

Appendix 2

Forecast errors in Central Bank of Iceland inflation forecasts

The Central Bank of Iceland has published inflation forecasts two years ahead in *Monetary Bulletin* ever since moving onto a formal inflation target in March 2001. Two-year inflation forecasts based on assumptions for the policy rate path are now presented three times a year.

Economic developments are always fraught with uncertainties. In its assessments of the inflation outlook, the Central Bank therefore emphasises the risk profile of its forecasts just as much as point values. Monetary policy decisions are made on the basis of a comprehensive assessment of the economic outlook in which forecasts are an important indicator, but not the only one. The main forecast is only one of many possible outcomes. Inflation is likely to be close to the main forecast, but marked divergences may be expected, in particular if key assumptions behind it change.

One part of the risk profile involves an assessment of the probability distribution of the inflation forecast, i.e. the estimated probability of different inflation outcomes in the future. This is done by examining the underlying determinants of inflation developments that could cause divergences from the main forecast. Examples of such uncertainties include global economic developments, domestic demand and developments in financial and FX markets. Calculation of the probability distribution of inflation forecasts is described in more detail in Appendix 3 in *Monetary Bulletin* 2005/1. Because of the high levels of inflation and uncertainties in recent years, the use of historical forecast errors may cause future uncertainties to be overestimated, if not at once then later on. Analysis of previous forecasts is useful for highlighting how large a part they should play in the decisions presented in *Monetary Bulletin*. However, it should not be forgotten that those decisions often aim to prevent the scenarios described in *Monetary Bulletin* from actually materialising.

The Central Bank publishes an annual survey of its inflation forecasting errors based on a variety of criteria, most recently in *Monetary Bulletin* 2005/2. This includes a comparison of the estimated confidence intervals with the distribution of the actual forecast after the Central Bank moved onto an inflation target. So far the root mean square error (RMSE) of forecasts has been estimated from relatively few measurements, but should become more reliable over time. Until the last *Monetary Bulletin* in July, the baseline forecast assumed an unchanged policy rate across the forecast horizon, which complicates comparison with earlier forecasts.

For many years, the Central Bank has published inflation forecasts with a horizon of up to one year. Table 1 shows the bias and RMSE in its forecasts up to four quarters ahead since 1994. The bias shows the forecasts' mean deviation from actual inflation and thus

whether inflation is being systematically over- or underforecast. By this criterion inflation has been underforecast two, three and four quarters ahead, to an increasing degree along the horizon. The RMSE measures how far on average the forecast value differs from the true value.

Table 1 Central Bank of Iceland inflation forecast errors since Q1/1994

	Q1	Q2	Q3	Q4
Bias	0.0	-0.2	-0.3	-0.5
RMSE	0.4	0.9	1.4	1.6

The divergence increases further along the forecast horizon, reflecting greater uncertainties then.

Table 2 presents the bias and RMSE one and two years ahead since the adoption of inflation targeting in Q2/2001. In all, 18 forecasts four quarters ahead and 14 forecasts eight quarters ahead have now been published which can be compared with actual inflation. Underforecasting is more pronounced two years ahead than one year ahead, although the difference is not substantial.

Table 2 Central Bank of Iceland inflation forecast errors since Q2/2001

	No. of measurements	Bias (%)	RMSE (%)
Four quarters ahead	18	-0.6	1.6
Eight quarters ahead	14	-0.9	1.7

Compared with the last survey of forecast errors in *Monetary Bulletin* 2005/2, the bias has increased both one and two years ahead. The RMSE, however, has decreased by 0.3 percentage points one year ahead but increased by 0.5 percentage points two years ahead. It is now greater two years ahead than one year ahead, contrary to the finding in the previous survey. Even though more measurements are included than in last year's survey, the sample is still too small to be conclusive.

Table 3 compares the distribution of measured inflation in forecasts over horizons of four and eight quarters respectively. With a sufficiently large sample, half of the forecasts might be expected to fall within the 50% confidence interval, three-quarters within 75% and nine out of ten within 90%. A comparison of the distribution of forecast errors with the assumed probability distribution reveals that the real proportions are lower for forecasts four quarters ahead but higher eight quarters ahead.

Table 3 Distribution of measured inflation based on confidence intervals

	No. of measurements	50%	75%	90%
Four quarters ahead	16 ¹	5 (31%)	9 (56%)	12 (75%)
Eight quarters ahead	12	6 (50%)	11 (90%)	12 (100%)

1. Only a point forecast was published in *Monetary Bulletin* 2004/1 and 2004/3. Therefore, 16 measurements are given in Table 3 but 18 in Table 2.

Of sixteen forecasts four quarters ahead, only five fell within the 50% confidence interval (31% of cases). Nine were within the 75% interval (56% of cases) and twelve within the 90% interval (75% of

cases). Of the twelve forecasts with a horizon of eight quarters, six were within the 50% confidence interval (50% of cases), eleven within the 75% interval (90% of cases) and all twelve (100%) within the 90% confidence interval. Inflation was therefore closer to the central probability distribution than the expected distribution indicated. However, the relatively few measurements involved should be borne in mind, and also that the probability distributions of previous forecasts are interdependent where they overlap.

Comparison of Central Bank and financial market analysts' forecasts

A comparison of forecasts by the Central Bank, Ministry of Finance and financial market analysts reveals that they are generally in broad alignment, as shown in Table 4. In 2004, analysts forecast on average an inflation rate of 3% one year ahead, while the Ministry of Finance forecast 3.3% inflation for 2005. The Central Bank also forecast inflation of 3.3% one year ahead in 2004, assuming an unchanged policy rate and exchange rate (based on the average of published forecasts over the year). Average year-on-year inflation in 2005 turned out to be 4%. In 2004, analysts forecast on average that inflation in 2006 would be 3.6%, the Ministry of Finance 3.3% and the Central Bank (assuming an unchanged policy rate and exchange rate) 3.2%.

In 2005, analysts forecast on average 4.3% inflation one year ahead but the Ministry of Finance 3.7%. In the Central Bank's baseline forecast, assuming an unchanged policy rate and exchange rate, 3.2% inflation was expected in 2006. The current outlook is that inflation in 2006 will be almost 7%.

Table 4 Comparison of inflation forecasts

	<i>Forecast in 2004</i>	
	<i>1 year ahead</i>	<i>2 years ahead</i>
Financial market analysts	3.0	3.6
Ministry of Finance	3.3	3.3
Central Bank	3.3	3.2
Statistics Iceland – measured inflation	4.0	-

	<i>Forecast in 2005</i>	
	<i>1 year ahead</i>	<i>2 years ahead</i>
Financial market analysts	4.3	5.3
Ministry of Finance	3.7	3.7
Central Bank	3.2	3.7