



**Economic and Social  
Council**

Distr.  
GENERAL

ECE/CES/GE.22/2006/SP/2  
16 March 2006

ENGLISH ONLY

**ECONOMIC COMMISSION FOR EUROPE**

**STATISTICAL COMMISSION**

**CONFERENCE OF EUROPEAN STATISTICIANS**

Group of Experts on Consumer Price Indices

Eighth Meeting  
Geneva, 10-12 May 2006  
Item 10 of the provisional agenda

**CPI AND MEASUREMENT PROBLEMS IN DEVELOPING COUNTRIES:  
THE CASE OF MALAWI\***

Submitted by National Statistical Office of Malawi

The meeting is organised jointly with the International Labour Office (ILO)

**I. INTRODUCTION**

1. Malawi is a small landlocked country in sub-Saharan Africa. The country shares boundaries with Zambia (Northwest), Tanzania (North and Northeast) and Mozambique (East, South and Southeast). She has an area of 118,484 square kilometers of which 94,276 square kilometers are land. The population is estimated for mid – 2005 at 12.3 million.

---

\* This paper has been prepared by Mr. Charles Machinjili, National Statistical Office of Malawi, at the invitation of the Secretariat.

2. The economy is predominantly agricultural with 85 percent of the people living in rural areas. Agriculture accounts for about 40 percent of GDP and about 90 percent of export earnings with the sector being dominated by tobacco, tea and sugar. Distribution is the second largest sector in the economy accounting for just over 20 percent of GDP.

3. From 2003 to-date GDP has registered positive but varied growth rates from 4.3 percent in 2003 to 5.1 percent in 2004 then declining to 1.9 percent in 2005 due mainly to a slowdown in the agricultural sector. It is projected to rebound to 8.5 percent in 2006 due to more than favorable weather conditions.

4. Since independence from Britain in 1964, the country has conducted Household Expenditure Surveys (HES) every ten years from 1970 through 1990 and Integrated Household Surveys (IHS) every five years from 1997 to the present.

5. These surveys have provided valuable information for deriving socio-economic groups and related weights for products consumed by these groups. This information has been the benchmark for the Consumer Price Indices (CPI).

6. Over the last three years inflation has averaged around 15 percent. The annual figure is for 2005 which averaged 15.4 percent. With the resumption of the Poverty and Growth Relief Fund Program (PGRF) with the IMF both bilateral and multilateral aid has resumed, it is expected that inflation will begin to slow down reaching one digit by end 2006.

## **II. METHODOLOGY OF CPI DATA COLLECTION IN MALAWI**

### Price Collection

7. For purposes of the CPI the country is divided into two strata: urban and rural. The urban stratum comprises the four major cities of Blantyre, Zomba, Lilongwe and Mzuzu. The rest of the country is classified as rural. Prices are collected from shops and markets in the two strata. For each item at most three price quotations are obtained.

8. For mainly fresh produce and items that are sold in heaps and bundles price collection is done through the actual purchase of the items. These items comprise maize grain, maize flour, root crops, vegetables, fruits, live chicken, fresh and dried fish, charcoal and firewood. The purchased items are then weighed to derive unit prices.

9. Collection of prices is done in collaboration with the Regional Statistical Offices.

10. Price information is sent by e-mail from the Regional Statistical Offices to the NSO Head quarters for index number calculation and derivation of inflation rates for the country.

11. The calculation of the indices is done using Excel spreadsheets.

12. The indices are divided into seven commodity groups (see appendix 1 for the groups and their relative weights).

13. The indices are computed using the base-weighted Laspeyres methodology (shown below) with expenditure shares as weights:

$$L_t = \frac{\sum_{i=1}^n p_{o,i} q_{o,i} \times (p_{t,i}/p_{o,i})}{\sum_{i=1}^n p_{o,i} q_{o,i}}$$

14. In the above formula the price relative for each item “i” ( $p_{t,i}/p_{o,i}$ ) is multiplied or weighted by base period expenditure ( $p_{o,i} \times q_{o,i}$ ). The resulting expenditures are summed up to give the current cost of the original basket and this amount is then divided by base period expenditure to derive the index.

### III. CHALLENGES TO THE MEASUREMENT OF THE CPI

#### Derivation of Weights

15. The weights for the commodities are based on the expenditure shares derived from the IHS. However since about 90 percent of households live in rural areas engaging in own consumption, which is mainly limited to food consumption, it is often difficult to monetize this consumption.

16. The question emerges therefore of whether or not to include non monetized consumption in the derivation of the weights. In the current CPI series non monetized food consumption was included leading to an unusually large weight for the food category (68.0%) for rural households (See table 1 below).

