**GROSS DOMESTIC PRODUCT AT CONSTANT PRICES**

GDP calculations at constant prices are implemented by production and expenditure approach, at previous year prices. Methodological framework is based on the principles and definitions of the System of National Accounts 1993 (SNA93), European System of Accounts 1995 (ESA95) and internationally recognised standards and recommendations for the calculation at constant prices, as defined in the Eurostat publication Handbook on price and volume measures.

For calculations at constant prices applied is the method of calculations at previous year prices, which means that for any year, its previous year is taken as base year. The term ‘base year’ means the year the values of which at current prices are used as weights for calculations at constant prices.

Weights for the production side of GDP are determined by the share that Gross value added, FISIM and taxes and subsidies on products have in the Gross domestic product. Weights for the expenditure side are defined by the share of expenditures for final consumption, for gross capital formation and for exports and imports of goods and services.

GDP calculations at previous year prices assume that previous year is regarded as base year and that weights are changed every year. According to this method, comparable are only two years that are expressed at same prices. Time series calculated at previous year prices could not be used for real growth rate calculations since data given by years are not comparable (each year is valued at previous year prices). In order to ensure comparable data series for growth rate estimations, the method of chain-linking shall be applied and thereby data are reduced to a selected referent year. Referent year means the year that is used for expressing time series at constant prices. For index series, this is the year with the value 100. Chain-linking method is characterised by a fact that by changing referent year we change absolute values, however growth rates remain unchanged. Pursuant to Eurostat recommendations, 2010 has been currently used as the reference year.

An arising issue is that chain-linked volume measures are not additive when expressed in monetary terms by using referent year prices, i.e. the aggregates cannot be obtained by adding the integral elements. These measures are additive only for the referent year and the year after the referent, since in these years the GDP elements are valued at same prices. The method of chain-linking is applied separately for aggregate values and for their integral components; therefore chain-linked aggregate values are not equal to the sum of their chain-linked components. This issue is exclusively of mathematical nature.

GDP calculations at constant prices are implemented in two stages:

1. calculations of each component at previous year prices using appropriate indicator;
2. calculations of chain-linked volume measures at referent 2010 prices.

The main sources applied for these calculations are data available from the statistical system, as well as data from administrative sources.

1. *Data from statistical system:*

* Price statistics:
* Producer price index (PPI);
* Consumer price index (CPI);
* Unit value index of exports and imports of goods (UVI).
* Physical volume indices of:
* agricultural production;
* forest exploitation;
* industrial production;
* transportation and telecommunications services.
* Turnover value of wholesale and retail trade;
* Turnover value of catering trade;
* Value of construction works done and hours worked in construction;
* Value of exports and imports;
* Tourist overnight stays;
* Number of employees, and salaries and wages.

1. *Data from administrative sources:*

* Deposits and credits of commercial banks;
* Insurance premiums;
* Exports and imports of services;
* Exchanges rates fluctuations;
* Taxes on products, duties and subsidies;
* Revenues and expenditures of budgets and the social security funds.

GDP calculations at constant prices by production approach and with fixed base year had been applied in the Republic of Serbia until 2010, and the weights in the base year 2002 had been used.

Weak points of the method of fixed base year are that the weights, moving away from the base year, less reflect the real economic situation resulting from structural changes in the economy. Changes in the structure of production and consumption, then emergence of new products or disappearance of old products are the reasons why it is necessary to change the base year. It is international practice to change the base year every five or ten years.

Starting from 2010 GDP is estimated at previous year prices, by division and section level of the Classification of Activities 2010 (harmonised with NACE Rev. 2).

In 2013 for the first time the results of GDP estimations at constant prices, by expenditure approach are released. Reconciliation of production and expenditure side of GDP estimations at constant prices is carried out by the way of statistical discrepancy on the expenditure side of GDP.

The results of GDP calculation at constant prices are presented:

* at previous year prices;
* as chain-linked volume measures with reference year 2010;
* as real growth rates.

