

## I Outline of the 2015-Base Consumer Price Index

### 1 Characteristics of the index

The Consumer price index (CPI) is calculated by comprehensively measuring the price fluctuation of goods and services purchased by households nationwide in the time series. It reflects changes in the cost of purchasing goods and services in a fixed “consumption patterns.”<sup>1</sup>

### 2 Outline of the index

#### (1) Scope of the CPI

Since the CPI measures the price changes affecting the life of households as consumers, the scope should include the living expenditure of a household economy<sup>2</sup> (religious contributions, donations, money gifts, other obligation fees and remittances are excluded).

Thus, expenditures such as direct taxes and social insurance premiums (non-consumption expenditure), security purchases, land and housing purchases (expenditure for saving and property purchases) are not included in the scope of the CPI.

Housing cost of owner-occupied housing is incorporated into the index by the “Imputed rent” approach (refer to “I [Reference] Treatment of the housing services of owner-occupied houses”).

#### (2) Index formula

The index is calculated as the weighted arithmetic mean with a fixed basket in the base period preceding the comparison period (Laspeyres formula).

$$I_t = \frac{\sum_{i=1}^n P_{t,i} q_{0,i}}{\sum_{i=1}^n P_{0,i} q_{0,i}} \times 100 = \frac{\sum_{i=1}^n \frac{P_{t,i}}{P_{0,i}} w_{0,i}}{\sum_{i=1}^n w_{0,i}} \times 100$$

$I$  : Index

$p$  : Price       $q$  : Quantity

$w$  : Weight (=  $pq$ )

$i$  : Item

0: Base period     $t$ : Comparison period

Of the two different methods to calculate indices, one is the fixed-base method, in which indices are calculated with the rate of consumption expenditure in the base year as the weight. The other is the chain-linking method in which the index of the current year, calculated based on the rate of consumption expenditure in the previous year as the weight, is multiplied every year. In the consumer price index, the indices given by the fixed-base method are published for measuring the price fluctuations with the fixed consumption patterns and the indices given by the chain-linking method, which reflect changes in consumption patterns every year, are also published as reference indices.<sup>3</sup>

<sup>1</sup> The International Labour Organization (ILO) set up the international standards for the consumer price index (refer to “VIII 1 Resolution concerning consumer price indices, adopted by the 17th International Conference of Labour Statisticians (2003) - excerpt -”). Japan also uses these standards for the consumer price index.

<sup>2</sup> Indirect taxes such as consumption taxes collected when goods and services are purchased are included in the consumer expenditure.

<sup>3</sup> Unless otherwise specified, the index represents those which are calculated by the fixed-base method in this document. For details of the index calculated by the chain-linking method, refer to “III Appendix 4 Calculation of the CPI by Laspeyres’ Chain Index method.”

(3) Index reference period and weight reference period

Both the index reference period and the weight reference period are the calendar year of 2015.

The weight is mainly calculated from the average monthly expenditure by item per household in 2015, which is obtained from the Family Income and Expenditure Survey (FIES) (Fundamental Statistical Survey based on the Statistics Act (Law No. 53, 2007, hereinafter the same) (refer to “III Chapter 4 Calculation of the weight ( $W_0$ )”).

(4) Index items

The number of items used for the calculation of the index (hereinafter referred to as “index items” or simply “items”) totals 585, consisting of 584 items and an item of imputed rent of owner-occupied housing (including 4 items priced only in Okinawa Prefecture). Items are selected with consideration of the importance of each item relative to total living expenditure, the representativity of price movements and feasibility of price data collection, in order to represent the price movement of all goods and services purchased by households.

As for the items, refer to “IV 1 List of information for items of the 2015-Base Consumer Price Index.”

(5) Price data

a) In principle, the prices of index items are derived from the retail prices of each municipality and the items obtained by the Trend survey in the Retail Price Survey (Fundamental Statistical Survey based on the Statistics Act) (refer to “VII Outline of Retail Price Survey (Trend Survey)”).

Note that the number of surveyed municipalities (villages, towns and cities, collectively referred to as “municipalities”) is 167 (refer to “IV 2 List of municipalities for the price survey”).

b) As for three items, “Personal computers (desktop)”, “Personal computers (notebook)” and “Cameras”, the prices of all products sold at major electric appliances shops nationwide, obtained from scanner data from the POS information are used.

(6) Index calculation

Firstly, the indices for the smallest groups are calculated by averaging the item indices, which are calculated by dividing the price in the comparison period (refer to “III Chapter 1 Calculation of the prices in the comparison period ( $P_i$ )”) by the price in the base period (refer to “III Chapter 3 Calculation of the prices in the base period ( $P_0$ )”, with a weight assigned to each item in the group. Secondary, Indices thus obtained are averaged with weight for each group, to obtain the indices for the groups immediately above the smallest groups. Repeating the same procedure, the indices for the minor groups, subgroups, the 10 major groups and all items index are obtained in succession.

In the case of the Japan index, the index is calculated as follows: First, the index of the relative price by item is calculated for each municipality and then averaged with the respective weight

for each municipality to obtain the average price index by item nationwide. Then this index is averaged with weight for each item for Japan to obtain upper level groups and the all items index. The same procedure is also taken for the city classes and districts.

### 3 Index groupings

#### (1) Basic classification indices

a) As for basic classification indices, all items, 10 major groups, subgroups, minor groups and individual items are calculated for Japan and the Ku-area of Tokyo.

In addition, as for 70 groupings of city classes (5 groupings), districts (10 groupings), major metropolitan areas (4 groupings), cities with prefectural governments (excluding the Ku-area of Tokyo), and part of the government ordinance–designated cities (Kawasaki-shi, Sagamihara-shi, Hamamatsu-shi, Sakai-shi and Kitakyushu-shi) (51 groupings), indices for all items, 10 major groups and subgroup indices are calculated.

