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# CONSUMER PRICE INDEX OF SERBIA FOR SELECTED PRODUCTS

**Oliver MOMČILOVIĆ[1], Jasmina RAJAKOVIĆ[2], Duško KOSTIĆ[3], Lilijana DJUKIC PETROMANJANC[4], Dejan SIMIC[3], Suzana DOLJANICA[5]**
[1] Academy of Sport, Belgrade, Serbia, oliomaster@gmail.com
[2] Business Academy, Novi Sad, Serbia, E-mail: jasminarajakovic@yahoo.com
[3] High Technical School of Entrepreneurship, Belgrade, Serbia, E-mail: dusko.kostic@gmail.com
[4] Elektrovojvodina, Zrenjanin, Serbia, E-mail: lilajna@gmail.com
[5] Faculty of Engineering Science, Kragujevac, Serbia, E-mail: suzana.doljanic@gmail.com

***Abstract*—**Consumer Price Index (CPI) is one of the national most observed economical statistic items. Its purpose is to weight the current state of goods and services to produce the overall prices index shares in the total of the consumer expenditures. CPI is used to measure effect of inflation and deflation and to adjust real value of wages, salaries, pensions, to regulate prices and deflate monetary magnitudes, to show changes in real values. In this paper, we discuss CPI of Serbia for several years period using selected products and statistical data obtained from federal research.

***Keywords*—**Consumer price index (CPI), economy, statistics, products.

## I. INTRODUCTION

THE main objective of the consumer price data collection in Serbia is to provide a measure of inflation for the country as a whole. Inflation for the households is the measure of the rate of change in the prices of products (goods and services) bought for the purpose of consumption in the economic territory of Serbia. It is classified according to the four digit categories and sub-categories of the COICOP/HICP (Classification Of Individual COnsumption by Purpose adapted to the needs of HICPs). [1-3] HFMCE is defined as that part of final consumption expenditure which is incurred:

1) *by households irrespective of nationality or residence status,*
2) *in monetary transactions,*
3) *on the economic territory of the Member State,*
4) *on goods and services that are used for the direct satisfaction of individual needs or desires, and*
5) *in one or both of the time periods being compared.*

In Serbia, as in the majority of EU States, the sample selected for the consumer price survey is not a random sample, but a purposive one. Generally speaking, it is possible to identify four stages in the selection of the sample for Serbia:

1) *The selection of the geographical areas;*
2) *The selection of the outlets;*
3) *The selection of the products (basket of products);*
4) *The selection of the elementary items. [11, 13, 14]*

The consumer price index (CPI) measures changes in prices of all goods and services consumed by the population of a country or a region. The CPI is a statistical estimate constructed with the prices of a sample of representative items whose prices are collected monthly. This study is performed on a set of products (basket), as food, transportation, education, clothing, etc. The CPI change is expressed as a percentage, inflation rate. If positive, it indicates that prices have risen, inflation, otherwise, if negative, it indicates falling prices, deflation. [7,8]

Paper [4] shows the possibility of modeling time series of macro-economic indicators, paper [6] modeling analysis of foreign trade of the Republic of Serbia and in [5] the possibility of modeling of time series based on polynomial is presented. Papers [10, 16] show the analysis of consumer price index (CPI) for Bosnia and Herzegovina.

## II. CALCULATING CPI

Retail prices are prices at which retail trade, individual agricultural producers and service providers sell their products and services to end users (value added tax included). Average retail prices in the Republic of Serbia are estimated pursuant to average prices in the territorial units of the RS, and these prices are obtained by weighting average prices in the town where the prices are scanned. Weights are sold quantities of products in a town. Consumer price indices by COICOP anticipate the measure of average changes of prices of products and services (fixed basket) that household purchases in order to meet their needs. The list of products and services the prices of which are scanned includes over 600 representative products. From January 2009, these indices are used as a measure in inflation in the Republic of Serbia. [9, 15] The whole methodology of price statistics is adjusted to the measuring price fluctuation need, i.e. price indices' calculation. Price indices are calculated for all mentioned types of prices by the following formula:

$$I = \frac{\frac{P_n}{P_0} W_0}{W_0} \quad (1)$$

and for prices not directly comparable to the base prices, by the following formula:

$$I = \frac{i_{n-1} \frac{P_n}{P_{n-1}} W_0}{W_0} \quad (2)$$

where:
$I_{n-1}$= base index (for each particular article) in the preceding month,
$P_n$= average price in the current month,
$P_{n-1}$ = average price in the preceding month,
$P_0$= average price in the base period,
$W_0$ = the value of sold quantities in the base period.

