Bangko Sentral ng Pilipinas

BSP Working Paper Series

A Geometric Price Index for the Philippines: A Preliminary Assessment

Veronica B. Bayangos and Irene T. Estigoy

Series No. 2010-01

March 2010

Center for Monetary and Financial Policy
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Abstract

This paper explores the use of a modified Tornqvist index using a geometric mean formula for the Philippine consumer price index (CPI). Using 2000 as base year, preliminary estimates seem to indicate that there is a bias in the current official CPI measure compared to a geometric CPI, and that this bias tends to be positive. This finding suggests that the CPI measure based on a Laspeyres formula may tend to overstate "true" inflation.

The paper argues that the estimated upward bias in the CPI has a direct implication on the BSP's conduct of monetary policy. Moreover, such upward bias may deepen over time and be affected by the business cycle. This may lead to overestimation of domestic price conditions. Along with a set of forward-looking indicators, the BSP may have to take this finding into account in the conduct of monetary policy.

Key words: Laspeyres price index, Tornqvist index, geometric mean, consumer price index, inflation

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A Geometric Price Index For The Philippines: A Preliminary Assessment

Veronica B. Bayangos and Irene T. Estigoy [1]

I. Introduction

The rate of inflation as computed using the consumer price index (CPI) constitutes the basis of the inflation targets of the Bangko Sentral ng Pilipinas (BSP) under the inflation targeting framework. Published by the National Statistics Office (NSO), the CPI is a measure of the average price of a standard basket of goods and services consumed by a typical family. Headline inflation, defined as the rate of change in the CPI, thus captures the changes in the cost of living based on the movements of the prices of items in the basket of commodities and services consumed by the typical Filipino household.

In a report to the Monetary Board on the BSP's monetary policy framework, Sinclair (2006) noted that one limitation with price indices in the Philippines at present is that they are re-weighted only every six years, and allow nothing for substitution away from goods that have risen in relative price.[2] His suggestions to help rectify this are: (1) to encourage the National Statistics Office (NSO) to adopt a geometrically weighted price index, with weights reflecting consumers' expenditure shares; and (2) at least for internal purposes, for the BSP to extrapolate annually the recent changes in expenditure shares that the six-yearly re-weightings confirm. These changes would result in a much more accurate measure of the rate of inflation.

The above suggestions are quite topical and important. At the Irving Fisher Committee on Central Bank Statistics Workshop in Basel in 2006, it was observed that significant improvements in price collection and CPI compilation, including formula and basket revision, have been achieved in many countries. An area where important progress has been achieved is the use of geometric mean as alternative formula in CPI compilation. Collin (2006) noted that out of 28 developed and emerging countries in the workshop, 19 countries (or 66 percent of the total number of countries in the workshop) have shifted to the use of geometric mean in CPI computation.[3]

Ideally, a price index would measure changes in the cost of living. A true cost-of-living index would measure the change in income that would be required for consumers to maintain a constant level of satisfaction, or utility. However, there are a number of practical issues that make constructing such an index difficult.

One of the difficulties in estimating changes in the cost of living is that consumer spending patterns change continuously. Spending patterns change because of changing tastes and also because of changes in relative prices. Over time, as prices change,

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[2] Peter Sinclair, "A Review of Monetary Policy In The Philippines: A Report to the Monetary Board of the Bangko Sentral ng Pilipinas," report to the Monetary Board, March 2, 2006.

[3] See Collin, Marianne (2006), "International methodological standards for the CPI and national practices," Proceedings on International Fisher Committee Workshop on CPI Measures: Central Bank Views and Concerns, Basel, April 2006. Appendix A provides the list of countries which participated in the workshop.

consumers will tend to buy more of those goods and services for which prices are rising slower than average and conversely, fewer of those for which prices are rising faster than average. This substitution may cause the CPI to overstate the effect of inflation on consumer welfare.

The paper argues that the apparent upward bias in the current and official CPI has a direct implication for the BSP, whose mandate is to maintain price stability. Moreover, such upward bias may deepen over time and be affected by the business cycle. This may lead to overestimation of price conditions. Along with other forward-looking indicators, the BSP may have to take this finding into account in the formulation of monetary policy.

This paper explores the use of a geometric consumer price index and constructs one for the Philippines. The aim is to build an alternative CPI that uses a geometric mean formula at the basic level to produce an overall index that better reflects the impact that changing prices have on the average consumer. This paper uses a modified version of the Tornqvist index using a geometric mean formula. However, due to limitation of data in the basic level, the geometric mean formula is applied to more aggregated commodity groupings for CPI data. Section 2 presents the methodological differences between the three major price indices – Laspeyres, Paasche and the Superlative Indices – before an international comparison of price definition and formula in CPI compilation across selected countries is presented in Section 3. Section 4 constructs a geometric CPI for the Philippines, while Section 5 discusses the monetary policy implications. Section 6 summarizes the main findings of the paper.

II. Methodological Differences

In general, three major price indices are used to measure price behavior – the Laspeyres, Paasche and the Superlative Indices. It can be noted at this point that the "true mean" of the changes in price level is unobservable. Hence, the three indices are simply representatives of the "true mean" of the changes in price behavior.

The Laspeyres index calculates the changes in the aggregate value of the base year's list of goods when valued at current prices as in equation 1. In other words, a Laspeyres index measures the difference between the theoretical cost in a given year and the actual cost in the base year of maintaining a standard of living as in the base year.

Laspeyres $$CPI^{L} = \sum_{i} {}_{i}w_{0}\left(\frac{{}_{i}P_{t}}{{}_{i}P_{0}}\right) \quad (1)$$

Paasche $$CPI^{P} = \left[\sum_{i} {}_{i}w_{t}\left(\frac{{}_{i}P_{t}}{{}_{i}P_{0}}\right)\right]^{-1} \quad (2)$$

Fisher $$CPI^{F} = \sqrt{(CPI^{L})(CPI^{P})} \quad (3)$$

Tornqvist $$CPI^{T} = \prod_{i}\left(\frac{{}_{i}P_{t}}{{}_{i}P_{0}}\right)^{\frac{1}{2}({}_{i}w_{o}+{}_{i}w_{t})} \quad (4)$$

where:

$_iP_t =$ Price of item ***i*** in comparison period ***t***

$_iP_0 =$ Price of item ***i*** in base period ***0***

$_iw_0 =$ Expenditure on item ***i*** in base period ***0***, divided by expenditures on all items in base period ***0***

$_iw_t =$ Expenditure on item ***i*** in comparison period ***t***, divided by expenditures on all items in comparison period ***t***

$\prod =$ Indicates the product operator

Meanwhile, Paasche index uses a formula similar to that of the Laspeyres index. The difference is that the Paasche method uses quantity measures for the current period rather than for the base period. The Paasche index can be calculated as in equation 2.

The Laspeyres index is simpler to calculate and can be computed once the current year prices are known, as the weights are base year quantities. By contrast, the Paasche index is not frequently used in practice when the number of commodities is large. This is because for the Paasche index, revised weights or quantities must be computed for each year examined. Such information may either be unavailable or hard to gather, which makes the index rather unpopular for policymakers.

The literature notes that the Laspeyres and Paasche indices tend to produce opposite extremes in index values computed using the same data. The Laspeyres index tends to overestimate the rise in prices or to have an upward bias. For instance, there is usually a decrease in the consumption of those items for which there has been a considerable price hike and the use of base year quantities will result in assigning larger weights to prices that have increased the most and the net result is that the numerator of the Laspeyres index will be too high.

