
Underlying inflation and asymmetric risks

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Underlying inflation – even absent a single definition agreed upon by all analysts – can be broadly defined as the persistent component of headline inflation. Measures of underlying inflation represent an important piece of information for the conduct of monetary policy. Central banks, such as the ECB or the Federal Reserve, typically rely on a variety of indicators of underlying inflation to make a robust assessment of inflationary pressures. Underlying inflation is for instance a key input to calibrate ECB policy tightening faced with the ongoing persistent inflationary episode (see Lagarde, 2023, Lane, 2023, Villeroy de Galhau, 2023).

Underlying inflation indicators are typically constructed either based on the exclusion of certain volatile items from the consumption basket or based on econometric models that estimate the persistent component of inflation dynamics. Exclusion-based measures do not account for the contemporaneous contribution that volatile items – such as energy or food – may have on underlying inflation. Model-based measures tend to rely on the assumption that underlying inflation can only exhibit smooth changes over time, commonly modeled as a random walk. These characteristics can be challenged in some contexts like the current one, where the abrupt surge in energy prices has rapidly spilled over other items in the consumption basket.

Against this background, this paper proposes a new measure of underlying inflation for the Euro Area that is built upon a nonlinear econometric framework that is based on estimating a regime-switching model at the sectoral level, using Bayesian methods. The proposed measure relies on all items of the HICP by considering special aggregates sub-indices of headline inflation over the sample 1999:1 to 2023:3. The resulting indicator is labeled ICARIS (Indicator of Core by Aggregating Regimes of Inflation Sub-components). We view our indicator as a relevant addition to the existing set of indicators of underlying inflation.

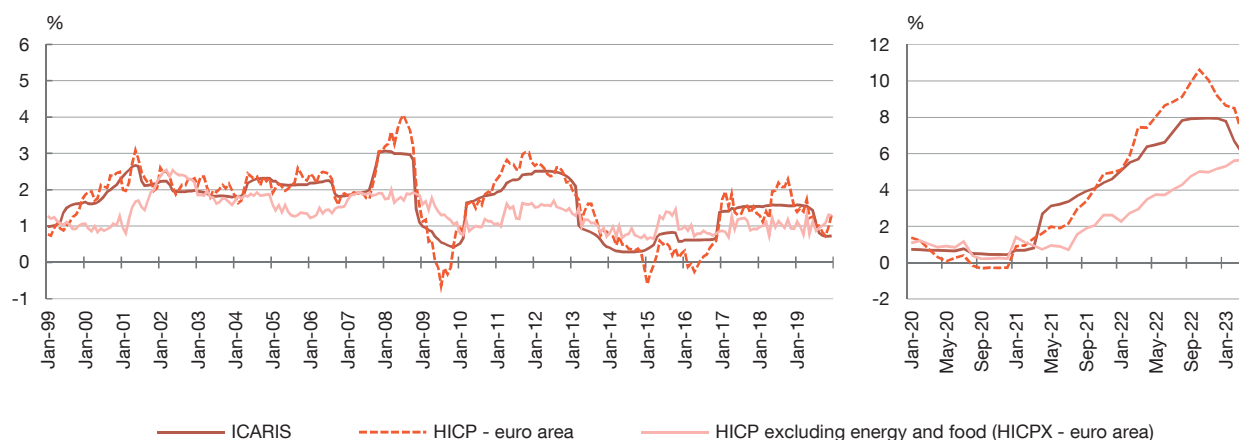
In relation to the existing literature on underlying inflation measures our approach has three main characteristics. First, it relies on regime switches to identify periods of sustained high and low inflation, where we allow information on real activity – proxied by the euro area Industrial Production Index – to inform about the transitions between inflation regimes. Second, the proposed underlying inflation measure relies on a disaggregate, bottom-up approach. In particular, underlying inflation is computed by aggregating the regime-dependent persistent components over sub-indices of headline inflation using their corresponding weights on headline HICP. Third, our approach allows us to quantify the asymmetric tail risks associated with future headline inflation.

Figure 1 plots our measure of underlying inflation. The ICARIS is characterized by strong persistence. This is an appealing feature as this underlying inflation measure is not influenced by erratic movements often displayed in the inflation rates of special aggregates. Despite its persistence, the ICARIS can rapidly adjust to new inflation environments. Based on these two features, our measure of underlying inflation can be also interpreted as a “locally inferred trend inflation”, since it measures the average strength of headline inflation, but takes into account different states of nature.

Our indicator comes with several advantages concerning the existing measures of underlying inflation. First, the regime-switching approach allows for non-linearity in inflation dynamics. To our knowledge, this is the first indicator of trend or underlying inflation built in this set-up. Incidentally, we do not assume trend inflation follows a unit root process, by contrast with an assumption often adopted in trend-cycle decompositions of inflation. Our approach is in this respect in better accordance with the non-explosive inflation behavior in inflation targeting or price-stability-oriented monetary jurisdictions.

Second, depending on the synchronization between the different special aggregates of headline inflation, the transition from (say) a low underlying inflation regime to a higher inflation regime could be either smooth or immediate. This is a particularly relevant feature in the current situation. In this vein, we document an asymmetric propagation pattern of euro area inflationary pressures over time. Transitions from

Figure 1



NOTES: The ICARIS is obtained as a weighted average of the persistent components of inflation associated with the special aggregates of HICP. Inflation measured by the euro area HICP and HICPX are also represented by the dashed blue and solid orange lines, respectively, for reference purposes. The sample covers 1999:01- 2023:03.

low- to high-inflation regimes are immediate, implying a simultaneous switch across headline HICP sub-components. Instead, transitions from a high- to a low-inflation regime are smooth and sequential across sub-components of headline HICP.

Third, given its nonlinear nature, our approach allows for inferences on structural breaks without the need to restrict the sample on a priori grounds, as the regimes are endogenously inferred from the data. This feature is particularly important when producing real-time inferences of underlying inflation during unprecedented episodes, such as the abnormally high euro area inflation rates observed since late 2021.

Our indicator is also able to provide not only assessments on the level of underlying inflation but also a robust characterization of the entire distribution of this latent variable. Moreover, our measure comes with a non-trivial expected future path – driven by the transition probabilities and the expected value of the persistent component – which is induced by the nonlinear nature of the estimated persistent component of inflation. Therefore, our model can be used to quantify asymmetric tail risks associated with future headline inflation dynamics. This is not possible in non-model-based approaches such as exclusion-based measures (e.g. the

trimmed means) since, by construction, do not come by themselves with an indication of the current short or medium-term trend. As regards trend-cycle decompositions (such as the UC model), while they are based on models able to generate forecasts, they typically rely on a random walk process for trend inflation. Therefore, they are not particularly informative in that respect, as trend inflation is by construction expected to stay constant at any horizon.

In addition, we document that our measure displays a good performance when used in a real-time context and is also competitive in the forecasting arena when compared with existing underlying inflation measures. We illustrate how the indicator and associated statistics allow us to timely track regime changes in underlying inflation, including during the recent inflationary episode.

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