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Article

Multiplication effects of investment in a publicly significant infrastructure project

Economy and forecasting

Reference: Nykyforuk, Olena/Kucher, Serhii et. al. (2023). Multiplication effects of investment in a publicly significant infrastructure project. In: Economy and forecasting (1), S. 83 - 98. http://econ-forecast.org.ua/?page_id=189&lang=uk&year=2023&issueno=1&begin_page=83&mode=get_art&flang=en. doi:10.15407/econforecast2023.01.083.

https://doi.org/10.15407/econforecast.2023.01.083
JEL: E270; E220

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MULTIPLICATION EFFECTS OF INVESTMENT IN A PUBLICLY SIGNIFICANT INFRASTRUCTURE PROJECT[5]

The article features results of the assessment of the multiplier effects for the national economy from the implementation of construction project of the first stage of production facility of the Dniester HPP for the period 2010-2019. For this purpose, macroeconomic statistics were processes, on whose basis an information system of primary and calculated indicators was created using the data from the project documentation, which became the basis for calculations. A methodological approach was developed to assess multiplier effects at the macroeconomic level using the input-output balance, which is reflected in the symmetrical "input-output" table. The authors highlight the main indicators, through which the impact of the implementation of the construction project of the Dniester HPP on Ukraine's economy is manifested, and which allow assessing its socio-economic significance: the multiplier of the output growth of the economic activity "Construction" at the expense of

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[5] The article is prepared within the cooperation between SI "Institute for Economics and Forecasting of the National Academy of Sciences of Ukraine" and PrJSC "Ukrhydroenergo".

project investments, the GVA (Gross Value Added) multiplier for all economic activities from project investments, and the GDP multiplier (public expenditure multiplier). According to the implemented approach, multiplier effects for the economy are calculated via additional output growth, additional value added growth, and GDP growth on project investments.

Based on the obtained results, it is proved that: 1) the implementation of the construction project of the first stage of the production facility of the Dniester HPP had made it possible to accumulate a multiplier effect for Ukraine's economy, confirming in practice the theory of multiplier effects and proving the efficiency of public capital investments; 2) to the greatest extent, the multiplier effect from the additional investment growth in this project is generated within the economic activity "Construction", which is explained by increased demand for domestically produced construction products.

Keywords: *multiplier effect, multiplier, investments, input-output tables, input-output balance, infrastructure project*

The implementation of large-scale socially significant infrastructure projects gives impetus to the development of the national economy. It should be noted that large infrastructure projects must be considered as an element of the system of inter-sectoral interaction, since they are a complex system with a complex level of organization of internal connections. Such a system in itself is not closed or isolated from external influences, but is a component of the macroeconomic environment, closely related to the sectors of the economy that provide the project with appropriate technologies, personnel, material and technical resources and infrastructure.

The construction project of the Dniester HPP is one of the significant infrastructure projects in modern Ukraine with state investments in production facilities averaging slightly more than UAH 1 billion per year (11.3 billion UAH was invested during 2010-2019).

The Dniester cascade of HPP and GAPP is located on the Dniester River in the south-west of Ukraine in the Chernivtsi region - 400 km from Kyiv, on the border with Moldova. The Dniester Cascade includes HPP-1 - operating, HPP-2 - operating, HPP - under construction, but with hydro units that are gradually being put into operation. The gas power plant under construction (expected to continue before 2027) with a planned capacity of 2.268/2.947 MW (generator/pump modes) will be the largest in Europe.

Preparatory work for the construction of the Dniester HPP began during the existence of the Ukrainian SSR back in 1983. The approval of the project and budget continued intermittently from 1988 to 2008 (adapting to new realities), and the active phase of investing in the construction of the first stage at the state level

started in 2010. According to the project documentation, the investment of three stages of the project, which overlap each other in time, is planned, and the commissioning of the first stage of the project, which involved the construction of production facilities, lasted from 2010 to 2021.

The Dniester HPP is designed to operate in a cyclical mode, intended to cover peak loads, fill nighttime dips, and provide emergency and frequency reserves for Ukraine's unified energy system with its significant unevenness of the daily load schedule and an urgent need for peak and fast-acting emergency capacities, and also to ensure the basic regime and create an emergency reserve for the country's NPPs and TPPs. Today, the Dniester HPP's production facility is owned by the private joint-stock company "Ukrhydroenergo", 100% of whose shares are fully owned by the state, which is why state investment in the further development of the Dniester HPP will have a significant macroeconomic multiplier effect.