In a similar manner, when the prices go down, consumers tend to demand more of those items that have declined the most and hence the use of base period quantities will result in too small weights for prices that have decreased the most with the net result is that the numerator of the Laspeyres index will again be too large. By contrast, the Paasche index tends to underestimate the rise in prices and therefore has a downward bias.

In addition, economic theory postulates indifference curves that show how consumers would alter their expenditure patterns in response to changes in prices. Unless the utility functions the indifference curves represent are similar in periods ***0*** and ***t***, a Laspeyres and a Paasche index for this period will each refer to a differently shaped utility function. In general, the Laspeyres index will provide an upper bound to its underlying change in utility while the Paasche index will give a lower bound to its utility change.

In order to resolve the issues surrounding the use of the Laspeyres and Paasche formulas, superlative indices were introduced (Diewert 1976, 1987).[4] There are two major indexes of this type: the Fisher Ideal index (equation 3) and the Tornqvist index (equation 4).

[4] See Steindel, Charles (1997), "Are there good alternatives to the CPI?" Current Issues in Economics and Finance, Federal Reserve Bank of New York, Volume 3, Number 6, April.

In its basic form, the Fisher Ideal index, originally suggested by Irving Fisher, uses a geometric mean by taking into account both the current year and base year prices, as in equation 5 below:

Fisher Ideal Index $$CPI^F = \frac{\sqrt{\sum P_1Q_0 x \sum P_1Q_1 x100}}{\sqrt{\sum P_0Q_0 \sum P_0Q_1}} \quad \textbf{(5)}$$

As evident in equation 5, the Fisher Ideal Index is the geometric mean of the Laspeyres and Paasche indices.

Meanwhile, a Tornqvist index is the geometric average of the price relatives weighted by the average expenditure shares in two periods (equation 4). There is little real difference in the design of, or the estimates made by, the two superlative measures. The superlative indices yield very good approximations of true inflation. Nevertheless, the indices present one important practical difficulty: their calculations of inflation in a period rely on the Paasche price index, which cannot be computed until the period ends and the pattern of expenditures has been observed.

During the past several years, there are significant efforts by several countries to rebase and link these indices. As highlighted in Chapter 15 of the 2008 United Nations System of National Accounts, over time the pattern of relative prices in the base period tends to become progressively less relevant to the economic situations of latter periods to the point where it becomes unacceptable to continue using them to measure volume changes from one period to the next.[5] It is then necessary to update the weights.

With long time series, it is as inappropriate to use the most current weights for a date long in the past as it is to use the weights from a long time in the past for the current period. It is therefore necessary to link the old series to the new reweighted series by multiplication. This is a simple numerical operation requiring estimates for an overlapping period of the index or series calculated using both the old and new weights.

The linking calculation can be undertaken in a number of ways. The current index on the new weights can be multiplied by a linking coefficient of the old to new index to convert the new index to the old index reference period. Alternatively, the index may have its reference period changed at the time of the introduction of new weights and the old index may be revised by dividing it by the linking coefficient. The process of linking an old series and a new one by means of a link for an overlap period is referred to as chaining.

[5] See United Nations (2009), *Chapter 15: 2008 System of National Accounts*, United Nations, New York.

III. International country experiences (Appendix A)

Collin (2006) noted that there has been great interest in recent years in issues concerning CPI measurement. Two distinct factors account for this heightened interest. First, as a result of innovation and globalization that leads to introduction of new products by CPI compilers, CPI measurement tends to be more difficult than in the past. In recent years, major improvements in price collection and CPI compilation (namely, the formula and basket revision) have been achieved in many countries, which are in line with international standards.[6] And secondly, the widespread adoption of inflation targeting by central banks makes it particularly important to measure inflation accurately.

With regard to price collection, many countries have reported significant improvements in the collection techniques of individual prices. In Italy, ISTAT has enhanced the definition of the products and the correction procedures. In addition, the number of price quotes has been augmented by means of an increase in the number of products surveyed and of the number of quotes per product. In the United States, the collection period covers all business days of the month, compared to the first 15 or 18 days before. In South Africa, the National Institute of Statistics has switched recently from a central collection method (survey) to a direct collection method.

A large number of countries have reported recent weight updates and the introduction of new goods by CPI compilers. In the 2006 Irving Fisher Committee on Central Bank Statistics Workshop, central bankers observed that CPI compilers revise and introduce new goods more frequently than in the past.[7] In addition, CPI compilers have recently started to use explicit methods to adjust for quality changes. In the US, Japan, Italy, Spain and Germany, hedonic methods have been used for different types of products.[8]

With regard to the formula for CPI computation, the adoption of a geometric mean formula to account for substitution bias by many countries has been relatively significant. At the more disaggregated level of the individual product prices that are incorporated into sub-indices, many countries have in recent years adopted the geometric mean to aggregate individual prices and to deal with the substitution bias at this level of aggregation. In Collin (2006) survey, 19 countries out of 29 countries (or 66 percent of the total number of countries) are now using geometric mean in the compilation of prices.

At the higher level of the compilation of the sub-indices themselves, some countries – Spain, Switzerland, Europe, Italy, and Korea – have implemented an annual chained index, which allows for more frequent weight updates and facilitates the introduction of new products. In addition, superlative formulas (ideal indices) are currently used in the United States and in Sweden to resolve completely the substitution bias at the upper level of aggregation.

[6] Refers to International Labour Office (2004): *CPI Manual: Theory and Practice*, ISBN No. 92-2-113699, August.

[7] For instance, in Europe, Thailand, Belgium, Brazil, Switzerland, Sweden, Poland, Portugal and Russia weights are revised either every year or every two years.

[8] The hedonic method relies on statistical techniques to estimate the implicit prices of product characteristics from observed prices and quantities sold in the marketplace. These implicit prices may then be used as measures of the value of observable qualitative differences in products to consumers, and thus help disaggregate the observed price difference between two products into quality change and pure price change. See Kokoski et al (2007).

For the United States, the Bureau of Labor Statistics (BLS) estimated that the use of geometric mean would reduce the annual rate of increase in the CPI by an average of 0.2 percentage point. In January 1999, the US BLS began using a geometric mean formula in place of the Laspeyres formula in calculating the basic components of the CPI. The aim of such adjustment in CPI computation is to correct for the overstatement of the CPI because of the failure to account for the substitution bias. The geometric mean formula was used in index components that made up approximately 61 percent of total consumer spending. The remaining index categories continued to be calculated using Laspeyres formula. These index categories include selected shelter services, selected utilities and government charges, and selected medical care services. It was estimated that the use of geometric mean would reduce the annual rate of increase in the CPI by an average of 0.2 percentage point.[9]

Although major changes have been implemented in recent years, some important enhancements are needed, for instance to improve international comparability. Apart from some divergences observed concerning the weight and new product revision as well as quality adjustments, some important enhancements are necessary in terms of the formula in CPI compilation for international comparability. Some countries are still using for instance the arithmetic means to aggregate individual prices, while other have adopted the geometric mean to cope with the substitution bias. In Asia, the Philippines, South Korea, Malaysia and Thailand are still using the arithmetic mean in CPI computation.[10] It may be reasonable to explore the use of a geometric mean formula in the computation of CPI in the Philippines. This paper adopts a slightly modified version of the Tornqvist index as in equation 4.

