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Digital Economy Multiplier

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Abstract

The article considers approaches to assessing the contribution of the digital economy to the national product from the perspective of the country and the region. At the regional level, it is proposed to calculate the multiplier effect of digital activities, using the multiplier. A methodology for estimating the digital economy multiplier is proposed, and the specifics of its calculation for an individual region are discussed. Data from the Federal State Statistics Service are used as the information base. The reported study was funded by the Siberian Institute of Management – branch of the Russian Presidential Academy of National Economy and Public Administration.

Keywords: Digital Economy Multiplier; Multiplier Effect of Digital Economy; Results; Evaluation Methodology.

Introduction

Issues such as the study of the development of the digital economy, the conditions and factors of digital transformation, the development of digital technologies and their introduction into economic activity and social life, the assessment of the costs of digitalization and the dividends received from it, the formation of a new structural policy are currently receiving close attention of scientists from various branches of science all over the world. However, many from these important

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issues have not yet been resolved. For example, the issues of statistical accounting of the digital economy have not been solved.

In addition, the tasks of assessing the level of digitalization of society and measuring the digital economy, analyzing the degree of impact of digital transformation on economic growth and development of the region are necessary to solve the strategic task of developing the digital economy.

In addition, the tasks of assessing the level of digitalization of society and measuring the digital economy, and analyzing the degree of impact of digital transformation on economic growth and development of the region are necessary to solve the strategic task of developing the digital economy. Therefore, the purpose of the work is to create a methodology for assessing the digital economy results in the region. Within the framework of the conducted research, the author's interpretation of the definition of the digital economy and the methodology for assessing its contribution to the regional product are proposed.

Methodological approaches to assessing the digital economy contribution to the national product

The structural attractiveness of a particular segment, sector or type of economic activity is usually determined by the market share, by the level of profitability (profitability), growth rates, the value of entry and exit barriers, the possibility of competition (Glinskiy, 2008a; Glinskiy, 2008b; Glinskiy and Serga, 2011). As stated in the McKinsey Report (2017), the digital economy is currently one of the few sectors of the global economy that is attractive on all of the listed parameters simultaneously. From 2011 to 2015, the total digital economy in Russia increased by 59%, it is growing 8.5 times faster than other sectors of the Russian economy, and its employee remuneration is 2 times higher than in other areas of the economy. As defined in the Passport of the National Program "Digital Economy of the Russian Federation" (2018), the Russian Federation faces the task of tripling the digital economy by 2025 compared to 2015. This is equivalent to increasing the share of the digital economy to 8-10% of GDP depending on oil prices and other macroeconomic parameters that on average corresponds to the level of the countries which leading the digital economy: the USA, China and Western Europe in 2015.

The efficiency of the digital economy is characterized by the value of the contribution of digitalization to the overall result of economic activity and can be assessed by various methods and by using of different tools. To date, the following methodological approaches are known to assess the digital economy contribution to GDP (direct and indirect):

- Creating a digital economy satellite account;

- Using resource and consumption tables of products and services with an extension to digital products;

- Calculation of the digital economy multiplier;

- Constructing a regression model of the dependence of GDP on digitalization;

- Estimates based on indicators on the domestic costs of developing the digital economy (Gokhberg, 2019).

Each approach has its own advantages and disadvantages and scope of application.

Digital Economy Multiplier

The problem of the need to calculate the multiplier effect of the digital economy lies in the area of governance. The decision to invest money in the development of digital projects, the digital sector of the economy or the digitalization of a particular territory is the basis of economic policy at the level of companies and corporations, as well as the subject of the Federation and the state as a whole. While for businesses, the question of investing money in digitalization is decided according to certain parameters of financial and economic efficiency, the criteria for decision-making by governing bodies are more blurred. But the state (a subject of the Federation, a municipality) having, as a rule, several options for investing funds and a number of constraints affecting the choice of directions of economic policy, must see the effect of digitalization. It is not enough to calculate only the direct effects of the implementation of specific management decisions in these situations. It is necessary, including estimates of indirect and cumulative effects. This can be done by using of the multiplier.

The term "multiplier" was first introduced in 1931 by the English economist R.F. Kahn (1931), later in 1933 J.M. Keynes (1933, 1978) formulated the theory of multiplier effects in the economy. The essence of the multiplier effect is formulated

as follows: an increase in any of the components of autonomous expenditures leads to an increase in the national income of society, and by an amount greater than the original costs. The multiplier theory was further developed by R. Harrod, E. Hansen, P. Samuelson, J. Hicks and other economists (Samuelson and Nordhaus, 2007). The most common method of calculating the multiplier in the literature is based on the comparison of statistical data on the extent to which the value of the economic indicator under study changes depending on the dynamics of another economic indicator. The tasks of assessing the impact of the volume of production and capital investments within one of the industries on the national economy as a whole arise quite often. Especially, when determining the priority directions of state support in conditions of budgetary constraints.

The following definitions have been adopted in scientific papers.

