

IV Outline of the Regional Difference Index of Consumer Prices

The regional difference index of consumer prices has been compiled since 1947 in order to measure city-to-city differences in the level of consumer prices. The index was calculated originally by Fisher's ideal formula, regarding each city and Ku-area of Tokyo. And then the formula was revised in accordance with the change of municipalities of the Retail Price Survey (RPS) in 1952 and 1963, and since 2010 the index has been compiled in the following method.

1. Scope of the index

As for the regional difference index of consumer prices, the annually-averaged indices are compiled for 51 cities consisting of cities with prefectural governments and government ordinance-designated cities (Kawasaki-shi, Hamamatsu-shi, Sakai-shi and Kitakyushu-shi), taking the average of 51 cities as a base of comparison (=100). For each area, "all items, less imputed rent", "food", and "all items, less rent" are compiled.

2. Price data

The price data for calculating the index are retail prices collected by the RPS.

3. Weights

The weights are calculated by national average expenditure by item per household in the year concerned, which is obtained from the Family Income and Expenditure Survey (FIES). The weights are made in the same way as the CPI.

4. Average prices

The prices by municipalities are calculated as a simple arithmetic mean during the period of January-December based on the price data mentioned in section 2.

The prices of fresh food, however, are calculated as arithmetic means weighted by monthly weights.

Average prices for 51 cities are calculated as weighted harmonic means of yearly prices, as shown below.

$$\begin{aligned}
 p_i &= \frac{\sum_j \alpha_j p_{ij} q_{ij}}{\sum_j \alpha_j q_{ij}} = \frac{\sum_j \alpha_j p_{ij} q_{ij}}{\sum_j \alpha_j \frac{p_{ij} q_{ij}}{p_{ij}}} \\
 &= \frac{\sum_j \alpha_j e_{ij}}{\sum_j \frac{1}{p_{ij}} \alpha_j e_{ij}}
 \end{aligned}$$

where p : yearly average price
 q : quantity per household
 e : expenditure per household
 α_j : proportion of households for reference city to Japan
 i : item
 j : municipality

5. Formula

The index is calculated as follows.

$$I_l = \frac{\sum_i \frac{P_{il}}{P_i} w_i}{\sum_i w_i} \times 100$$

where w : weight (Japan)
 l : region (municipalities)