UNITED
NATIONS

E

Economic and Social
Council

Distr.
GENERAL

ECE/CES/GE.22/2006/11
27 February 2006

Original :ENGLISH

ECONOMIC COMMISSION FOR EUROPE **STATISTICAL COMMISSION**

CONFERENCE OF EUROPEAN STATISTICIANS

Group of Experts on Consumer Price Indices

Eighth Meeting
Geneva, 10-12 May 2006
Item 10 of the provisional agenda

PRICE COLLECTION IN UNSTABLE MARKET CONDITIONS [1]

Submitted by Statistical Office of Serbia and Montenegro
and Statistical Office of the Republic of Serbia

The meeting is organised jointly with the International Labour Organization (ILO)

I. INTRODUCTION

1. Retail price indices belong to the group of the most important short-term indicators, thus quality of their calculating and their modernization present the priority task.

2. In Serbia and Montenegro retail price indices are calculated for the level of Serbia and Montenegro (Statistical Office of Serbia and Montenegro), Serbia (Statistical Office of the Republic of Serbia), Montenegro (Statistical Office of the Republic of Montenegro- MONSTAT) and for the city of Belgrade (Statistical Office of the city of Belgrade). Retail price indices have

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been computed and published since 1954. The first national official methodology was published in 1962 and it has constantly been modified according to the changes within the country. The applied computation methods are the same for the national and republican levels and are in accordance with main international recommendations also. This paper presents the case of retail price indices in the Republic of Serbia.

3. Democratic changes and the beginning of the transition period have set a very serious task to the statistical system of the country, referring primarily to production of basic indicators of the country's economy policy success that should be internationally comparable and reliable enough to enable right decision making.

II. UNSTABLE MARKET CONDITIONS

4. In the period 1990 - 2005, market conditions in Serbia were frequently changed, hence the efforts of the prices statisticians were directed to monitoring those changes and reacting in the quickest possible way.

5. Hyperinflation reached its peak at the end of 1993 and in January 1994, when prices daily changed at the rate of 60%. It caused the complete market breakdown as well as breakdown of the huge trade systems that could not easily adapt to the changes. Simultaneously with the fall of big enterprises, small shops with limited and changeable goods assortments began appearing. This greatly affected the data collection for retail price indices computation, since price collectors needed bigger shops sample in order to ensure sufficient number of observations for reliable indices. A very significant part of turnover was relocated into underground and illegal part of economy.

6. The contrary process began after 2001, with the foreign capital inflow and with privatization of the huge social enterprises. Big supermarkets opening and establishing the chains of stores decreased the competition role of small shops that slowly completely diminished. The situation was extremely difficult in the interior of Serbia, where goods supply was bad and number of shops with certain product groups was deficient, so in case of shops closing, substitution could not be provided. Problem of missing prices and quality harmonization were the major methodological problems to be solved in that period.

III. BASIC ELEMENTS

7. The group of national retail price indices includes:

(a) Retail price index - weighted by retail trade structure and used as national inflation measure, deflator of retail turnover and for values revaluating;
(b) Consumer price index - weighted by household consumption structure and used for salaries (wages), pensions and other social benefits revaluation and harmonization.

Geographical coverage

8. Indices are computed for the Republic of Serbia as total and two territories: Central Serbia and Vojvodina. Up to 1999, indices were also computed for Kosovo and Metohia. Prices are collected in 15 towns in Serbia. The towns are administrative and trade centers of the regions, and their distribution tends to equally cover the whole territory of the Republic. Index can be taken as representative for the whole territory of the Republic as there are no greater price differences among urban and rural areas.

Population

9. Retail price indices are computed on the basis of retail turnover structure and total households' consumption structure in the Republic of Serbia, without division into urban and rural population.

List of products and classifications

10. *List of products* for prices collection contains about 500 products. Criterion for products selection is the products` significance in household consumption and in retail turnover. Definitions of products from the list are detailed enough to provide price recording of comparable products on the whole territory, and general enough to ensure the presence of the products in majority of towns.

11. Introducing new products for price recording is carried out at the beginning of the year. When data on prices for the whole year become available, the product is included in the list for index calculating.

12. *Classifications* of products are national classification of goods and services by origin and purpose. They are not based on the international classification of individual consumption by purpose (COICOP - Classification of individual consumption by purpose).

13. Classification that is used for retail price indices calculation starts with the basic division into Goods and Services. These two groups are further divided into sub-groups, classes and sub-classes of products.

14. Classification of consumer price indices calculation is primarily based on product purpose, and has the basic seven groups: Food, Tobacco and beverages, Clothing and footwear, Housing and household operations, Hygiene and health care, Education, culture and entertainment, Vehicles and transport services. This classification is also further divided into sub-groups, classes and sub-classes of products.