The project is implemented at the expense of state investments, so it is designed to provide an impetus for achieving the goals of economic growth. In practice, an increase in public investment in the economy, as a rule, implies an improvement in the main macroeconomic indicators. However, in the case of the construction of large infrastructure projects, it is not enough to evaluate only the direct effects of their implementation. It is also necessary to evaluate indirect - multiplier - effects, whose essence consists in an increase in any of the components of autonomous costs, which causes an additional increase in output, GVA and GDP, and by a value that is greater than the initial impetus (initial investment costs).

Formulation of the problem. According to the standard methodology for making decisions regarding investments in industrial facilities, it is necessary to calculate the project indicators of an internal nature: net present value (NPV); internal rate of return; discounted payback period; profitability index, etc. This is enshrined in particular by such normative acts as: The procedure and methodology for the evaluation of an investment project with significant investments (approved by the Resolution of the CMU of July 28, 2021 No. 819); The procedure for selecting state investment projects (approved by the Resolution of the CMU of July 22, 2015 No. 571); State building codes A.2.2-3:2014. Composition and content of project documentation for construction, etc.

However, the existing methodology for assessing the feasibility of state-level investment, firstly, does not take into account the peculiarities of large state-owned infrastructural industrial enterprises, and, secondly, does not take into account the assessment of additional accompanying positive impacts from socially significant infrastructure projects on the regional and national economy, which include multiplier effects

In view of the outlined problems, **the purpose of the article** is to assess the multiplier effects from the implementation of a socially significant investment

project - the construction of the Dniester HPP, taking into account the direct and indirect effects that arise during the construction process at the macro level.

Analysis of research and publications on the issue under consideration. The concept and scheme of the deployment of multiplier effects were presented by R. Kahn in his most famous article "The Relation of Domestic Investment to Unemployment" (1931) in the context of the problem of increasing the level of employment, after which they were clarified in the article "Public Works and Inflation" in 1933 where the organization of public works was considered as a means of getting out of economic depression, reducing unemployment and increasing output. R. Kahn demonstrated that public spending on the organization of public works not only creates jobs, but also stimulates an increase in consumer demand, contributing to the growth of production and employment in the economy as a whole [1]. Later, Richard Kahn in collaboration with J.M. Keynes formulated the "General Theory of Employment, Interest and Money", which is based on the calculation of multiplier effects in the economy [2].

At the current stage, this scientific development is used by researchers both for calculating multiplier effects in individual sectors of the economy, such as: tourism, construction, transport, services, agro-industrial complex, etc. [3-8], and at the level of the regional and national economy [9-12].

Research methodology. To estimate the multiplier effects from investments in the construction project of the first stage of the Dniester HPP, it is advisable to use a comprehensive quantitative approach. The essence of the methodical approach proposed by the authors is to carry out such an assessment by defining how the output, gross added value, and gross domestic product will increase due to the funds invested in the project.

Most of the proposed calculations regarding the defining of multipliers and the assessment of the multiplier effects of the construction project at macro level are carried out using the inter-industry balance of production and distribution of goods and services (the theory of which was developed by V. Leontiev), which is reflected in the "input-output" table (hereinafter IOT). In particular, a matrix of the use of domestically produced products is used, where imported products are excluded from inter-industry flows.

The IOT covers the entire Ukraine’s economy, and thanks to the combination of the most important macroeconomic indicators, this table makes it possible to reconcile data for the calculation of gross domestic product through balancing and interrelation of indicators based on the method of "commodity flows". The IOT establishes production links of the "product-product" or "industry-industry" type and is used to carry out forecast and scenario calculations of the development of national economy based on the coefficients of direct and total costs. The purpose of developing an IOT is the generation of information about the relationships that arise between residents in the process of production and use of goods and services, for the analysis of the structure of national economy and main macroeconomic proportions and for meeting the users’ informational needs [13].

