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METHODOLOGY

FOR CAPITAL INVESTMENT INDEX CALCULATION

Kyiv 2009

The Methodology for capital investment index calculation was developed in relation to the implementation of measures specified in the Strategy of State Statistics Development until 2012 aiming to improve the statistical methodology on capital investment. The main objective of the Methodology is to create tools to estimate investment processes dynamics in Ukraine. The Methodology consists of the Preface, four sections, References and describes principles of generation and calculation of capital investment index. The Methodology is meant to be used by state statisticians and other stakeholders of statistics.

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Preface

This Methodology was drafted in compliance with the theoretical provisions of statistics and the international practice of capital investment accounting with regard to specifics of the national economics.

The Methodology is designed to calculate capital investment index in Ukraine. Capital investment indices can be used for analysis of investment processes dynamics, in macroeconomic calculations and in forecasting of the Ukrainian economic sectors development.

The Methodology provisions will be updated as capital investment statistics continues to develop.

1. Main definitions

Capital investment means investing in purchase or manufacture with one's own effort for one's own use of tangible and intangible assets with the service life over one year.

Investment in material assets:

Investment in land means investing in acquisition of land plots and natural resources for their further development.

Investment in existing buildings and structures means investing in acquisition of buildings, structures, their components that were used by other economic entities.

Investment in residential buildings means investing in residential buildings, extension, reconstruction and overhaul maintenance of functioning of the residential buildings taking account of expenses on purchase and assembly of equipment providing their functioning, as well as investing in purchase of new unused residential buildings, their components and unfinished construction residential sites.

Investment in non-residential buildings means investing in construction of non-residential buildings, extension, reconstruction and overhaul maintenance of functioning non-residential buildings taking account of expenses on purchase and assembly of equipment providing their functioning, as well as investing in purchase of new unused residential buildings, their components and unfinished construction non-residential buildings.

Investment in building structures means investing in construction of structures, extension, reconstruction and overhaul maintenance of functioning building structures taking account of expenses on purchase and assembly of equipment providing their functioning, as well as investing in purchase of new unused building structures, their components and unfinished building structures.

Investment in machinery, equipment and tools means investing in purchase, manufacture with one's own effort, assembly, modernisation, improvement and overhaul maintenance of mechanical tools, machinery and general and special-purpose equipment, machinery and equipment for agriculture and forestry, tools, household plants and aggregates that are not directly related to operation of buildings and structures and are recorded as fixed assets.

Investment in electrical and electronic equipment means investing in purchase, manufacture with one's own effort, assembly, modernisation, improvement and overhaul maintenance of office equipment and electronic computation aggregates, electrical devices and equipment for radio, television and communication, medical tools and equipment, accurate measurement devices, optical appliances and clocks.

Investment in transport vehicles means investing in purchase, manufacture with one's own effort, assembly, modernisation, improvement and overhaul maintenance of automotive products and other transport vehicles.

Investment in long-term biological assets and land amelioration means investing in amelioration, draining, irrigation and other amelioration works, land clearance operations, investing in acquisition, growing or creation with one's own effort of long-term biological assets of plant-growing and livestock breeding, including formation of the main stock of plow and productive cattle.

Investment in other tangible assets means investing in library stocks, low-value circulating assets, temporary (not title) building structures, reusable containers, animals and perennial plantations that are not related to agricultural activity of assets and meant for hiring, improving operative leasing rent, etc.

Investment in intangible assets means investing in acquisition or creation with one's own effort for one's own use of non-monetary assets that are not of material form, are identifiable, with service life over one year.

Investment in software and databases means investing in acquisition, creation, modernisation or improvement of software and databases with regard to expenses on their preparation for the intended use. .

Investment in the right to use natural resources and property, patents, licences, trademarks, similar rights and other intangible assets means investing in rights to use subsoil resources, geological and other information about natural environment, to use a land plot, a building, a right to trademarks, firm titles, inventions, patents, licences, industrial samples, plant varieties, animal breeds, know-how, copyright and associated rights.

2. General provisions

Capital investment index serves to show change in volumes of capital in periods selected for comparison. Capital investment components correspond to the value of tangible and intangible assets in which economic entities invested their funds. Since capital investment components are presented in terms of value, capital investment index may be reasonably calculated with the use of deflation, which means adjusting value of assets with invested funds, by their price indices (deflators).

