

How are the price indices calculated?

Two types of data are required to calculate the price indices: the weights and price change data.

1. The weights data

The consumer price index measures the changes in the price level of consumer goods and services generally purchased by households over time. However, there are many kinds of goods and services on the market, and their shares of household expenditures vary greatly. For instance, the price of edible rice rises 10% and the price of fresh flowers rises 10%, these price changes will have different impacts on people's lives. Consequently, the consumer price index should not be calculated by the simple average method, thus the weights are used to ensure the CPI reflects the relative importance of each item in the CPI basket, as a proportion of household expenditure.

2. Rebasing and Updating the items and weights

In practice, the important and representative items are derived from the **Family Income/Expenditure Survey** and then their price changes are collected periodically. The proportion of overall household expenditures for each item in the CPI basket is as the weight. In the 2011-based CPI, 370 items of goods and services are selected into the CPI basket to price and are classified into seven groups which include Food, Clothing, Housing, Transportation & Communication, Medicines & Medical Care, Education & Entertainment and Miscellaneous. The weight for each group in turn is 25.2%, 3.8%, 27.1%, 15.3%, 4.9%, 16.8% and 6.8%. However, to reflect nation's economic development and changes in consumer expenditure patterns, and maintain the representative in CPI, the weighting structure are updated every five years; Japan, South Korea, and Singapore also update their weights every five years, Canada does so every four years, and the United States does so every two years.

3. How are price data collected?

The 2011-based CPI covers 370 items in 17 cities or counties. The prices of items are collected 1-15 times per month depending on the feature of the priced items. Approximately 18,000 specifications of goods and services are collected. Price data obtained mostly by personal interview survey and reviewed by the Budget, Accounting, and Statistics Office of the 17 cities or counties, and then sent to DGBAS for follow-up re-checking. DGBAS collects some public fees, such as transportation, electricity and medical care charges directly from the related agencies, and disseminates the index on the fifth day (postpones to the next working day in case of holiday) after the end of the reference month. To ensure the quality of survey data, DGBAS irregularly assigns employees to perform random checks, and also holds consumer price survey workshops, aiming at strengthening the price collecting techniques of enumerators to boost data quality and accuracy.

4. How is the index calculated?

The general index and group indices are computed according to the derived form of Laspeyres weighted aggregate formula, which employs quantities (Q_0) sold in the base period as the weight; this formula is as follows:

$$L_{t,0} = \frac{\sum P_t Q_0}{\sum P_0 Q_0} \times 100 = \sum \frac{P_t}{P_0} \bullet \frac{P_0 Q_0}{\sum P_0 Q_0} \times 100$$

Here $\frac{P_t}{P_0}$ is the ratio of prices at time t (i.e. price relatives) vs. the base period, and

$\frac{P_0 Q_0}{\sum P_0 Q_0}$ is the consuming expenditures ratio in the base period.

For example:

To calculate the price relatives of the current-month and base period of each item (i1, i2, i3), and then multiply by the corresponding weights. To aggregate the index of the products for each item and divided by the sum of the weights of each group into the index for the ith group.

Item	Weight	Index
i1	0.03	110
i2	0.06	105
i3	0.01	130

$$\text{Index of } i^{\text{th}} \text{ group} = \frac{0.03 \times 110 + 0.06 \times 105 + 0.01 \times 130}{(0.03 + 0.06 + 0.01)} = 109$$