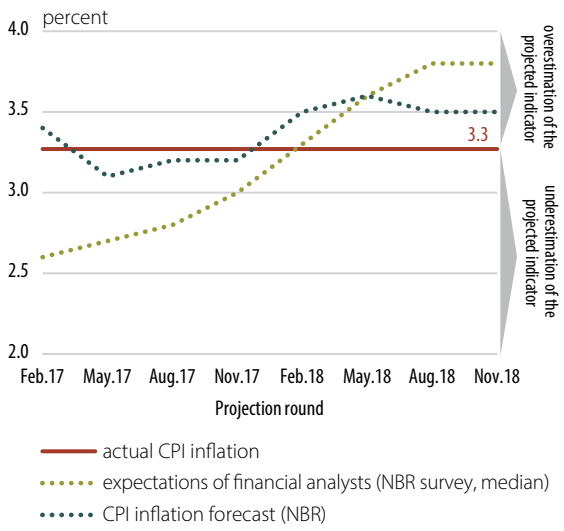
Box 2. Assessment of forecast errors for the December 2018 annual CPI inflation rate

Considering that the central bank's decisions work their way through the economy with specific time lags, macroeconomic forecasts play an essential part in the inflation targeting strategy, especially through the impact on economic agents' and consumers' expectations. The assessment of forecast errors is common practice among central banks with such a monetary policy regime in place, helping improve the forecasting framework. This box aims at assessing the accuracy of the forecasts that the NBR made in successive rounds for the end-2018 annual CPI inflation rate, thus carrying on the assessment process launched in the previous years. Relative to this point of reference, eight projection rounds were identified, corresponding to the *Inflation Reports* published from February 2017 to November 2018.

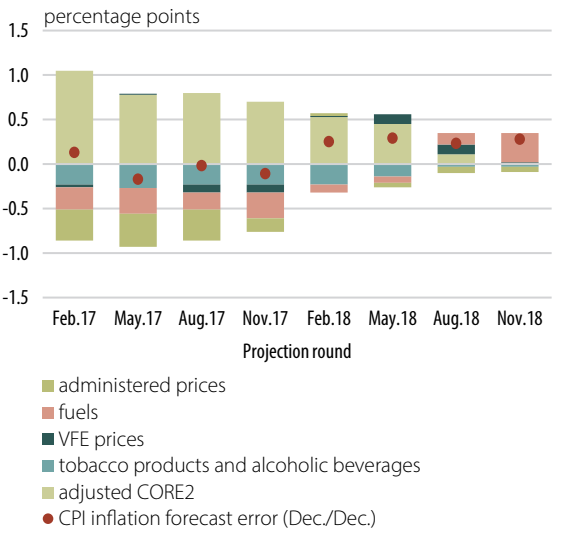
Chart A. Successive forecasts of annual CPI inflation rate for December 2018



Source: NIS, NBR projections, NBR survey

The annual CPI inflation rate reported at end-2018 (3.3 percent, according to NIS Release No. 17/ 14 January 2019) fell within the range of values projected by the NBR in the period under analysis. Thus, the forecast errors stood between -0.2 percentage points (for the May 2017 *Inflation Report*) and +0.3 percentage points (for the February 2018 *Inflation Report*), whereas, in absolute terms, the low corresponded to the August 2017 *Inflation Report*. The NBR forecasts were more accurate than the median of financial analysts' inflation expectations, retrieved from the surveys conducted by the NBR in the months when *Inflation Reports* were published, for comparability reasons (Chart A).

Chart B. Forecast errors in successive rounds distributed by contribution of CPI components



Source: NBR calculations

The breakdown of the forecast errors for end-2018 annual inflation rate by consumer basket components (Chart B) reveals that over most of the projection interval, to different extents, the tendency to overestimate core inflation was offset by the tendency to underestimate the components beyond the scope of monetary policy. In the first part, the largest contributions to underestimating inflation were made by administered prices, fuel prices and tobacco product prices, subsequently these contributions shrinking or even acting in the opposite direction (for instance, fuel price).

