American Journal of Economics 2020, 10(6): 311-324
DOI: 10.5923/j.economics.20201006.01

Identification of Factors Influencing the Influx of FDI and Spillover Effects from Their Attraction to the Economy of the Russian Federation

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Abstract This article focusses on the formation of new scientific solutions regarding the identification of factors influencing the influx of FDI and Spillover effects from their attraction to the economy of the Russian Federation. The study focuses on the importance of FDI for the development of economic systems in developing countries. It has been revealed that, in the current conditions, the size of attraction and the impact of FDI on the Russian economy are critically insufficient. The necessity of searching for the problems of the current situation and its solution, within which the emphasis should be placed on economic and mathematical modeling, is noted. Based on the use of economic and mathematical modeling, nine main FDI influence factors from seventeen indicators on the Russian economic system are selected. Separately, eight main factors from thirteen indicators of the influence of Spillover effects on the Russian economy are identified.

Keywords FDI, Influence factors, Russian economy, Spillover effects

1. Introduction

Investments are one of the key factors of development of any country in the world (Lipsey 2002; Heckscher, 2007; Rogatnev, 2015). Moreover, considering the constant shortage of own financial resources of the country and local authorities, as well as business entities, it is an investment that is an alternative not only for increasing the fiscal press of the country, but also attracting expensive and difficult to maintain credit resources for country`s institutions, local government, and business units (Amal, Tomio, Raboch, 2010; Nosova, 2011). However, it is necessary to understand that attracting investments in a country's economy depends on a set of external and internal factors. Here from, at the present stage of the development of the world and national economies, one of the main goals for attracting investments is to determine the totality and extent of the influence of the relevant factors. (De Gregorio, 2005; Nasabulina, 2008; Maza, Villaverde, 2015).

Most developing countries are experiencing a significant shortage of investment resources (Fabry & Zezhni, 2006; Gokalp & Eldirim, 2016; Tintin, 2013). Practice and research (Baz & Milner, 2008; Silajdzic, Mehic, 2015; Dang, 2016) show that investments are a fundamental factor in accelerating the development of the national socio-economic system and increasing competitiveness, both of the state economy as a whole and its industries and enterprises. Under these conditions, FDI are of particular importance, which perform several functions at once for the economic systems of developing countries, namely: ensure the inflow of foreign freely convertible currency and positively affect the exchange rate of national currencies; stimulate the development of all sectors of the economy (services, industry, agricultural sector); increase the competitiveness of the national economy and its individual elements; reduce unemployment; increase revenues of budgets of all levels, business entities, and households; stimulate the development and implementation of innovations; provide access for business entities to modern technologies in management and production (Makoni, 2013; Mehlis, 2015; Gornaya, Ischuk & Khalilova, 2017).

While examining the influx of FDI in developing countries, it should be noted that there is fierce competition on the world markets for investment resources, which, given the significant mobility of such investments, requires constant identification and study of the factors influencing FDI both from investors and recipients countries (Tobin & Rose - Ackerman, 2005; Buchanan, Lee & Rishi, 2012). The study of the FDI impact on the economies of developing countries requires special attention, including taking into account the Spillover effects (Buckley, Clegg & Wang, 2007; Stanchik, 2007; Tian, Law, Lin & Song, 2011). The exclusion from the study of identification and

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Published online at http://journal.sapub.org/economics

assessment of the impact of Spillover effects on the state economic system deforms the obtained scientific and practical conclusions.

We note that the factors influencing the attraction of FDI and the Spillover effects of their attraction to the economy, despite the general basis for their identification, vary significantly on the strength of influence and may reflect the national characteristics of the economic system of a particular country, including a developing one. (Fan, 2009; Maza & Villaverde, 2015; Amal, Tomio & Raboch, 2010). Thus, a significant scientific task at the global, international, and national levels of the functioning of economic systems is the identification of factors influencing the influx of FDI and the Spillover effects of their involvement in the economy of individual countries with an emphasis on developing ones.

Under such conditions, it is of scientific interest to solve this problem in relation to the economies of developing countries that are of significant importance for the global economic system (including the Russian economy), which, at the end of 2018, ranked eleventh in the world in terms of the size of the economic system (The World Bank, 2019). The above indicates that, on one hand, the economic system of the Russian Federation is one of the largest in the world, which can be classified as developing, and has a significant impact on the global economy. On the other hand, forming a relatively effective legal framework to attract and protect foreign investments the basis of which are the lows: "Investment activity in RSFSR " and "Foreign investments in Russian Federation" Russia faces the need for a detailed study of the factors influencing the attraction of FDI in its economy under the conditions of the growing demand of investment resources and changes in investment volumes, as well as the structure of donor countries of investment resources under the influence of the introduction of economic sanctions by a number of countries around the world. (Fedorova, Nikolaev, Nikolaev, Alekseeva, 2018; Gorbunova, 2018).

