

What we know from core inflation measures? Evidence from the European Union countries

Aleksandra Hałka*, Grzegorz Szafranski*

Aleksandra.halka@nbp.pl; Grzegorz.szafranski@nbp.pl

*Narodowy Bank Polski

Extended abstract

The deep and long lasting decreases in consumer inflation, markedly below inflation targets, have been observed since 2012 throughout European Union economies. The period of persistently ultra-low inflation (nick-named as 'lowflation') is perceived as a challenge to conventional monetary policy, particularly in the presence of zero lower bound on short term interest rates and possible second round effects (Yossifov, Podpiera 2015). Many economists disregard deflation concerns by attributing the lowflation phenomenon to the supply shocks only. According to a 'good deflation' hypothesis the explorations of the unconventional sources of oil and gas lead to price decreases on global energy markets. However, the negative headline inflation data in many countries are accompanied with core inflation recording the historical lows, which brings the questions about the changes in the long-run level of inflation.

The aim of our paper is twofold. First we decompose the consumer inflation in several European economies into permanent (trend inflation) and transitory component. We believe that such a decomposition may help policy makers to identify the nature of shocks affecting inflation. We also document that, the proper identification of sources of inflation variability may be also useful in predicting future inflation.

Second, we investigate the role of the core inflation measures. As some authors point out core inflation is the part of the price index that mirrors the changes in the domestic demand pressure (see Roger, 1998). Other economists, however, postulate that core inflation should rather approximate the long-run trend inflation (Bryan and Cecchetti, 1994; Clark, 2001). In our paper we check whether the core inflation (HICP excluding energy and unprocessed food) is a good approximation of trend inflation or whether as argued by Bradley, Jansen, Sinclair (2015) by its construction a significant part of the permanent component is excluded. Moreover we investigate to what extent the core inflation may reflect the changes in demand pressure in the economy.

To answer these questions we decompose HICP into permanent and transitory components using unobserved components models as proposed by Bradley et al (2015) and compare the permanent HICP components with core inflations in EU countries. To address the question on the role of the core inflation we also construct regressions motivated by an open-economy backward-looking version of the Philips curve in which we compare the relevance of the output gap in shaping different inflation measures.

Bradley et al (2015) using unobserved component models evidence that permanent component of the US inflation is not well captured by a popular core inflation measure (like inflation excluding energy and food prices). Depending on the assumptions posed in the models they find that standard core inflation measures may temporally overstate or understate the true permanent component of inflation and that core inflation

does not include only permanent component but also a transitory one. Moreover, the excluded items (food and energy prices) contain both the transitory and permanent components. Similar findings have been reached by Stock and Watson (2016) – low volatility of US food inflation in 2000s supports its inclusion into their multivariate trend inflation index. 2

Our paper adds in two ways to the existing literature. First our research encompasses wider range of countries than in Bradley et al. (2015). It covers countries different in terms of economic development as well as trade openness which potentially can be affected to different extent by the external shocks. Second we conduct the analysis on the month-over-month logarithmic price to omit overlapping samples problems.

In the study we analyse the headline HICP and core inflation indices (ex. unprocessed food and energy) in 26 EU countries over the period 2001-2016 (for Hungary and Romania from 2002 due to limited core inflation data availability). First, we test whether headline and core inflation are unit-root or trend-stationary processes taking into account also possible breaks in their dynamics. Then, we apply unobserved component model across EU countries to disentangle trend components from temporary fluctuations. Following Bradley et al (2015) we allow for correlations between shocks to transitory and permanent components and across indices. To select the most appropriate approach to price dynamics we compare models with and without cointegration between the series and test for specific breaks in their long-run trends.

The main take away from our research to the monetary policy is firstly, although the energy and unprocessed food prices are volatile they also include part of the permanent component of the inflation. Therefore, the measure that excludes these sub-indices is not the best approximation of the underlying inflation in particular in the period of the long-lasting commodity shocks. Secondly, despite that the most of the economists argues that the core inflation measures should reflect the trend inflation rather than the fluctuation of the demand pressure we also find a positive correlation between core inflation and output gap. This result supports the hypothesis that the price changes on the global commodity markets over the last decade were more supply- than demand driven.

Looking into the relationship between core inflation and the estimates of trend inflation from unobserved components model our detailed results are:

1. Core inflation (ex. energy and unprocessed food) is not the best approximation to trend inflation. Another candidates for trend inflation measures are permanent components in HICP and core inflation extracted from multivariate unobserved components models (Stock, Watson, 2015). In fact, there is no evidence on the cointegration of overall consumer price level (HICP-all items) and its core components in EU countries. In a consequence:
 - a. headline and core inflation may diverge from each other for a long time without any error-correcting mechanism, which ensures that core inflation reflects the long-term trajectory of the HICP-all items inflation,
 - b. after the outbreak of the sovereign debt crises in EU the divergence between HICP and core inflation widened,

2. The volatility of the HICP permanent component is higher than volatility of the core inflation. According to our estimates the smoothing of core inflation by exclusion of the volatile food and energy components is excessive. It results from negative correlation of core inflation transitory shocks with the permanent ones.
3. Permanent shocks to HICP-all items index and transitory shocks to core inflation are predominantly negatively correlated i.e. persistent shocks are followed by equilibrium restoring short-term fluctuations which offset initial shock as in Bradley et al. (2015),
4. In most of the countries core inflation is unbiased estimator of trend inflation and only in a few countries these indices are highly positively correlated (the Czech Republic, Greece, Latvia, Sweden and Slovakia).
5. Inflation rates in EU countries in 2000s happen to be quite persistent (permanent shocks to prices dominate over transitory components) but still if we allow for breaks in the mean of the long-run trend inflation they are stationary. Additionally, consumer price indices (both HICP and core inflation) of the analysed UE countries do not exhibit similar dynamic pattern. Depending on the country and the index the analysed inflation rates are stationary around a constant or time-varying mean (with the break in most cases connected to the sovereign debt crisis).
6. There is a prevailing evidence of moderate correlation between core inflation and output gap across many EU countries. In some of euro area economies (Belgium, Cyprus, Greece, France, Italy, Slovenia) trend inflation calculated as permanent HICP component is also closely related to economic slack.

Selected literature:

Bryan M. F. and Cecchetti S.G., Measuring Core Inflation, in Mankiw. G, ed., Monetary Policy, University of Chicago Press, 1994.

Bradley, M. D., Jansen, D. W. and Sinclair, T. M., 2015. How Well Does "Core" Inflation Capture Permanent Price Changes?, *Macroeconomic Dynamics*, Cambridge University Press, 19(04), 791-815.

Clark, T., (2001), Comparing measures of core inflation, *Economic Review*, Q II, 5-31

Iossifov P., Podpiera J., (2015), Low Inflation and Deflation in EU Countries Outside the Euro Area. Should Policymakers be Concerned?, *Swedish Institute for European Policy Studies*, 2015:19epa.

Stock J. H., Watson M. W., 2016. Core Inflation and Trend Inflation, *Review of Economics and Statistics*, 98(4), 770-784.