Total producer price index of agricultural and fishing products is calculated by sale and purchase prices' weighting indices. Sale prices' indices are calculated by weights representing the value structure of sold products from agricultural organizations' own production, and purchase prices indices are calculated by weights representing the value structure of products purchased from private holdings. Producer price indices of industrial products are calculated by weights, representing the share of some products value in a total realization value. Products weights by fields are calculated on the basis of the Industry Annual Report on products realization at a domestic market. The share of some fields in the total realization is obtained from the Complex Annual Report data (by sole activities), and after exports value deduction. Industrial product price indices in wholesale trade are calculated by weights representing the turnover value structure of enterprises and other organizations dealing with wholesale trade. Retail price indices are calculated by weights representing the turnover value structure in retail trade and farmer's market, increased by the services' value based on corresponding offices data (crafts, public services, cultural, traffic and PTT services). Catering trade price indices are calculated by weights, representing a turnover structure value of enterprises and other organizations dealing with catering activities. Consumer price index is calculated on the basis of: a) a specially grouped list of products and services for personal consumption, b) average retail prices of these products and services, and/or, their individual price indices. For a list drawing up and weights calculation, all household consumption survey data have been used. Living costs' index is calculated according to the formula given for price index calculation, where $W_0$ represents the structure value of goods and services purchased in households interviewed.

## III. SERBIA CPI FOR PERIOD OF 2008-2014

Expressed in average amounts for the year, not end-of-period data. A consumer price index (CPI) measures changes in the prices of goods and services that households consume. Such changes affect the real purchasing power of consumers' incomes and their welfare. As the prices of different goods and services do not all change at the same rate, a price index can only reflect their average movement. A price index is typically assigned a value of unity, or 100, in some reference period and the values of the index for other periods of time are intended to indicate the average proportionate, or percentage, change in prices from this price reference period. Fig. 1. shows a graphical overview of Serbia's CPI for total available recorded period.

In Table I, total CPI per year for each month is given, and in Table II we can see a steady increase in prices of various living costs by groups. From Fig. 1 we can observe that the average CPI from 2008 has increased in the following years which caused higher inflation and, therefore, lower standard of living.

All the prices are collected by the personnel of the statistical institutions of Serbia. The price collectors receive clear specifications of the item's name. Its COICOP code and unit of measurement is what they should collect in specific outlet. They choose a concrete item for price collecting in specific outlet in accordance with the criterion of the most sold products in that outlet in order to be sure that the collector is collecting prices for exactly the same items each month. The form for the price collecting also includes the information on detailed product description in terms of brands, variety and quantity, as well as the information on possible replacements of items. All of this allows us to monitor the exact price change in two different periods but not the comparison of average prices between different geographical locations.

**Table I:** Serbia's CPI monthly per year in the period 2007-2014 [3, 9, 12, 17-18]

| | Jan | Feb | Mar | Apr | May | June | July | Avg | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2007** | 102.2 | 101.9 | 102.5 | 103.2 | 105.1 | 105.5 | 105.3 | 107.9 | 109.5 | 110.1 | 111.7 | 113 |
| **2008** | 114 | 114.6 | 116.4 | 118.2 | 120.3 | 121.2 | 119.8 | 120.3 | 121.4 | 123.7 | 123.9 | 122.7 |
| **2009** | 125.4 | 126.9 | 127.4 | 128.6 | 131.3 | 131.3 | 130 | 129.9 | 130.3 | 130.1 | 131.1 | 130.8 |
| **2010** | 131.4 | 131.8 | 133.4 | 134.1 | 136.1 | 136.7 | 136.6 | 138.5 | 140.3 | 141.7 | 143.7 | 144.2 |
| **2011** | 146.2 | 148.3 | 152.2 | 153.8 | 154.4 | 154 | 153.2 | 153.1 | 153.3 | 154 | 155.3 | 154.3 |
| **2012** | 154.4 | 155.7 | 157.4 | 158.3 | 160.5 | 162.4 | 162.6 | 165.3 | 169.1 | 173.8 | 173.8 | 173.1 |
| **2013** | 174.1 | 175.1 | 175.1 | 176.5 | 176.5 | 178.2 | 176.6 | 177.3 | 177.3 | 177.6 | 176.5 | 176.9 |
| **2014** | 179.5 | 179.7 | 179.1 | 180.1 | / | / | / | / | / | / | / | / |