The main indicators most fully reflecting the macroeconomic significance of the implementation of the construction project of the first stage of the Dniester HPP PrJSC "Ukrhydroenergo" for the economy of Ukraine are defined as follows:

1) *the multiplier of the increase in the output of economic activity "Construction" at the expense of the project investments* is a coefficient that reflects how much the final indicator of the increase in the output of economic activity "Construction" changes when investing state capital in the construction of a specific object due to a multiplier effect;

2) *the GVA multiplier for all economic activities from the project investments* is a coefficient that shows changes in the economy due to the increase in GVA in all economic activities due to inter-industry connections as a result of state capital investments in the construction of a certain specific object, as a result of which a multiplier effect occurs;

3) *the GDP multiplier (multiplier of public expenditures)* is a coefficient that defines the ratio between initial public expenditures and their final growth in the form of national income.

The following were the basis for calculating the multiplier effects:

1) statistical data by the State Statistics Service of Ukraine, in particular the "input-output" table, which excludes imports for the period 2010-2019;

2) technical and informational support for calculations based on official statistical data (created at the first stage);

3) the project data from the documentation of the construction of the first stage of the Dniester HPP for the period 2010-2020.

The approach to determining multiplier effect for the economy due to the additional increase in output after investment in the project

The multiplier effect of output growth includes: 1) direct effects associated with the growth of production in an economic activity (in our case, economic activity "Construction") and 2) additional effects via inter-industry ties, which are manifested in the growth of GVA of other economic activities.

The approach to defining the multiplier effects for the economy due to the output increase from the project investments is based on calculation of the coefficients of direct and total costs. Coefficients of direct and total costs are calculated based on the IOT indicators in basic prices for the economic activity "Construction". For this purpose, auxiliary matrices are constructed: the matrix of coefficients of direct costs; the identity matrix; and the matrix of coefficients of total costs.

The coefficients of the matrix of total costs have the following interpretation: if the output of the final product of the j^{th} industry needs to be increased by one unit, then the gross output of the product of the i^{th} industry must be increased by the corresponding coefficient of total costs. Thus, the sum of the *b* coefficients in the corresponding column allows defining how much the gross output will increase

in all the industries under consideration, if the output of the final product of the industry under study increases by one unit.

Determining the coefficients of direct and total costs allows calculating the output multiplier for the economic activity "Construction" (M_Y):

$$M_Y = K_{fullcosts} / K_{directcosts} \quad (1)$$

The obtained multiplier of output for the economic activity "Construction" (M_Y) allows to calculate the multiplier effect for Ukraine's economy from capital investments in construction of the corresponding year via the increase in output in the economic activity "Construction". For this purpose, one should define the share of the increase in generated construction products at the facilities of electric power enterprises in the increase in total generated construction products (works, services) in the corresponding year. This allows assuming that the calculated share of the increase in generated construction products at the facilities of electric power enterprises in the increase in total generated construction products is proportional to the share of the created multiplier effect from the capital investments in the economic activity "Construction" and shapes the effect of "impetus" from investments in the construction of power facilities.

Based on the obtained multiplier effect for Ukraine's economy from the project investments, the output multiplier from project investments is defined as the ratio of the obtained effect to the project investments.

An approach to determining the multiplier effect for the economy due to the additional increase in added value after investment in the project

The following approach is based on the calculation of the effect of GVA growth by individual economic activities of the national economy via the growth of added value, which is a component of aggregate production costs (output), whose growth is calculated based on the matrix of technological structure of the generation of fixed capital due to the project investments.

One of the ways to define the growth vector of the final demand for domestic products is to define it using the matrix of the technological structure of fixed capital generation, whose columns are vectors characterizing the shaped (standard) industry structure of fixed capital generation during the implementation of investment projects in various sectors of the economy.

Thanks to the calculation of increase in the final consumption of domestic products for the economic activity "Construction" (ΔS_{inv}) due to the project investments, an opportunity is created for the formation of an "investment matrix" (based on the matrix of coefficients of total costs):

$$\Delta Y_{inv} = \Delta S * K_{totalcosts}, \quad (2)$$

where ΔY_{inv} is the increase in production costs in all economic activities due to the project investments; ΔS_{inv} – the increase in final consumption of the economic activity "Construction" due to the project investments; and $K_{totalcosts}$ is an

element of the matrix of coefficients of total costs.