15. According to the strategy of harmonization of the statistical system with international standards, classification of goods and services is planned to be changed with COICOP classification; therefore, the list of products is significantly extended in order to provide better group coverage of such international classification. Data on catering services, included in COICOP classification, are collected within the separate survey and are currently included neither in retail price indices nor in consumer price indices.

Weights

16. Weights present structure of retail turnover of goods and services used in household consumption (for calculation of retail price indices), i.e. structure of household consumption (for calculation of consumer price indices).

17. Basic sources for weights computation are data on retail trade turnover, household budget survey and structure of household sectors consumption in the system of national accounts. Besides these main data sources, other available sources are used as well. Since 2004, weights revision has been carried out every year and new weights structure has been applied from January every year.

IV. PRICE COLLECTION

18. Reliability and accuracy of price indices depend a lot on data collected during the field work. In order to ensure the real prices dynamics, the selection of products and shops has to be representative. Selected shop has to reflect structure of shops and consumers` habits in right way, and selected products are supposed to be the ones that are being bought the most often and whose dynamics is representative for the whole group of products that is presented. Price recording is performed according to the Instruction that offers precise rules for the way of shops and products selection, way and periodicity of data collection, as well as procedure rules in case of substitution of a shop or a product. This instruction is constantly adapted to suit changes and to enable collectors find solutions for the problems arising during field work and also provide consistency of actions in all towns.

19. Price collectors are full-time employees of the Statistical Office of the Republic of Serbia. This Office has its regional divisions in all towns where price recording is carried out; therefore price collectors are the locals who are well acquainted with the situation in town and with customers` habits in their surrounding. This is very important, since according to the present methodology, collectors choose shops where the prices are going to be recorded, and also the exact products that fit the description of the products from the list, and for which the prices will be collected.

20. Since 2005 prices that are consistent on the whole territory of the Republic have been collected centrally.

Selection of shops - recording places

21. Shops - recording places are selected in each town. Collectors choose shops with the biggest turnover, in which the greatest number of people stock up and also where prices represent the average of the prices in town. Number of shops varies from town to town, depending on the goods assortment that is being sold, considering the fact that it is necessary to provide more prices for each product from the list.

22. Shops in which the prices will be recorded are selected at the end of the year, and they cannot be changed through the whole calendar year. Especially, if a selected shop is closed, or it greatly changes the assortment of goods, it is substituted with another shop with similar goods assortment and with similar prices level.

Selection of products

23. When selecting the products for which the prices will be recorded, usually the products that fit the description from the list of products are chosen; such products have to be the ones that are the most sold in a town and that will be present at the market for a longer period of time.

24. During a year, prices are, whenever it is possible, collected for the same quality of products (quality comprises all characteristics of the product important for the level of prices, meaning that producer, package, shop, etc. are important). Products for which the prices will be recorded are selected in December. It is also the time when documentation on products is made, with all significant features that influence the price, as well as the price of the product.

Substitution of shops and products

25. Although it is supposed, according to the methodology, that the sample of shops and products should be constant during a year, this appears to be very difficult to achieve, especially in the transition countries. Sample changes during a year become necessary, either because of closing of a shop, long lasting deficit of a product or because of appearing of new products that become important in consumption, making the previously chosen product less representative.

26. Instruction for price recording regulates these changes, but it is not always possible to carry out such a procedure. When it comes to a problem that cannot be solved according to instruction, a collector has to contact the Price Statistics Department of the SORS, aiming to get further instructions.

27. Price Statistics Department makes notes of all the problems that appear during the field work, making necessary appendices to the Instruction for the forthcoming period.

Time/period of prices recording

28. Manufactured goods and services` prices are collected once a month, in the period 3$^{rd}$-21$^{st}$ each month. Aiming to enable uniform collection of all products` prices and also simultaneous recording of the same goods and services on the whole territory of the Republic, goods and services are divided into four groups; prices for each group are collected in different periods of a month:

(a) Manufactured non-food products - from 3rd to 10th;
(b) Manufactured food products - from 11th to 12th;
(c) Services - from 16th to 18th;
(d) Agricultural products` prices are recorded twice a month, in the first and third week of a month.

29. Related to agricultural products, prices are collected in trade shops and on green markets. Recording is performed on a market day in a week when prices are recorded, in a part of the day when turnover is the greatest.

30. For the products that have unique prices and that are recorded on central level, the price from the 15th in a month is taken as representative.

Documentation of prices recording

31. Referring to the forthcoming price recording, each price collector is obliged to prepare complete documentation in December. Data base is made for each town and it contains the list of shops where prices are to be recorded (address book), with all important features of a shop, including the name and the phone number of a contact person, list of products for which the prices will be recorded, detailed description of the products, as well as the previously recorded prices of those products. Such data base is updated after each recording, enabling collector gain both updated and also complete previous documentation.