**Table II:** Average price values of Serbia's CPI for various groups [3, 9, 12, 17-18]

| | 2007/january | 2007/june | 2008/january | 2008/june | 2009/january | 2009/june | 2010/january | 2010/june |
|---|---|---|---|---|---|---|---|---|
| | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. |
| **Consumer price indices by COICOP** | | | | | | | | |
| **Republic of Serbia [1]** | | | | | | | | |
| Total | 102.2 | 105.5 | 114.0 | 121.2 | 125.4 | 131.3 | 131.4 | 136.7 |
| Food and non-alcoholic beverages | 101.1 | 103.3 | 121.4 | 136.5 | 136.9 | 143.5 | 136.7 | 141.7 |
| Food | 100.9 | 103.0 | 123.0 | 139.6 | 139.1 | 145.8 | 138.1 | 143.5 |
| Alcoholic beverages, tobacco and narcotics | 116.1 | 122.9 | 130.0 | 132.2 | 162.0 | 166.8 | 179.7 | 182.6 |
| Clothing and footwear | 103.8 | 104.2 | 107.4 | 110.9 | 114.3 | 117.0 | 122.1 | 122.6 |
| Housing, water, electricity, gas and other fuels | 101.9 | 109.2 | 109.8 | 111.8 | 126.2 | 127.8 | 130.6 | 139.8 |
| Furnishings, household equipment and routine household maintenance | 100.0 | 103.3 | 105.9 | 105.3 | 105.9 | 109.7 | 114.4 | 119.0 |
| Health | 104.9 | 107.9 | 109.8 | 110.6 | 116.6 | 126.6 | 124.1 | 128.6 |
| Transport | 98.0 | 101.3 | 109.1 | 117.8 | 107.1 | 122.1 | 126.7 | 134.3 |
| Communication | 101.1 | 101.3 | 98.9 | 98.8 | 106.0 | 108.3 | 110.5 | 111.0 |
| Recreation and culture | 103.2 | 105.7 | 109.7 | 112.1 | 120.0 | 124.0 | 128.1 | 132.9 |
| Education | 105.6 | 104.8 | 110.6 | 111.2 | 118.5 | 120.7 | 124.6 | 132.7 |
| Restaurants and hotels | 103.3 | 105.2 | 109.6 | 113.2 | 119.1 | 120.8 | 127.7 | 130.0 |
| Miscellaneous goods and services | 102.7 | 106.1 | 108.8 | 111.3 | 116.0 | 119.1 | 121.6 | 125.7 |