IV. Using a geometric mean formula for the Philippine CPI

A. Compilation of Philippine CPI data[11]

The Philippine CPI market basket is the list of sample of goods and services that are commonly purchased and bought by an average Filipino household.[12] The market basket used in the construction of the CPI can be drawn either from the results of the Commodity and Outlet Survey (COS) or Interview/Survey of Key Informants.

The COS is a nationwide survey undertaken by the NSO. This is conducted for the purpose of gathering data on commodities/services that a family purchases/consumes/avails of most of the time and the type of outlets where these commodities/services are purchased/availed of within the country. The results of the survey typically provide the basis for the identification of the market basket at different income levels, that is, the upper 70 percent and bottom 30 percent which will be used in the computation of the CPI for the different income groups. It also serves as the basis for the identification of type of outlets for the regular monthly price survey.

[9] The year-on-year increase ranged from 0.1 percentage point to 0.5 percentage point for the whole of 1998. See Dalton, Kenneth V., John S. Greenlees, and Kenneth J. Stewart (1998), "Incorporating a geometric mean formula into the CPI," Monthly Labor Review, October.

[10] Indonesia and Singapore have started using geometric mean in the computation of CPI in the lower level.

[11] See Ericta, Carmelita N. and Rosie B. Sta. Ana (2009), "Price Collection for the Consumer Price Index: A Documentation," Philippine Institute for Development Studies Discussion paper Series No. 2009-19, July.

[12] See Annex B for a sample of current CPI market basket and their respective weights.

In the case when the COS is not conducted, the interview or the Survey of Key Informants is being done. This is conducted nationwide in selected sample outlets by asking the sellers the commodities and specifications they sell that are saleable to the buying public.

Collection of data for the CPI is done through the coordinated effort of the Bureau of Agricultural Statistics (BAS) and the NSO. BAS collects price data for agricultural commodities in the National Capital Region (NCR) and in provincial capitals where there are BAS offices while the NSO collects prices for all other commodities in all other areas. Data are collected from the sample outlets, such as outlets or establishments where prices of commodities/services are quoted.

About 459,000 price quotations gathered throughout the country are entered into the computation of the monthly CPI. Except for food, beverages and tobacco in the National Capital Region and selected petroleum products in Areas Outside the National Capital Region which are monitored on a weekly basis, price collection is done twice a month. First collection phase is done during the first five days of the month while the second phase is on the 15th to 17th day of the month.

CPI data are disseminated at the following commodity group levels: major division, sub-groups and 3- and 4-digit commodity groups. Annex B provides details of the Philippine CPI market basket and their respective weights.

Philippine CPI is re-weighted only every six years. The current CPI uses 2000 as base year. The year 2000 was chosen as the base year for two major reasons: (1) it was the year that was perceived to be more politically, economically and socially stable; and (2) it was the year when the FIES which is the basis of weights was conducted. The current series also features the use of separate provincial and city market baskets.

The current CPI uses a Laspeyres formula. The formula used in computing the current CPI is the weighted arithmetic mean of price relatives, a variant of the Laspeyres formula. In computing the CPI, the formula is as follows:

$$CPI^{P} = \sum_{i} \left[\frac{w\left(\frac{p_n}{p_0}\right)}{w} \right] \qquad \textbf{(6)}$$

where

$p_n =$ Price of an item in the current price

$p_0 =$ Price of an item in base period

$w =$ Weights

The current CPI has a fixed-weight formula. The Laspeyres formula has fixed base year period weights.[13] The weights for the 2000-based CPI were derived from the expenditure data of the 2000 FIES, a nationwide survey that covered 41,000

[13] The weights in the CPI computation reflect the consumption priorities of households and the way they allocate resources to meet their needs. Moreover, weight is a value attached to a commodity or group of commodities to indicate the relative importance of that commodity or group of commodities in the market basket.

households. Each province/city was considered a domain so much so that weights were generated for each of them. This was done to account for the differences in consumption patterns because of geographical location. The weight for each item of expenditure is the proportion of that expenditure item to the total national expenditure. Likewise, geographical weights were also determined where the weight of the region is equal to the sum of the weights of the provinces belonging to that region. The sum of the weights for the region is equal to the national weight.

Because the CPI is a fixed-weight index, it does not adequately reflect on-going changes in buying habits. As the overall level of prices rise, relative prices change as well. Some prices rise faster than average and some prices rise more slowly than average. When goods are reasonably close substitutes, consumers can change their spending patterns and buy relatively more of those goods whose prices are rising slowly, and fewer of those goods whose prices are rising rapidly.

If overall consumer satisfaction is unchanged once purchasing patterns respond to changed relative prices, then a price index based on a fixed market basket of goods and services will overstate the increase in cost of a given standard of living. Because the CPI does not take into account consumers' ability to insulate themselves, albeit to a limited extent, from inflation by changing their spending patterns, it overestimates how much they would need to raise total spending to maintain a constant standard of living.

B. Are there statistical differences?

Using 2000 as base year, this section builds an alternative CPI series for the Philippines using a geometric mean formula based on the current Laspeyres formula. It would be ideal to consider a Paasche index, but in the absence of such index, the estimates are limited to a geometric mean formula of the current Laspeyres index. Moreover, it would be reasonable to use the more disaggregated CPI data. However, due to data limitation, CPI data in 3 and 4 digits are used. In addition, the Tornqvist index uses both current and previous year's weights. In the absence of current year's weights, the estimates are based on the base year's weights. This would imply that estimates may still have an upward bias (or the lower bound of the upward bias). These three comprise the limitation of the paper.

The following will then determine whether there is any significant difference between the CPI using the Laspeyres and that using the modified Tornqvist. To the extent that these indices are only representatives of the "true mean" of the changes in price behavior, a statistical comparison between the two may be employed.

The formula. Equations 3 and 4 in Section 2 can be used to re-construct the geometric mean formula for the Philippine CPI. Using cereal as an example, the cereal index can be re-constructed from the current Laspeyres formula as in equation 7 below:

$$CPI^{G}_{Cereal} = [({}_{rice}P^{weight}_{current})x({}_{corn}P^{weight}_{current})]^{\frac{1}{\sum weight\,(rice+corn)}}$$

$$CPI^{G}_{Cereal} = [(171.37^{0.094}_{Nov\,2009})x(170.55^{0.009}_{Nov\,2009})]^{\frac{1}{0.102}} \qquad \textbf{(7)}$$

$$CPI^{G}_{Cereal} = 171.29_{Nov2009}$$

Equation 7 above shows that for the month of November 2009, the cereal index using geometric mean formula yields a slightly lower index of 171.29 compared to the same index of 171.30 using the Laspeyres formula.

However, it should be stressed that the computation of the Philippine CPI based on geometric mean formula is rather limited. It would be useful to start the computation of CPI from the lower level, that is, from the price quotations typically found on the surveys conducted by the NSO.

