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COMPILATION METHOD AND QUALITY CONTROL OF CPI IN CHINA

Supporting paper submitted by the National Bureau of Statistics, People's Republic of China *

I. INTRODUCTION

1. The quality of price indices is mainly determined by the scientific advancement in the compilation method and the standardization in the process of data collection. The consumer price index (CPI) is a major parameter reflecting the trend of inflation or deflation in an economy, which holds the balance in macro-economic analysis and policy-making. Therefore, China has been making its efforts in improving the compilation method of CPI in recent years, at the same time quality control has been strengthened in the course of data collection. In 2000, a reform took place in the compilation of CPI. Now China uses the popular chain Laspeyre's formula to update and adjust the basket of goods. Starting from 2001, The National Bureau of Statistics (NBS) began to compile fixed base price indices making the

* Prepared by Mr. Huang Langhui, Director-General, Urban Survey Organization, National Bureau Statistics, People's Republic of China.

year 2000 as the base year. In the meantime, China continues to improve its survey network, to strengthen the training of interviewers and to further standardize the workflow of the survey. The CPI of China basically reflects the real changes of consumer prices and is recognized by both domestic and overseas experts.

II. METHODOLOGY REFORM HAS EMPHASIZED SCIENTIFIC AND RATIONAL ASPECTS WITH THE AIM OF ENSURING THE REPRESENTATIVITY AND ACCURACY OF THE PRICE INDICES

An internationally accepted method is used for the compilation of CPI.

Sample selection, population and distribution of survey areas and survey spots

2. Since China is a large country, the disparity between urban and rural areas and different regions is huge, showing the feature of a dualistic economy. Therefore, the price survey should reflect the changes of prices both in urban and rural areas respectively, and then further show the change of the harmonized urban and rural average prices level for the whole country. The selection of price survey areas should take into consideration the representativity of urban and rural areas. Generally speaking, firstly we combine a stratified sampling method with a systematic sampling method, and then proper adjustment will be made according to the real situation. Cities are selected by ranking from top to bottom of those cities covered in the survey areas in terms of annual average wages, then sum up the permanent residents of each city, and finally use a systematic sampling method according to the number of cities that need to be covered in the survey. The selection of counties uses the same method as that in cities but using the per capita net income. About 226 cities and counties across the country are covered in national indices collection. Of this total, 146 are cities above county level and the rest 80 are counties, including inland and coastal areas, economically developed areas, remote and depressed areas. With the aim of making the selected areas more representative of the local areas, each region adds cities and counties to be covered in the survey thus making the total number of cities and counties of the CPI survey over 500. The local survey teams carefully implement the survey scheme formulated by the National Bureau of Statistics, and are supervised by the National Statistical Bureau in terms of survey operation.

3. The selection of price survey spots in the selected cities and counties is also based on a combination of the stratified sampling method and the systematic sampling method, and then proper adjustment is made according to the real situation. Firstly, the various stores, free markets of agricultural products and service sites are ranked according to the total volume of sales or turnover and operation scale, then the total volume of sales, turnover and operation scale are added up, and finally the systematic sampling method is used according to the number of survey spots that should be covered in the survey. In the selection of survey spots, those central markets, large department stores and supermarkets with varieties of goods and large consumer flows located in busy areas are covered in the survey; at the same time, we have taken into consideration the consumption behavior of residents living in different areas and the balance distribution of those selected survey spots. Therefore, both comprehensive department stores and specialized stores are included in the samples. Priority is given to those high credit-standing stores with a stable channel of stock. With regard to the numbers of

survey spots, we shoot at aim to ensure the representativeness of the price data by using existing survey resources. For each type of standardized product, 3-4 survey spots are selected in large cities, 2-3 for medium cities and 1-2 for small cities and counties. There are altogether 25,900 survey spots across the country. From the quality of price data we can tell that the number and distribution of survey spots provide the needed survey information and guarantee the representativity and accuracy of the price indices.

