill.

3. For example, Klas Eklund, who is a member of DI newspaper's "shadow MPC", is critical of the Riksbank's inflation forecasts, see Dagens industri (2013).

4. Our review resembles those made in the Riksbank's annual Account of Monetary Policy, the box "Assessment of macroeconomic forecasts" in the 2013 Spring Fiscal Policy Bill and the section "Assessment of the forecasts for 2012 and 1997-2012" in the National Institute of Economic Research's Swedish Economy, March 2013.

The mean error shows whether the forecasts have systematically overestimated or underestimated the outcomes. However, it is not appropriate to use the mean error when one compares the accuracy of different forecasts, as forecast errors with plus or minus signs cancel out one another. Both the mean absolute error and the mean square error eliminate this problem and therefore provide a better basis for assessing forecasts.

One complexity with this type of comparison is that the different institutions make their forecasts at different points in time. A forecaster that makes its forecast at a later date than the others often has access to more information. If this forecast proves to be more accurate it could of course be due to good forecasting ability, but it could also be due to the agent having more knowledge when making the forecast.<sup>5</sup> Andersson and Aranki (2009) have developed a method that adjusts the forecast errors for the point in time when the forecasts were made. The adjusted forecast errors distinguish forecasting ability from differences in information and are therefore better when assessing forecasts.

In this study we rank the forecasters on the basis of both adjusted mean square errors and adjusted mean absolute errors. The difference between these two measures is that the mean square error penalises major forecast errors more than the mean absolute error. If a forecaster's rank is better according to the mean square error than according to the mean absolute error, the forecaster has probably made many, but minor, forecast errors. Correspondingly, a better rating according to the mean absolute error means that the forecaster has probably made few, but larger, forecast errors.

## The Riksbank's forecasts for GDP, unemployment and the CPIF have been among the best

In our assessment we compare the different forecasters with one another. Instead of showing the actual measures (mean square errors and mean absolute errors), we present a ranking of the different institutions.<sup>6</sup> The forecasters studied are the same as those in the Account of Monetary Policy 2012, that is, the Riksbank and up to nine other forecasting institutions. Here we will look more closely at 2007-2012. This period has received particular attention as it is used in the box "Assessment of macroeconomic forecasts" in the 2013 Spring Fiscal Policy Bill.<sup>7</sup>

In general, the Riksbank's forecasts hold up well in this assessment of the entire period 2007-2012.<sup>8</sup> According to both the mean square error and the mean absolute error, we are among the best at forecasting GDP, unemployment and the CPIF. However, the Riksbank is among the worst at forecasting the repo rate and the CPI (see Table 1).

Put simply, the CPI can be regarded as an aggregate of the CPIF and the repo rate. As the Riksbank's repo-rate forecasts have been the least accurate, it follows that the CPI forecasts will be less accurate than the CPIF forecasts. The reverse can be noted for SEB. Their CPI forecasts are rated better than their CPIF forecasts as a result of accurate repo-rate forecasts.

The Riksbank's CPI forecasts are rated lower according to the mean square errors than according to the mean absolute errors. As mentioned earlier, this could mean that the Riksbank has a few large individual forecast errors that bring down its rating in an assessment over a longer period of time. Let us therefore look at the Riksbank's ranking over time.

5. One can equate this with comparing two racing-car drivers. If one wins, is it because he or she had a faster car (more information), or because he or she was a better driver (ability)?

6. We have chosen to look at the ranking because it makes the results easier to survey. If one wishes to gain a deeper understanding of the actual forecast errors, one can read the different yearly issues of the Account of Monetary Policy.

7. As a result of an error in the data used, Tables 1 and 2 differ slightly from the figures published in the Material for Assessing Monetary Policy 2011, the box "Assessment of macroeconomic forecasts" in the 2013 Spring Fiscal Policy Bill and the section "Assessment of the forecasts for 2012 and 1997-2012" in the National Institute of Economic Research's Swedish Economy, March 2013.

8. Statistics Sweden began calculating the CPIF in 2008, at the request of the Riksbank. There are thus no forecasts for the CPIF to assess for 2007. The assessment period for the CPIF is therefore 2008-2012.

## The Riksbank's CPI forecasts have also been good

If we focus on one single forecaster – the Riksbank – we can split the data. By studying the rankings in individual years, we can gain an understanding of how the rating for the period as a whole has arisen. The Riksbank reports forecast comparisons for individual years in the document Account of Monetary Policy. However, it is not possible to produce a directly-comparable rating on the basis of these reports, as the Riksbank has gone from using mean absolute errors to using mean square errors for the rankings.<sup>9</sup>

We would like to stress that an assessment of an individual forecasting year should not be over-interpreted, as one particular forecaster may have had greater luck than exercised greater skill that particular year. However, if the Riksbank is systematically among the best or the worst, this could say something about our forecasting ability.

We observed in the previous section that the forecasts for GDP, unemployment and the CPIF have held up well for the period 2007-2012 as a whole, and that the repo-rate forecasts have been poor. This also applies to most of the years (see Table 2).

Let us now take the discussion on CPI forecasts to a slightly deeper level. If we look at individual years, it was only in 2009 that the Riksbank was actually the worst. The effect of an individual year becomes clear if we compare the rankings for the CPI with those for unemployment. The forecasts for these two variables are rated roughly the same for most of the years, with the exception of 2009. For the other years the CPI forecasts are actually rated slightly higher than the unemployment forecasts. But when the forecasts for the period as a whole are assessed, the unemployment forecasts appear really good, whereas the CPI forecasts appear rather poor. This is because the Riksbank's CPI forecasts for 2009 were very inaccurate. As the differences between the forecasters' forecast errors for individual years are fairly small, a large forecast error in one particular year has a major impact on an assessment that summarises several years.<sup>10</sup>

To further clarify the effects of the poorer CPI forecasts for 2009, we redo the exercise but exclude 2009 from the overall assessment for 2007-2012. This leads to a significant improvement in the Riksbank's ranking.<sup>11</sup> We then attain fourth place in the rankings, according to the mean square errors.<sup>12</sup> Since the large forecast errors for 2009 bring down the Riksbank's rank for the period as a whole, it is wrong to claim that the Riksbank's inflation forecasts have in general been poor.