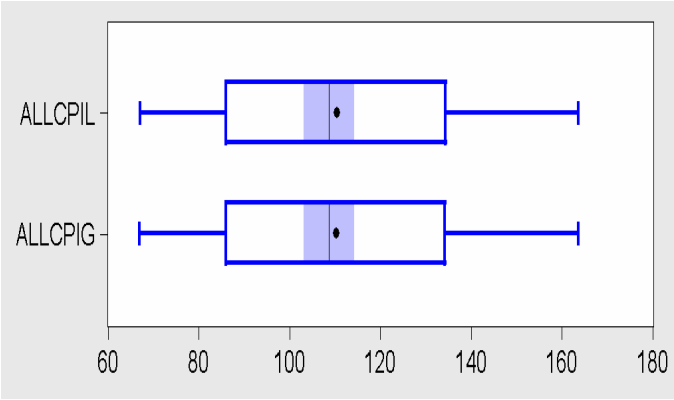
Nevertheless, the monthly CPI was re-constructed on major commodity groups using geometric mean formula from January 1994 to December 2009 as follows:[14]

Food, beverages and tobacco
Food
Cereal and cereal products
Cereal

Non-food
Clothing
Housing and repairs
Fuel, light and water
Services
Miscellaneous goods

Figure 1 shows a boxplot comparing Philippine CPI using Laspeyres formula (*ALLCPIL*) and geometric mean formula (*ALLCPIG*). A boxplot represents the basic descriptive statistics of a distribution, namely, the smallest observation (sample minimum), lower quartile, median, upper quartile, and largest observation (sample maximum). A boxplot may also indicate which observations, if any, might be considered outliers. Boxplots can be useful to display differences between populations, while the spacing between the different parts of the boxplot indicates the degree of dispersion and skewness in the data.

Figure 1: CPI: Descriptive Statistics, 1994-2009



FULL SAMPLE 1994-2009	ALL ITEMS ALLCPIL	ALLCPIG
Observations	192	192
Mean	110.385	110.294
Median	108.600	108.616
Maximum	163.600	163.595
Minimum	67.000	66.878
Standard deviation	27.846	27.846
Skewness	0.253	0.253
Kurtosis	1.984	1.987
Sum	21,194	21,176
Sum Sq. Dev.	148,099	148,099

[14] This implies that the CPI weights are fixed from 1994 to 2009.

Figure 1 shows that both *ALLCPIL* and *ALLCPIG* are positively skewed. Both the maximum and minimum index are lower in *ALLCPIG* than that for *ALLCPIL*. In a similar manner, the mean (dot in Figure 1) and median (line in Figure 1) are relatively lower in *ALLCPIG* than *ALLCPIL*.[15]

Although ALLCPIG is generally lower, a test of the equality of means between the ALLCPIG and ALLCPIL shows that the two are homogenous. Using 5 percent level of significance, Figure 2 shows that *ALLCPIG* and *ALLCPIL* are homogenous with respect to the means based on t-test, ANOVA F-test and Welch F-test from January 1994 to December 2009 (Figure 2). A breakdown of the sample period into pre-IT (January 1994-December 2001) and IT period (January 2002-December 2009) shows that such finding is robust across these sub-periods, as the results failed to reject the null hypothesis of equal means for the sub-sample periods at 5 percent level of significance.

Figure 2: CPI: Test for equality of means, 1994-2009

Date: 02/04/10 Time: 16:53
Sample: 1994M01 2009M12
Included observations: 192

Method	df	Value	Probability
t-test	382	0.031899	0.9746
Anova F-test	(1, 382)	0.001018	0.9746
Welch F-test*	(1, 382)	0.001018	0.9746

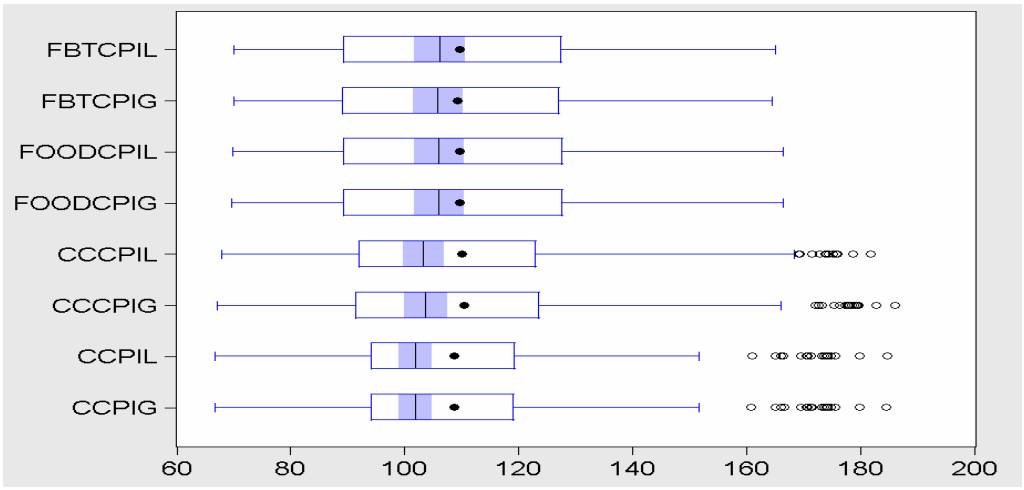
*Test allows for unequal cell variances

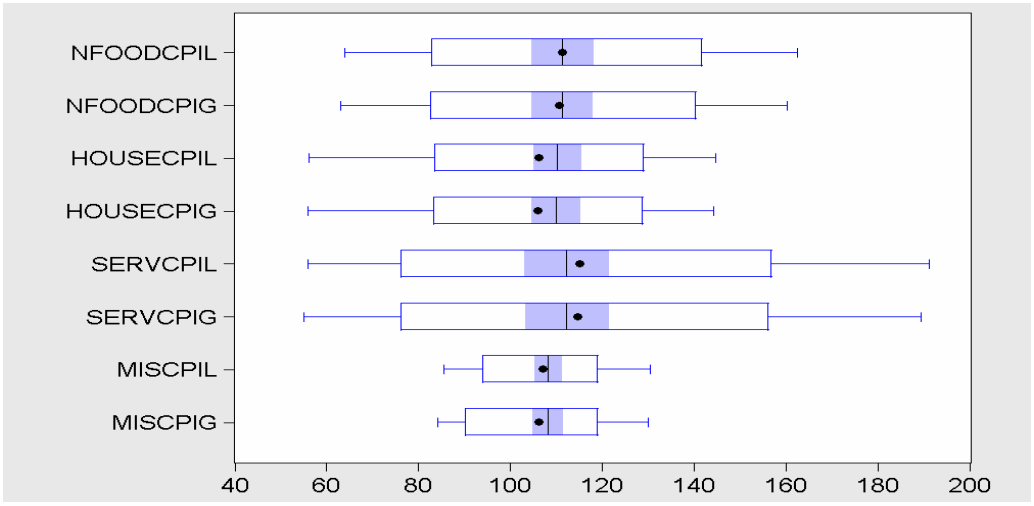
By commodity groups, those in the non-food group (lower panel of Figure 3), namely, housing and repairs, fuel, light and water and services have lower indices. In case of the food group (upper panel of Figure 3), the commodity groups that used a geometric mean formula have relatively lower indices, albeit marginal. This is true for cereal and cereal preparations that include rice, corn and bread. However, it should be noted that *CCCPIL, CCCPIG, CCPIL, CCPIG* have outliers (dots in Figure 3, upper panel). This could indicate some measurement limitations in the base (current) indices using Laspeyres formula. In addition, the clothing series was also taken out from the non-food group (Figure 3, lower panel) after it exhibited significant outliers.[16]

[15] However, a closer look at the Jarque-Bera test results indicate that *ALLCPIL* and *ALLCPIG* are not normally distributed from January 1994 to December 2009 at 5 percent level of significance. The Jarque-Bera test is a statistic for testing whether the series is normally distributed. The test statistic measures the difference of the skewness and kurtosis of the series with those from the normal distribution. Under the null hypothesis of a normal distribution, the Jarque-Bera statistic is distributed as X^2 with 2 degrees of freedom. The reported probability is the probability that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. This means that a small probability value leads to the rejection of the null hypothesis of a normal distribution.