For the classification of city groups, districts and major metropolitan areas, refer to “IV 2 List of municipalities for the price survey.”

b) Indices for items such as “All items, less fresh food,” “All items, less imputed rent,” “All items, less imputed rent & fresh food,” “All items, less fresh food and energy” and “All items, less food (less alcoholic beverages) and energy” are calculated as the analytical series of basic classification indices.

#### (2) Goods and services group indices

a) Goods and services group indices are calculated for Japan and the Ku-area of Tokyo.

b) Indices for items such as “Public utilities charges” and “Services, less imputed rent” are calculated as the analytical series of goods and services classification indices.

#### (3) Indices aggregated based on baskets of specific household groups

The following indices are calculated for Japan:

a) Subgroup Index for Total Households<sup>4</sup>

b) Subgroup Index by Yearly Income Quintile Group of Worker’s Households

c) Subgroup Index for Retired Elderly Households (age 60 and over / 65 and over)

d) 10 Major Group Index by Age Groups of Household Head

e) 10 Major Group Index by Types of Tenure of Dwelling

#### (4) Indices by the characteristic of items

The following indices are calculated for Japan:

a) Indices of Goods Groups Classified According to Elasticity to Living Expenditure

b) Indices of Annual Purchase Frequency Classes

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<sup>4</sup> Total households include both one-person households and two-or-more-person households.

(5) Seasonally adjusted indices (Fixed-base method)

The indices of the following nine groupings are calculated for Japan and the Ku-area of Tokyo:

Basic classification indices

- All items
- All items, less fresh food
- All items, less imputed rent
- All items, less imputed rent & fresh food
- All items, less fresh food and energy
- All items, less food (less alcoholic beverages) and energy

Goods and Services Group Indices

- Goods
- Semi-durable goods
- Goods, less fresh food

(6) Reference indices

The indices for the following basic classification are calculated for Japan:

CPI calculated by Laspeyres' Chain Index method<sup>5</sup>

(7) Others

The following indices are calculated:

- a) 5 major group indices (prewar base) for the Ku-area of Tokyo
- b) Subgroup index<sup>6</sup> (2010-base) for Japan and Ku-area of Tokyo

#### 4 Publication of the CPI<sup>7</sup>

In principle, the CPI is released at 8:30 A.M. (Japan time) on Friday of the week including the 26th of each month. The index figures of the preceding month for Japan and the preliminary figures of the current month for the Ku-area of Tokyo are released. The average index figures for the calendar year and fiscal year are released when the monthly figures for December and March are released respectively.

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<sup>5</sup> The indices of six groupings are calculated for Seasonally Adjusted Consumer Price Index Computed by Laspeyres' Chain Index Method. The 2015-base indices calculated by the Laspeyres' Chain Index method are released when the monthly figures for January 2017 are released.

<sup>6</sup> The 2010-base conversion subgroup indices are released when the monthly figures for January 2017 are released.

<sup>7</sup> The released indices are also available at the Portal Site of Official Statistics of Japan "e-Stat" (<http://www.e-stat.go.jp/>) with the database and API functions.

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| (1) Report on the CPI (leaflet).....      | This report contains basic classification indices, goods and services group indices for Japan and the Ku-area of Tokyo. It is published on the date of release as printed literature and also available on the Internet website. |
| (2) Monthly report on the CPI.....        | This report contains indices of all groupings and time series indices of major groupings of the month concerned.<br>This is available only on the Internet website.                                                              |
| (3) Annual report on the CPI (leaflet)... | This report contains monthly and yearly indices of all groupings and time series indices of major groupings. It is published in the next spring of the current year, and also available on the Internet website.                 |

[Reference] Treatment of the housing services of owner-occupied houses

To include the housing cost of owner-occupied housing in the price index, the imputed rent index and the all items index<sup>8</sup> including the imputed rent have been calculated since 1970 by the imputed rent approach.

In the Family Income and Expenditure Survey (FIES), which is used for calculating weights of the CPI, the purchase of housing is regarded as a purchase of property (capital accumulation), not included in the living expenditure. However, shelter services derived from houses purchased instead of renting houses are considered to account for a large portion of actual consumption, so it may not be reasonable that it is not included only because of lack of monetary transaction. Therefore, the housing services of owner-occupied housing are incorporated into the CPI considering they are equivalent to house rents of similar houses, which is called the “imputed rent” approach.

The treatment of housing cost of owner-occupied housing in the CPI differs by countries. The ILO manual, the “Consumer Price Index Manual: Theory and Practice” published by the International Labor Organization (ILO) in 2004, indicates that there are three approaches to deal with the housing cost of owner-occupied housing, i.e. (i) acquisition, (ii) payment and (iii) use. In Japan, focusing on approach (iii), the housing cost of owner-occupied housing is incorporated into the CPI as a necessary rental cost if the owner occupied housing is rented housing.

In the actual index calculation, the imputed rent, estimated by the National Survey of Family Income and Expenditure<sup>9</sup> (NSFIE, a fundamental statistical survey based on the Statistics Act), which is conducted one year before the base year (every five years), is used for the weight (refer to “III Appendix 3 Calculation of the weights for the imputed rent”), and the house rent of privately owned houses surveyed in the RPS (Trend) is substituted for the monthly price in the comparison period (refer to “III Appendix 2 Calculation of model items”).

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<sup>8</sup> Since 1985-base, “All items, including imputed rent,” which had been calculated as a reference grouping, has been used as the “All items” index, and “All items, less imputed rent” is treated as the analytical series of the basic classification index.

<sup>9</sup> In the 2015-base revision, 2014 result was used.