## The Riksbank's good forecasting ability indicates that the forecasts will also have high ratings in the coming years

The Riksbank's forecasting ability has generally been good. We have been among the best at predicting coming developments in GDP, unemployment and the CPIF. The forecasts for the CPI have also been fairly good, with the exception of those for the year 2009. The variable that stands out is thus not the Riksbank's inflation forecasts, but its repo-rate forecasts. Examining why these have been less accurate is something we need to work on in future.


Let us return to the comparisons with the sporting world. Although FC Barcelona has been the highest-rated club team in football, they were crushed by Bayern München in the Champions League semi-final. So, even if one has the highest rating, one will not win every match. But the high rating is evidence of a good ability, which tends to lead to good results when regarded over a longer period of time. It is therefore likely that Barcelona will go far in next year's Champions League.

9. This publication was previously called Material for Assessing Monetary Policy (UUP in Swedish) and this type of ranking has been included since 2008. Since the UUP 2011, the adjusted mean square error has been used for ranking forecasters.

10. It is difficult to find differences between the forecasters that are statistically significant, see the Account of Monetary Policy, 2012.

11. Excluding 2009 from the assessment also affects other forecasters' ratings, of course. Handelsbanken also made relatively poor forecasts for the CPI for 2009, and their rank improves, rising to number three when we exclude the year 2009. Other forecasters, such as the Swedish Trade Union Confederation and Nordea, made relatively accurate forecasts for 2009. Their ratings deteriorate, to second last and last respectively, when the year 2009 is excluded from the assessment.

12. If the year 2009 is excluded from the assessment of the forecasts for the CPIF and the repo rate, the Riksbank is rated as number one and number five (according to mean square errors).



Going back to the Riksbank's forecasts, we can say that in the same way, the fact that the forecasts for GDP, unemployment, the CPIF and the CPI have been good for most years during the period 2007-2012 cannot be seen as a guarantee that the forecasts will be good in each individual year to come. There will be events that mean the forecasts are not rated highly every year. And we have already seen that the Riksbank failed to qualify for the quarter-finals with its CPI forecasts for 2009. However, the fact that the Riksbank's forecasts obtain high ratings is a sign of good forecasting ability. It is therefore likely that the forecasts will also have high ratings in the coming years.



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**Table 1. Ranking of different institutions' forecasts for the period 2007-2012**

	GDP	Unemployment	CPIF	Repo rate	CPI
FID	10 (9)	10 (10)	6 (6)	3 (2)	4 (3)
HUI	8 (10)	4 (3)	–	–	9 (10)
KI	9 (8)	9 (8)	5 (4)	5 (5)	8 (7)
LO	4 (4)	5 (9)	4 (2)	–	2 (9)
ME	–	–	–	4 (3)	–
Nordea	1 (3)	2 (2)	1 (3)	–	5 (5)
RB	3 (1)	3 (4)	3 (1)	6 (6)	10 (8)
SEB	2 (2)	1 (1)	7 (7)	1 (4)	3 (2)
SHB	6 (6)	7 (5)	8 (8)	–	6 (4)
SN	7 (7)	6 (6)	9 (9)	–	7 (5)
SWED	5 (5)	8 (7)	2 (5)	2 (1)	1 (1)

Note. The institutions assessed are the Ministry of Finance (FiD), HUI Research (HUI), the National Institute of Economic Research (KI), the Swedish Trade Union Confederation (LO), Nordea, the Riksbank (RB), Skandinaviska Enskilda Banken (SEB), Handelsbanken (SHB), the Confederation of Swedish Enterprise (SN) and Swedbank (SWED). The figures in the table give the forecasters' ratings, based on the adjusted mean square error. The figure in brackets is the rating based on the adjusted mean absolute error. The highest rating is 1. Ten institutions produce forecasts for GDP, unemployment and the CPI, nine produce forecasts for the CPIF and five produce forecasts for the repo rate. The assessment of the repo rate forecasts also includes market expectations according to market pricing (ME).

Sources: Statistics Sweden, the respective forecasters and the Riksbank.

**Table 2. Annual ranking of the Riksbank's forecasts 2007-2012**

	GDP	Unemployment	CPIF	Repo rate	CPI
2007	3 (2)	7 (5)	–	4 (4)	6 (4)
2008	4 (4)	4 (2)	2 (2)	5 (5)	3 (3)
2009	4 (4)	4 (6)	8 (7)	6 (6)	10 (10)
2010	3 (2)	6 (6)	3 (1)	2 (2)	5 (4)
2011	3 (2)	4 (3)	4 (2)	4 (5)	5 (5)
2012	3 (3)	7 (7)	5 (4)	5 (6)	7 (8)
The whole period	3 (1)	3 (4)	3 (1)	6 (6)	10 (8)

Note. The figures in the table give the Riksbank's ratings, based on the adjusted mean square error. The figure in brackets is the rating based on the adjusted mean absolute error. The highest rating is 1. Ten institutions produce forecasts for GDP, unemployment and the CPI, nine produce forecasts for the CPIF and five produce forecasts for the repo rate. The assessment of the repo rate forecasts also includes market expectations according to market pricing.

Sources: Statistics Sweden, the respective forecasters and the Riksbank.