32. In 2005, access application was introduced in all of the towns, changing the former, paper data base.

Prices' recording course

33. At the beginning of recording a collector makes plan of recording and prepares auxiliary papers for prices` recording. Auxiliary paper form depends on a collector and his way of work, but its compulsory elements are all important details about a shop and a product and the last recorded price of every product.

34. While recording is performed, a collector makes notes on his observations, relating to prices` changes, market supplies and all important changes that influence prices` changes in a town.

35. In case of products substitution, a collector has to make notes on all significant elements of a new product and also the differences between the old and new product. These notes are very important, serving as a base for all new decisions about the applied methods in a concrete case.

36. After completing field work, a collector has to pass on all the data from the auxiliary paper into data base, relating to product changes and all recorded prices.

37. Having finished recording of a certain group of products, all recorded prices are forwarded to Price Statistics Department and simultaneously a paper report is completed, containing prices by places of recording together with all other important notes referring to that recording. As there are four groups of products, sending of the material is performed four times.

38. Prices' recording is completed on the 21st of the month, when the last part of the material is delivered.

V. DATA PROCESSING

Prices control

39. After receiving the data, validation process of all recorded prices is performed, using the program package GODAR, created in Statistical Office of the Republic of Serbia. When necessary, analytical personnel from the Price Statistics Department contact collectors in order to make them check the "suspicious" prices by revisiting the field.

Average prices

Average monthly prices

40. Average monthly price of a product for a town is computed as a simple arithmetic mean of the recorded prices in that town

$$p_{gk}^{m} = \frac{\sum_{i=1}^{n} p_i}{n}$$

where p_{gk}^{m} represents average monthly price for a town g, and a product k, p_i is product's price in a shop I, and *n* is number of the recorded prices in that town.

41. Average monthly price for territories (since 1999 refers only to Central Serbia and Vojvodina) is computed as a weighted arithmetic mean of average monthly town prices, by formula

$$p_{tk}^{m} = \frac{\sum_{i=1}^{n} w_g p_{kg}}{\sum w_g}$$

where w_g represents weight of a town, that belongs to a certain territory.
Average monthly price for the Republic of Serbia is calculated as average weighted arithmetic mean of average monthly prices for the territories.

42. Weight represents the structure of sold "quantities" of a product in each town. The "quantities" might be:

(a) Quantities in unit measure in which a product is sold (kilo, liter, piece, etc.);
(b) Number of employees - for the prices of crafts services;
(c) Number of visitors - for the prices of tickets;
(d) Number of transported passengers - for the transportation prices;
(e) Number of inhabitants (if other data for defining a consumption structure for small areas are unavailable).

43. Weights for computation of average monthly prices are constant and are changed only when some huge consumption structure changes appear.

Average annual prices

44. Average annual prices for manufactured goods and services are calculated as simple arithmetic mean of average monthly prices.

45. Average annual prices of agricultural products are calculated as weighted arithmetic mean of average monthly prices, where the quantity of sold products in each month is taken as weight.

46. Average annual prices are simultaneously the base prices for indices computation for the following year.

Indices calculation

47. With indices calculation, we make difference between:

(a) **Current period -** month for which index is calculated;
(b) **Base period for prices -** average of the previous year;
(c) **Base period for weights -** period for which consumption and turnover structure is computed. Currently, it is 2003.

Individual base indices

48. Individual base indices for comparable prices are calculated according to the formula

$$i_k = \frac{p_k^m}{p_k^o}$$

where i_k is base index of a product k in month m, p_k^m is average monthly price of a product k, and p_k^o is base price of the product.

49. For products with incomparable prices, base index is calculated according to the formula

$$i_k = \frac{p_k^{m-1}}{p_k^o} * \frac{p_{k'}^m}{p_{k'}^{m-1}}$$

where p_k^{m-1}, p_k^o are prices of comparable products, and $p_{k'}^m$, $p_{k'}^{m-1}$ prices of a product that substituted product k in month m - 1. This formula is used when products are substituted during a calendar year and it requests existing of the recorded prices for both products in month m - 1.

Aggregated base indices

50. For computation of base indices at higher levels of aggregating (sub-groups, groups and total index), Laspeyres formula is applied.

$$I_m = \frac{\sum_k w_k i_k}{\sum_k w_k}$$

w_k represents weight and i_k is individual index of a product k.

Annual index

51. Average annual index is obtained as the average monthly index, starting only with average annual price that is related to base price.

52. Monthly December index in relation to December index of the previous year presents measure of price change from the beginning to the end of the year. It is the most popular measure for annual inflation.

VI. OTHER METHODOLOGICAL ISSUES

Treatment of seasonal products

53. When computing retail price indices for the Republic of Serbia, it is important to notice that only agricultural products have seasonal character; therefore, when computing the indices, the method that is used is the method of constant weights, and for months when there is no such products at market, the last recorded price is used until the new season comes.