Multiplier (in macroeconomics) is a numerical coefficient showing how many times the final indicators of economic development will change with the growth of investment or production in the analyzed type of activity.

The multiplier effect is the product of the multiplier by the change in production, investment and other industry characteristics (Lisin and Uzyakov, 2002).

The current state of statistical observation and accounting of the digital economy and digitalization in the Russian Federation and, even more so, in its specific regions does not allow calculating the final indicators of economic development due to the growth of digital production (multiplier effect). In this situation, it is possible to use simplified approaches to solve this problem: to estimate the contribution of the digital economy to the region's economy based on the calculation of the multiplier.

The multiplier of the digital economy will be determined by formula (1):

$$K_{\text{M}} = \frac{M}{M_{\text{T}}} \quad (1)$$

where M is the total income of the digital economy (direct and indirect, taking into account the multiplier effect) in the region;

M_{T} - the amount of funds generated by the digital economy on the first round of circulation of funds, included in the GRP of the region (the direct economic effect of digital activity).

It is proposed to use the methodology of estimating total tourism income refined by the authors (Glinskiy et al, 2011) and adapted to the digital economy.

To estimate the total income of the digital economy it is logical to use the formula (2) proposed by the Karelian Research Center of the Russian Academy of Sciences (Savelyev and Tolstoguzov, 2008):

$$M = M_T + M_1 \times \frac{1}{1-R} \quad (2)$$

M_1 – part of the revenue of the digital economy, which has an impact on GRP (the volume of GRP caused by orders of digital production), can be calculated by the formula (3):

$$M_1 = \frac{Y \times Q_T \times (V_T - Z_{TИ})}{X} \quad (3)$$

V_{T} – the volume of products and services (income) of the digital economy in value terms;
$Z_{\text{ТИ}}$ – the volume of costs for the purchase of goods and services for digital production from other businesses (the cost of products and services of the digital economy);
Y – gross regional product (GRP);
X – gross domestic product (GDP);
R – coefficient reflecting the degree of closure of the region's economy and reflecting the connection of two successive circles of circulation of funds from the digital economy in the region;
Q_{T} – the share of the costs of the digital economy remaining in the national (regional) economy.

The basis for the calculations is an estimate of the volume of funds raised from digital activity on the first round of circulation, included in the GRP of the region (the direct economic effect of digital activity - M_T).

This methodology is based on the concept of aggregate income from the digital economy as the main indicator to judge the economic impact of digitalization on the region's economy. Aggregate income is understood as the total annual direct and indirect benefits received by the region from digital activities, expressed in monetary terms.

Indirect revenues from digitalization represent the funds spent by the economic entities associated with digital activities, the region's digital infrastructure enterprises, in the field of information and communication to purchase production equipment, consumer goods and services from enterprises outside the digital industry. In addition, the indirect income from digital activities for the region is only that part of the spent funds (direct and total costs) that does not go outside its borders. The method of determining the multiplier for comparing the contribution of industries to the development of the region's economy allows us to estimate the indirect income from digital activities.

In this case, when estimating indirect income from the digital economy, we will assume that the funds included in the GRP of the region make two turnovers based on the following point. The average production cycle for the activities of the Russian economy is about 150 days, GRP is calculated for the year (360 days), therefore, income in the activities related to the digital economy will make a little more than two turnovers for the year.

Assessment of the digital economy multiplier at the regional level

When calculating a region's total income from the digital economy, the following points must be taken into account:

1) The amount of funds raised by digitalization in the first round of circulation of funds is the gross value added by the type of economic activity "Activities in the field of information and communication" (determined on the basis of the annual calculation of GRP).

2) The volume of costs for the purchase of goods and services intended to serve digital activities from other enterprises (costs that constitute the cost of the digital product) is taken equal to the costs of third-party services used in the production of information and communication services.

3) The Q_T - coefficient, which reflects the share of the costs of information and communication activities remaining in the region, is defined as the share of profit and income taxes in the structure of revenues of the consolidated budget of the Russian Federation subject. Profit taxes are derived from the production activities of enterprises and organizations, income taxes - from individuals employed in the economy of the region, respectively, the share of these taxes in the revenue structure of the budget of the subject of the Russian Federation to a certain extent characterizes the share of the results of production activities remaining in the region. It is quite logical to extend this share to the costs of the digital economy.

4) Gross regional product (the value of goods and services produced for final use) is defined as the sum of gross value added by types of economic activity.

5) Output of goods and services is the total value of goods and services, which are the result of production activity of resident units of the regional economy in the reporting period.

6) Calculation of the coefficient reflecting the degree of closure of the economy and the connection of two successive circles of circulation of funds from the digital economy, based on the coefficient Q_T.

The multiplier effects of the digital economy in value terms can be estimated by GRP based on the values of the multiplier.

The authors plan to continue work on the adaptation and testing of this methodology for calculating the multiplier of the digital economy.

Conclusion

The presented methodology for using the multiplier will allow us to assess the direct and multiplier economic effect of digital activities in the region and determine the contribution of the region to the overall result of the country's digital economy.

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