Summing up the elements of the "investment matrix" by row shows the increase in output for all economic activities. In this phase, due to the increase in production costs, the GVA increase from the project investments (ΔGVA_{inv}) is defined, which extends to the entire economy. To find this effect, the share of GVA of the i^{th} economic activity for the corresponding year in the output of the i^{th} economic activity of the corresponding year (gva_i) is initially defined.

The multiplicative effect of GVA growth (ΔGVA_{inv}) can be found using the following formula:

$$\Delta GVA_{inv} = gva_i * \Delta Y \Delta GVA_{inv}, \quad (3)$$

where GVA_{inv} – increase in GVA of the i^{th} economic activity due to the project investments; gva_i – the share of added value of the i^{th} economic activity for the corresponding year in the output of the i^{th} economic activity for the corresponding year; and ΔY_{inv} - increase in production costs from the project investments.

The obtained multiplier effect of the increase in GVA (ΔGVA_{inv}) from the project investments allows defining the appropriate multiplier according to formula 4:

$$_{GVA} = \Delta GVA_{inv} / I_{project}, \quad (4)$$

where M_{GVA} is the GVA multiplier from the project investments; and $I_{project}$ - the amount of the project investments.

An approach to defining the multiplier effect for the economy as a result of additional GDP growth after investment in the project

To calculate GDP, the value of final products is used – that of goods and services intended both for domestic consumption in the country and for export.

The contribution of individual economic activities to GDP (value added) is the difference between the value of all products/services generated by an economic activity and its costs for purchasing goods/services from other economic activities. The GDP indicator only includes the value of final products and evaluates the additional value generated. Thus, double counting of the cost of intermediate goods/services used for the production of other goods/services is excluded. The indicator of contribution to GDP is the most accurate indicator of the economic role of individual economic activities.

Calculation of the direct GDP multiplier for a large infrastructure project is carried out in several steps:

first, absolute GDP growth is calculated;

secondly, the share of the economic activity "Construction" in the GDP of the corresponding year is defined;

thirdly, the multiplier effect for the economy due to GDP growth from the project investments in construction is calculated by multiplying the share of GVA

in economic activity “Construction” in total GDP by absolute GDP growth;

fourthly, the direct multiplier of GDP due to the project investments is calculated via the ratio of the effect of investments in economic activity “Construction” to the project investments.

Results of the calculations of multiplier effects for the economy from the implementation of the construction project of the first stage of the Dniester HPP according to the above described approaches

At the stage of implementation of the construction project of the first stage of the Dniester HPP (the initial stage was the preparation of project documentation), the largest multiplier effect will be obtained directly in the economic activity “Construction” and associated with the increase in consumer spending within this economic activity. Based on the calculations of the coefficients of direct and total costs, the multiplier of increase in the output of economic activity “Construction” from the project investments was obtained with an average value of 5.9 for the entire construction period (2010-2019), demonstrating that UAH 1 of state capital invested in the construction project of the first stage of the Dniester HPP, generates an additional 4 hryvnias and 90 kopecks in economic activity "Construction" (Table 1).

Table 1

Multiplier of the increase in output of economic activity "Construction" due to investments in the construction project of the first stage of the Dniester HPP

Indicator	Value
Cumulative effect transferred from increases in generated products to effect from investments in economic activity "Construction", *UAH million*	67397.23
Total amount of investments in the project (1st stage) in economic activity "Construction", *UAH million*	11337.97
Multiplier of output increase in economic activity "Construction" due to the project investments	***5.9***

Source: compiled based on the authors’ calculations

The results obtained based on the methodical approach described above confirm a significant multiplier effect in the economic activity "Construction" (Table 2), which, depending on the volume of investments in a particular year and construction products generated by the facilities of electric power enterprises, has different values in total construction products generated.

