

Core inflation in the Philippines: measurement and evaluation

Carlos C. Bautista

Abstract

Selected core inflation measures are computed for the Philippines using monthly CPI data. Based on a series of tests to determine the presence of desirable statistical properties, the recently proposed independent inflation rate and the traditional exclusion method appears to be adequate measures of Philippine core inflation. Limited influence estimators performed poorly in the statistical tests.

Keywords: headline inflation, independent inflation rate, trimmed mean inflation, weighted median inflation, exclusion method

JEL classification: E31

Original version: April 2003
This version: December 2005

Correspondence:

Carlos C. Bautista
College of Business Administration
University of the Philippines
Diliman, Quezon City 1101, Philippines

Tel +63-2-928-4571
Fax +63-2-920-7990
E-mail bautista@up.edu.ph
Web www.up.edu.ph/~cba/bautista

The author is grateful to the National Economic Development Authority (NEDA) policy and planning staff of the Philippines for providing the CPI data set used in this study and Maria Socorro G. Bautista for comments on an earlier draft. The usual disclaimer applies.

Core inflation in the Philippines: measurement and evaluation

1 Introduction

The success of inflation targeting as a monetary policy strategy in some developed economies in the previous decade and its recent adoption by several more countries have stimulated research on the measurement of trend or underlying inflation, more popularly termed core inflation. Core inflation measurement attempts to produce inflation estimates that are free from the effects of relative price movements.¹ Estimates of core inflation are important in the inflation targeting framework because both real and nominal shocks can, independently of each other, influence headline inflation (percent change in the all-items-CPI). A central bank that targets headline inflation must have at hand an appropriate measure of core inflation to be able to distinguish these shocks from one another and respond appropriately.

Finding a good measure of core inflation is difficult because it is not normally computed by government statistical agencies, in part because there is generally no agreed upon definition of core inflation. Like potential output, this variable is practically unobservable and the task of measurement falls on end-users: central banks and economic planning agencies. In the Philippines, monetary policy is currently being redirected towards an inflation targeting framework (Tuaño-Amador and Paraso, 2002), and an inter-agency committee has been assigned to construct a viable measure of core inflation. This study attempts to measure and evaluate selected core inflation indicators using monthly Philippine data from 1991 to 2002. These are the exclusion method, the independent inflation rate (IIR), the weighted median inflation and the trimmed mean inflation.

¹ Relative price changes are essentially supply shocks that can under particular situations significantly influence aggregate inflation in the short-run. The oil shock of the 1970s is a good example.

2 Selected measures of core inflation

Since the early 1990s, a variety of methods to compute core inflation have been proposed. One of the earliest methods used to arrive at core inflation is the exclusion method. In the Philippines, the National Economic Development Authority's (NEDA) core inflation estimate excludes the following commodities from the CPI: rice, corn, fruits and vegetables, fuel, and transportation and communication services. This core inflation estimate is shown in the lower left panel of Fig. 1 along with headline inflation.²

Another frequently used method introduced by Bryan and Cecchetti (1993) belongs to a class of estimators known as limited influence estimators. Positive (or negative) skewness in the distribution of rates of change of the CPI components may lead to an aggregate inflation rate that is too high (or too low) as reflected by headline inflation.³ To avoid over- or under-estimation of inflation due to relative price changes, a limited influence estimator trims off the tails of the distribution by setting the weights of tail components to zero and re-computing aggregate inflation using the remaining weights that are re-scaled to sum to 1. For example, a 15% trimmed mean inflation rate cuts off from each tail of the distribution, 15% of the lowest and highest commodity inflation rates. A 50% trim yields the weighted median inflation rate. Estimates of the 15% trimmed mean and weighted median inflation rates are shown in the upper portion of Fig. 1 together with headline inflation.

² Monthly CPI data with 28 components from 1991 to 2002 and the 1994 CPI weights are used. NEDA computes core inflation as $(p_t/p_{t-12}) - 1$. For consistency in this study, all rates of inflation including the exclusion method of NEDA are computed as $\ln(p_t/p_{t-12})$. Phillips-Perron tests indicate nonstationarity of headline inflation and all core inflation estimates in this study.