54. Aiming to achieve comparability of data in two neighboring years, seasonal products are included in the process of calculating price indices with new prices of the same month, each year. Especially, when it comes to a greater shift of the season, it can cause earlier or later introducing of a new price in the indices calculation. Criterion for introducing new price is that a product must have appeared in greater quantities in all towns where prices are recorded.

Adjusting of price changes to quantity changes

55. Price indices should, by definition, measure the “pure” change of goods and services` prices. In that sense, as it was previously said, list of products for which prices are collected should be representative and constant during the whole calendar year (in the period between two weights corrections).

56. Practically, such situation is unsustainable due to numerous reasons:

(a) Selling of the product chosen for prices collection suddenly decreases due to the appearance of new products. The former product is no longer a good representative of the group of products that it belongs to, and is supposed to be substituted (example can be found in clothing and footwear group, since it depends on fashion changes).
(b) Manufacture of a product has completely ceased, therefore stocks have been sold and price recording for such product becomes impossible. An example can be seen in models variation of electrical household appliances.
(c) Some minor changes of a product that cause no great difference regarding a product itself, but can influence price change, can constantly occur in turnover. An example is package, color or design change.

57. Precise measuring of quality changes is not possible in the majority of cases. Price adjusting to quality change can be solved according to one of the following models:

(a) Minor change of a product (package, design, etc.) - every change is taken to be pure price change. In this case, new quality price is directly related to old quality price and complete price change is reflected in index changes.
(b) New product differs a lot from the old one - price change is completely attributed to quality change. It is assumed that prices dynamics of both products is the same and any of overlapping models is applied. In this case, there is no index change at the moment of substitution.
(c) It is obvious that price change is not harmonized with quality change - it is necessary to estimate real price change, due to genuine presentation of price change.

58. The greatest number of products substitution, according to the Instruction for price recording, belongs to the first case; hence the most frequently applied is the first method. Price changes have two directions, so that they usually do not have great impact on total index.

VII. FURTHER DEVELOPMENT OF PRICE STATISTICS METHODOLOGY

59. During 2005 in the scope of CARDS project and in cooperation with Statistics Sweden, the following topics on indices computation methodology have been discussed:

Analysis of the product list representative

60. Product list is constantly updated; it is also planed, within the cooperation with Swedish statistics, to make coverage of product groups that were not present up to now (health services, educational services, rents, insurance and financial services, etc.). Integral part of the subproject involves influence on consumption changes that appear as a consequence of customers' behavior (products substitution).

Accepting of the international classification that is used in other countries (COICOP)

61. Weights for computing retail price indices have been done according to new classification, as is the pilot data processing for 2005. For the purpose of comparison with the existing processing, methodological solutions for regular retail price indices processing have been used in this phase.

Computing of seasonal products prices

62. Aims are the following:

(a) Analysis of the model influence on retail price indices;
(b) Selecting the best method for computation, taking care of the situation in the country and available data sources.

63. This is one of the current activities. Data base that is required for analysis has been prepared and other countries` solutions have been analyzed.

Analysis of various formula effects on indices computation

64. Aims are the following:

(a) Analysis of various formulas` characteristics in the process of calculating prices of elementary aggregates (arithmetical, geometrical mean or average of prices relations);
(b) Analysis of formula selection influence on price indices;
(c) Noticing products that are greatly influenced by formula selection and selecting the right formula for such products;
(d) Analysis of reciprocal influence between the selected formula and other methodological processes in indices computation.

Excluding the influence of quality change on price change

65. Aims are as follows:

(a) Identify products whose price are greatly influenced by quality changes;
(b) Choose corresponding methods for each identified group of products;
(c) Describe field work in case of product quality change for each group of products, in order to provide better data from field work.

Introducing hand held computers for field work phase in the process of data collecting

66. Project refers to price data collection by using hand held computer technology of the new generation (PDA - personal digital appliance). Using of such computers enables price collectors constant communication with the central data base; it enhances data quality, input errors are minimal and data delivery for further processing is faster. Besides that, it allows collection of many other, important data, necessary for prices and market conditions analysis; it all ensures

better quality of computed price indicators. This activity is in progress and it is planned to last until mid 2007.

VIII. CONCLUSION

67. In the unstable market conditions, numerous problems arise in all phases of retail price indices computation, especially during the field work phase. In the last few years, the Statistical Office of the Republic of Serbia has paid additional attention to quality improving in data collection, hence creating the new instruction for price recording and intensifying the collectors' trainings.

68. Statistical Office of the Republic of Serbia intends to publish new CPI index, in accordance with EU standards, starting from January 2007. Following such a plan, new goods and services are to be introduced to the list, aiming to cover all groups of COICOP classification.
