

Peculiarities of Efficiency Assessment Methods Application for International Investment Projects

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Abstract— The article considers financial and economic factors affecting efficiency for international investment projects. The correlation between the factors affecting foreign economic activity and economic efficiency of international investment projects is established. The methodology of assessment of international investment projects on the basis of deterministic factor analysis by method of chain substitutions is suggested. Suggested approach to assess income from implementation of international investment projects was tested.

Keywords – investments, international investment projects, foreign economic activity

I. INTRODUCTION

Currently, assessment of efficiency of international investment projects is relevant. To study this topic, it is necessary to understand theoretical and practical issues related to implementation of international investment activities. Investment activity in various forms and demonstrations provides the company with stable development.

For enterprises, where implementation of international investment projects is conducted, it is necessary to create additional material and technical base, expand production, update fixed assets. Each investor aspires to receive more profit at a minimum of expenses, that is to achieve optimum efficiency of its activity. In this regard, efficiency assessment of international investment projects and search for ways to improve it are of great practical importance.

In the period from 2016 the number of international investment projects on the territory of Russia, in which foreign partners have invested, increased to 205, as evidenced by the results of the study of investment attractiveness of the European countries, conducted by Ernst & Young Global Limited (EY). For investors conditions in the field of production appeared more favorable. Since production to this day is the main branch of the Russian Federation economy

with the largest number of international projects, attracting foreign direct investment.

From 2015 to 2016 Russia went up in top-20 rating of European countries by the activity of international investors one position and took the 7th place. The growth rate of direct investment in Russia in 2015 was 61%, and in 2016 they were relatively small-scale and increased by only 2%.

In terms of jobs creation, their number under foreign direct investment projects has also increased by 6% over the year-in comparison with 2015, reaching 15 064. Russia has also taken seventh place by this indicator.

II. RELEVANCE, SCIENTIFIC SIGNIFICANCE OF THE RESEARCH

Relevance of the chosen topic of research is that at present, in the conditions of modern development of economic relations it is important to develop foreign trade activity, to attract international investors for joint implementation of international investment projects. This approach of financial relations between different countries, international organizations, individual investors will allow to exchange useful experience of implementation of successful investment projects, to develop new modern technologies, etc.

Scientific significance of the research is that the obtained results of the analysis can be useful for implementation of investment activities on the world stage.

III. RESEARCH OBJECTIVE

The objective of this research is to develop an approach to assess efficiency of international investment projects based on the use of deterministic factor analysis methods.

IV. THEORETICAL PART

It should be noted that efficiency of international investment projects implementation is influenced by a large number of factors. Important in implementation of international investment projects are the currency of financing, the choice of commercial banks, the territorial location of the investment object and intercountry focus of products (works, services) of the project. It is also necessary consider the rate and characteristics of inflation, foreign economic factors, ratio of exchange rates, tax environment, interest rates on loans and insurance. Therefore, to assess efficiency of such projects, it is necessary to use indicators that allow for these factors to be taken into account and to evaluate the resulting effect.

We have studied economic content, methodology and practice of applying existing methods of analyzing and assessing efficiency of investment projects, including static, dynamic and static-dynamic. The first group includes the following indicators: net income, payback period, index of return of costs and investments, financial feasibility and need in additional financing, characteristics of the financial condition of the organization implementing the project. The second group is represented by analytical indicators taking into account the discounting as well as the internal rate of return.

In the structure of static-dynamic methods it is possible to allocate minimum of the given expenses, annuity and calculation of profit mass for the whole period of project implementation, etc.

The methods described above are suitable for efficiency assessment of international investment projects, but they do not reflect efficiency of their use for investment activities of a particular entity. In addition, they do not reflect the impact of market dollar rate and purchasing power parity.

Studying methodical issues of analysis of international investment projects efficiency, it is possible to note that at present there is no uniform method of assessment. We are therefore encouraged to conduct this type of assessment in the following sequence:

Stage 1. Collecting required information. For the analysis of international investment projects, initial information about the organization, scope of its activities, analysis of the financial status of organization and its position in the market is collected at this stage.

Stage 2. Calculation and analysis of generalizing and individual indicators. Preparation of comparative analytical tables. Generalizing performance indicators characterize efficiency of the enterprise in general. When calculating generalizing indicators, the entire cumulative result and all total costs (resources) of the enterprise are considered. And individual performance indicators characterize efficiency of the use of any particular type of resource or efficiency of any individual unit of the enterprise, etc. When calculating individual indicators results and costs (resources) corresponding to the efficiency calculation object are considered.