Product classification and quantity of standardized products

4. The products list for the CPI survey is divided into 8 categories by function, including food, tobacco and alcoholic drinks and related articles, clothing, household apparatus and maintenance services, medicines and medical articles, means of transportation and communication, recreational, educational and cultural articles, and residence. There are 251 subcategories according to the larger components chosen from the consumer expenditure survey that covers over 110,000 households and reflects the consumption behavior of those households. The principles of products selection are as follows: (1) large consumption; (2) highly representative of price changes and reflect the degree of changes; (3) the heterogeneity among the selected products should be significant. On the basis of the 251 subcategories, each region selects about 650 products; therefore, the survey data in each month roughly cover about 1.2 million price data.

Calculation method

5. China now uses the chain Laspeyre's formula to calculate the fixed-base index, and then using the fixed-base index to estimate the year-on-year change in the price index, monthly chain price index and other types of price indices in terms of different time intervals.

Collection, calculation and evaluation of weight

6. The weights of the consumer price index come from the consumer expenditure survey of 110,000 households. Except for the weight for fresh vegetables and fruits, the weights for other items are kept unchanged for one year, and proper adjustments are made at the beginning of the year. However, monthly adjustments are made for the weight of fresh vegetables and fruits. The calculation method for the weight is as follows:

- i. The weight of the surveyed city is based on the information collected through the household expenditure survey of the city;
- ii. The weight of the surveyed county or city is based on the information of the annual per capita consumption expenditure of urban households and annual per capita cash expenditure on living expenses of rural households and related information on the population weighted average;
- iii. The weight of urban and rural areas in provinces is based on the information from the consumption expenditure survey of urban households and cash expenditure on the living expenses survey of rural households;
- iv. The weight of a province is the urban and rural per capita consumption expenditure and the population weighted average according to urban and rural weight;

- v. The national weight is the per capita consumption expenditure and population weighted average according to the weight of the provinces, autonomous regions and municipalities.

7. Generally speaking, the estimated weights based on information from the household expenditure survey is basically good. There are some drawbacks, however, in the current urban and rural household expenditure surveys such as large proportion of medium and low income residents and lack of data on some service items or underestimated survey data. This has caused errors in the estimated results of some groups, in particular that of the subcategories have become comparatively large. Therefore, each year we invite appropriate experts to evaluate those weights and provide more reasonable revisions of those weights for our reference. Secondly, we rely on a typical survey and the verification of related data to amend the deviated weights. Thirdly, we compare the current year weights with those in previous years to make a rational evaluation of the outliers. As for the provincial levels, comparison, verification and revision should be made to their weights, and of selected cities and counties at and below the provincial level.

Tabulation method of price indices

Calculation of basic category indices

- i. Monthly chain price indices

The method of geometric mean is used in the calculation on the basis of the ratios of the price changes of the representative items. The formula for the calculation is given below:

$$K_1 = \sqrt[n]{G_{t1} \times G_{t2} \times \dots \times G_{tm}} \times 100\%$$

Where $G_{t1}, G_{t2}, \dots, G_{tm}$ stands respectively for the ratio of the price of the first to the n^{th} item in the reporting period (t) to its price in the previous period (t-1).

- ii. Fixed-base indices

$$I_{\text{»ü}} = K_1 \times K_2 \times \dots \times K_t$$

Where K_1, K_2, \dots, K_t stands respectively for the monthly chain relative index in the different periods from the base period to the reporting period.

- iii. The calculation of the categorical indices and the general indices level by level with the method of weighted mean. The formula for the calculation is given below:

$$L_t = \left(\sum W_{t-1} \frac{P_t}{P_{t-1}} \right) \times L_{t-1}$$

Where W stands for weight, P stands for price, t stands for the reporting period, t-1 stands for the previous period and P_t/P_{t-1} stands for the chain relative index of this period.

iv. The calculation of the index at the provincial level

The index of the whole province is calculated on the basis of the indices of the urban and rural areas in the province and the corresponding data of the urban and rural areas on per capita consumption expenditure and population with the method of weighted mean.

v. The calculation of the index of the whole country

a. The calculation of the national urban (rural) index

The index of the urban (rural) areas is calculated on the basis of the indices of the province and the corresponding data of the per capita consumption expenditure and population with the method of weighted mean.

b. The calculation of the national index

The index of the whole nation is calculated on the basis of the indices of the urban and rural areas in the whole country and the corresponding data of urban and rural areas on per capita consumption expenditure and population with the method of weighted mean.