**1. Gross domestic product by production approach**

Gross domestic product by production approach represents the sum of gross values added of all economic activities, at constant prices, when subtracted financial intermediation services indirectly measured (FISIM) and added taxes minus subsidies on products (net taxes) at constant prices.

GDP calculations at constant prices are made by division and section level of the Classification of Activities. Applied is the method of Gross value added extrapolation with the use of single output and input indicators. On the division level, implemented was the multiplication of each individual division indicator, expressed in the form of chain index, by the previous year Gross value added.

For each activity, appropriate indicators were used.

* 1. *Agriculture, forestry and fishing (section А)*

Indicators:

* index of physical volume of agricultural production (net);
* index of physical volume of forest exploitation;
* index of number of employees.

Index of physical volume of agricultural production (net) is used for calculations of Gross value added of agriculture production at constant prices by extrapolating GVA in the base year.

Estimations for the division Forestry and logging is carried out by extrapolating GVA in the base year with the index of physical volume of forest exploitation; for the divisions of Fishing and aquaculture – by extrapolating Gross value added in the base year with the index of number of employees.

#### 1.2. Mining and quarrying (section B), Manufacturing (section C), Electricity, gas and steam supply (section D)

Indicator – index of physical volume of industrial production.

Applied is extrapolation of GVA in the base year at the level of division classified within any of these three sections, with the respective index of physical volume of industrial production.

#### 1.3. Water supply, sewerage, waste management and remediation activities

#### (section Е)

Indicator – index of number of employees.

Applied is the extrapolation of GVA in the base year of each division classified within this section with the respective index of number of employees.

*1.4. Construction (section F)*

Indicators:

* value of construction works done at current prices;
* index of hours worked;
* producer price index of construction elements and material put in place.

Applied is extrapolation of GVA in the base year with the composite index, derived from the index of construction works done at constant prices and the index of hours worked in construction.

#### 1.5. Wholesale and retail trade; repair of motor vehicles and motorcycles

#### (section G)

Indicators:

* trade of motor vehicles turnover value, at current prices;
* wholesale trade turnover value, at current prices;
* retail trade turnover value, at current prices;
* consumer price index;
* producer price index of industrial products;
* unit value index of imports.

Applied is the extrapolation of GVA in the base year with the index of turnover value, at constant prices.

*1.6. Transportation and storage (section H)*

Indicators:

* physical volume indices of transportation services;
* index of number of employees.

Applied is the extrapolation of GVA in the base year of each division classified within section H (except 52 – Warehousing and support activities for transportation) with the respective physical volume index of transport services. For division 52 applied is the extrapolation of GVA in the base year with the index of number of employees.

#### 1.7. Accommodation and food service activities (section I)

Indicators:

* data on catering turnover value, at current prices;
* consumer price index;
* index of number of overnight stays.

For Accommodation applied is the extrapolation of GVA in the base year with the index of number of overnight stays.

For Food and beverage service activities, applied is the extrapolation of GVA in the base year with the index of catering turnover value, at constant prices.

*1.8. Information and communication (section J)*

Indicators:

* number of published books, brochures, and serial publications;
* number of cinema attendance;
* hours of television and radio programs broadcast;
* indices of physical volume of telecommunication services;
* index of number of employees.

The calculation is carried out by extrapolation of Gross value added in the base year for the division level of the Classification of Activities sector J, with the respective indicator or index number of employees. For the division 61 – Telecommunications, calculation is derived by extrapolating the Gross value added in the base year with the index of physical volume of telecommunication services.

*1.9. Financial and insurance activities (section K)*

Indicators:

* stocks of deposits and credits at commercial banks, at current prices;
* data on insurance premiums, at current prices;
* consumer price index;
* index of number of employees.

For Financial service activities, except insurance and pension funding, applied is the extrapolation of Gross value added in the base year with the composite index derived from the index of average stocks of deposits and credits at constant prices, and the index of number of employees.

For Insurance, reinsurance and pension funding, except compulsory social security, applied is the extrapolation of Gross value added in the base year with the index of insurance premiums at constant prices.