Stage 3. In-depth study of generalizing indicators using deterministic and stochastic factor analysis.

Economic analysis, which studies influence of individual factors on economic indicators, is called factor analysis. By means of factor analysis it is possible to reveal latent variables, responsible for presence of linear statistical correlations between observed variables.

Two main objectives of factor analysis:

- determination of relationships between variables, (classification of variables), i.e. "objective R-Classification";
- reduction of the number of variables required to describe data.

The main types of factor analysis are deterministic analysis and stochastic analysis.

Deterministic factor analysis is based on the method of studying influence of such factors, interrelation of which with the generalizing economic indicator is functional. The latter means that the generalizing indicator is either a product, or quotient or an algebraic sum of individual factors.

The following methods of deterministic factor analysis are distinguished: method of chain substitutions; method of absolute differences; method of relative differences; integral method; method of taking logarithms.

Stochastic factor analysis is based on the method of influence research of such factors interrelation of which with the generalizing economic indicator is probabilistic, otherwise-correlation.

There are the following methods of stochastic factor analysis: method of pair correlation; multiple correlation analysis; matrix models; mathematical programming; method of operations research; game theory.

Stage 4. Preparation of opinion on efficiency of international investment projects implementation and efficiency of implemented international investment project in general. The project with the greatest economic effect (profit) is accepted for implementation.

V.PRACTICAL SIGNIFICANCE, SUGGESTIONS AND RESULTS OF IMPLEMENTATIONS, RESULTS OF EXPERIMENTAL TESTS

On the basis of studying theoretical and methodical issues of the analysis of international investment projects implementation efficiency, it is possible to suggest use of following methods:

through the system of generalizing and individual indicators of IIP implementation efficiency in the foreign market;

by conducting factor analysis both deterministic when relationship between generalizing and individual indicators is direct and stochastic, when the relationship of the indicators is implicit.

Consider the method of calculating performance indicators of international investment projects implemented in the foreign market using the system of generalizing indicators. It should be noted that in case of implementation of investment projects in the foreign market, calculation of the proceeds shall be made in US dollars, and for the study of economic efficiency of this kind of international investment projects the

market rate of 1 U.S. dollar and its rate of purchasing power parity shall be considered.

The first generalizing indicator, showing efficiency of international investment projects implementation, is the rate of increase in production efficiency of certain types of products from of such projects implementation (Epi)

$$Epi = \left(\frac{\left(\frac{Ai_1 * P_i^S}{P_i^{PPP}} \right) - \left(\frac{Ai_0 * P_i^S}{P_i^{PPP}} \right)}{\frac{Ci_1}{Ci_0}} - 1 \right) * 100\% \quad (1)$$

where P_i^S – unit price, in US dollars;

P_i^{PPP} – US dollar market rate, rub.

P_i^{PPP} – US dollar rate on purchasing power parity, rub;

Ai_1 and Ai_0 – volume of production, respectively, for the settlement period and before implementation of an international investment project, sold on the foreign market, in physical indicators;

Ci_1 and Ci_0 – cost of types of products, respectively, for the settlement period and before implementation of an international investment project, sold on the foreign market, rub.;

Eci – cost reduction (relative cost savings) for the settlement period of use of international investment project, sold on the foreign market, rub.;

$$Ai_1 * P_i^S * \frac{P_i^{PPP}}{P_i^S} \text{ and } Ai_0 * P_i^S * \frac{P_i^{PPP}}{P_i^S}$$

Efficiency factors of production of certain types of products sold on the foreign market, respectively, after and before the implementation of the international investment project.

Efficiency factor of production of certain types of products reflects their profitability, or the advance of the production result in comparison with the costs contributing this result. If when calculating this factor, a value equal to one is obtained, the actual production costs are equal to the price of a certain type of production and the company will not have any profit when implementing an international investment project. Conversely, if the efficiency factor of a certain type of product is greater than one, the actual cost per unit of a certain product will be lower than the value of its price. It is worth noting that the higher the value of the calculated fact is, the more profit will be per unit of cost.