| | 2011/january | 2011/june | 2012/january | 2012/june | 2013/january | 2013/june | 2014/january | 2014/april |
|---|---|---|---|---|---|---|---|---|
| | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. | Base indices, 2006=100. |
| **Consumer price indices by COICOP** | | | | | | | | |
| **Republic of Serbia [1]** | | | | | | | | |
| Total | 146.2 | 154.0 | 154.4 | 162.4 | 174.1 | 178.2 | 179.5 | 180.1 |
| Food and non-alcoholic beverages | 154.9 | 166.9 | 160.4 | 174.5 | 189.2 | 196.4 | 186.1 | 187.6 |
| Food | 156.9 | 169.2 | 161.4 | 176.8 | 191.3 | 199.4 | 188.4 | 190.1 |
| Alcoholic beverages, tobacco and narcotics | 207.7 | 217.3 | 223.6 | 226.4 | 283.1 | 291.7 | 330.2 | 331.9 |
| Clothing and footwear | 129.4 | 129.3 | 133.4 | 133.8 | 136.9 | 136.6 | 138.0 | 134.9 |
| Housing, water, electricity, gas and other fuels | 148.6 | 159.1 | 163.2 | 166.3 | 174.1 | 177.0 | 188.2 | 188.4 |
| Furnishings, household equipment and routine household maintenance | 125.0 | 128.7 | 135.3 | 142.8 | 152.6 | 155.6 | 156.6 | 157.1 |
| Health | 134.0 | 140.8 | 140.0 | 142.6 | 152.2 | 156.9 | 161.3 | 163.1 |
| Transport | 141.1 | 147.0 | 151.6 | 162.7 | 166.3 | 165.8 | 167.7 | 167.5 |
| Communication | 110.8 | 110.6 | 116.6 | 116.2 | 126.2 | 127.0 | 128.0 | 128.2 |
| Recreation and culture | 137.5 | 138.5 | 144.2 | 148.8 | 151.8 | 158.3 | 163.6 | 164.8 |
| Education | 140.1 | 140.2 | 141.6 | 142.6 | 148.9 | 149.3 | 149.4 | 149.1 |
| Restaurants and hotels | 135.7 | 138.0 | 141.4 | 145.5 | 155.1 | 158.0 | 167.3 | 168.4 |
| Miscellaneous goods and services | 132.6 | 137.4 | 142.8 | 147.1 | 156.9 | 159.0 | 160.8 | 160.8 |

Source: Statistical Office of the Republic of Serbia

[1] Since 1999 without data for AP Kosovo and Metohija


Fig. 1. Serbia CPI for period 2008-2014

## IV. CURRENT STATE OF CPI IN SERBIA

Prices of products and services used for personal consumption in April 2014, in relation to March 2014 are increased by 0.6% on average. Consumer prices in April 2014 increased by 2.1% in relation to April 2013. In April 2014, in relation to the December 2013, consumer prices are increased by 1.8%. Observed by main groups according to destination of consumption, in April 2014 in relation to the previous month, increase of prices was noted in the groups Food and non-alcoholic beverages (1.3%), Communication (1.2%), Health (0.8%) and in the groups Recreation and culture and Furnishings household equipment and routine maintenance of the house (by 0.2% each). Decrease of prices was noted in the groups Transport and Clothing and footwear (by -0.2% each)

and in the groups Alcoholic beverages and tobacco and Education (by -0.1% each).

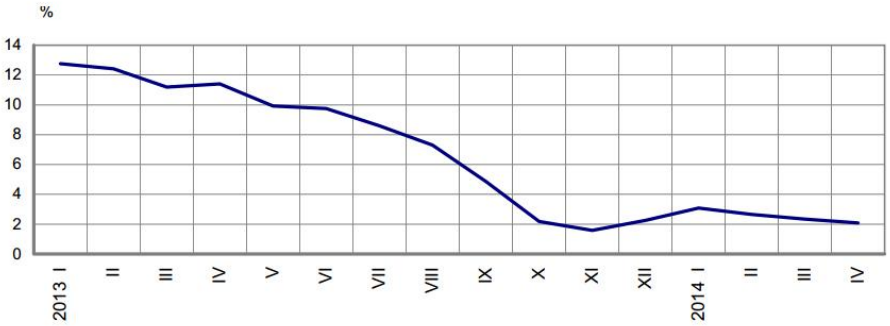


Fig. 2. Consumer price indices by COICOP in the Republic of Serbia, April 2014 [3, 9]

Consumer price indices show a noticeable decline in value during the period shown in Fig. 2. Prices of products and services used for personal consumption in March 2014 in relation to February 2014 decreased by 0.3% on average. Consumer prices in March 2014 increased by 2.3% in relation to March 2013. In March 2014, in relation to the December 2013, consumer prices increased by 1.2%. Observed by main groups according to destination of consumption in March 2014 in relation to the previous month, decrease of prices was noted in the groups Food and non-alcoholic beverages (-0.8%), Communication (-0.6%) and Clothing and footwear and Recreation and culture (by -0.4% each). Decrease of prices was also noted in the groups Education (-0.2%) and Transport (-0.1%). Increase of prices was noted in the groups Restaurants and hotels (0.5%), Furnishings houshold equipment and routine maintenance of the house (0.2%) and in the groups Alcoholic beverages and tobacco and Health (by 0.1% each).