For Activities auxiliary to financial services and insurance activities, applied is the extrapolation of Gross value added in the base year with the index of number of employees.

*1.10. Real estate activities (section L)*

Indicators:

* index of the physical volume of imputed rent;
* index of number of employees.

The calculation for the part – divisions *Real estate activities* – is derived by extrapolating the Gross value added in the base year with the index of physical volume of imputed rent.

For the rest of the divisions, the calculation is derived by extrapolating the Gross value added in the base year with the index of the number of employees.

###### *1.11. Professional, scientific and technical activities (section М)*

###### Indicators:

* index of number of employees;
* index of scientific research;
* index of number of hours of radio and TV commercials and advertisements;
* index of number of veterinarians.

The calculation is carried out by extrapolation of Gross value added in the base year for all divisions classified under section M, with the corresponding indicator or index number of employees.

###### *1.12. Administrative and support service activities (section N), Public administration and defence; compulsory social security (section O)*

Indicator: index of number of employees.

Applied is the extrapolation of Gross value added in the base year for all divisions classified within these sections, with the respective index of number of employees.

*1.13. Education*

Indicators:

* number of pupils and students by educational level;
* expenditure of budget funds.

The calculation is carried out by extrapolating Gross value added of the education section in the base year with the composite index created on the basis of the weighted average of education indicators, which are weighted by the data on expenditures for the respective education level.

###### *1.14. Human health and social work activities (section Q)*

Indicators:

* number of outpatient visits to health care organizations;
* number of inpatient hospital days;
* types of dental services;
* number of doctors and other medical staff;
* number of social welfare beneficiaries;
* expenditure of budget funds.

The calculation is performed by extrapolation of Gross value added in the base year for divisions classified under section Q, with corresponding composite index, an indicator that is created on the basis of the weighted average of the respective indicators for health and social work, where data on expenditures for certain services are used as weights.

###### *1.15. Arts, entertainment and recreation (section R)*

Indicators:

* number of theatre attendance, i.e. visitors;
* number of performances;
* number of visitors to museums and archives;
* number of books borrowed from libraries;
* index number of employees.

The calculation is carried out by extrapolating Gross value added in the base year for the divisions under section R with the respective indicator or the index number of employees.

###### *1.16. Other service activities (section S),*

###### *Activities of households as employers (section* T)

Indicator – index of number of employees.

Applied is the extrapolation of Gross value added in the base year for all divisions classified within these sections with the respective index of number of employees.

*1.17. Financial intermediation service indirectly measured (FISIM)*

Indicators and the method applied for the calculation of FISIM are the same as for the division – Financial service activities, except insurance and pension funding.

*1.18. Taxes and subsidies on products*

Data on taxes on products are obtained by extrapolating the value of taxes on products in the base year with the Gross value added index at constant prices.

Customs duties were derived by extrapolating the value tariffs in the base year with the index of turnover value in wholesale trade at constant prices.

Subsidies on products are obtained by extrapolating the value of subsidies on products in the base year with composite index, which is calculated as the weighted average index of physical volume of agricultural production and the index of physical volume of services in railway and urban transport.

Net taxes are equal to the sum of taxes and customs duties on products less subsidies on products.

**2. Gross domestic product by expenditure approach**

Gross domestic product by expenditure approach is calculated as the sum of individual consumption expenditure of households, individual consumption of non-profit institutions serving households (NPISHs), as well as government individual and collective consumption expenditures and gross capital formation. Gross capital formation are equal to the sum of expenditures for gross fixed capital formation, changes in inventories and changes (acquisitions less disposals) of valuables.

Calculations at constant prices are derived for all categories of GDP:

* Household final consumption expenditure (HFCE) are calculated at the four-digit (classes) level of the Classification of individual consumption by purpose (COICOP), for residents in the rest of the world and non-residents on the Serbian territory;
* Final consumption expenditure of non-profit institutions serving households (NPISHs) – total;
* Government final consumption expenditure (GFCE) are estimated according to the Classification of the Functions of Government (COFOG), with divided individual and collective government consumption;
* Gross fixed capital formation (GFCF), by technical structure;
* Acquisitions less disposals of valuables, total;
* Changes in inventories, by categories;
* Exports and imports – distinction in goods and services.