Further determine dependence of rate of efficiency increase of international investment project, implemented on external market on reduction of cost (relative cost saving) for the calculated period of implementation of the international investment project implemented on the foreign market (Epi).

$$Epi = \left(\frac{Ai_1}{Ai_0} + \frac{Ci_1}{Ci_0} - 1 \right) * 100 = \frac{Ai_0 * Ci_0 - Ci_1}{Ci_1} * 100 * \frac{3ci}{Ci_1} * 100. \quad (2)$$

Rate of efficiency increase of production of certain types of products shows the advance of the growth rate of output over the rate of increase in costs for its production. It should be noted that the efficiency of production of certain types of products increases directly in proportion to the increase in

their output and back in proportion to the increase in total cost. If the whole increase of output of certain kinds of production is reached without increase of expenses or at reduction of them in comparison with the basic level, the projects providing such increase, can be considered effective.

Another important generalizing indicator of international investment projects efficiency is increase in added value due to the relative cost savings of a certain type of product as a result of scientific and technical event (ΔDCi), which can be determined by one of the following formulas:

$$\Delta DCi = \left(Ai_1 - Ai_0 * \frac{Ci_1}{Ci_0} \right) * P_i^S * \frac{P_i^{PPP}}{P_i^S}, \quad (3)$$

$$\Delta DCi = Eci * \frac{P_i^S * \frac{P_i^{PPP}}{P_i^S} * Ai_0}{Ci_0}. \quad (4)$$

Analyzing formulas 3 and 4, we can conclude that the increase in added value due to the relative cost savings of a certain type of product may be higher, lower or equal to the relative cost savings of a certain type of product. The added value increase will be equal to the specified savings if the unit cost in the base period coincided with its price. If the unit cost in the base period was lower than the price, the increase in added value due to relative cost savings as a result of international investment project exceeds this savings. This indicates that assessment of the impact of international investment project on the outcomes shall be based on the increase in added value. The fact is that if the basis for the assessment is accepted the cost savings of products, the best position would have those projects on which labor, material and financial resources were not sufficiently rationally used in the base period.

If the unit cost was more than the price in the base period, the increase in value added by relative cost savings would be less than the specified savings. This indicates that the actual cost per unit before the investment project implementation was higher than the price level. It should be emphasized that the value of the added value increases due to the relative cost savings by absolute value coincides with the increase in volume of released products due to the specified savings.

Total increase of added value due to the action of intensive and extensive factors ($\Delta DCtoti$) can be calculated by the following formula:

$$\begin{aligned} \Delta DCtoti &= Eci * \frac{P_i^S * \frac{P_i^{PPP}}{P_i^S} * Ai_0}{Ci_0} + \Delta Ci * \left(\frac{P_i^S * \frac{P_i^{PPP}}{P_i^S} * Ai_0}{Ci_0} - 1 \right) + \Delta 3i = \\ &= Eci * KEni + \Delta Ci * (Keni - 1) + \Delta 3i, \end{aligned} \quad (5)$$

where ΔCi – absolute increase in the cost of production of certain types of products in comparison with the previous year, rub.;

$\Delta 3i$ – absolute increase of labor costs (including social contributions) in comparison with the previous year, rub;

$Keni$ – coefficient of production efficiency of certain types of products in the base year can be calculated by the following formula:

$$Keni = \frac{P_i^S * \frac{P_i^P}{P_{i0}^P} * A_i}{C_{i0}}. \quad (6)$$

The first part of this formula ($Eci * Keni_0$) reflects the increase in value added by action of intensive factors, the second ($\Delta Ci * (Keni_0 - 1)$) and the third ($\Delta 3i$) – reflect the increase in added value due to the action of extensive factors. It is clear from the content of indicators in the second and third part of the formula, that the increase in added value occurs, first, by increasing the cost for increasing output, if production efficiency factor in the base period has a value greater than one, and second, increase in labor costs.

Having studied increase of the added value, including the cost of depreciation, due to actions of qualitative and quantitative factors related to implementation of international investment project ($\Delta DC(A)toti$) is calculated by the following formula:

$$\Delta DC(A)toti = Eci * Keni_0 + \Delta Ci * (Keni_0 - 1) + \Delta 3i + \Delta Ai, \quad (7)$$

where ΔAi – absolute increase in depreciation costs associated with implementation of the international investment project, when production of certain types products, rubles.

Increase of profit (ΔPi) and income (ΔIi) due to joint effect of intensive and extensive factors related to implementation of international investment project, is calculated by the following formulas:

$$\Delta Pi = Eci * Keni_0 + \Delta Ci * (Keni_0 - 1), \quad (8)$$

$$\Delta Ii = Eci * Keni_0 + \Delta Ci * (Keni_0 - 1) + \Delta Ai \quad (9)$$

The first part of these formulas reflects the increase of profit and income respectively because of intensive factors, due to implementation of the international investment project. The rest parts of the formulas show increase in profit and income due to effect of extensive factors.