[16] The presence of outliers may indicate measurement limitations in the current clothing series using a Laspeyres formula.

Figure 3: Food (Upper Panel) and Non-Food (Lower Panel) CPI: Descriptive Statistics, 1994-2009





Legend:

ALL ITEMS	*Laspeyres*	*ALLCPIL*
	Geometric	*ALLCPIG*
Food, Beverages and Tobacco	*Laspeyres*	*FBTCPIL*
	Geometric	*FBTCPIG*
Food	*Laspeyres*	*FOODCPIL*
	Geometric	*FOODCPIG*
Cereal and Cereal Products	*Laspeyres*	*CCCPIL*
	Geometric	*CCCPIG*
Cereal	*Laspeyres*	*CCPIL*
	Geometric	*CCPIG*
Non-Food Items	*Laspeyres*	*NFOODCPIL*
	Geometric	*NFOODCPIG*
Housing and Repairs	*Laspeyres*	*HOUSECPIL*
	Geometric	*HOUSECPIG*
Services	*Laspeyres*	*SERVCPIL*
	Geometric	*SERVCPIG*
Miscellaneous Goods	*Laspeyres*	*MISCPIL*
	Geometric	*MISCPIG*

Meanwhile, a closer look at data shows that a co-integrating relationship may exist between the logarithm of ALLCPIL and ALLCPIG. A co-integration test shows that *ALLCPIL* and *ALLCPIG* are co-integrated from January 1994 to December 2009 (Figure 4). However, when a linear deterministic trend is defined on both series, data analysis shows that using a lag of four months, a co-integrating relationship may not exist between the two series.

Figure 4: CPI: Co-integration test

Date: 02/04/10 Time: 17:01
Sample (adjusted): 1994M06 2009M12
Included observations: 187 after adjustments
Trend assumption: No deterministic trend
Series: ALLCPIL ALLCPIG
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.115347	29.17483	12.32090	0.0000
At most 1 *	0.032902	6.256203	4.129906	0.0147

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

In addition, the two series are highly correlated over the BSP policy horizon. Using a cross-correlation analysis over a two-year policy horizon (24 months), Figure 5 shows that the operational relationship between *ALLCPIL* and *ALLCPIG* appears to be strong. Hence, *ALLCPIG* may be considered at least as useful or as informative a measure of domestic price conditions as *ALLCPIL.*

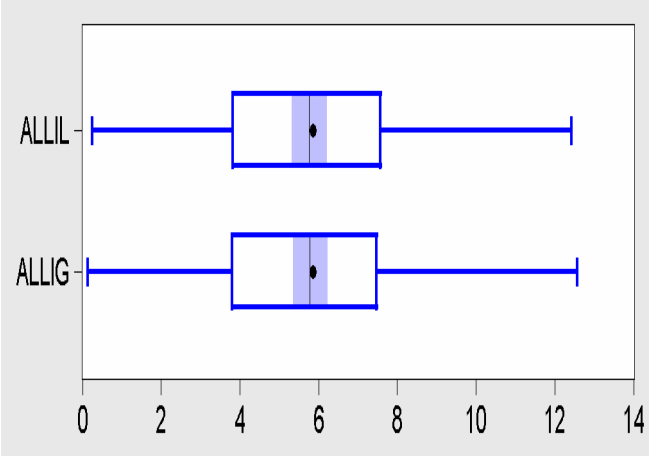
Figure 5: CPI: Cross correlation

Date: 02/04/10 Time: 17:03
Sample: 1994M01 2009M12
Included observations: 192
Correlations are asymptotically consistent approximations

ALLCPIL,ALLCPIG(-i)	ALLCPIL,ALLCPIG(+i)	i	lag	lead
		0	1.0000	1.0000
		1	0.9837	0.9837
		2	0.9674	0.9674
		3	0.9510	0.9511
		4	0.9347	0.9347
		5	0.9181	0.9182
		6	0.9014	0.9016
		7	0.8847	0.8849
		8	0.8682	0.8684
		9	0.8514	0.8516
		10	0.8346	0.8349
		11	0.8175	0.8179
		12	0.8005	0.8009
		13	0.7838	0.7842
		14	0.7663	0.7668
		15	0.7483	0.7488
		16	0.7299	0.7305
		17	0.7113	0.7119
		18	0.6926	0.6932
		19	0.6745	0.6752
		20	0.6577	0.6584
		21	0.6418	0.6425
		22	0.6268	0.6275
		23	0.6118	0.6125
		24	0.5967	0.5974

When year-on-year growth of CPI is taken into account, a descriptive analysis using boxplots shows that ALLIL (inflation using a Laspeyres formula) and ALLIG (inflation using a geometric mean formula) are both normally distributed. Figure 6 (right panel) shows that both *ALLIL* and *ALLIG* are positively skewed. In terms of spread in the series, the standard deviation shows that *ALLIG* is slightly less dispersed than *ALLIL*. A closer look at kurtosis shows *ALLIG* and *ALLIL* are flat relative to a normal distribution.[17] Nevertheless, the Jarque-Bera test results indicate that *ALLIL and ALLIG* support a normally-distributed series from January 1994 to December 2009 at 5 percent level of significance.

Figure 6: Inflation: Descriptive Statistics, 1994-2009



FULL SAMPLE 1994-2009	ALL ITEMS ALLIL	ALLIG
Observations	180	180
Mean	5.857	5.849
Median	5.760	5.778
Maximum	12.412	12.562
Minimum	0.248	0.133
Standard deviation	2.504	2.500
Skewness	0.246	0.236
Kurtosis	2.591	2.672
Jarque-Bera	3.069	2.483
Probability	0.216	0.289
Sum	1,054	1,053
Sum Sq. Dev.	1,122	1,118

Moreover, a test for the equality of means shows that ALLIG and ALLIL are homogenous. Using 5 percent level of significance, Figure 7 shows that *ALLIG* and *ALLIL* are homogenous with respect to the means based on t-test, ANOVA F-test and Welch F-test from January 1994 to December 2009.

Figure 7: Inflation: Test for equality of means, 1994-2009

Date: 02/04/10 Time: 17:22
Sample: 1995M01 2009M12
Included observations: 180

Method	df	Value	Probability
t-test	358	0.029663	0.9764
Anova F-test	(1, 358)	0.000880	0.9764
Welch F-test*	(1, 357.999)	0.000880	0.9764

