Description of Methods Used in Compilation of Consumer Price Index

1. Historical Notes

In response to the recommendation of the United Nations Economic Committee for Asia and Far East (UNECAFE), the Directorate-General of Budget, Accounting and Statistics (DGBAS), Executive Yuan, in coordination with the Commission on Economic Stability and the Ministry of Economic Affairs, consulted statistical experts and economists and decided to combine the index of retail prices in major cities and townships of Taiwan Province and the index of living cost of government employees into the "Index of Urban Consumer Prices for Taiwan Province" in 1954. To carry out the program, the DBAS of Taiwan Provincial Government(now is Directorate-General of Budget Accounting, and Statistics, Central Taiwan Division), was assigned to conduct a salary-earner's family budget survey for 1954-1955 at counties and cities in Taiwan Province, with the results to be used to arrive at the weights. Consumer goods to be priced were increased as a part of the preparation for the compilation reform. A pilot project was launched to do experimental compilation for a period of six months from July 1958. The project is based on prices of 150 items of goods and services which were classified into seven groups , such as Food, Clothing, Housing, Transportation & Communication, Health, Education and Recreation, and Miscellaneous etc. The indices, adopting the Laspeyres weighted aggregate formula, produced a set of fairly comprehensive, satisfactory results. The official publication began on January 1959. This is the origin of the Consumer Price Index(CPI).

In 1963, finding that the index series were no longer able to reflect the changes in industrial structure as well as in consumption pattern due to quick economic development and a continued rise in living standards, the DGBAS instructed the DBAS to prepare an improvement plan which was subsequently submitted to and approved with some modification by the Commission on Improvement of Statistical System (CISS) of the Executive Yuan. After an experimental compilation period from January to December 1967, the index series were officially published in January 1968 to replace the formers. Following the practice applied to the wholesale price indices, the DBAS of Taiwan Province and the DBAS of Taipei Municipality were required to jointly compile the CPI series.

In 1971, the DGBAS reformed the compilation of the CPI series to make the base period conforming to that for the Wholesale Price Index (WPI) series and also to improve the accuracy and enhance the comprehensiveness of the compilation results. The CPI series were published concomitantly with the WPI series. In 1974, to go in line with quick economic expansion and a change in consumption, the number of priced commodities was increased again, with more groups and subgroups are added to the series and the base period shifted to 1971. The revised CPI series were officially published in January 1975. Subsequently, the base period was changed once every five years and the priced commodities were expanded in order to accurately reflecting the price trends.

From the base year of 1996, the DGBAS introduced the relative importance to compile the indices; the link period is next December of base year. In the base year of 1996, the pricing localities were adjusted; the DGBAS no longer distinguish between the urban and rural area thus the compilation of urban CPI was not available since February 2008. In the base year of 2011, the DGBAS began publishing the indices classified by Frequency of Purchase Group and Elementary Aggregation, which were calculated upon the link period, December 2012. In order to go in line with the current expenditure structure of households, from the base year of 2016, the CPI will be rebased annually according to Household Final Consumption Expenditure instead of deriving from the Family Income/Expenditure Survey, which was calculated upon the link period, December 2017.

2. Objective and Uses

(1) Objective

The CPI measures the changes in prices of goods and services purchased for consumption purpose.

(2) Uses

① As an indicator of inflation and as a means used to compute real income or purchasing power.
② As the base to adjust the payment and make contracts by public and private agencies.
③ As the base to adjust the tax deductions (income tax, gift tax, land value tax and estate tax etc.)

3. Items Priced

According to the family consumption pattern in 2016 in Taiwan Area, 368 items of commodities and services are selected for pricing in 17 surveyed cities or counties.

4. Index Classification

(1) Basic Group: Contains a general index and the indices for 7 groups, 40 subgroups, and 62 small groups.

(2) Special Group

① Indices classified by commodity and service group, which contain the indices for 2 groups, 10 subgroups.

② Indices classified by frequency of purchase group, which contain the indices for 3 groups.

5. Base Period

The base period is 2016.

6. Weights

(1) Outlet-type Weights: the average consumption expenditures per household per item in 2016 of each outlet type. The outlets priced are classified to 8 different types (i.e. department store, supermarket, hypermarket, convenient store, wet market, specific store, other store and online shop).

(2)Area Weights: the average consumption expenditures per household in 2016 of each locality multiply by the midyear numbers of household.