Table 2

Multiplicative effect of output increase in economic activity "Construction" (increase in production costs) due to investments in construction project of first stage of Dniester HPP

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
The project investments, *UAH million*	356.9	618.1	1634.1	2262.0	1505.9	1959.7	627.6	1440.3	663.7	269.6
Capital investment in economic activity "Construction", *UAH million*	29767	31990.8	40760.3	40796.2	36056.7	43463.7	44444	52176.2	55993.9	62346.6
Multiplicative effect for national economy from capital investments in economic activity "Construction, *UAH million*	5505.41	141422.1	148117.5	150678.6	134484.1	162458.7	167759.3	191656.9	206222.0	232773.1
Share of construction products generated by the facilities of electric power enterprises in total construction products (works, services) generated, %	2.9	2.8	2.7	2.7	2.7	2.9	2.9	3.5	5	9.1
Effect transferred from increase in generated products to effect of investment in* economic activity "Construction", *UAH million	***3961.1***	***3959.8***	***3999.17***	***4068.3***	***3631.1***	***4711.3***	***4865.0***	***6708.0***	***10311.1***	***21182.3***

Source: compiled based on the authors' calculations

The results of calculations based on the approach to determining the multiplier effect for the economy via the increase in added value based on the matrix of the technological structure of the generation of fixed capital and GVA from the project investments are presented in Tables 3-4.

Output growth – an increase in production costs, generated by the multiplier effect, leads to growth in GVA and growth in additional income. The coefficient of the GVA multiplier for the period 2010-2019 is 11.1, which shows a high average efficiency of state capital investments in the project. In addition, the dynamics of the multiplier values in individual years shows significant fluctuations, in particular the multiplier's growth in the period 2012-2016, which is inversely proportional to the economic situation during this period (Table 1-5): in 2010 - 4.0; in 2011 - 4.5; in 2012 - 16.9; in 2013 - 10.9; in 2014 - 22.3; in 2015 - 7.5; in 2016 - 10.2; in 2017 - 6.2; in 2018 - 7.1; and in 2019 - 5.1. This means that for every hryvnia of state capital investment in construction of the first stage of the Dniester HPP, the following income is additionally generated in the national economy: in 2010 - 3 UAH, in 2011 - 3.5 UAH, in 2012 - 15 UAH, 9 UAH, in 2013 - 9.9 UAH, in 2014 - 21.3 UAH, in 2015 - 6.5 UAH, in 2016 - 9.2 UAH, in 2017 - 5.2, in 2018 - 6.1 UAH, and in 2019 - 4.1 UAH.

The obtained peak values of the multipliers were affected by a number of factors (Table 4), such as:

1) economic crisis of 2014;
2) fluctuations and decline in GDP;
3) decrease in capital investments, including in construction;
4) growth of marginal propensity to consume;
5) increase in the project's investments.

The above factors led to a growth of the multiplier effect from the project's investments during the economic crisis, confirming in practice the theory of multiplier effects and proving the effectiveness of the government's capital investments. The high values of the gross value added multiplier, especially in 2014, are due to sufficiently high investments in the project under the condition of a general decrease in capital investments in Ukraine's economy and a GDP decline.

Table 3

Multiplicative effects and multipliers, which to the greatest extent reflect the impact of investments of the construction project of first stage of Dniester HPP on Ukraine's economy