**2.1 Household final consumption expenditure**

Estimations of HFCE at previous year constant prices are derived at a detailed COICOP level, mainly by applying consumer price indices (CPI), however on some occasions, by applying changes in physical volume in relation to the previous year. Series are generally released at 3-digit level (COICOP group), but compilation takes place at a more detailed, 4 or 5-digit level. The respective indicators are listed hereunder.

|  |  |  |
| --- | --- | --- |
| **COICOP** | | **Deflators** |
|  |  |  |
| 11.01.1 | Food | CPI, Index of physical volume |
| 11.01.2 | Non-alcoholic beverages | CPI, Index of physical volume |
| 11.02.1 | Alcoholic beverages | CPI, Index of physical volume |
| 11.02.2 | Tobacco | CPI, Index of physical volume |
| 11.03.1 | Clothing | CPI |
| 11.03.2 | Footwear | CPI |
| 11.04.1 | Actual rentals for housing | CPI, Index of physical volume |
| 11.04.2 | Imputed rentals for housing | Index of physical volume |
| 11.04.3 | Maintenance and repair of the dwelling | CPI |
| 11.04.4 | Water supply and miscellaneous dwelling services | CPI |
| 11.04.5 | Electricity, gas and other fuels | CPI, Index of physical volume |
| 11.05.1 | Furniture, furnishings, carpets and other floor coverings | CPI |
| 11.05.2 | Household textiles | CPI |
| 11.05.3 | Household appliances | CPI |
| 11.05.4 | Glassware, tableware and household utensils | CPI |
| 11.05.5 | Tools and equipment for house and garden | CPI |
| 11.05.6 | Goods and services for routine household maintenance | CPI |
| 11.06.1 | Medical products, appliances and equipment | CPI |
| 11.06.2 | Out-patient services | CPI, Index of physical volume |
| 11.06.3 | Hospital services | Index of physical volume |
| 11.07.1 | Purchase of vehicles | CPI, Index of physical volume |
| 11.07.2 | Operation of personal transport equipment | CPI |
| 11.07.3 | Transport services | Index of physical volume, CPI |
| 11.08.1 | Postal services | CPI |
| 11.08.2 | Telephone and fax equipment | CPI |
| 11.08.3 | Telephone and fax services | CPI, Index of physical volume |
| 11.09.1 | Audio-visual, photographic and information processing equipment | CPI |
| 11.09.2 | Other major durables for recreation and culture | CPI |
| 11.09.3 | Other recreational items and equipment, flowers, gardens and pets | CPI |
| 11.09.4 | Recreational and cultural services | CPI, Index of physical volume |
| 11.09.5 | Newspapers, books and stationery | CPI |
| 11.09.6 | Package holidays | CPI, Index of physical volume |
| 11.10.0 | Education services | CPI, Index of physical volume |
| 11.11.1 | Catering services | CPI |
| 11.11.2 | Accommodation services | CPI |
| 11.12.1 | Personal care | CPI |
| 11.12.3 | Personal effects n. e. c. | CPI |
| 11.12.4 | Social protection | CPI |
| 11.12.5 | Insurance | CPI |
| 11.12.6 | Financial services | CPI |
| 11.12.7 | Other services n. e. c | CPI |
|  | Residents outside of Serbia | CPI (EU CPI accommodated) |
|  | Non-residents in Serbia | CPI (Serbian CPI accommodated) |

The estimations of individual household consumption at constant prices anticipate two-stage procedure:

* 1. Estimations of each category in previous (base) year prices by applying respective indicator;
  2. Estimations of chain-linked volume measures at 2010 (referent year) prices, whereby comparability within series is ensured.

