Appendix 1

Forecast errors in Central Bank of Iceland forecasts

The inflation forecast and analysis of economic prospects are one of the cornerstones of the Central Bank's monetary decision-making process. Due to the lags in the monetary policy transmission mechanism, it is vital for the Bank to have the clearest possible view of future inflation prospects and economic developments at any time.

Since the adoption of inflation targeting in March 2001, the Central Bank has published an inflation forecast two years ahead in its quarterly *Monetary Bulletin*. Confidence intervals have been included with the forecast, since the great uncertainty surrounding economic developments could make a simple point forecast misleading. Confidence intervals take into account various uncertainties that could lead to substantial deviations from the point forecast. Among them are changes in the global economic situation, exchange rate developments and various domestic factors. In evaluating inflation prospects two years ahead and possible monetary policy responses to them, the Central Bank also considers the risk profile of the forecast no less than the point forecast itself.

The Central Bank publishes a survey of its inflation forecasting errors once a year, most recently in *Monetary Bulletin* 2004/2. Evaluations of inflation forecasts focus on their bias and root mean square error (RMSE). The bias shows the forecasts' mean deviation from actual inflation and thus whether inflation is being systematically over- or under-forecast. The root mean square error measures how far on average the forecast value differs from the true value.

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 the Bank's forecasts since 1994. Both the bias and the RMSE increase as the forecast horizon lengthens, which is natural since the uncertainty increases further ahead. There are no indications of systematic under- or over-forecasting of inflation over this period.

Table 1 Central Bank inflation forecasting errors 1994:1-2005:1

	Forecast horizon			
%	*1 Q*	*2 Q*	*3 Q*	*4 Q*
Bias	0.0	-0.1	-0.2	-0.3
RMSE	0.4	0.8	1.3	1.6

Since moving on to an inflation target in March 2001, the Central Bank has also published an inflation forecast two years ahead. Table 2 presents the bias and RMSE since the adoption of inflation targeting. It shows that there is little discrepancy between the bias of the forecasts one and two years ahead, while the RMSE of the forecast two years ahead appears to be smaller. An explanation could

be that monetary policy is more capable of having an impact on inflation in the longer run due to the lags in the transmission mechanism. One should be careful, however, in interpreting these data due to the small number of data points available so far. Tables 1 and 2 show a similar RMSE one year ahead after the inflation target was adopted (1.5%) and over the whole period (1.6%). By comparison, the standard deviation of annual inflation over these periods is in the range 2-2½%.

Table 2 Central Bank inflation forecasting errors since 2001:2

	No. of measurements	*Bias (%)*	*RMSE (%)*
Four quarters ahead	13	-0.3	1.5
Eight quarters ahead	9	-0.4	1.2

Table 3 compares the estimated probability distribution of the inflation forecast with the distribution of actual inflation after targeting was adopted in 2001. Twelve forecasts four quarters ahead can now be compared with measured inflation over the same period. Of these, five fell within the 50% confidence interval (in 42% of cases), eight within the 75% interval (67% of cases) and eleven within the 90% interval (92% of cases). One forecast fell outside the 90% confidence interval, produced just before the beginning of the sharp depreciation of the króna in Q2/2001. Distribution of forecasting errors therefore closely matches the given probability distribution. Nine forecasts over a horizon of eight quarters can be tested. Five turned out to fall within the 50% confidence interval (56% of cases) and all nine within 75%. The confidence intervals two years ahead have therefore overestimated the measured distribution of inflation after two years.

Table 3 Distribution of measured inflation based on inflation forecast confidence intervals

	No. of measurements	*Within confidence interval*		
		50%	*75%*	*90%*
Four quarters ahead	12[1]	5	8	11
Eight quarters ahead	9	5	9	9

1. Only a point forecast was published in *Monetary Bulletin* 2004/1. Therefore, 12 measurements are given in Table 3 but 13 in Table 2.

Finally, when the forecast errors are examined in the context of exchange rate developments over the forecast period, a fairly clear relation can be seen between the deviations of the exchange rate from, first, the assumed rate in the forecast, and second, the one-year inflation forecast error. The relation is not so clear in forecasts two years ahead, which do not appear to be as sensitive to exchange rate changes as one-year forecasts. This implies that fluctuations in the exchange rate primarily affect the development of short-term inflation and have less impact on inflation in the long term. One explanation is that if the króna deviates significantly from an exchange rate that is compatible with the inflation target in the long run, this calls for a monetary policy response to correct the deviation.