Capital investment index can be estimated as a relation of the value of assets with funds invested in a particular quarter deflated by corresponding price indices, to the average quarterly value of assets that received investment in the reference year.

$$I_{t/b}^{CI} = \frac{\sum_j (v_{j,t} \div i_{j,t/b})}{\sum_j \bar{v}_{j,b}}, \quad j=1, \dots, m, \quad (1)$$

where t – reporting quarter, $t \in y$, y – reporting year;

b – reference year;

j – type of assets;

m – number of asset types involved in the calculation;

$v_{j,t}$ - volume of capital investment by a type of asset j in quarter t ;

$i_{j,t/b}$ – capital investment price index by asset type j in quarter t related to the average value of reference year b ;

$\bar{v}_{j,b}$ - average quarterly volume of capital investment by asset type j in the reference year,

$$\bar{v}_{j,b} = \frac{v_{j,b01} + v_{j,b02} + v_{j,b03} + v_{j,b04}}{4}, \quad (2)$$

where $v_{j,b01}$, $v_{j,b02}$, $v_{j,b03}$, $v_{j,b04}$ - volumes of capital investment by asset type j for QI, QII, QIII and QIV of a corresponding reference year y .

3. Sources of information:

form of state statistical observation No.2 – investment “Capital investment” (quarterly);

form of state statistical observation No.2 – investment “Capital investment” (annual);

form of state statistical observation No.2 – constr “Report on the use of permit for construction works”;

form of state statistical observation – No.1-prices (constr) “Report on prices for material resources purchased for construction”;

form of state statistical observation No.1-prices (ind) “Report on industrial producer prices”;

form of state statistical observation – No.21-gen “Sale of agricultural products”;

form of state statistical observation – No.5-FEA “Report on export (import) of goods that are not subject to customs declaration”;

form of state statistical observation – No.14-FEA “Report on purchase (sale) of goods to ensure operation of transport vehicles, needs of passengers and crews”;

Input-Output tables in basic prices;

cargo customs declarations.

4. Calculation procedure for capital investment index

4.1. stage 1: Calculation of capital investment index (as a relation of deflated value of assets to the average quarterly value of the reference year).

The said capital investment index may be calculated using formula (1). Table 1 gives calculation components. According to state statistical observation on capital investment and sale of permits for construction works by each type of assets j it is possible to estimate capital investment volume in the reporting quarter t while formula (2) is used to calculate the average quarterly volume of capital investment in the reference year ($\bar{v}_{j,b}$).

Table 1. Input data for capital investment index calculation

<i>Type of asset</i>	<i>j</i>	<i>$\bar{v}_{j,b}$ – average quarterly volume of capital investment by type of asset j in the reference year; $v_{j,t}$ – volume of capital investment by type of asset j in quarter t</i>	<i>$i_{j,t/b}$ – price index of capital investment by type of asset j in quarter t to the average quarterly value of reference year b</i>	<i>Sources of information on price indices</i>
1	2	3	4	5
Land	1	$\bar{v}_{1,b}, v_{1,t}$ – volume of investment in land	$i_{1,t/b}$ – price index on the primary and the secondary housing market; the GDP deflator index is used when the specified index is missing	express-bulletin “Gross domestic product and gross national income of Ukraine”, official web-site of the SSSU
Existing buildings and structures	2	$\bar{v}_{2,b}, v_{2,t}$ – volume of investment existing buildings and structures	$i_{2,t/b}$ – price index on the primary and the secondary housing market; the GDP deflator index is used when the specified index is missing	express-bulletin “Gross domestic product and gross national income of Ukraine”, official web-site of the SSSU
1	2	3	4	5
Residential buildings	3	$\bar{v}_{3,b}, v_{3,t}$ – volume of investment in residential buildings	$i_{3,t/b}$ – price index for building and assemblage works in the construction of residential buildings	report on the social and economic situation of Ukraine, official web-site of the SSSU

Non-residential buildings	4	$\bar{v}_{4,b}$, $v_{4,t}$ – volume of investment in non-residential buildings	$i_{4,t/b}$ – price index for building and assemblage works in the construction of non-residential buildings	report on the social and economic situation of Ukraine, official web-site of the SSSU
Building structures	5	$\bar{v}_{5,b}$, $v_{5,t}$ – volume of investment in building structures	$i_{5,t/b}$ – price index for building and assemblage works in the construction of building structures	report on the social and economic situation of Ukraine, official web-site of the SSSU
Home-made machinery, equipment and tools	6	$\bar{v}_{6,b}$, $v_{6,t}$ – volumes of investment in home-made machinery, equipment and tools are to be estimated by calculation: $v_{6,t} = (1 - d_{t,I/A}) \times v_{M,t}$ $\bar{v}_{6,b} = (1 - d_{b,I/A}) \times \bar{v}_{M,b}$ where $d_{t,I/A}$, $d_{b,I/A}$ – share of import in the gross fixed capital formation on EA “Mechanical engineering” and Input-Output tables in basic prices; $v_{M,t}$, $\bar{v}_{M,b}$ – volumes of investment in machinery, equipment and tools	$i_{6,t/b}$ – producer price index in machinery and tools manufacture	report on the social and economic situation of Ukraine, official web-site of the SSSU
1	2	3	4	5
Imported machinery, equipment and tools	7	$\bar{v}_{7,b}$, $v_{7,t}$ – volumes of investment in imported machinery, equipment and tools are to be estimated by calculation: $v_{7,t} = d_{t,I/A} \times v_{M,t}$ $\bar{v}_{7,b} = d_{b,I/A} \times \bar{v}_{M,b}$ where $d_{t,I/A}$, $d_{b,I/A}$ – share of import in the gross fixed capital formation on EA “Mechanical engineering” and Input-Output tables in basic prices; $v_{M,t}$, $\bar{v}_{M,b}$ – volumes of investment in machinery, equipment and tools	$i_{7,t/b}$ – index of average import prices for machinery and equipment	official web-site of the SSSU

