

Disclosure of interest rate forecasts and use of fan charts in Czech National Bank communications

(January 2008)

Starting from 2008, instead of providing a verbal description of the expected interest rate path the CNB will publish its interest rate forecast in numerical form, as a fan chart. This move, together with other changes to the inflation targeting regime (in particular the disclosure of the votes cast by the board members on interest rates by name), confirms the CNB as one of the most open inflation-targeting central banks. The text below explains the reasons underlying the CNB's decision to disclose its interest rate forecast, and describes how the fan charts are created and how they should be interpreted.

Greater openness

The greater monetary policy openness observed throughout the world in recent years has been widely welcomed both by central bankers and by other economists. Central banks' progress in this field enhances their monetary policy credibility and helps market participants and the public to better understand the decisions that are taken. Given the prominent role that expectations play in inflation, it is no wonder that inflation-targeting central banks are most active in the process of increasing openness.

However, the opinions on whether inflation-targeting central banks should publish interest rate forecasts are not entirely unanimous. Advocates of disclosure emphasise its positive effect on central bank credibility. If the public can better comprehend and assess the central bank's monetary policy decisions, its trust in the bank's ability to keep inflation on target increases. This in turn helps the central bank to anchor inflation expectations and steer market interest rates with longer maturities. At the same time, greater openness due to the disclosure of interest rate forecasts puts the central bank under increased pressure to improve the quality of its forecasting system. Research into the effects of greater monetary policy openness shows that interest rate disclosure has a significant impact on market expectations and increases market participants' ability to predict monetary policy decisions.

By contrast, opponents of interest rate disclosure claim that the central bank's forecast can affect the markets too much. Private entities may become over-reliant on the central bank's projection, not paying sufficient attention to their own information and analyses and then considering themselves "deceived" if the announced rate path does not materialise. Despite these reservations, the CNB believes that in the conditions of the Czech economy the benefits arising from the disclosure of interest rate forecasts outweigh the potential risks.

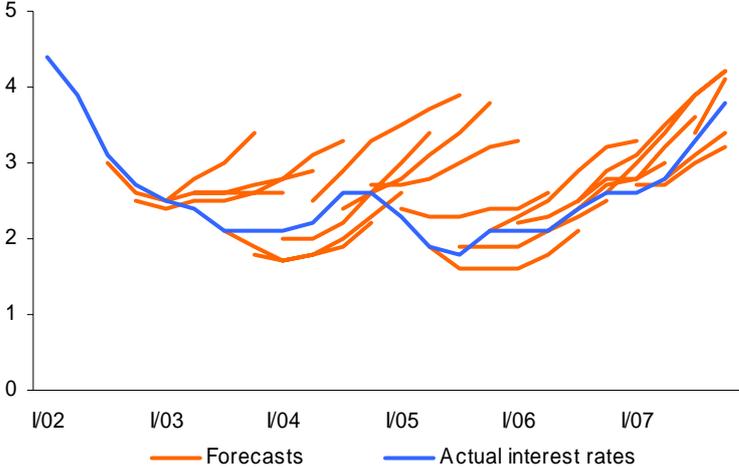
Not a commitment

It is vital, however, that all users of CNB forecasts are aware that the published interest rate outlook should in no way be interpreted as a commitment of the central bank to set interest rates in line with the forecast. There are two reasons for this. First, the forecast represents the most probable future path of interest rates under given initial assumptions and information. However, new information on the domestic and global economy that comes in after the forecast is drawn up can change the interest rate outlook. The task of the central bank is not to pursue its forecast come what may, but to keep inflation close to the declared target by setting appropriate interest rates. The second reason for viewing the published outlook as an

illustration of the future path rather than as a pledge, is that individual CNB Bank Board members may not entirely agree with the forecast prepared by the Monetary and Statistics Department or may regard the associated risks as being skewed to one side or the other. In such case it is possible that at its monetary policy meeting on the new forecast the Bank Board will make a rate decision that differs from the published outlook.

Chart 1 shows that interest rates have deviated from the forecasts in the past as well. The chart illustrates all the projected interest rate paths from individual consecutive forecasts as well as the actual interest rate path between 2002 and the third quarter of 2007. The interest rate shown is the three-month money market rate (3M PRIBOR), which is used in the CNB’s forecasting system to proxy for the CNB’s key monetary policy rate, i.e. the two-week repo rate. These rates may differ temporarily owing to changing expectations regarding the monetary policy settings in the coming three months or to changing conditions on the money market, but this difference is usually negligible with regard to the effect of monetary policy at the forecast horizon and to the CNB’s decision-making.

Chart 1: Interest rate (3M PRIBOR) forecasts and actual outcome



Fan charts capture the general uncertainty

Central banks deal with the potential misreading of their interest forecasts as an unconditional commitment by revealing the assumptions, risks and uncertainties surrounding the forecast. As a rule, central banks also publish their forecasts in the form of fan charts with confidence intervals around the most probable scenario, and sometimes also sensitivity analyses showing an alternative outlook for interest rates if the economy deviates from the baseline scenario. Foreign experience suggests that market participants in advanced countries have become accustomed to the conditional nature of interest rate forecasts.