**2.2 Non-profit institutions serving households**

Final consumption expenditure of NPISHs, at constant prices, is calculated on the total aggregate level.

Data at current prices, obtained from the annual financial statements, are deflated by using the total consumer price index.

**2.3 Government final consumption expenditure**

Government final consumption expenditure (GFCE) at current prices is estimated based on the following data sources:

* Treasury Administration;
* Statistical survey “Complex annual survey on budgetary users”.

Government final consumption expenditures at current prices are calculated pursuant to the input cost principle, i.e. by summing up all components of the government final consumption expenditure:

*Government final consumption expenditure = Compensation of employees + Intermediate consumption + Other taxes on production + Consumption of fixed capital + Social transfers in kind – Market output*

Calculation at constant prices is carried out by expenditure approach, while using respective indicators.

*Compensation of employees*

Compensation of employees at constant prices is calculated by extrapolating compensation of employees’ volume index with the respective index of number of employees.

*Intermediate consumption*

Intermediate consumption at constant prices is obtained by deflating values at current prices. As deflator used is the composite index obtained by weighting the respective price indices. The weights are determined as the shares of costs of operating activities that are taken over from the annual financial statement of budgetary users.

*Other taxes on production*

Other taxes on production at constant prices have been obtained by extrapolating current values with the respective index of number of employees.

*Consumption of fixed capital*

Consumption of fixed capital at constant prices is obtained by deflating current values with the respective implicit price deflator for gross fixed capital formation (by adequate activity of the Classification of Activities).

*Social transfers in kind*

Social transfers in kind are split on health services and social work services. Social transfers in kind at constant prices are obtained by deflating current values with the relative consumer price index.

*Market output*

Market output at constant prices is obtained by deflating current price values with the relevant consumer price index.

**2.4 Gross capital formation**

Gross capital formation are equal to the sum of expenditures for gross fixed capital formation, changes in inventories and changes (acquisitions less disposals) of valuables.

**2.4.1 Gross fixed capital formation**

The data on *GFCF at constant prices* are available by technical structure of investments – investments in construction works (dwellings and other buildings and structures), investments in equipment (with a split into investments in domestic and imported equipment) and investments in other fixed assets (cultivated biological resources, mineral exploration, software, entertainment, literary or artistic originals and other fixed assets), by section level of the Classification of Activities.

Within each section level of the Classification of Activities, the calculation of real growth of investments is carried out by deflating each GFCF component at current prices separately, applying appropriate deflator (the same one used for certain investments category in all activities). Deflators are selected among available data sources from the actual statistical system. In addition, new ones are calculated especially for the constant prices estimation needs.

GFCF at constant prices are estimated based on following data sources:

I. Statistical surveys:

* “Annual survey on investments in fixed assets”,
* Price statistics *–* Producer price indices of industrial products for domestic market, Producer price indices of industrial products by purpose, Producer price indices of industrial products for selected groups of products for specific needs and Producer price indices of agricultural products;Consumer price indices,
* Import unit value indices (UVIs),
* Data on salaries and wages.

II. Administrative and other sources:

* Annual financial statements,
* Exchange rate fluctuations.

2.4.1.1 Construction works investments

Construction works investments at constant prices are estimated by deflating investments at current prices. Since the total input structure for construction includes costs of building materials, energy, transport, salaries and wages and a number of other elements, the deflator used for this part – *the Composite price index for construction works* is developed as a weighted average of respective PPIs of industrial products for domestic market (incorporating elements and materials for construction, energy, machinery and equipment, and motor vehicles and trailers) and index of average gross salaries in the construction section.

With this approach, all cost components (material costs, consumption of fixed capital and remuneration for employees) are taken into account considering its contribution to the total construction costs. Weights are obtained based on data from annual financial statements of construction enterprises, as shares of each element of costs in the total expenditures of enterprises.