Table 1: Commodity Group Weights for the Malawi CPI

Commodity Group	Food	Beverages & Tobacco	Clothing & Footwear	Housing	Household Operation	Transport	Miscellaneous
National	58.1	5.9	8.5	12.1	4.1	5.1	6.2
Urban	35.2	8.3	8.6	21.1	4.9	11.0	10.9
Rural	68.0	4.8	8.5	8.2	3.8	2.5	4.2

#### Collection of Prices

17. In an effort to minimize cost prices are collected once in the middle of the month for urban areas and once on market days, usually at the end of the month, for rural areas.

18. However collecting prices at one point in the month does not give a realistic average price for the month.

### Purchasing and Weighing of Items

19. Commodities from produce markets are bought and later weighed to get unit prices since these are sold in heaps and bundles.

20. The first problem has to do with cost. Since prices will continue to go up it may not be sustainable to maintain such a practice. The second has to do with the condition of the weighing scales. Very often these are not well maintained and therefore liable to give inaccurate readings.

### Treatment of Missing Items

21. When no price quotations are available for an item the previous month's price is retained. This introduces a downward bias in inflation if prices are rising and an upward bias if prices are falling.

### Treatment of Quality Changes

22. When the observed differences between a new and a disappearing product are negligible, the practice is for the price collector to simply substitute the new product for the old one.

23. This practice of comparable substitution implicitly attributes all of any observed price difference between the two products to pure price change.

### Choice of Formulae and Substitution Bias

24. The Laspeyres formula is used to compute the indices. This formula assumes comparison of prices of a fixed basket of goods and services from the base period.

25. One problem with this methodology is that a fixed-weight index takes no account of people's ability to substitute to achieve the same utility when commodities become more expensive over a period of time.

## **IV. PROPOSALS FOR IMPROVING THE MEASUREMENT OF CPI**

### Commodity Weights

26. Commodity weights are very important as they have a large influence on movements in the CPI. The source data for these are the expenditure shares and a decision has to be made right at the planning stage of the household survey on what type instrument is to be used to collect the information: should it be a diary of expenditure and for what duration or should it be a one time question with a short recall period.

27. In addition the issue of monetary versus non-monetary expenditure needs expert attention right from the outset.

### Price Collection

28. Some countries have special “market days”. These are days when all traders assemble together at a designated place to transact their business. It is therefore important to take account of such days when most commodities are available and therefore prices would be expected to be stable.

### Weighing of Commodities

29. The solution to this is to use electronic scales which require minimum adjustments.

### Missing items

30. Imputations for missing prices can be made on the basis of implicit or explicit methodology. For implicit imputation the missing index and its weight are simply omitted from all calculations. The weight for the missing index is automatically re-distributed proportionally across the remaining indices in the group.

31. For the case of explicit imputation, which is the one recommended, the index for the missing item is explicitly recorded but flagged as an imputation and the group index is calculated using the imputed value. Imputations can be made using the movement of a group, sub-group or single product.

### Treatment of Quality Change

32. When products permanently disappear and the selected replacement is of a different quality the difference in quality can be imputed using appropriate techniques. One way is to estimate the price trend of similar products to represent the price trend of the discontinued product without necessarily making a direct comparison between the price of the old and the new product. The difference in price of the imputed price (old product) and that of the new product is the implicit quality adjustment.

### Substitution Bias

33. A way out is to use formulae that allow for substitution effects. The Fisher Ideal Price Index is one such formula.

$$FP_i^t = (LP_i^t \times PP_i^t)^{1/2}$$

34. Where  $LP_i^t$  is the Laspeyres price index for item “i” and  $PP_i^t$  is the Paasche index for item “i”. This gives a simple geometric average of the Laspeyres and Paasche price indices.

35. Another way is to undertake household budget surveys at shorter and more regular intervals to enable the update of weights at such intervals.

## V. CONCLUSION

36. The paper has looked at the problems besetting a small developing country like Malawi in measuring CPI. The cited problems are not unique to developing countries alone but can be applied universally. The determination of weights, the methodology for price collection, the choice of formulae and the approach followed in dealing with missing items and quality changes all play a critical role in the accuracy and robustness of the CPI.

### References

1. Armknecht, P.A., Improving the Efficiency of the U.S. CPI, IMF Working Paper WP/96/103, International Monetary Fund, Washington D.C., September 1996.
2. Government of Malawi, National Statistical Office, Monthly Statistical Bulletin, various issues.
3. Ibid, Integrated Household Survey, Abstract 1997/1998 published 2000.
4. Robin Lynch, Measuring Real Growth-Index Numbers and Chain-Linking, Economic Trends, No. 512 June 1996.

-----