To illustrate uncertainty, the CNB, too, will use fan charts when disclosing its outlook for interest rates and for headline and monetary-policy relevant inflation and its forecast for GDP growth (see Chart 2). The central line in each chart represents the baseline scenario of the forecast, and the bands around this line illustrate the uncertainty surrounding the forecast. The successively lighter bands represent widening confidence limits. The darkest band around the centre shows the development which can occur with 30% probability, while the other bands successively show the developments occurring with 50%, 70% and 90% probability.

The confidence intervals are constructed with reference to the errors of previous CNB forecasts for the relevant variables. The advantage of this approach is its simplicity and clarity and the fact that it captures all the types of uncertainty contributing to the non-fulfilment of the forecasts (the uncertainty regarding input assumptions as well as the settings of forecasting instruments). A potential disadvantage is that in the event of changing conditions and economic shock strengths the past prediction errors may not precisely capture the size of the uncertainty going forward. The confidence intervals should thus be regarded as only tentative.

Since the confidence intervals are symmetric and based on past forecast errors, the fan chart illustrates the general uncertainty surrounding the baseline scenario and cannot be used to determine the current magnitude or deviation of the forecast risks as assessed by members of the CNB Bank Board. This type of information can, however, still be obtained from other CNB communication tools, such as the alternative scenarios described in Inflation Reports, the press conferences on monetary policy decisions, the minutes of Bank Board meetings and the public statements made by individual Bank Board members.

Thus, when creating the confidence intervals in fan charts, we assume a symmetric normal distribution around the baseline scenario of the forecast. The variance of this normal distribution is based on the Root Mean Square Error (RMSE). The RMSE for a given forecast horizon is defined as follows:

$$RMSE = \sqrt{\frac{1}{8} \sum_{j=1}^8 (X_j - F_j)^2}$$

where X is the actual value of the forecast variable, F is the forecast for this variable drawn up in the past with a corresponding forecast horizon, and the difference $(X - F)$ is the forecast error. The RMSE is calculated from the errors of the last eight available forecasts, fulfilment of which can be assessed at the eight-quarter horizon. The RMSE for the individual forecast horizons is then further smoothed linearly so that the probability fan has a smooth shape. The RMSE is updated once a year. The confidence intervals are derived for the individual horizons and confidence levels from the relevant (smoothed) RMSE and the relevant quantiles of the normal distribution.

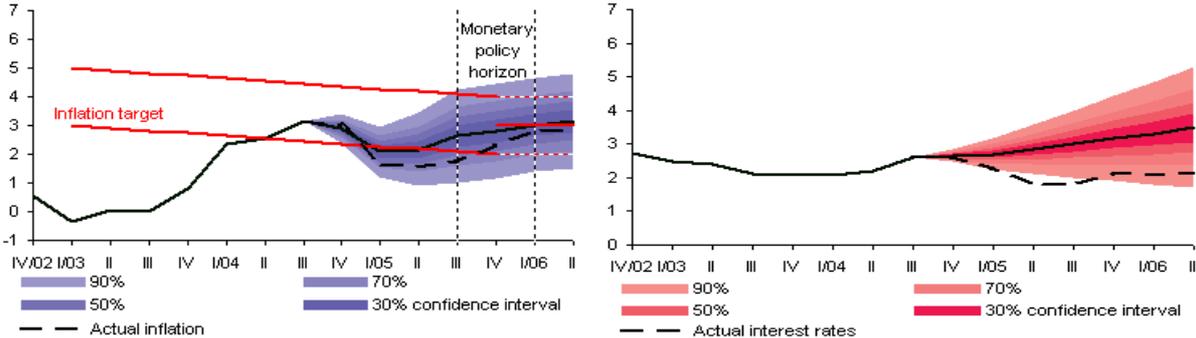
The confidence interval for the interest rate and GDP growth paths widens linearly over the entire forecast horizon, whereas that for headline and monetary-policy relevant inflation widens only for the first four quarters and then remains constant. This is consistent with the evolution of the CNB’s forecast errors to date and generally also with the inflation targeting regime, under which the central bank anchors inflation close to the target at the medium-term horizon, whereas the interest rate and GDP paths reflect the effects of unforeseen shocks faced by monetary policy.

Illustrative example

For illustration, Chart 2 displays the expected outlook for headline inflation and interest rates according to the October 2004 forecast in the form of fan charts. The solid line represents the past profile and the October 2004 forecast, while the dashed line shows the actual evolution of rates and inflation after this forecast was drawn up. At the time this forecast was published the chart could have been interpreted as saying, for example, that interest rates at the one-year

horizon would, with a probability of around 75%, be above the current level and that inflation at the same horizon would, with a probability of around 70%, be above the lower boundary of the CNB’s target at that time. It can also be seen, however, that in the period that followed inflation was below the centre of the CNB’s forecast. Monetary policy reacted to this and other new information with considerably lower interest rates so as to steer inflation back on target some time later. Monetary policy will continue to act in the same manner in the future, in line with the inflation targeting regime.

Chart 2: Fan-charts for headline inflation (left) and interest rates (right), October 2004 forecast vs. actual outcome



The fan charts capture the uncertainty surrounding the future evolution of consumer price inflation and interest rates. The darkest band around the centre of the forecast shows the development that can occur with 30% probability. The widening bands successively show the developments occurring with 50%, 70% and 90% probability.