*2.4.1.2 Equipment investments*

For estimating the real growth of investments in machinery and equipment*,* the following indices are used as deflators:

* Composite price index for domestic equipment
* Composite price index for imported equipment

The starting point for computation of deflators presents the detailed results of the investments survey in equipment, domestic and imported, that are further broken down into 10 categories of capital goods (product groups). Values at current prices for each of these product groups are deflated by the respective price index (relevant PPIs for domestic part and UVIs for imported equipment, exchange rate adjusted), while for weights we take shares of each product group in total investments in equipment, at section level. Separate composite price indices are derived for each section of the Classification of Activities, because the structures of investment products categories vary across industries.

*2.4.1.3 Investments in other fixed assets*

The estimation of investments in other fixed assets at constant prices is carried out by deflating the current prices values. The deflator applied here is *composite price index for other fixed assets,* which is obtained as weighted average of respective deflators: PPI for industrial products for domestic market, PPI for agricultural products, CPI and Composite price index for construction works.

Weights are obtained from the annual investments survey, as share of each product group (cultivated biological resources, mineral exploration, software, entertainment, literary or artistic originals and other fixed assets) in the total investments in other fixed assets, at section level of the Classification of Activities.

By adding together investments in construction works, equipment and other fixed assets at previous year prices, the total GFCF at constant prices is derived.

**2.4.2 Changes in inventories**

Financial statements create the main data source for the compilation of changes in inventories, except for inventories in agriculture, where respective data are taken from the Agriculture division. Four types of inventories are distinctive (inventories of materials, work-in-progress inventories, finished products and goods for resale) and they are estimated separately, according to division level of the Classification of Activities.

Data for changes in inventories with holding gains/losses excluded were estimated for the first time in 2006 with series backward to 2003. The estimations are based on FIFO principle of the bookkeeping inventories.

The choice of deflators used for estimation of holding gains/losses facilitates the choice of deflators for the estimates of changes in inventories at constant prices. These estimates have been done by deflating the values at current prices (changed for the value of holding gains/losses) with respective price indices, depending on category of inventories: producer price index for intermediary products is used for inventories of materials, adequate producer price index is used for inventories of work-in-progress and finished products, while consumer price index is used for inventories of goods.

By its nature, changes in inventories can have different (both positive and negative) sign, which disables the calculation of growth rate and chained values for this category.

**2.4.3** **Acquisition less disposals of valuables**

Taking into account the small share of acquisitions less disposals of valuables in gross capital formation, and in GDP as well, volume estimates for this item are obtained by deflating the current price value using total consumer price index. Since this aggregate can take negative as well as zero, these data cannot be chain linked.

**2.5 Exports and imports of goods**

The main source of data on exports and imports of goods at current prices is the survey "External trade in goods of the RS", carried out by the Statistical Office of the Republic of Serbia (SORS). For constant price calculations needs, the data are compiled at division level of the Standard International Trade Classification (SITC, Rev. 4). The total amounts of goods exports and imports at current prices, included in national accounts figures, are obtained from the balance of payment (BoP) statistics (published by the NBS), after CIF/FOB adjustment and adjustment for coverage have been made to the data obtained from the SORS.

Estimations at constant prices are carried out when current values of exports and imports of goods are deflated by using the corresponding unit value indices (UVIs) of Paasches' type, compiled at division level of SITC. Unit value indices are calculated on the basis of USD values of exports and imports of goods. To express these indices in RSD equivalents, applied is an adjustment factor calculated as the ratio of the annual average USD exchange rates (published by the NBS) for the current and the previous year.

The data on exports and imports of services at current prices are obtained from the BoP statistics compiled by the National Bank of Serbia (NBS). For the purpose of the calculation of exports and imports of services at constant prices, the services are broken down into three main categories: transport services, travel (tourist trade) services and other services.

Exports of services at current prices are deflated using general domestic consumer price index for each of the above mentioned categories. Deflation of imports of transport and other services at current prices is carried out using composite index derived from the weighted general CPIs (exchange rate adjusted) of the ten countries with the highest exports of services to Serbia; while the imports of tourism services are deflated using deflator obtained on the basis of data on direct purchases abroad by Serbian residents.