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Do core inflation measures help forecast inflation?

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Abstract

We conduct cointegration and Granger causality tests for traditional and new measures of core inflation. We find that both measures are consistent with desired properties of measures of underlying inflation, but neither is very useful for forecasting purposes. © 1998 Elsevier Science S.A.

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1. Introduction

Monetary policymakers are confronted with some price changes that are permanent and some that are temporary. Since measures of inflation may be especially vulnerable to the volatility of a few key components, economists have developed alternative measures, called ‘‘core’’ inflation rates, that attempt to identify permanent trends in inflation by eliminating temporary price fluctuations. A number of observers argue that core inflation is a better measure of the ‘‘underlying trend’’ of inflation, which may be important in the formation of inflation expectations. This paper examines how well alternative measures of core inflation forecast future inflation rates.

The standard approach to segmenting core and transitory components of inflation is to remove, in a more or less arbitrary way, ‘‘noisy’’ elements from, say, the Consumer Price Index. The Bureau of Labor Statistics (BLS) subtracts food and energy components from CPI to obtain core inflation (Brauer and Wu, 1991). Other techniques, based on the time series properties of the CPI, have included smoothing the index via moving averages or processing it via a Kalman Filter.

An alternative measure of core inflation, suggested by Bryan and Pike (1991) and further developed by Bryan and Cecchetti (1993), is motivated by the observation that the distributions of prices are characterized by skewness caused by the asymmetric reaction of price-setting agents. Since only those agents who have relatively low adjustment costs and relatively large price shocks may choose to respond immediately with price increases, using the mean of the distribution of initial price changes may overstate the response to shocks. Bryan and Cecchetti (BC) propose truncating the distribution of

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price changes to eliminate outlying observations and provide a more representative measure of central tendency, or core inflation. They examine two measures, a trimmed mean (with the 7.5% tails removed), and the weighted median of the distribution of price changes. Because BC find that the median fares best in their statistical tests, and because the Federal Reserve Bank of Cleveland has begun publishing monthly estimates of the median CPI,[1] we focus on BC's weighted median as the alternative to the BLS measure of core inflation.

This study is motivated by two concerns: 1) to examine the time series properties of two measures of core inflation, change in CPI less food and energy (CPILFE), the BLS measure, and change in median CPI (CPIMED), the BC measure, for consistency with the time series properties of total inflation; 2) to test, using cointegration and error-correction techniques, the usefulness of these measures as forecasts of inflation. We will also test the hypothesis that CPIMED is clearly superior to CPILFE as a measure of core inflation..

2. Stationarity and cointegration tests of core inflation measures

For any interval, total inflation can be decomposed into core and transitory components:

$$p_t = p_t^{\mathrm{c}} + p_t^{\mathrm{e}}, \tag{1}$$

where small letters denote differences in logs. Temporary perturbations to inflation, p_t^{e}, are caused by events, e, such as weather, supply/demand disturbances, etc. The transitory component does not have the characteristics of usual disturbance terms, since each event will be unique, so concepts like weak stationarity may be overly stringent. Nevertheless, we expect any realization of p_t^{e} to have zero mean and finite variance, so that nonstationarity in the unit root sense is ruled out.

The stationarity of inflation is a matter of some debate in the literature,[2] with conclusions varying with time periods and frequency of observation. If total inflation is nonstationary and integrated of order d, or I(d), meaning that it must be differenced d times to achieve stationarity, then core inflation must also be I(d), given the assumptions on p_t^{e} (Box and Jenkins, 1976, p. 122). Furthermore, in the case that inflation is I(1), a meaningful definition requires core inflation also to be I(1) and *cointegrated* with total inflation such that $\pi_t = p_t - \beta p_t^{\mathrm{c}}$ for some (unique) β is stationary. Given the assumption of zero mean for transitory elements of inflation, $\mathscr{E}[\beta] = 1$.

BC conduct stationarity tests for CPI inflation, CPILFE and CPIMED, but draw incorrect conclusions from their results. In the text of their working paper (but not in the note to their Table 2, p. 11) they state that the Dickey–Fuller test ''fails to reject stationarity in all of the series''. A correct interpretation of their findings, however, is that the Dickey–Fuller statistics (which are all greater than the 10% critical value for BC's tests) fail to reject *nonstationarity* (the null hypothesis of the Dickey–Fuller tests) in all of the series. BC's evaluation of inflation series using least squares on inflation levels is an inappropriate procedure for nonstationary variables.[3]

[1] See, for example, ''Median CPI up 0.3% in February'', news release from the Federal Reserve Bank of Cleveland (1997) March 19.
[2] Mishkin (1984) and Schwert (1987) provide evidence of unit roots in various measures of inflation.
[3] See, for example, Enders (1995), p. 213.