Home-made electrical and electronic equipment	8	$\bar{v}_{8,b}, v_{8,t}$ – volumes of investment in home-made electrical and electronic equipment are to be estimated by calculation: $v_{8,t} = (1 - d_{t,I/A}) \times v_{E,t}$ $\bar{v}_{8,b} = (1 - d_{b,I/A}) \times \bar{v}_{E,b}$ where $d_{t,I/A}, d_{b,I/A}$ – share of import in the gross fixed capital formation on EA “Mechanical engineering” and Input-Output tables in basic prices; $v_{E,t}, \bar{v}_{E,b}$ – volumes of investment in electrical and electronic equipment	$i_{8,t/b}$ – producer price index in manufacture of electrical, electronic and optical equipment	report on the social and economic situation of Ukraine, official web-site of the SSSU
Imported electrical and electronic equipment	9	$\bar{v}_{9,b}, v_{9,t}$ – volumes of investment in imported electrical and electronic equipment are to be estimated by calculation: $v_{9,t} = d_{t,I/A} \times v_{E,t}$ $\bar{v}_{9,b} = d_{b,I/A} \times \bar{v}_{E,b}$ where $d_{t,I/A}, d_{b,I/A}$ – share of import in the gross fixed capital formation on EA “Mechanical engineering” and Input-Output tables in basic prices; $v_{E,t}, \bar{v}_{E,b}$ – volumes of investment in electrical and electronic equipment	$i_{9,t/b}$ – average price index for imported electrical and electronic equipment	official web-site of the SSSU
1	2	3	4	5
Home-made transport vehicles	10	$\bar{v}_{10,b}, v_{10,t}$ – volumes of investment in home-made transport vehicles are to be estimated by calculation: $v_{10,t} = (1 - d_{t,I/A}) \times v_{T,t}$ $\bar{v}_{10,b} = (1 - d_{b,I/A}) \times \bar{v}_{T,b}$ where $d_{t,I/A}, d_{b,I/A}$ – share of import in the gross fixed capital formation on EA “Mechanical engineering” and Input-Output tables in basic prices; $v_{T,t}, \bar{v}_{T,b}$ – volumes of investment in transport vehicles	$i_{10,t/b}$ – producer price index in transport vehicles and equipment manufacture	report on the social and economic situation of Ukraine, official web-site of the SSSU

Imported transport vehicles	11	$\bar{v}_{11,b}, v_{11,t}$ – volumes of investment in imported transport vehicles are to be estimated by calculation: $v_{11,t} = d_{t,I/A} \times v_{T,t}$ $\bar{v}_{11,b} = d_{b,I/A} \times \bar{v}_{T,b}$ where $d_{t,I/A}, d_{b,I/A}$ – share of import in the gross fixed capital formation on EA “Mechanical engineering” and Input-Output tables in basic prices; $v_{T,t}, \bar{v}_{T,b}$ – volumes of investment in transport vehicles	$i_{11,t/b}$ – average price index for imported transport vehicles	official web-site of the SSSU
Long-term biological assets and land amelioration	12	$\bar{v}_{12,b}, v_{12,t}$ – volume of investment in long-term biological assets	$i_{12,t/b}$ – price index of agricultural products sale	report on the social and economic situation of Ukraine, official web-site of the SSSU
Other tangible assets	13	$\bar{v}_{13,b}, v_{13,t}$ – volume of investment in other tangible assets	$i_{13,t/b}$ – GDP deflator index	express-bulletin “Gross domestic product and gross national income of Ukraine”, Official web-site of the SSSU
1	2	3	4	5
Software and databases	14	$\bar{v}_{14,b}, v_{14,t}$ – volume of investment in software and databases	$i_{14,t/b}$ – output deflator index on EA “IT activity”	express-bulletin “Gross domestic product and gross national income of Ukraine”, Official web-site of the SSSU
Rights to use natural resources and property, patents, licences, trademarks, similar rights and other intangible assets	15	$\bar{v}_{15,b}, v_{15,t}$ – volumes of investment in Rights to use natural resources and property, patents, licences, trademarks, similar rights and other intangible assets are to be estimated by calculation: $\bar{v}_{15,b} = \bar{v}_{ITG,b} - \bar{v}_{14,b}$ $v_{15,t} = v_{ITG,t} - v_{14,t}$ where $\bar{v}_{ITG,b}, v_{ITG,t}$ – volumes of investment in intangible assets	$i_{15,t/b}$ – output deflator index on EA “Activity in law, business accounting, engineering; services to entrepreneurs”	express-bulletin “Gross domestic product and gross national income of Ukraine”, Official web-site of the SSSU