We focus on the significant interests of both foreign and Russian scientists (Ason, 2018; Petrikova, 2009; Maza & Villaverde, 2015) in identifying and assessing the impact of FDI inflow factors in the Russian economy. Special attention is paid to the impact of the Spillover effects on the Russian economic system (Fedorova & Barikhina, 2015; Fedorova, Korkmazova & Muratov, 2016; Ivanova, 2017). At the same time, we note the need for further identification of the factors influencing the influx of FDI and the Spillover effects of their attraction to the economy of the Russian Federation, the purpose of this study.

Based on the goal, it is important to prove or refute several hypotheses, namely:

- FDI plays a significant role in the Russian economy, dynamically increasing its absolute and relative values;
- there are sufficient opportunities to identify influence factors on the inflow of FDI in Russia based on economic and mathematical modeling;
- there are sufficient opportunities to determine the influence of Spillover effects from attracting FDI in the Russian economy based on economic and mathematical modeling.

2. Materials and Methods

We consider it appropriate to assess the factors that influence the attraction of FDI in the Russian economy and assess the impact FDI on the economy of the Russian Federation by constructing linear regression models:

$$Y = b_0 + b_1x_1 + b_2 x_2 + \ldots + b_nx_n + \varepsilon, \quad (1)$$

where, in the framework of modeling the attraction of FDI in the Russian economy: Y –FDI inflow into the Russian economy; b_0 - constant; ε - residues; $b_1, _2, \ldots, _n$ - regression coefficients; $x_1, _2, \ldots, _n$ – influence factors on the attraction of FDI in the Russian economy; n – number of factors influencing the attraction of FDI in the Russian economy; in the framework of modeling the FDI impact on the Russian economy: Y – GDP growth per capita in the Russian Federation from the FDI influx; b_0 - constant; ε - residues; $b_1, _2, \ldots, _n$ – regression coefficients; $x_1, _2, \ldots, _n$ – directions of the FDI influence on the economy of the Russian Federation, including taking into account the Spillover effects; n –the number of directions of FDI influence on the Russian economy.

To assess the factors influencing the influx of FDI in the economy of the Russian Federation, a linear regression model, based on the model developed by A. D. Galenkova, O. S. Mariev, K. V. Chukavina (2018) is used, where, to the proposed development, international ratings are added, which investors consider while investing FDI in the state's economy, namely: the rating of countries in the world in terms of business; the index of country`s global competitiveness in the framework of the corresponding rating; global ranking of countries and territories of the world in terms of FDI (GRFDI), as well as several other indicators. In this case, variables, measured not in percentage, must be taken according to the logarithm in order to switch to elasticities.

Thus, the total number of initial variables, that have been adopted as those that affect the influx of FDI into the Russian economy includes GDPg - GDP growth rate; TOI - Trade Openness Index; Defl - GDP deflator; IntUs - number of Internet users per 100 population; Unempl - unemployment rate; LFTE - the percentage of the population with higher education; HTE - the share of high-tech exports in the total exports; inst - the product of indices of economic freedom and insolvency of the state; DB - the country's rating in terms of business conditions; GC -country's global competitiveness index; GRFDI -the country's global ranking in terms of FDI; RD(R)NC - the rate of devaluation of the national currency (in this case, the Russian ruble); GRIRCI - the growth rate of interest rates on capital investments; BTB - business tax burden level; LLP - the level of labor

productivity; DBIRIri - the difference between interest rates on investments in Russia and international interest rates; DBPIri - the difference between the price of investments in Russia and international prices.

In this case, we can calculate the inflow of FDI in the Russian Federation as follows:

$$\ln FDI = \Sigma\, akXkt + \varepsilon kt, \quad (2)$$

where, lnFDI is the logarithm of the inflow of FDI in the Russian Federation; ε - residues; a - regression coefficients; k – number of metrics (in this case 17); t - the time period of the study; X - indicators that affect the inflow of FDI into the economy of the Russian Federation.