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	*Σ/M*
GVA increase from the project investments for all economic activities, *million UAH*	1426.3	3349.0	35965.0	34536.1	50310.4	26367.9	14056.7	24931.1	15485.8	5133.9	
Consumer spending increase from the project investments for all economic activities, *million UAH*	2301.6	5003.8	54431.6	49281.5	65422.0	35801.7	18919.1	33089.6	20027.4	5863.5	
Output increase from the project investments in the economy, *million UAH*	5964.6	13364.5	174284.2	165120.6	231464.8	124339.3	65951.6	59146.6	36454.7	11916.3	
Gross domestic product in actual prices (nominal GDP), *million UAH*	1079346.0	1299991.0	1404669.0	1465198.0	1586915.0	1988544.0	2385367.0	2981227.0	3560302.0	3977198.0	
GDP at constant prices of 2010, *million UAH*	1079300.0	1138300.0	1141100.0	1140800.0	1066000.0	961800.0	985300.0	1009600.0	1044000.0	1077400.0	
Coefficient	1.0	1.2	1.3	1.4	1.5	1.8	2.2	2.8	3.3	3.7	
GVA increase from the project investments for all economic activities (re-calculated), *million UAH*	1426.3	2790.8	27665.4	24668.6	33540.3	14648.8	6389.4	8904.0	4692.7	1387.5	126113.9
Consumer spending increase from the project investments for all economic activities (re-calculated), *million UAH*	2301.6	4169.9	41870.5	35201.1	43614.7	19889.9	8599.6	11817.7	6068.9	1584.7	175118.4
Output increase from the project investments in the economy (re-calculated), *million UAH*	5964.6	11137.1	134064.7	117943.3	154309.9	69077.4	29978.0	21123.8	11046.9	3220.6	557866.3
Output, *million UAH*	2388289.0	2895283.0	3150653.0	3189558.0	3354027.0	4189241.0	5058294.0	6257420.0	7494615.0	8371797.0	
Share of output growth from the project investment in Ukraine's total output, *%*	0.25	0.38	4.26	3.70	4.60	1.65	0.59	0.34	0.15	0.04	
Share of GVA increase from the project investment in Ukraine's GDP, *%*	0.1	0.3	2.6	2.4	3.2	1.3	0.6	0.8	0.4	0.1	
Total project investments, *million UAH*	356.9	618.1	1634.1	2262.0	1505.9	1959.7	627.6	1440.3	663.7	269.6	11338.0
Capital investments, *million UAH*...		180575.5	241286.0	273256.0	249873.4	219419.9	273116.4	359216.1	448461.5	578726.4	623978.9
Capital investments in construction, *million UAH*		29767.0	31990.8	40760.3	40796.2	36056.7	43463.7	44444.0	52176.2	55993.9	62346.6
M_{GVA}	***4.0***	***4.5***	***16.9***	***10.9***	***22.3***	***7.5***	***10.2***	***6.2***	***7.1***	***5.1***	***11.1***

Source: compiled based on the authors' calculations

Table 4

Justification of the obtained indicators of multiplier effect and multipliers at macroeconomic level

Indicator	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Marginal propensity to save	0.15	0.1	0.1	0.08	0.02	0.02	0.01	0.01	0.01	0	0.02
Marginal propensity to consume	0.85	0.9	0.9	0.92	0.98	0.98	0.99	0.99	0.99	1	0.98
Total project investments, *billion UAH*	0.36	0.62	1.63	2.26	1.51	1.96	0.63	1.44	0.66	0.270	1.13
Capital investments, *billion UAH*		180.5	241.2	273.2	249.8	219.4	273.1	359.2	448.4	578.7	623.9
Capital investments in construction, *UAH billion*		29.7	31.9	40.7	40.7	36.1	43.5	44.4	52.2	55.9	62.3
Ukraine's GDP in constant prices of 2016, *billion UAH*	*2613.0*	*2755.8*	*2762.4*	*2761.7*	*2580.7*	*2328.5*	*2385.3*	*2441.6*	*2526.8*	*2607.7*	

Source: compiled based on the authors' calculations

The results of calculations based on the approach to defining the multiplier effect for the economy via GDP growth from investments in the construction project of the first stage of the Dniester HPP are presented in Table 5.

Table 5

Direct GDP growth multiplier due to investments in the construction project of the first stage of the Dniester HPP

Indicator	**Value**
Investments of 1st stage of the project, *UAH million*	11338.0
Multiplicative effect of the project investments in Ukraine's total GDP, *UAH million*	12036.7
GDP multiplier	***1.06***

Source: compiled based on the authors' calculations

The results of calculations of the simple GDP multiplier using this approach are simplified, so they show that investing 1 hryvnia of capital investment from the state budget produces an increase of 6 kopecks. This multiplier does not take into account the direct effects associated with the increase in the industry's output, the additional effects due to inter-industry ties and effects from income distribution, hence it only to a certain extent reflects the real increase in income for the national economy from investing in the construction project of a production facility, that is, the first stage of the Dniester HPP.