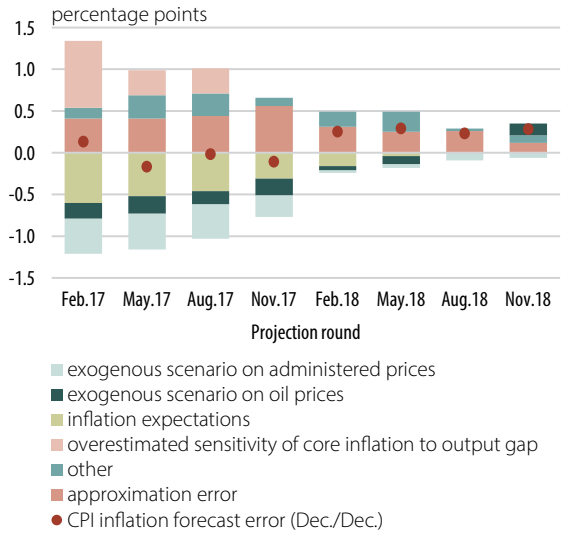
The annual growth rate of administered prices at end-2018 was mainly affected by the unanticipated hikes in natural gas prices implemented during

the year[1]. As these hikes were progressively incorporated into the trajectory of administered prices, their contribution to the underestimation of the annual CPI inflation rate diminished. At the same time, the unexpected shock from the fall in the electricity price seen in August 2018 reduced the contribution of administered prices to the forecast errors made in the November 2017 – May 2018 rounds.

The contribution of the fuel price to the underestimation of CPI inflation rate contracted during the period under analysis and even acted in the opposite direction in the last two rounds under review, in the context of the drop in the Brent crude oil price at end-2018. This evolution, which was not anticipated by the futures prices used for the forecast of future spot prices, took place amid the heightened uncertainty about supply-side factors overlapped by demand-side factors.

Tobacco products and alcoholic beverages contributed to the underestimation of the annual CPI inflation rate all through the eight rounds under analysis, in the context of the multiple unanticipated hikes implemented by the economic agents in the tobacco industry. These price increases were higher than those justified by fiscal changes, most likely reflecting the inelastic demand.

Chart C. Forecast errors in successive rounds distributed by contribution of MAMTF factors



Source: NBR calculations

In most forecasting rounds, the contribution of adjusted CORE2 inflation to the CPI inflation forecast errors partly offset the underestimation from exogenous components amid a favourable evolution of the prices of some agri-food commodities especially in the first part of 2018, with an impact on processed food prices. At the same time, the tendency to overestimate the sensitivity of core inflation to output gap relative to external factors led to the overestimation of adjusted CORE2 inflation in the first rounds under review, given the increase in the relative importance of the disinflationary global environment in explaining price dynamics in Romania to the detriment of domestic factors[2]. This matter and the other analytical determinants investigated are presented in Chart C, where forecast errors are decomposed based on the specific factors in the NBR's model for macroeconomic analysis and medium-term forecast (MAMTF)[3].

1 For more details, refer to the Romanian Energy Regulatory Authority press releases issued in 2018 available at: http://www.anre.ro/ro/presa/comunicate (Romanian only).

2 This assumption is also supported by the empirical evidence on Romania's higher trade integration with the EU, as well as by consumption being covered to a larger extent from imported goods than from domestically-produced goods, as underlined in Box 2 entitled "The relationship between economic activity and inflation" in the May 2017 *Inflation Report*.

3 This decomposition assumes counterfactual simulations in which projection input data (also called specific factors) are supposed to be exactly known (being assigned the actual historical values). The difference between the inflation projections released in the eight *Inflation Reports* and those resulting from the counterfactual simulations allows for determining the contribution made by each of the specific factors to the total forecast error.

At the same time, this decomposition highlights the errors owed to developments in the oil price and administered prices, as well as to the inflation expectations of economic agents, who anticipated a lower inflation rate for end-2018 in the first rounds under review. "Other" includes forecasting framework-specific factors (such as the risk premium, the cyclical component estimates for the main macroeconomic variables, historical data revision). Furthermore, re-running projections with updated factors for assessing their contributions to the annual inflation forecast error also involves a shift from the average quarterly inflation (modelled in the MAMTF) to end-of-period inflation, which implies an approximation error.