(3) Group and Item Weights: the weights of the groups are largely based on the Household Final Consumption Expenditure of National Income. The weights of the priced item are mainly derived from the expenditures per household in 2016 obtained from the Family Income/Expenditure Survey (including interview survey and diary survey). In addition, both of the weights of groups and items are constant every month of the same year except each item of fresh vegetable and fruit.

(4) Varying Weights: all items of vegetables and fruits use monthly varying weights which are obtained from the sales value data for 2014, 2015 and 2016 but the group weights keep constant.

7. Pricing

(1)Price Localities:

9 cities (i.e. New Taipei, Taipei, Taichung, Tainan, Kaohsiung, Taoyuan, Keelung, Hsinchu and Chiayi) and main towns and townships in 8 counties (i.e., Yilan, Hualien, Miaoli, Nantou, Yunlin, Pingtung, Taitung, and Penghu) are selected for pricing.

(2) Date of Pricing:

The date of pricing is determined by the feature of the priced items. For the 9 surveyed cities, it may be priced 9 to 15 times a month (i.e., on the days in the month whose last digit happen to be 2(2 observations), 5, or 8(2 observations)) or 3 to 5 times a month (i.e., on the 5th (2 observations), 15th and 25th (2 observations) days of the month). For the 8 surveyed counties, it may be priced once a month (i.e., on the 15th day of the month) or 3 times a month (i.e., on the 5th, 15th, and 25th days of the month).

(3) Reporting Agency:

The Office (Department) of Budget, Accounting and Statistics of a surveyed county (or city) is designated as the reporting agency.

8. Computation

(1) Procedure of compilation：

Specification price relatives →(weighted by Outlet-type Weights)
→Elementary aggregation →(weighted by Area Weights)
→Regional aggregation →(weighted by Item Weights)
→CPI and Indices of Groups

(2)Formula: The general index and group indices are computed according to the derived form of Laspeyres weighted aggregate formula in following steps:

① Elementary aggregation: For non-substitutable items, such as residential rent, utilities, medicines & medical care and official fees, Carli indices are compiled. All CPI elementary indices except above-mentioned items are Jevons indices. (Carli index: unweighted arithmetic mean of price relatives. Jevons index: unweighted geometric mean of price relatives.) In this stage, the Outlet-type weights are applied.

$$\frac{P_{y.m,j,k}}{P_{y-1.12,j,k}} = \left[\prod_{o} \left(\frac{P_{y.m,j,k,o}}{P_{y-1.12,j,k,o}} \right)^{W_{j,k,o}} \right]^{\frac{1}{\sum_{o} W_{j,k,o}}}$$

②Regional aggregation:

$$\frac{P_{y.m,j}}{P_{y-1.12,j}} = \frac{\sum_{k} \frac{P_{y.m,j,k}}{P_{y-1.12,j,k}} \bullet W_{j,k}}{\sum_{k} W_{j,k}}$$

③ Index:

$$I_{y.m/16} = \frac{\sum_{j} \frac{P_{y.m,j}}{P_{y-1.12,j}} \bullet (P_{y-1.12,j} \bullet Q_{16,j})}{\sum_{j} P_{y-1.12,j} \bullet Q_{16,j}} \times I_{y-1.12/16}$$

j: item k: locality o: price quote Q: quantity

$W_{j,k,o}$: outlet-type weight $W_{j,k}$: area weight P: price

$P_{y-1.12}$: the price for December of the y-1 year

$P_{y-1.12,j} \bullet Q_{16,j}$:average consumption expenditure of a family in 2016 basket for each item, valued at December of the y-1 year price.

$I_{y-1.12/16}$: the price index for December of the y-1 year in the 2016-base.

$I_{y.m/16}$: the price index for m month of the y-1 year in the 2016 base.

(3) The yearly index is the arithmetic average of the monthly indices.

(4) Treatment for Lack of Priced Items:

Ordinary Items:

If the item of a specific brand is out of supply on market, a similar commodity bearing a different brand is priced and the adjustment should be made according to the following formula:

$$\text{Price of substitute commodity at base period} = \frac{\text{Price of originally surveyed commodity at base period}}{\text{Price of originally surveyed commodity at period prior to current one}} \times \text{Price of substitute commodity at period prior to current one}$$

9. Publication

The monthly index is published on the 5th working day (subject to postponement due to Chinese Lunar New Year or other consecutive public holidays) after the end of the reference month in news release. The e-book "Price Statistics Monthly" with the detailed figures is made available immediately at the time of release; please see http://eng.dgbas.gov.tw or http://eng.stat.gov.tw for details.