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A critical assessment of existing estimates of US core inflation ☆

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ABSTRACT

Core inflation rates are widely calculated. The perceived benefit of core inflation rates is that they help to inform monetary policy. This is achieved by uncovering the underlying trend in inflation or by helping to forecast inflation. Studies which compare core inflation rates frequently assess candidate core rates on these two criteria. Using US data, the two standard tests of core inflation – the ability to track trend inflation and the ability to forecast inflation – are applied to a more comprehensive set of core inflation rates than has been the case in the literature to date. Furthermore, the tests are applied in a more rigorous fashion. A key difference in this paper is the inclusion of benchmarks to the tests, which is non-standard in the literature. Two problems with core inflation rates emerge. Firstly, it is very difficult to distinguish between different core rates according to these tests, as they tend to perform to a very similar level. Secondly, once the benchmarks are introduced to the tests, the core inflation rates fail to outperform the benchmarks. This failure suggests that core inflation rates are of less practical usefulness than previously thought.

1. Introduction

The fundamental idea underlying the concept of core inflation is that inflation is ultimately determined by monetary growth in the long-run. In the short-run, non-monetary factors mean that the actual inflation rate differs from the core rate. The concept of core inflation is important because it provides a clear picture of the underlying trend in prices. This is in contrast to the actual inflation rate, which is inadequate for this purpose, as it is designed to measure changes in the cost of living. As such, the core rate is of particular importance in a policy context. Information regarding the true trend in prices is critical to policymakers given the long and variable lags between the implementation of monetary policy and its effect on inflation.

Like many other important economic concepts such as potential output or the NAIRU, core inflation is not an actual series and instead must be estimated. Its usefulness as a policy tool depends critically on the accuracy of the estimation method used to construct the core rate. Methods used to calculate core inflation include removing volatile items from the calculation of inflation, statistical filters, SVAR methods, trimmed means and factor models so there is a broad range of core inflation estimators. There is an existing literature that compares the relative merits of core inflation rates based on their policy usefulness. The two tests of policy usefulness most commonly used are the ability to track trend inflation and the ability to forecast actual inflation.

Using US data, this paper proposes the most rigorous examination of core inflation estimates to date. The contribution of the paper is threefold. Firstly, in relation to the trend tracking test, the standard approach to date involves estimating the

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core rate and the trend over the full sample. This paper implements the test recursively and so provides a more realistic assessment of the ability of core inflation rates to track trend inflation. Secondly, the forecast tests in the core inflation literature frequently omit a benchmark forecast from the comparison and instead only rank candidate core inflation rates. This is despite the convention in the forecasting literature of including a benchmark model. In this paper, benchmarks are included in both the forecasting tests and the trend tracking test. The introduction of a benchmark forecast to a core inflation paper is not novel. However, studies with benchmark forecasts have typically focused on a small number of core estimators and it has generally not been implemented for the US. In contrast, the introduction of the benchmark to the trend tracking test is novel. The final contribution of the paper is that the comparison exercise is the most exhaustive to date in terms of the range of core inflation estimators included. Most papers focus on a specific type of core inflation estimator whereas a number of core inflation estimators are included in this paper.

The paper finds that core inflation rates are no better at forecasting inflation or tracking trend inflation than the benchmarks included in the tests. In short, the benefit of core inflation rates to policymakers is overestimated. New uses of core inflation rates could exist. This paper suggests two alternative tests of core inflation, less stringent that those currently employed, but the performance of existing core inflation estimators is still relatively poor according to these alternative tests. It may also be possible to use existing estimators more efficiently. For example, although this paper shows that the standard forecasts of inflation based on an inflation gap fail to outperform a benchmark, other specifications or estimation techniques involving existing core rates might be found that could improve on the benchmark. Section 2 contains a literature review and highlights the contribution of the paper. Section 3 outlines the estimators used in the paper, including any issues in the estimation. Section 4 critically evaluates the performance of the core estimators and section 5 concludes the paper.

2. Literature review

In tackling the issue of core inflation, the initial focus in the literature was simply to construct new estimates. A number of approaches were taken but these can generally be classified as either structural or statistical. The most basic statistical approaches simply involve excluding certain components, such as the volatile food and energy components. This type of core inflation rate is routinely calculated by national statistical agencies. More sophisticated techniques include statistical filters. The Hodrick–Prescott (HP) filter has been widely applied to economic time series, including inflation and provides one core estimate. The HP filter has been criticised in the past, particularly in relation to the well-known end-point problem. Baxter and King (1999) propose an alternative filter, based on the spectral decomposition of a time series. It involves filtering parts of the series that lie between certain frequencies and this can be also used as a measure of core inflation.

Bryan et al. (1997) propose the use of trimmed means as estimators of core inflation. Based on the notion that the headline rate can be significantly affected by large price changes in individual components, the trimmed means exclude these items and are considered robust to these outliers. Subsequent to their paper, trimmed mean estimates were calculated for a large number of countries. In this paper, we calculate trimmed means using two alternative weighting systems.

Persistence measures of core inflation can also be calculated. These measures are based on the persistence of the individual components that constitute the inflation rate. Persistence is estimated using an autoregressive model. Cutler (2001) applied this approach to UK data using only one lag for all series whereas Bilke and Stracca (2007) apply a similar approach to Euro Area data but measure persistence with the lag length determined using traditional lag selection tests. One of the core inflation measures examined in this paper is the Bilke and Stracca (2007) approach. This type of core inflation measure is rarely calculated so its inclusion in the comparison should shed some light on its relative merits.

The structural approach considered is the structural VAR as this is clearly the most prevalent structural approach to estimating core inflation. The methodology used is that proposed by Quah and Vahey (1995) with a standard long-run restriction. According to their approach, "inflation is assumed to be affected by two different types of shock, distinguished by their effect on output. The core inflation shock is output neutral after some fixed horizon whereas the non-core shock is allowed to influence output in the long-run". Following identically the method of Quah and Vahey (1995), a bivariate VAR is estimated using the assumption that the core shock is output neutral.

The final type of core inflation rate included in the paper is a dynamic factor model estimate. Factor models are used when analysing a large volume of data such as the individual price series that make up the overall inflation rate. Following the approach of Stock and Watson (2002), the factor model finds the common element in all these price changes. The benefit of this type of approach is that it takes both time series information, cross-sectional information and frequency domain information into account.

The papers mentioned so far relate to the estimation of core inflation. Other papers in the literature aim to compare and assess various core inflation measures. This paper compares core inflation measures but considers a broader range of core inflation series than other papers in the literature. For example, Clark (2001) compares core inflation measures but concentrates chiefly on exclusion based statistical measures. In a study on German data, Landau (2000) includes the structural VAR but omits a number of important statistical estimators. Smith (2004) examines filters, trims and some exclusion measures, as do Rich and Steindel (2007). The scope of this paper includes all major estimation methods.

Many papers rank core inflation rates based on their ability to forecast actual inflation. Given the well documented difficulties associated with forecasting inflation it is somewhat surprising that this is such a popular yardstick. It is in some part due to the manner in which the forecast comparison exercises have been conducted. Although not an exhaustive list, Cogley