III. RIGOROUSLY CARRY OUT THE METHODOLOGIES THROUGH WELL-PLANNED ORGANIZING AND IMPLEMENTATION

8. China has a great number of experienced statisticians in the field of price data collection; moreover, there are a set of methodology and quality control and evaluation methods to guarantee the quality of price data.

The improved statistical legal system has created a sound legal environment for price data survey

9. The Statistics Law of People's Republic of China has paved the way for conducting statistical work according to the law. In the past 20 years, the statistical work of China has gradually shown the feature of rule by law. The Statistics Law clearly defines that state organs, public organizations, enterprises, institutions, and self-employed industrialists and businessmen that are under statistical investigation shall, in accordance with the provisions of this Law and State regulations, provide truthful statistical data. They may not make false entries or conceal statistical data, and they may not refuse to submit statistical reports or report statistical data belatedly. Falsification of or tampering with statistical data shall be prohibited. Autonomous mass organizations at the grass-roots level and citizens shall have the duty to provide truthful information needed for State statistical investigations. This has greatly enhanced the cooperation of the respondents and improved the accuracy of the survey data. The emphasis on the use of statistics law in price surveys has the aim of upgrading the data quality.

Survey organizations and its staff can basically meet the need of price survey

10. To ensure data quality, professional survey organizations are set up in 226 selected cities and counties of the 31 provinces, autonomous regions and municipalities; they are under the direct control and supervision of the Survey Organization of the National Bureau of Statistics. The National Bureau of Statistics is responsible for the formulation of the survey scenario. The recruitment of staff members should be examined and approved by the National Bureau of Statistics. The funds are also allocated by the NBS. There are at least 4 full time interviewers in each grass-roots survey organization responsible for the price survey; altogether, over 1000 full time interviewers are engaged in the consumer price index survey. Besides that, the well-functioning data processing system and special data transmission network have ensured rapid transmission and timely processing.

Further enhanced training and cooperation to improve the quality of its personnel

11. China has attached great importance to the professional training of its statisticians. Since the compilation of the CPI is using unified survey methodology, products list, compilation method and data processing software, a working conference on prices is therefore held each year to guarantee the smooth implementation of the survey methodologies across the country. At the same time, Urban Survey Organizations at national and provincial levels carry out various courses to provide technical training to interviewers at grassroots in the following fields: sampling techniques, price survey theory, computer science and so on. Most of the interviewers are benefiting from those courses and their capacity and professional knowledge have been enhanced. The BNS always seeks the opinion of the experts from the departments concerned before making fundamental changes to the methodology of price statistics. A special workshop is held to discuss the reform of price statistics. In recent years, China has enhanced its cooperation with other countries and international societies in the field of price statistics by participating in seminars on price statistics organized by international institutions and organizations. In the first half of 2002, the CPI of China has been covered in the GDDS of the IMF, which indicates that China's price statistics have become more transparent and open. It has made a step forward in meeting the international convention.