We note that the number of indicators that are considering assessing the impact on FDI inflows into the Russian economy is excessive and it is necessary to reduce their number, since they may correlate with each other, for which it is proposed to use the findings suggested by V.R. Baraz (2005), namely:

1. Using Excel software capabilities, correlation coefficients (r) will be calculated for all selected indicators of the model, and a qualitative assessment of the tightness of communication using the Chaddock scale will be performed.

2. A statistical evaluation of the obtained values of the correlation coefficients (r_{calc}) for all selected indicators will be used by comparing their absolute value with a tabular (or critical) indicator (r_{crit}), the values of which were taken from a special table. Moreover, if:

- $|r_{calc} \geqslant r_{crit}|$, the hypothesis of the importance of linear connection is not rejected, and this coefficient can be included in the model;
- $|r_{calc} < r_{crit}|$, then the hypothesis of the significance of the linear correlation is rejected, and this coefficient cannot be included in the model.

In the framework of statistical estimation of the obtained values of the correlation coefficients (r_{calc}) for all selected indicators of the model, when choosing (r_{crit}), we take values based on the significance level (i.e., the probability of a probable error in the forecast) $\alpha = 0.05$, for a degree of freedom f, which will be equal to 3.

In this case, the degree of freedom will be calculated as follow:

$$f = n - k \quad (3)$$

where, k is the number of model indicators, and n is the number of time intervals

In our case: f = 20 - 17 = 3.

1. The calculation of the determination coefficient R^2 will be used, as well as the methodology of a group of scientists led by A.V. Kalinichenko (2010) for the selection of indicators of the proposed model.
2. Based on the above methods of selecting indicators, we will include in the proposed model as the main indicators, only those that have passed all three selection criteria.
3. Based on the above, the inflow of FDI in the Russian Federation can be calculated as follows

$$\ln FDI = \sum a_n F_{nt} \quad (4)$$

where, lnFDI is the logarithm of the FDI inflows into the Russian Federation; a - regression coefficients; n is the number of the calculated main indicators; t is the period of the study; F - the main factors that affect the inflow of FDI into the economy of the Russian Federation.

In the framework of modeling, the influence of FDI Spillover effects on the Russian economy is used as an adapted linear regression model of I.O. Sukhareva and N.N. Yunusova (2013), where, within the framework of the proposed development, the factors of FDI absorption by the recipient country are detailed, and Spillover effects from attracting such investments to the country are taken into account. Therefore, the total number of variables that are adopted, such as those that affect changes in GDP per capita in the Russian Federation due to the FDI attraction to the country: DID - degree of infrastructure development (number of telephone users in the country per 100 people); QIE - the quality of the institutional environment; U - urbanization (the share of the urban population in the total population of the country); PS - index of political stability; HC - the number of years spent on education by a population of over 16 years old; IL - the share of domestic investment in the total investment in the country; EEFP - export growth of enterprises with foreign capital (%); EDI is an indicator of economic development; PI - increase in public investment in total investment in the country (%); FDI - increase in foreign investment in total investment in the country (%); lnSE - logarithm of the sum of the Spillover effects of attracting FDI in the country's economy; QMP - the quality of monetary policy in the country; PF - price factors. Variables, not measured in percentages, were taken according to the logarithm in order to switch to elasticity.

Then, to calculate the changes in GDP per capita in the Russian Federation will be as follows:

$$\ln GDP_{pc} = \Sigma\, a_k X_{kt} + \varepsilon_{kt}, \quad (5)$$

where, lnGDPpc is the logarithm of the change in GDP per capita in the Russian Federation; ε - residues; a - regression coefficients; k - the number of indicators taken (in this case 13); t - the period of the study; X - indicators that affect changes in per capita GDP in the Russian Federation.

As with the first model, we can argue that the number of indicators used in the model is excessive and it is necessary to reduce their number, as they may correlate with each other, for which we can propose to use the three methods of selecting indicators given above for the first model. The only exception is that the degree of freedom, f, will be equal to 7.

Based on the above methods of indicators selection, we will include in the proposed model as the main indicators, only those that have passed all three selection criteria.

Based on the calculations, the final equation for calculating the change in per capita GDP in the Russian Federation will be as follows:

$$\ln GDP_{pc} = \sum a_n F_{nt} \quad (6)$$

where, lnGDPpc is the logarithm of the change in GDP per

capita in the Russian Federation; a - regression coefficients; n is the number of calculated key indicators; t is the period of the study; F - the main indicators that affect changes in GDP per capita in the Russian Federation;

To conduct the study, statistical and other data of over twenty years (beginning in 1999 and ending in 2018) on the development of the Russian economic system were taken into account, which made it possible to consider its functioning, as well as the influx of FDI and their influence factors, taking into account the development of the country's economic systems in the long run and the framework of two consecutive economic crises, as well as periods after crisis development.