Should GDP deflator index, output deflator index on EA “IT activity” and output

deflator index on EA “Activity on law, business accounting, engineering; services to entrepreneurs” in quarter t to the average quarterly value of reference year b be missing as of the date of capital investment calculation, relevant deflator indices in quarter $(t-1)$ to the average quarterly value of reference year b are to be used.

Should data on import share in gross fixed capital formation on EA “Mechanical engineering” in year y ($t \in y$) be missing as of the date of capital investment calculation, the last available Input-Output tables data in basic prices are to be used.

Using the symbols in Table 1, capital investment index is to be calculated according to the formula:

$$\begin{aligned}
 I_{t/b}^{CI} = & ((v_{1,t} \div i_{1,t/b}) + (v_{2,t} \div i_{2,t/b}) + (v_{3,t} \div i_{3,t/b}) + (v_{4,t} \div i_{4,t/b}) + (v_{5,t} \div i_{5,t/b}) + \\
 & + (v_{6,t} \div i_{6,t/b}) + (v_{7,t} \div i_{7,t/b}) + (v_{8,t} \div i_{8,t/b}) + (v_{9,t} \div i_{9,t/b}) + (v_{10,t} \div i_{10,t/b}) + \\
 & + (v_{11,t} \div i_{11,t/b}) + (v_{12,t} \div i_{12,t/b}) + (v_{13,t} \div i_{13,t/b}) + (v_{14,t} \div i_{14,t/b}) + (v_{15,t} \div i_{15,t/b})) / \quad (3) \\
 & / (\bar{v}_{1,b} + \bar{v}_{2,b} + \bar{v}_{3,b} + \bar{v}_{4,b} + \bar{v}_{5,b} + \bar{v}_{6,b} + \bar{v}_{7,b} + \\
 & + \bar{v}_{8,b} + \bar{v}_{9,b} + \bar{v}_{10,b} + \bar{v}_{11,b} + \bar{v}_{12,b} + \bar{v}_{13,b} + \bar{v}_{14,b} + \bar{v}_{15,b})
 \end{aligned}$$

4.2. stage 2: Calculation of derived capital investment indices.

Capital investment index in quarter t to the previous quarter ($t-1$) should be calculated using the formula:

$$I_{t/(t-1)}^{CI} = \frac{I_{t/b}^{CI}}{I_{(t-1)/b}^{CI}} \quad (4)$$

Capital investment index in quarter t of the reporting year y to the corresponding quarter t of the previous year ($y-1$) should be calculated as follows:

$$I_{t,y/t,(y-1)}^{CI} = \frac{I_{t,y/b}^{CI}}{I_{t,(y-1)/b}^{CI}} \quad (5)$$

Capital investment index over the period from the beginning of the year to a corresponding period of the previous year should be calculated as correlations of quarterly indices sums, which form these periods.

For example, capital investment index for 9 months, 2010 to 9 months, 2009 equals:

$$I_{3q2010/3q2009}^{CI} = \sum_{i=1}^3 I_{2010/b}^{CI,i} \div \sum_{i=1}^3 I_{2009/b}^{CI,i} = (I_{2010/b}^{CI,1} + I_{2010/b}^{CI,2} + I_{2010/b}^{CI,3}) \div (I_{2009/b}^{CI,1} + I_{2009/b}^{CI,2} + I_{2009/b}^{CI,3}) \quad (6)$$

where $I_{3q2010/3q2009}^{CI}$ - capital investment index for 9 months, 2010 to 9 months, 2009;

$I_{2010/b}^{CI,1}$, $I_{2010/b}^{CI,2}$, $I_{2010/b}^{CI,3}$ - capital investment indices of QI, QII, QIII, 2010 to the average quarterly value of the reference year;

$I_{2009/b}^{CI,1}$, $I_{2009/b}^{CI,2}$, $I_{2009/b}^{CI,3}$ - capital investment indices of QI, QII, QIII, 2009 to the average quarterly value of the reference year.

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