The standardized working flow of the price data has ensured the quality of data collection and processing

12. China continues to improve the compilation method and statistical methodology of its consumer price index; on the other hand, various measures are adopted to ensure the precise implementation of the methods in the course of data collection. In terms of the price survey, the examination and approval of data, the calculation of weights, the compilation of indices and quality evaluation and the specific working flow are standardized and formulated according to the requirement of the headquarters. Therefore, the quality of the compiled indices is under effective control. As for the price survey, firstly, we stick to the principle of fixed people, fixed location and fixed time to collect the prices directly. Secondly, we stick to the principle that the selected products should be of the same quality and comparable. Thirdly, we stick to the principle of using the realized price. Fourthly, we follow the principle set by the government on the frequencies of prices collection, i.e. each 5 days we collect the prices of products that tend to change with high frequency; however, for general products and

services, data are collected 2 to 3 times every month. Fifthly, we emphasize on standardized and complete bookkeeping. A three-level checking system is used in data processing, tabulation and calculation of indices. Firstly, the interviewers should carefully examine the price data collected through the survey to make sure that the original price record is authentic and reliable, and ensure the representative varieties are of the same quality and comparable. In this way, survey errors could be avoided. Secondly, staff members should make careful examination and verification of the key-in data to avoid man-made error. Thirdly, logical checking is made to those indices, and the head of the survey organization should examine and approve the final results before reporting the data to the upper level.

IV. ENHANCED QUALITY CHECK AND EVALUATION

13. China has set up a data quality checking and evaluation system to make the price data more standardized, systematic and scientific, which will in turn enhance the quality of the consumer price index. Each year, the Urban Survey Organization of National Bureau of Statistics selects a number of survey organizations at provincial and county levels to check their basic work in price surveys and the quality of price data. The checking results and related analysis will be made known to all the survey organizations. The good experiences of the local survey organizations on data quality evaluation and control are shared with others. Survey organizations at provincial level will conduct the same quality checking process according to the requirement and arrangement of the Urban Survey Organization of the National Bureau of Statistics. They select the cities and counties covered in the scheme to check the implementation of the methodologies, the price survey spots and the representativeness and reliability of the items, weights, prices and indices.

Checking the implementation of related methodologies and the standardization of the work

14. Since each provincial survey organization formulated its own supplementary regulations in addition to the national reporting system to deal with its unique conditions, the provincial survey organization is responsible for the accuracy and feasibility of the regulations and making timely adjustments with the changing situation.

Checking the sample distribution and evaluating the quality of basic data, including: number of survey spots, their structure and distribution

15. The evaluation of the data quality will focus on survey spots, representative of the selected varieties and their coverage. The survey spots and representative varieties should on the one hand meet the need of the national requirements; on the other hand they should also reflect the real situation in the selected areas.

Examining and evaluating the weights

16. The weights used at national and provincial levels should be checked to see if the data resources and calculation methods are the same, if the proportion of both urban and rural

areas reflects the actual condition. As for the weights at city and county levels, the focus is on the reliability of the data resources and the accuracy of the classification.

Examining and evaluating the source material of price data

17. The examination mainly touches upon the following aspects: if the information provided by the survey spots reflects the real situation; how good is the implementation of the principle of having fixed people to directly collect data in fixed spots at fixed time? If the interviewers from the local survey organizations are familiar with the contact persons and salespersons in local areas, how do they know about the markets and stores there? Are the current representative items comparable with those in the previous surveys? Are the data collected directly from the survey authentic and is the quality of the survey record good? Timing, numbers of price surveys, accuracy and quality of key-in data are also covered in the examination and evaluation.

Examining and evaluating the price indices

18. Focusing on logical relation among different indices; the indices at national and provincial level shall lie between indices of urban and rural areas and indices of affiliated cities and counties. When we make comparisons among cities or counties, we look at the trend to see if they are consistent. When we look at the month on month changes, we mainly focus on the data with high magnitude in selected survey spots. Examination is also made to see if the price indices truly reflect policy-oriented price changes or seasonal factors. Related economic indicators are used to cross-check and evaluate the price indices. These indicators are: price changes of inter-medium input and raw materials, money supply, consumption, investment, imports and exports, income and expenditure of urban and rural residents and their consumption expectations and GDP growth.

19. Through years of hard work, the relevance, validity, reliability and accuracy of the CPI of China have improved noticeably, which can meet the needs of macro-economic decision-making and of the public. The consumer price index plays a very important role in economic life. However, we should continue to put efforts into learning advanced methodologies to further improve the quality of CPI of China.