³ The mean-skewness relation can be explained through menu cost adjustments by firms as analyzed in detail by Ball and Mankiw (1995). Their study can be used to justify trimmed-mean core inflation estimates.

The independent inflation rate (IIR) is a fairly recent technique suggested by Arrazola and de Hevia (2002) to measure core inflation. The IIR is constructed in such a way that movements in IIR are contemporaneously orthogonal to variations in relative price inflation rates. For N components of the CPI, the IIR may be defined as:

$$\pi_t^* = \sum_{i=1}^N \alpha_i \pi_{it} \quad (1)$$

such that:

$$\text{cov}[\Delta\pi_t^*, (\Delta\pi_{it} - \Delta\pi_{jt})] = 0, \quad j = 1, \dots, N-1; \quad i \neq j \quad \text{and} \quad i = \text{any of the } N \text{ goods} \quad (2)$$

The α_i s are non-negative weights and $\sum_i \alpha_i = 1$. The method requires the determination of this set of weights for which the $N - 1$ orthogonality conditions in Eq. (2) hold. These researchers show that the weights can be obtained by running an OLS regression of the form:

$$\Delta\pi_{1t} = \alpha_2 (\Delta\pi_{1t} - \Delta\pi_{2t}) + \dots + \alpha_n (\Delta\pi_{1t} - \Delta\pi_{Nt}) + \varepsilon_t \quad (3)$$

where $\varepsilon_t = \Delta\pi_t^*$ is the residual, $\alpha_1 = 1 - \sum_{i=2}^N \alpha_i$ and the dependent variable is the arbitrarily chosen numeraire. They compute the IIR using Spanish data and show marked differences between this and the previous measures. The IIR estimate for the Philippines is shown in the lower right portion of Fig. 1. The IIR weights estimated for major commodity groups using OLS is shown in Table 1 along with the official weights.

3 Evaluation of core inflation estimates

In the literature, core inflation measures are evaluated by comparing each measure with a reference measure like the centered moving average of headline inflation. The measure that has the lowest mean square error is deemed the most efficient measure. Some studies, such as those

of Freeman (1998) and Le Bihan and Sédillot (2000), try to determine headline inflation forecast accuracy as a way to evaluate core inflation.

An alternative and easy to implement evaluation procedure recently proposed by Marques et al (2002, 2003), and the one used in this study, sets three conditions that a useful core inflation measure should satisfy. The basic ideas embodied in this evaluation procedure are that (1) core and headline inflation should not systematically deviate from each other since the latter is just the sum of the former and a mean zero transitory disturbance, (2) core inflation must be an attractor for headline inflation and (3) the reverse of (2) must not occur. Verifying that these conditions hold is made using a sequence of statistical tests that the measure must be subjected to.

The statistical tests for these properties of core inflation and the relevant OLS regression equations are summarized in the second column of Table 2. Condition 1 implies that headline inflation, π_t , and core inflation, π_t^* , should be cointegrated in a manner in which the cointegrating regression has a zero intercept and a slope equal to one. This effectively means that the difference between headline inflation and core inflation, $\pi_t - \pi_t^* = z_t$, is stationary with a mean of zero. For this reason, (a) a Wald test on the cointegrating regression is performed to jointly test if the intercept is zero and the slope is equal to one and (b) a unit root test on the difference between π_t and π_t^* is done using a test equation with neither intercept nor trend. Here, condition 1 is satisfied if the Wald test does not reject the null and the unit root hypothesis is rejected.

Conditions 2 and 3 are tested using an error correction (EC) model of π_t and π_t^* in which restrictions on the cointegrating regression tested in condition 1 are imposed. Condition 2 which states that π_t^* is an attractor for π_t , implies that there should exist an EC mechanism for headline inflation as evidenced by a statistically significant EC coefficient in the EC equation for π_t . A simple t -test is conducted here.