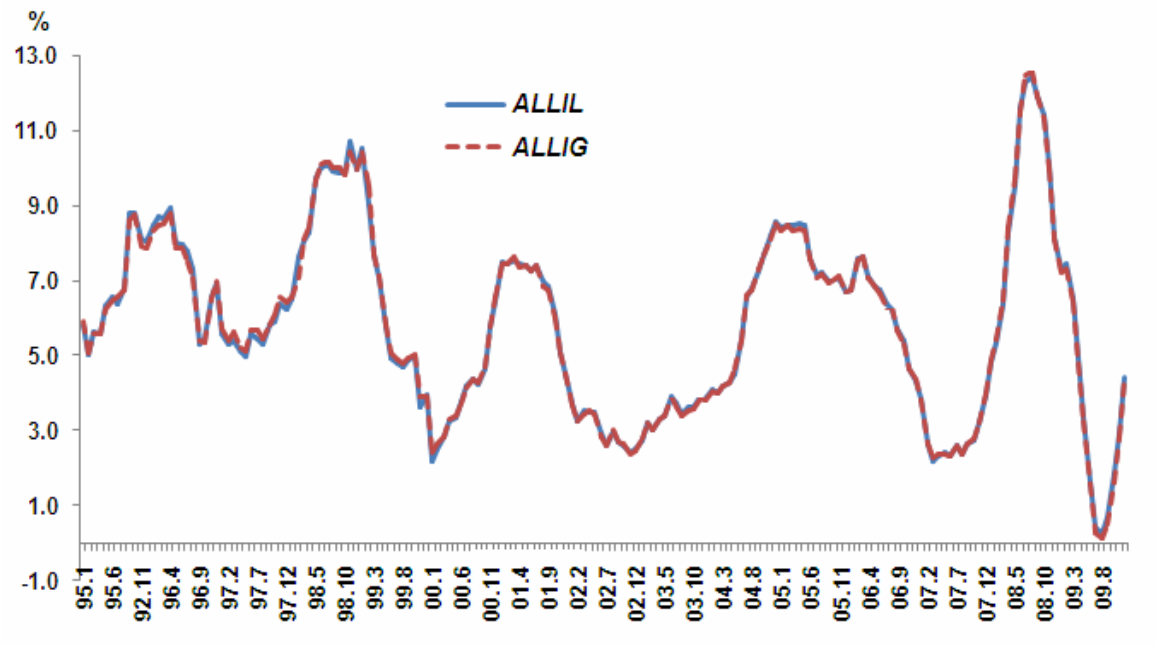
*Test allows for unequal cell variances

Meanwhile, the average inflation (mean) is relatively lower for ALLIG compared to that for ALLIL, suggesting that the latter may be overstated. Figure 8 and Figure 6 (mean dot in Figure 6) show that that inflation is relatively lower for *ALLIG* than that for *ALLIL*. The mean difference between the two series averaged 0.1

[17] Kurtosis measures the peakedness or flatness of the distribution of the series. The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked relative to the normal; if the kurtosis is less than 3, the distribution is flat relative to the normal.

percentage point from January 1994 to December 2009 (Figure 6, right panel). This finding is closer to the BLS estimate for the United States. It can be recalled from Section 3 that the BLS reported a difference that ranged from 0.1 to 0.5 percentage point, or an average of 0.2 percentage point from January 1999 to December 2007.[18] This indicates that the current Philippine CPI data series may be overstated as a measure of the cost of living.

Figure 8: Inflation: ALLIL and ALLIG, 1994-2009



A look at data shows that a co-integrating relationship may exist between the ALLIL and ALLIG. Using a lag of four months, a co-integration test shows that *ALLIL* and *ALLIG* are co-integrated from January 1994 to December 2009 (Figure 9).

Figure 9: Inflation: Co-integration test

Date: 02/04/10 Time: 17:24
Sample (adjusted): 1995M06 2009M12
Included observations: 175 after adjustments
Trend assumption: Linear deterministic trend
Series: ALLIL ALLIG
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.131831	36.23004	15.49471	0.0000
At most 1 *	0.063551	11.49050	3.841466	0.0007

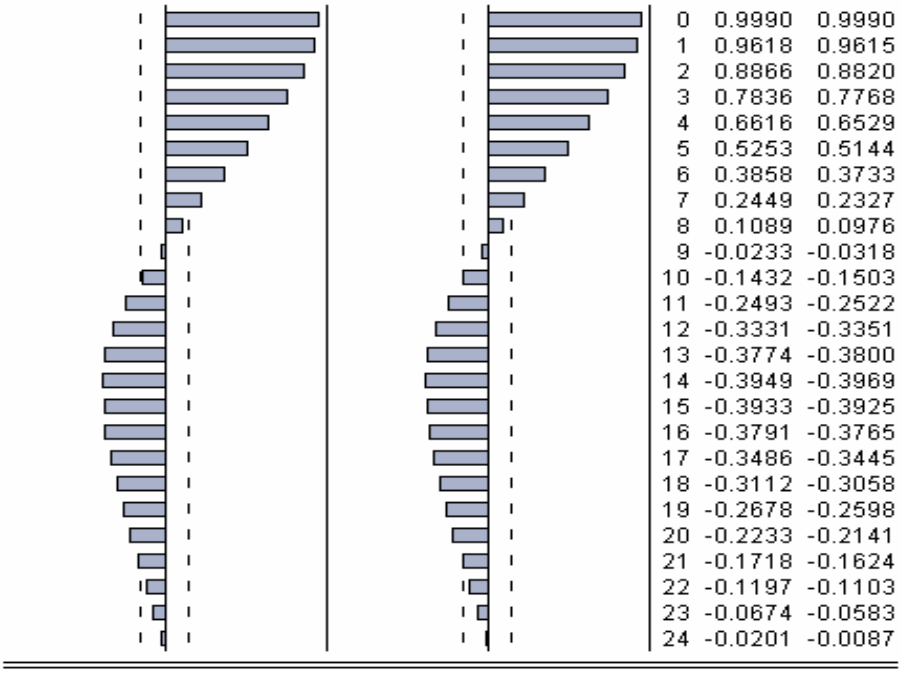
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

[18] See Cashell, Brian W. (2008), "The Chained Consumer Price Index: How Is It Different?," CRS Report for Congress, Congressional Research Service, 21 February 2008.

In addition, the two series are highly correlated up to seven months. Using a cross-correlation analysis over a two-year policy horizon (24 months), Figure 10 shows that the operational relationship between *ALLIIL* and *ALLIG* may be strong up to seven months.

Figure 10: Inflation: Cross correlation

Date: 02/04/10 Time: 17:25
Sample: 1995M01 2009M12
Included observations: 180
Correlations are asymptotically consistent approximations



ALLIL,ALLIG(-i)	ALLIL,ALLIG(+i)	i	lag	lead
		0	0.9990	0.9990
		1	0.9618	0.9615
		2	0.8866	0.8820
		3	0.7836	0.7768
		4	0.6616	0.6529
		5	0.5253	0.5144
		6	0.3858	0.3733
		7	0.2449	0.2327
		8	0.1089	0.0976
		9	-0.0233	-0.0318
		10	-0.1432	-0.1503
		11	-0.2493	-0.2522
		12	-0.3331	-0.3351
		13	-0.3774	-0.3800
		14	-0.3949	-0.3969
		15	-0.3933	-0.3925
		16	-0.3791	-0.3765
		17	-0.3486	-0.3445
		18	-0.3112	-0.3058
		19	-0.2678	-0.2598
		20	-0.2233	-0.2141
		21	-0.1718	-0.1624
		22	-0.1197	-0.1103
		23	-0.0674	-0.0583
		24	-0.0201	-0.0087

V. Implications on the BSP's conduct of monetary policy

Section 4.2 shows that preliminary estimates seem to indicate that there is a bias in the current official CPI measure compared to a geometric CPI, and that this bias tends to be positive.[19] In particular, the year-on-year growth of CPI using a geometric mean formula is relatively lower compared to that for CPI using a Laspeyres formula by about 0.1 percentage point. However, a limitation of the study is that the difference may still be on the low side as substitution is not yet fully accounted for. This finding underscores the need for more regular conduct of FIES which can be used to re-weight the CPI, as well as the review of the formula used in the computation of the CPI.

