Calculation method for uncertainty bands

As usual, the forecasts in the main scenario are uncertain, which is illustrated by the uncertainty bands for the inflation, GDP and repo rate forecasts in Figures 1–4. The forecasts in the main scenario show the path which the Riksbank expects the economy to take and is a weighted consideration of various conceivable development paths (scenarios) and risks.[11] Chapter 2 discusses some specific alternative scenarios and what consequences they would have for inflation, the repo rate, etc. if realised.

In this report, uncertainty bands have not only been calculated for the inflation forecast, but also for the forecasts for GDP growth and the repo rate. The uncertainty bands for the forecasts for inflation and GDP growth are based on the Riksbank's historical forecast errors.[12] In the case of the repo rate, the uncertainty bands are based on the historical forecast errors for implied forward rates and – as explained below – are adjusted slightly to take into account the existence of risk premiums.[13]

The Riksbank's historical forecast errors can be used to illustrate the uncertainty in the forecasts on condition that the forecast errors in the future are as large as the historical forecast errors. Given normal distribution of the forecast errors, different uncertainty bands can be calculated with the help of the mean square error (or rather the root mean square error), which is the method used by the Riksbank in this report. For example, in these conditions, it is possible to design an uncertainty band which will show the interval in which the variable in question will lie with a probability of 90 per cent.

The root mean square error (RMSE) is a common statistical measure used to describe and compare the precision of forecasts. For instance, the RMSE for forecasts one period ahead are calculated as

$$\sqrt{\sum_{t=1}^{n}\left(y_{t+1}-y_{t+1}^{forc}\right)^{2}/n}$$

where y designates the outcome and y^{forc} the forecast. If, for instance, RMSE one quarter ahead is 0.4, then a 90 per cent uncertainty band is produced by

$$y_{t+1}^{forc} \pm 1.64 \times 0.4$$

where the figure 1.64 is taken from the normal distribution.

One complication when using this method to calculate uncertainty bands for the repo rate is that the implied forward rates not only reflect forecasts for the repo rate, but also include risk premiums. This give rise to a systematic forecast error in the implied forward rates, which cannot be regarded as representative for repo rate forecasts. To make the calculated uncertainty bands more representative for the repo rate forecast, the systematic forecast error is eliminated. However, the possibility that this systematic forecast error is to a certain extent due to other factors than the existence of risk premiums cannot be excluded.

11 There are therefore no grounds to revise the main scenario afterwards in light of a certain specific risk. This approach was adopted previously in the Inflation Report.

12 This entails a change in the method used for designing the fan chart for inflation, which has previously been calculated using a weighted average of underlying risks. With the new method, the uncertainty bands are symmetrical.

13 T-bills and government bonds have been used in the calculation of implied forward rates.