Condition 3 (π_t is not an attractor for π_t^*) requires core inflation to be strongly exogenous in the EC model. While condition 2 requires π_t^* to Granger cause π_t through the EC mechanism, condition 3 makes sure that π_t does not Granger cause π_t^* . As an attractor for π_t , core inflation performs its role as a leading indicator for headline inflation. To make sure that there are no role reversals, the core inflation measure must meet the requirements of condition 3. This is satisfied if the EC coefficient in the EC equation for π_t^* and all the coefficients of lagged headline inflation are statistically insignificant. A *t*-test on the EC coefficient determines weak exogeneity while a Wald test as shown in Table 2 tests for strong exogeneity. More discussions and detailed explanations of the three conditions and the associated tests can be found in Marques et al (2002, 2003).

In Table 2, it can be seen that limited influence estimators – the weighted median and the trimmed mean – are unable to meet condition 1 requirements as the Wald test rejects the joint hypothesis of zero intercept and unit slope coefficient. Subsequent conditions are no longer tested because these require the satisfaction of condition 1. As shown in the last column of the Table, the IIR passes all tests. The estimate using the exclusion method passes the tests for conditions 1 and 3 but fails those of condition 2. Note however that the series of tests used are very stringent and are sensitive to the sample periods. Varying the sample allows the exclusion method to pass all tests but this is not the case for limited influence estimators.

It is interesting to note that the exclusion method fared well in the battery of tests. This measure is easy to compute and more importantly, is easy to explain to the public – an important requirement if monetary policy using the inflation targeting framework is to be conducted in a transparent manner. The IIR is on the other hand, a sophisticated and esoteric method that provides a rigorous statistical justification for the computation of core inflation. The IIR then can serve as a check if the exclusion method provides a good estimate of core inflation. Note in the

Figure 1 that both exclusion and IIR have close estimates of core inflation in 1995-1996 that are lower than those of limited influence estimators.

Table 1
 Official CPI 1994 weights and OLS estimates* of IIR weights

CPI component	Official weights	IIR weights
Food	0.551	0.049 (0.043)
Clothing	0.037	0.446 (0.063)
Housing	0.147	0.165 (0.047)
Fuel, light, water	0.057	0.079 (0.035)
Services	0.123	0.189 (0.056)
Miscellaneous	0.085	0.072 (0.040)

*Standard errors are in parenthesis

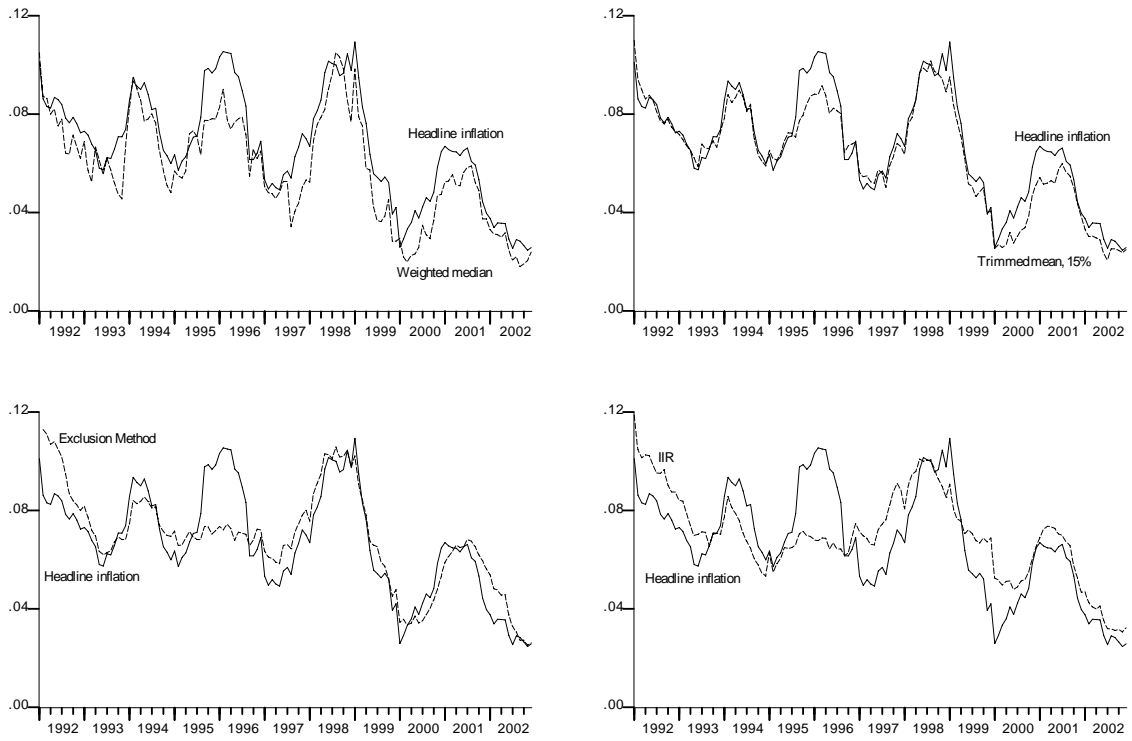
Table 2
Evaluation of Philippine core inflation measures (numbers are p-values)