In particular, a re-weighting of the CPI is necessary to ensure that CPI truly represents the current domestic price condition. Consumer tastes and technology change over time, causing the fixed market basket of goods and services to become outmoded. To capture such changes for a more meaningful price comparison, revision or updating of the fixed market basket, the sample outlets, the weights and the base year have to be undertaken periodically.

[19] See Shiratsuka (1999).

A two-year collaborative project with the BSP, National Statistical Coordination Board (NSCB), National Statistics Office (NSO) and Statistical Research and Training Center (SRTC) has commenced in February 2010 to develop chain-type measures of GDP and price indices in aid of monetary policy. Under this project, price indices, including the CPI, can be re-weighted every three years using the FIES which is conducted every three years. [20]

In addition, the results indicate that the current CPI measure may overstate "true" inflation. The upward bias in the CPI has a direct implication for the BSP, whose mandate is to maintain price stability. Moreover, such upward bias may deepen over time and be affected by the business cycle. This may lead to overestimation of price conditions. Depending on the size, such upward bias may warrant a relatively tighter monetary policy to keep inflation expectations in line with the inflation target.

Moreover, tests of cross correlation and co-integration seem to indicate a relatively strong relationship between the current CPI measure and preliminary estimates of a geometric CPI, at least over the BSP policy horizon. This suggests that a geometric CPI may serve as an alternative measure of the cost of living.

Reliable CPI measures are of utmost importance to central banks as these indicate the degree of price stability. Measurement errors in the CPI may lead to inadequate monetary policy actions.

The BSP has a crucial concern in using a more precise CPI measure under an inflation targeting framework. Under the inflation targeting framework, the BSP distinguishes between the inflation target and the inflation forecast. The inflation target represents policymakers' desired inflation rate which they commit to achieve over the policy horizon. Inflation targets tend to be less susceptible to revisions.

The inflation forecast, meanwhile, represents the expectation of the inflation rate over the policy horizon, given current information set. The inflation forecast changes over time as new information is incorporated in the assessment of future inflation. The forecast is a major factor considered by the BSP when deciding on whether monetary policy instruments should be adjusted to attain the inflation target based on a set of forward-looking indicators. The inflation target and the inflation forecast depend on a credible CPI measure.

The concern about the 'true' inflation relates to the broader issue of credibility. Though no single measure will ever be perfect, it should be clear that enhanced credibility of CPI measure will ultimately strengthen the credibility of monetary policy.

A bigger challenge remains in terms of improving the communication on CPI issues to the general public. These are sensitive issues as CPI measures are often used to index wages and contracts, including financial instruments. More transparency may probably help, for instance, with respect to the theoretical foundation and actual practices underlying CPI calculations.

However, CPI biases are unavoidable to some extent. This is because the economy is constantly changing. Statistical agencies are thus required to regularly assess whether their data properly reflect dynamic changes in the economy, thereby allocating their limited resources efficiently to create better statistics. This makes the conduct of monetary policy difficult especially in ensuring that inflation forecast is in line with the inflation target. For its part, the BSP relies on a wide range of economic and

[20] The lag may take four years since the publication of FIES may take another year.

financial indicators here and abroad in assessing the prospects for both demand and supply-side inflationary pressures, in order to calibrate monetary policy settings appropriately. Nevertheless, the results of the preliminary assessment of a geometric price index for the Philippines underscore the importance of close coordination with the statistical agencies on enhancing the compilation process for price statistics.

VI. Summary of findings and policy implications

The CPI is an indicator that derives its usefulness in its representation of how much a typical market basket behaves over a specific time period. Over the recent years, significant developments in price collection and CPI compilation, including formula and basket revision, have been achieved in many countries. An area which achieved significant improvement is the use of geometric mean as an alternative formula in CPI compilation. The shift to a geometric mean formula from the typical Laspeyres formula was meant to address the substitution bias which has found to be causing the CPI measure based to overstate or understate the effect of inflation on consumer preferences.

This paper explores the use of a modified Tornqvist index using a geometric mean formula for the Philippines. Using 2000 as base year, preliminary estimates seem to indicate that there is a bias in the current official CPI measure compared to a geometric CPI, and that this bias tends to be positive. This finding suggests that the CPI measure based on a Laspeyres formula may tend to overstate "true" inflation. This finding is in line with those found in literature on geometric price index.

However, a limitation of the study is that the difference may still be on the low side as substitution is not yet fully accounted for. This finding underscores the need for more frequent re-basing as well as the review of the formula used in the computation of the CPI. .

The paper argues that the estimated upward bias in the CPI has a direct implication to the BSP, whose mandate is to maintain price stability. Moreover, such upward bias may deepen over time and be affected by the business cycle. This may lead to overestimation of price conditions. The BSP may have to take this uncertainty into account in the conduct of monetary policy.

Moreover, tests of cross correlation and co-integration seem to indicate a relatively strong relationship between the current CPI measure and the preliminary estimates of a geometric CPI, at least over the BSP policy horizon. This may suggest that a geometric CPI may serve as complementary measure of the cost of living.

The BSP has a crucial concern in keeping a more precise CPI measure under an inflation targeting framework. Reliable CPI measures are of utmost importance to central banks as these indicate the degree of price stability. Measurement errors in the CPI may lead to incorrectly calibrated monetary policy actions.

The concern about the 'true' inflation ultimately relates to the broader issue of credibility. Though no single measure will ever be perfect and that CPI biases are inevitable to some extent, it should be clear that enhanced credibility of CPI measure will ultimately strengthen the credibility of monetary policy. These findings highlight the importance of close coordination with the statistical agencies on how to come up with more precise price statistics.

References

Cashell, Brian W. (2008), "The Chained Consumer Price Index: How Is It Different?," CRS Report for Congress, Congressional Research Service, 21 February 2008.

Collin, Marianne (2006), "International methodological standards for CPI and national practices," Proceedings on International Fisher Committee Workshop on CPI Measures: Central Bank Views and Concerns, Basel, April 2006.

Dalton, Kenneth V.,John S. Greenlees, and Kenneth J. Stewart (1998). "Incorporating a geometric mean formula into the CPI," Monthly Labor Review, October.

Diewert,W. Erwin (1976), "Exact and Superlative Index Numbers," *Journal of Econometrics* 4 (May).

Diewert, W. Erwin. (1987), "Index Numbers." In John Eatwell, Murray Milgate, and Peter Newman, eds., *The New Palgrave: A Dictionary of Economics*. New York: Stockton Press.

International Labour Office (2004): *CPI Manual: Theory and Practice*, ISBN No. 92-2-113699, August.

Kokoski, Mary, Keith Waehrer, and Patricia Rozaklis (2007), "Using Hedonic Methods for Quality Adjustment in the CPI: The Consumer Audio Products Component," Division of Price and Index Number Research U.S. Bureau of Labor Statistics, 2 Massachusetts Avenue, NE Washington, DC 20212.

Shiratsuka, Shigenori (1999), "Measurement errors and quality-adjustment methodology: lessons from the Japanese CPI," Economic Perspectives, Federal Reserve Bank of Chicago, issue Q II, pages 2-13.

Sinclair, Peter (2006), "A Review of Monetary Policy In The Philippines: A Report to the Monetary Board of the Bangko Sentral ng Pilipinas," report to the Monetary Board, 2 March 2006.

