

Box VIII-1

Central Bank inflation forecasting methods

The Central Bank of Iceland has published inflation forecasts for many years. Their importance increased significantly when the Bank adopted a formal inflation target in March 2001. Since then, the Bank has published a quarterly inflation forecast and risk profile over a two-year horizon in *Monetary Bulletin*.¹

Initially the Bank based its inflation forecasts on a simple single-equation model in which inflation was assumed to be determined by prices of imported goods, measured in domestic currency, and unit labour costs, i.e. wage growth in excess of labour productivity (see e.g. Gudmundsson, 1990). This model has performed quite well for forecasting, especially of relatively short-term inflation developments. However, its shortcomings became apparent in 1999. That year the exchange rate of the króna remained relatively stable, global inflation low and growth of wage costs moderate, but inflation was far in excess of Central Bank forecasts. The forecast errors were traced to the fact that the simple model ignored the impact of the output gap, which international research has demonstrated to be an important determinant of future inflation (see, e.g., *Monetary Bulletin* 2004/2, 36-37). The Bank therefore enhanced its inflation forecasting tools by incorporating a system of equations describing the interaction of inflation and wage growth and the impact of pressures in the goods and labour markets on the development of these aggregates (Pétursson, 2002). In addition, in recent years the Bank has used two other inflation forecasting models which assume stochastic trend behaviour in the long-term determination of the price level (Gudmundsson, 2002). The Bank has thus used four models for inflation forecasting in recent years and its baseline forecast has been the weighted average of these four models. Weights of individual models have varied according to the forecast horizon: those with sounder economic properties carry more long-term weight while those based more on statistical relationships weigh heavier in the short-term forecasts.

As described in Appendix 1 on pp. 61-63, the Central Bank has adopted a new quarterly macroeconomic model which is also used in preparation of its core inflation forecast. The inflation forecasting equation in that model is only estimated with data from 1992 and differs somewhat from the Bank's earlier forecasting models. The inflation equation in the macroeconomic model is given as the following Phillips curve:

$$\pi_t = \alpha\pi_t + \beta\pi_{t+1}^e + (1 - \alpha - \beta)(\pi^T - \pi)_{t-1} + \lambda x_{t-2}$$

where π_t is year-on-year inflation in quarter t , π_{t+1}^e is expected inflation² in quarter $t+1$, π^T is the Central Bank's inflation target, y_t is the output gap in quarter $t-1$ and x_{t-2} is the year-on-year change in the real exchange rate in quarter $t-2$ (an increase in x represents a real exchange rate depreciation).

The size of the parameters α and β determines the underlying inflationary behaviour. The higher the value of α , the more persistent is the impact of demand and supply shocks (changes in y and x) on inflation; the higher the value of β , the greater the impact of expectations on the future inflation outlook; and the closer that the sum of α and β is to zero, the more credible the inflation target. Since the sum of the three inflation parameters is equal to 1, this ensures

1. The determination of the risk profile for the inflation forecast is discussed in *Monetary Bulletin* 2005/1, Uncertainties in the Central Bank's inflation forecast, Appendix 3, 60-63.

2. Inflation expectations may be either adaptive, on the basis of a simple statistical model, or rational, based on repeated total modelling.

that the Phillips curve is vertical in the long run and inflation is equal to the target.

The main advantages of this inflation equation are that it has sound theoretical characteristics, is flexible to use and appears to describe inflation developments in recent years better than earlier models. In the future, the Central Bank's inflation forecast will be broadly based on the abovementioned model. Nonetheless, independent evaluation by the Bank's experts will still perform an important function in the final assessment of the inflation outlook. The Bank's earlier inflation models will also play an important part in estimates of forecasting uncertainties and preparation of risk profiles.

Sources

Gudmundsson, Guðmundur (1990): Tölfræðikönnun á verðbólgu á Íslandi árin 1962-1989 [A statistical survey of inflation in Iceland 1962-1989], *Fjármálatíðindi*, 37, 43-53.

Gudmundsson, Guðmundur (2002): Samband verðbólgu við laun og innflutningsverðlag [The relationship of inflation to wages and import prices], *Fjármálatíðindi*, 49, 23-34.

Pétursson, Þórarinn G. (2002): Wage and price formation in a small open economy, Central Bank of Iceland *Working Papers*, 16.