Type of test	Equation/Null Hypothesis	Exclusion Method	Weighted Median	Trimmed Mean-15%	IIR
Condition 1	$\pi_t = \alpha + \beta\pi_t^* + \varepsilon_t$				
Wald test	$\alpha = 0, \beta = 1$	0.616	0.000	0.000	0.443
Phillips Perron test	$\pi_t - \pi_t^* = z_t$ has a unit root	0.007	0.004	0.013	0.015
Condition 2	$\Delta\pi_t = \sum_{i=1}^k \alpha_i \Delta\pi_{t-i} + \sum_{i=1}^k \beta_i \Delta\pi_{t-i}^* + \gamma z_{t-1} + \eta_t$				
t-test	$\gamma = 0$	0.304	-	-	0.064
Condition 3	$\Delta\pi_t^* = \sum_{i=1}^k \delta_i \Delta\pi_{t-i}^* + \sum_{i=1}^k \theta_i \Delta\pi_{t-i} - \lambda z_{t-1} + \xi_t$				
t-test	$\lambda = 0$	0.444	-	-	0.726
Wald test	$\lambda = \theta_1 = \dots = \theta_k = 0$	0.681	-	-	0.778

Notes: For the vector EC model used by conditions 2 and 3, lag lengths up to $k = 12$ were used. The lag length chosen by AIC and SIC is $k = 1$ for both NEDA and IIR.

For the trimmed mean estimator, the trimming parameter was varied from 7.5% to 40% but the results did not differ much from those reported above for the 15% trimmed mean.

Fig. 1. Core inflation estimates and headline inflation



References

- Arrazola, M., de Hevia, J., 2002. An alternative measure of core inflation. *Economics Letters* 75, 69-73.
- Ball, L., Mankiw, N.G., 1995. Relative price-changes as aggregate supply shocks. *Quarterly Journal of Economics* 110, 161-193.
- Bryan, M.F., Cecchetti, S.G., 1993. Measuring core inflation. National Bureau of Economic Research. Working Paper No. 4302.
- Freeman, D.G., 1998. Do core inflation measures help forecast inflation? *Economics Letters* 58, 143-147.
- Le Bihan, H., Sédillot, F., 2000. Do core inflation measures help forecast inflation? Out-of-sample evidence from French data. *Economics Letters* 69, 261-266.
- Marques, C.R., Neves, P.D., da Silva, A.G., 2002. Why should Central Banks avoid the use of the underlying inflation indicator? *Economics Letters* 75, 17-23.
- Marques, C.R., Neves, P.D., Sarmento, L.M., 2003. Evaluating core inflation indicators. *Economic Modelling*, forthcoming.
- Tuaño-Amador, M.C.N., Paraso, M.D.G., 2002. Operational issues in inflation targeting in the Philippines. *Bangko Sentral Review* 4 (1), 22-29.