The share of the added value increase due to effect of intensive factors (Dui) in the total volume of its increase is determined by the following formula:

$$Dui = \frac{Eci * Keni_0}{\Delta DCtoti} * 100 \quad (10)$$

When using factor analysis to evaluate international investment projects efficiency, we can use the simplest deterministic methods, among which the following can be distinguished:

- chain substitution method;
- index method;

indicator on the change of efficiency factor of production of certain types of products implemented under the international investment project.

, implemented under the international investment project due to changes in production volume:

$$\Delta K_{ep_{A_1}} = K_{ep_{con_1}} - K_{ep_0} \quad (17)$$

Change of efficiency factor of production of certain types of products, implemented under the international investment project due to changes in the price of sold products in US dollars:

- absolute difference method;
- relative difference method;
- integral method.

Consider at an example of efficiency factor of production of certain kinds of products implemented under an international investment project (K_{ep}) application of the method of chain substitutions of deterministic factor analysis.

First of all present a model of dependence of generalizing indicator on particular:

$$K_{ep} = A_i * P_i^S * \frac{P_i^P}{P_{i0}^P}, \quad (11)$$

After particular indicators are defined, their relationship with the generalizing indicator is established, proceed to study the influence of each of them on the generalizing indicator.

For the base period the mixed model of multiplicatively-fold type of efficiency factor of production of certain types of products, implemented under the international investment project will look as follows:

$$K_{ep_0} = A_{i_0} * P_{i_0}^S * \frac{P_{i_0}^P}{P_{i0}^P}, \quad (12)$$

For the reporting period, the mixed model of the multiplicatively-fold type of production efficiency of certain types of products implemented under the international investment project will look as follows:

$$K_{ep_1} = A_{i_1} * P_{i_1}^S * \frac{P_{i_1}^P}{P_{i0}^P}, \quad (13)$$

Further, by gradual replacement of the value of each particular indicator from the basis to the reporting find intermediate results of the factor analysis.

Condition 1. Replace the first particular indicator of production volume:

$$K_{ep_{con_1}} = A_{i_1} * P_{i_0}^S * \frac{P_{i_0}^P}{P_{i0}^P}, \quad (14)$$

Condition 2. Replace the second particular indicator of the price of sold products in US dollars:

$$K_{ep_{con_2}} = A_{i_1} * P_{i_1}^S * \frac{P_{i_0}^P}{P_{i0}^P}, \quad (15)$$

Condition 3. Replace the third particular indicator of US market rate, in rub.:

$$K_{ep_{con_3}} = A_{i_1} * P_{i_0}^S * \frac{P_{i_1}^P}{P_{i0}^P}, \quad (16)$$

Further determine the influence of change of each particular

Change of efficiency factor of production of certain types of products

$$\Delta K_{ep_{P_i^S}} = K_{ep_{con_2}} - K_{ep_{con_1}} \quad (18)$$

Change of efficiency factor of production of certain types of products, implemented under the international investment project due to changes in US dollar market rate:

$$\Delta K_{ep_{P_i^P}} = K_{ep_{con_3}} - K_{ep_{con_2}} \quad (19)$$

Change of efficiency factor of production of certain types of products, implemented under the international investment project due to changes in US dollar rate on purchasing power parity:

$$\Delta K_{\varepsilon p_{\text{PPP}}} = K_{\varepsilon p_{\text{con.}}} - K_{\varepsilon p_1} \quad (20)$$

The cumulative impact of particular indicators on the change in the production efficiency factor of certain types of products sold under the international investment project can be found as follows:

$$\Delta K_{\varepsilon p} = K_{\varepsilon p_1} - K_{\varepsilon p_0} = \Delta K_{\varepsilon p_{A_1}} + \Delta K_{\varepsilon p_{P_1^S}} + \Delta K_{\varepsilon p_{P_1^B}} + \Delta K_{\varepsilon p_{P_1^D}} \quad (21)$$

CONCLUSION

As a result of studying methodical issues of research of international investment projects efficiency, it is possible to note, that when using deterministic factor analysis by the method of chain substitutions it is possible to identify reserves for improving efficiency of foreign economic activity of the Russian Federation. Using results of the proposed approach management decisions of financial and economic services of the organizations in the field of prices and volumes of export can be clarified and adjusted.

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