Steindel, Charles (1997), "Are there good alternatives to the CPI?" Current Issues in Economics and Finance, Federal Reserve Bank of New York, Volume 3, Number 6, April.

United Nations (2009), *Chapter 15: 2008 System of National Accounts*, United Nations, New York.

Appendix A: Price Definition and CPI Computation Across Selected Countries

Country	Price Definition	Formula in CPI Computation	
		Lower (Basic) Level	**Higher Level**
Argentina	IPC-GBA (Great Buenos Aires) measures the price changes of a set of goods and services representative of that population's consumption patterns	Geometric mean: mainly; Arithmetic mean: water supply, cable television sometimes	Chained Laspeyres
Australia	The Australian CPI measures pure price change in a selected basket of goods and services of constant quantity and quality) typically purchased by Australian households	Geometric mean: mainly Ratio of arithmetic mean sometimes	Laspeyres
Belgium	The CPI measures the change in the retail prices of a fixed set of goods and services used by households	Arithmetic mean	Laspeyres
Brazil	CPI (PCA) measures the change in the prices of a fixed basket of products as determined in the Household Budget Survey	Geometric mean	Chained Laspeyres
Canada	Indicator of changes in consumer prices experienced by Canadians through time and obtained by comparing the cost of a fixed basket of commodities purchased in a particular year. The index reflects only pure price movements	Geometric mean	Laspeyres
France	CPI estimates the average change in prices of household consumer goods between two given periods. It is a synthetic measurement of "pure" trends in producer prices	Unweighted arithmetic average of price homogenous products; Geometric average of relative prices: other varieties	Chained Laspeyres
Germany	CPI measures the average change in the prices for all goods and services purchased by households for consumption purposes	Ratio of arithmetic means	Laspeyres
Hong Kong SAR	CPI measures the relative change over time in the total cost of a specified basket of consumer goods and services-fixed in terms of quantity and quality – generally purchased by households	Geometric mean: heterogenous products; Ratio of arithmetic means: homogenous products	Laspeyres
India	CPI measures the price of change over time in the level of retail prices of a fixed set of goods and services on which the working class families make expenditure	Ratio of arithmetic mean	Laspeyres
Indonesia	CPI measures the price of change in a fixed market basket of constant quality consumed by general population	Average of price relatives; Geometric mean: seasonal goods	Laspeyres
Italy	CPI measures the temporal change in the change in the price of a basket of goods destined to final private consumption	Geometric mean	Chained Laspeyres

Appendix A: Price Definition and CPI Computation Across Selected Countries

Country	Price Definition	Formula in CPI Computation	
		Lower (Basic) Level	**Higher Level**
Japan	CPI measures the price movements of goods and services which are purchased by consumer throughout the country.	Ratio of arithmetic mean	Laspeyres
South Korea	CPI measures the average change in prices for a fixed-market basket of goods and services of constant quantity and quality purchased by urban consumers	Ratio of arithmetic mean	Laspeyres
Mexico	CPI measures the evolution of over time of a constant basket of goods and services taken as representative of consumption habits for urban households	Geometric mean average: food products Arithmetic mean: the rest of the basket	Chained Laspeyres
Malaysia	CPI measures pure price changes in a fixed basket of goods and services commonly purchased by a majority of private households	Ratio of arithmetic average of prices	Chained Laspeyres
Netherlands	CPI measures the average price movements of goods and services purchased by households	Ratio of arithmetic mean	Laspeyres
Philippines	CPI measures the price movements of a standard "basket" of goods and services consumed by a typical family	Weighted arithmetic mean of price relatives	Laspeyres
Poland	CPI measures the average change in the price of goods and services purchased for consumption purposes by resident households	Geometric mean	Chained Laspeyres
Portugal	CPI measures pure price changes in fixed-market basket of constant quantity and quality for the general population	Geometric mean	Chained Laspeyres
Singapore	CPI measures the change in the prices of a fixed-market basket of goods and services commonly purchased by a majority of households over time	Geometric mean	Laspeyres
Russia	CPI measures the changes over time in the overall level of prices for goods and services purchased by public for non-production consumption	Geometric mean	Chained Laspeyres
South Africa	CPI shows the average price level of all those goods and services of unchanging (a fixed basket of goods and services of unchanging or equivalent quantity and quality) bought by a typical consumer or household changes over time	Geometric mean	Laspeyres
Spain	CPI is a statistical measurement of the evolution in the overall prices of goods and services consumed by the population living in family dwellings	Geometric mean	Chained Laspeyres

Appendix A: Price Definition and CPI Computation Across Selected Countries

Country	Price Definition	Formula in CPI Computation	
		Lower (Basic) Level	**Higher Level**
Sweden	CPI measures the average change in prices of goods and services available for private consumption	Geometric mean	Walsh
Switzerland	CPI measures the pure change in prices of goods and services bought for the purpose of consumption by resident households	Geometric mean	Chained Laspeyres
Thailand	CPI measures the change in prices of a fixed basket of goods and services purchased for consumption by the average households in the urban area throughout the country	Arithmetic means of relative prices	Chained Laspeyres
United Kingdom	CPI measures the average change in prices of goods and services bought in the UK for the purpose of consumption by all UK residents, foreign visitors, and residents of institutional households	Geometric means of price relatives	Chained Laspeyres
United States	CPI measures pure price change in a market basket of goods and services of constant quality. The cost-of-living concept is the measurement objective.	61% geometric mean and 39% weighted average of relative prices (modified Laspeyres)	Chained Laspeyres
Europe	HICP (Harmonized Index of Consumer Prices) measures the average price changes of goods and services available for purchase in the economic territory of the Member States for the purpose of directly satisfying consumer needs	Ratio of arithmetic mean or ratio of geometric mean prices	Chained Laspeyres

Source of basic data: Philippines based on NSO website; Other countries based on Collin, Marianne (2006), "International methodological standards for CPI and national practices," Proceedings on International Fisher Committee Workshop on CPI Measures: Central Bank Views and Concerns, Basel, April 2006.

APPENDIX B: Philippines: CPI Weights for All Income Households

Code	Description	Base year=2000
0	All items	100.00
1	Food, beverages and tobacco	50.03
10	Food	46.58
11	Cereal and cereal preparation	13.28
110	Cereals	10.24
111	Rice	9.36
112	Corn	0.88
11290	Cereal preparation	3.04
12	Dairy products	2.33
13	Eggs	1.01
14	Fish	6.39
15	Fruits and vegetables	5.30
16	Meat	7.63
17	Miscellaneous foods	10.64
18	Beverages	2.25
19	Tobacco	1.19
2	Non-food	49.97
20	Clothing	3.00
21	Footwear	0.92
22	Ready-made apparel except footwear	2.03
23	Custom clothes (accessories and services)	0.06
3	Housing and repairs	16.80
31	Minor repairs	1.02
32	Rentals	15.77
4	Fuel,light and water	6.95
41	Fuel	2.35
42	Light	3.75
43	Water	0.85
5	Services	15.89
51	Educational services	3.83
52	Medical services	2.10
53	Personal services	2.06
54	Recreational services	0.38
55	Transportation and communication	7.52
56	Other services	0.00
6	Miscellaneous foods	7.33
61	Household furnishing and equipment	1.76
62	Household operations	1.23
63	Personal care and effects	3.30
64	Other miscellaneous goods	1.04

Source of Basic Data: National Statistics Office website.