**Table III:** Serbia CPI for 2014 conclusive with April for various groups [3, 9, 17]

| COICOP | | Structure (%) | IV 2014 | IV 2014 | IV 2014 | I-IV 2014 | I-IV 2014 | IV 2014 |
|---|---|---|---|---|---|---|---|---|
| | | | Ø 2013 | III 2014 | IV 2013 | Ø 2013 | I-IV 2013 | XII 2013 |
| **00** | **Total** | **100.00** | **102.9** | **100.6** | **102.1** | **102.6** | **102.5** | **101.8** |
| 01 | Food and non – alcoholic bevereges | 35.00 | 102.4 | 101.3 | 97.1 | 101.7 | 97.9 | 103.1 |
| 02 | Alcoholic beverages, tobacco | 7.73 | 110.6 | 99.9 | 112.9 | 110.4 | 113.9 | 106.5 |
| 03 | Clothing and footwear | 4.56 | 98.3 | 99.8 | 99.3 | 99.1 | 99.8 | 96.7 |
| 04 | Hoising, water, electricity, gas and other fuels | 12.93 | 104.3 | 100.0 | 107.1 | 104.3 | 107.4 | 100.9 |
| 05 | Furnishings household equipment and routine maintenance of the house | 3.91 | 101.3 | 100.2 | 102.1 | 101.1 | 102.3 | 99.9 |
| 06 | Health | 6.18 | 103.4 | 100.8 | 106.4 | 102.7 | 106.2 | 102.3 |
| 07 | Transport | 12.39 | 101.0 | 99.8 | 100.9 | 101.1 | 100.9 | 100.9 |
| 08 | Communication | 5.07 | 101.1 | 101.2 | 101.1 | 100.6 | 100.6 | 99.7 |
| 09 | Recreation and culuture | 4.47 | 103.0 | 100.2 | 108.1 | 102.8 | 108.3 | 99.4 |
| 10 | Education | 1.20 | 100.3 | 99.9 | 100.0 | 100.4 | 100.1 | 99.8 |
| 12 | Miscellaneous goods and services | 4.14 | 101.0 | 100.0 | 101.6 | 101.0 | 102.0 | 100.1 |

## V. CONCLUSION

Expressed at end of the period, not annual average data, consumer price index (CPI) measures changes in the prices of goods and services that households consume. Such changes affect the real purchasing power of consumers' incomes and their welfare. As the prices of different goods and services do not all change at the same rate, a price index can only reflect their average movement. A price index is typically assigned a value of unity, or 100, in some reference period and the values of the index for other periods of time are intended to indicate the average proportionate, or Consumer Price Index (CPI). In February 2014, consumer price indices by COICOP increased on average when related to January 2014. Observed at the level of groups of products and services, the major increase was noted for the groups: recreation and culture; alcoholic beverages and tobacco; food and non-alcoholic beverages; restaurants and hotels; health; transport; housing, water, electricity, gas and other fuels; and education. Prices decreased for the groups of clothing and footwear; communications; and furnishings, household equipment and routine maintenance. In February 2014, producer prices of agricultural and fishing products expressed fall in relation to January 2014. Observed by the main product groups, the most expressive was decline of prices in the groups of livestock animals and poultry and fresh fish. Price growth was considerable for the groups: vegetables; fruit; and industrial crops. In February 2014,

producer prices of industrial products in domestic market were noted to increase slightly when related to January 2014. Observed at the CA level of divisions, the major growth was noted for extraction of crude oil and natural gas; manufacture of other non-metallic mineral products; manufacture of computers, electronic and optical products; and manufacture of electrical equipment. The slight fall was noted for the divisions: manufacture of chemicals and chemical products; manufacture of food products; and manufacture of tobacco products.

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