Conclusions

Based on to the results of the study, the authors have obtained the following values of the main indicators at the macro level, which most fully reflect the importance of the implementation of the project of constructing the first stage of the Dniester HPP of PJSC "Ukrhydroenergo" for Ukraine's economy:

1) *multiplier of output increase for economic activity "Construction" due to the project investments* for the period 2010-2019 is 5.9 - that is, for 1 UAH of state capital investments in the construction project of the first stage of the Dniester HPP, an additional 4 UAH and 90 kopecks were generated in the economic activity "Construction";

2) *the multiplier of GVA growth for all economic activities from investments in the project* for the period 2010-2019 is 11.1 - this shows the high efficiency of state capital investments in the project, i.e. for every hryvnia invested in the form of state capital investment in the construction of the first stage of the Dniester HPP, the following additional income was generated for Ukraine's economy: in 2010 - 3 UAH, in 2011 - 3.5 UAH, in 2012 - 15.9 UAH, in 2013 - 9.9 UAH, in 2014 - 21.3 UAH, in 2015 - 6.5 UAH, in 2016 - 9.2 UAH, in 2017 - 5.2 UAH, in 2018 - 6.1 UAH, and in 2019 - 4.1 UAH;

3) *the GDP growth multiplier (state expenditure multiplier)* shows that investing 1 hryvnia of capital investment from the state budget generates an additional increase of 6 kopecks;

4) *the share of output growth due to the project investment in Ukraine's output* ranges from 0.04% (2019) to 4.6% (2014);

5) *the share of GVA growth from the project investment in Ukraine's GDP* ranges from 0.13% (2010; 2019) to 3.17% (2014).

During the construction of the first stage of the Dniester HPP in 2010-2019, the investments of PJSC "Ukrhydroenergo" amounted to UAH 11.3 billion; at the same time, it is calculated that capital investments due to the multiplier effects during the construction period (without taking into account the effect from operation):

–added UAH 26.05 billion to Ukraine's gross domestic product, which is equivalent to UAH 6.5 billion of state budget expenditures;

–and added UAH 4.9 billion to households' consumer spending.

Therefore, the study has shown that capital state investments in a socially significant infrastructure project, such as the construction of the first stage of the

Dniester HPP - had positive multiplier effects in terms of the growth of output, GVA and GDP, which should be taken into account at the state level when evaluating further investment projects.

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Received 13.01.23
Reviewed 15.02.23
Signed for print 25.10.23

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МУЛЬТИПЛІКАЦІЙНІ ЕФЕКТИ ВІД ІНВЕСТУВАННЯ В СУСПІЛЬНО ЗНАЧУЩИЙ ІНФРАСТРУКТУРНИЙ ПРОЄКТ[10]

Представлено результати оцінки мультиплікаційних ефектів для національної економіки від реалізації проєкту Дністровської гідроакумуляційної електростанції (далі – ГАЕС) за період 2010–2019 рр. Для цього було опрацьовано

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макроекономічну статистику, на базі якої сформовано інформаційну систему первинних та розрахункових показників із використанням даних проєктної документації, що стала основою для проведення розрахунків. Адаптовано методичний підхід до оцінки мультиплікаційних ефектів на макроекономічному рівні з використанням міжгалузевого балансу, що відображений у статистичній таблиці "витрати-випуск". Виокремлено основні показники, за якими проявляється вплив інвестування цього проєкту на національну економіку та які дають змогу оцінити його суспільно-економічне значення: мультиплікатор приросту випуску виду економічної діяльності (ВЕД) "Будівництво", мультиплікатор валової доданої вартості (ВДВ) по всіх ВЕД, мультиплікатор валового внутрішнього продукту (ВВП). За цим підходом мультиплікаційні ефекти для економіки розраховуються шляхом обчислення додаткового приросту після інвестицій у проєкт: випуску, валової доданої вартості та ВВП.

На основі отриманих результатів доведено, що: 1) реалізація проєкту Дністровської ГАЕС дозволила акумулювати мультиплікаційний ефект для національної економіки, підтвердивши теорію на практиці та довівши ефективність державних капітальних інвестицій; 2) найбільшою мірою мультиплікаційний ефект від додаткового приросту інвестицій цього проєкту генерується всередині виду економічної діяльності "Будівництво", що пояснюється збільшенням попиту на будівельну продукцію вітчизняного виробництва.

Ключові слова: *мультиплікаційний ефект, мультиплікатор, інвестиції, таблиця "витрати-випуск", міжгалузевий баланс, інфраструктурний проєкт*