Box 3. Building the uncertainty interval associated with the baseline scenario inflation forecast

The emergence of unforeseen elements – such as shocks – in terms of both origin as well as regarding their magnitude or direction of action may very often impede upon the accuracy of the projection. Using forecast errors as a general measure for the uncertainty associated with the inflation forecast based on a macroeconomic model (namely the medium-term forecasting model used by the NBR) has an upside in that it provides a summary of the effects of all unforeseen shocks that acted in the past and thus led to *(ex post)* deviations of the inflation projection from actual levels. The methodology proposed in this box relies upon the use of forecast errors in constructing the uncertainty interval associated with the baseline scenario inflation forecast. This solution has the following advantages:

- it summarises the cumulative and quantifiable impact on inflation rate of all shocks from the past, irrespective of their nature and magnitude;

- by employing the entire track record of quarterly macroeconomic projections (starting from that published in the August 2005 *Inflation Report*), the deviations in both directions that led to over/underestimation of forecasted inflation will be captured;

- it avoids quantifying arbitrary assumptions on individual risk factors, which could prove to be the extremes in terms of their foreseen magnitude and their potential effects on the endogenous variables within the model;

- it features a certain flexibility, i.e. the uncertainty interval resulting from calculations related to forecast errors can be adjusted in order to reflect the assessments of monetary policy makers as regards the magnitude of future uncertainty relative to previous periods.

Among the downsides there is the fact that, seen as a synthetic measure, this methodology falls short of clearly specifying the relative importance of those risk factors considered as being highly relevant to the projection horizon.

The methodological details on the calculation of the uncertainty interval bounds include the following:

- forecast errors of projection cycles during August 2005 August 2008 were calculated as differences between the projected values (using the medium-term forecasting model) and the actual values of inflation on horizons spanning 1,2,..., 8 quarters ahead;

- the considered forecast errors were calculated on the basis of average quarterly inflation rates, not end-of-period rates, considering that the model is built on quarterly time series (in line with the horizon over which the described theoretical mechanisms have relevant efficacy);

- in order to summarise the gathered information, a synthetic indicator similar to MAE (mean absolute error) was determined for each relevant time horizon (1,2,..., 8 quarters ahead);

- results were adjusted using a logarithmic interpolation in order to smooth the uncertainty interval bounds and avoid the bias towards uneven narrowing/widening of uncertainty over various time horizons.

The size of the uncertainty interval associated with the baseline scenario inflation forecast should be interpreted in simple terms as a mean of the possible effects resulting from the future action of some risk factors uncertain at the current moment in terms of both origin and magnitude or direction. At the same time, it is a quantitative approximation of expected uncertainty incorporated in the inflation forecast.

Finally, for an effective impact on economic activity, the manner in which a central bank communicates its own assessments and uncertainties to the public is essential.