3. Results

3.1. Assessing the Impact of FDI on the Russian Economy

Table 1. Analysis of the dynamics of FDI inflows into the economy, GDP dynamics, and the share of FDI in Russia's GDP for 1999-2018 years

Year	GDP billion USD	FDI billion USD	FDI share in GDP %
1999	210.2	9.6	4.57
2000	278.5	11.0	3.95
2001	328.9	14.3	4.35
2002	370.5	19.8	5.34
2003	461.6	29.7	6.43
2004	633.9	40.5	6.39
2005	819.1	53.7	6.56
2006	1061.7	55.1	5.19
2007	1393.7	120.9	8.67
2008	1781.5	103.8	5.83
2009	1307.6	81.9	6.26
2010	1635.7	114.7	7.01
2011	2047.7	190.6	9.31
2012	2189.1	154.5	7.06
2013	2292.5	170.2	7.42
2014	2058.3	22.0	1.07
2015	1356.8	6.9	0.51
2016	1280.5	32.5	2.54
2017	1579.3	28.6	1.81
2018	1657.3	8.8	0.53
Absolute deviation	1447.1	-0.8	-4.04
Rates of growth, %	788.44	91.67	11.63

* - Compiled by the author based on sources: [Federal State Statistics Service of the Russian Federation, 2019; Knoema, 2019]

In most of the developing countries, FDI is one of the key factors in stimulating the national economy. At the same time, the value of FDI inflows decreases in countries where there are significant economic, political, or institutional problems (Azzimonti and Sarte, 2007; Prokhorova and Gadiyak, 2012; Koboekay, 2012). Given the above, we analyze the dynamics of the inflow of FDI into the economic system of the Russian Federation over the last twenty years, beginning in the year 1999 and ending in the year 2018, as well as the dynamics of Russia's GDP and the share of FDI in the country's GDP in table 1.

Based on the analysis, the following conclusions have been drawn:

- After a significant increase in FDI in the Russian economy from the year 1999 to 2007, (+111.3 billion USD or +1259.38%) during the crisis of 2008-2009, the size of FDI fell significantly (-39 billion USD or -32.26%), after which, for four years, there has been significant fluctuations in the size of FDI inflows, and since the year 2014, there has been a critical decrease in the size of FDI inflows into the economy of the Russian Federation, which was caused by both crisis phenomena in the economic system and sanctions against the country by a significant number of key donor countries of FDI;
- Russia's GDP dynamics demonstrated the presence of two economic crises during the study period when there was a decline in GDP, as well as three periods of growth, two of which occurred after the crisis recovery of the state economy;
- A trend is clearly visible if, over twenty years of researching the GDP of the Russian Federation, despite the crisis in the economy, it has grown by 1,447.1 billion USD or 788.44%, the size of FDI inflows into the country's economy decreased by 0.8 billion USD, with a growth rate of only 91.67%, which led to a significant decrease in the share of FDI in Russian GDP from 4.57% in 1999 to 0.53% in 2018. At the same time, the maximum value of the share of FDI in Russia's GDP was observed in 2011 (9.31%), and the minimum in 2015 (0.51%).

Thus, we can talk about a critical decrease in the role of FDI in the economy of the Russian Federation from 2014 to 2018. The given situation was not only caused by the economy, but also by the political influence, as well as institutional factors, which requires further identification. The Spillover effects of the FDI influence on the Russian economy deserve special attention, which also requires their identification based on economic and mathematical modeling.

3.2. Creating a Model for Assessing the Impact of Factors Attracting FDI in the Russian Economy

Assessment of scientific works on the study of the factors influencing the attraction of FDI in the economy of the recipient countries (Brainard, 1997; Asedu, Isfahani, 1998; Tobin, Roz - Ackerman, 2005; Azzimonti, Sarte, 2007; Koritsky, 2014; Gornaya, Ischuk, Khalilova, 2017; Galenkova, Mariev, Chukavina, 2018) allow us to argue that a significant part of scientists uses economic and mathematical modeling as a research method, offering their models to describe this economic process. Separately, it

should be noted that the attempts of scientists to create a model for attracting FDI into the economy of the Russian Federation.

Brainard (1997) proposed the use of the so-called "gravity approach", to assess factors for FDI attracting in the host economy, expressed by the following model:

$$F_{ij} = M_i M_j / D_{ij}, \quad (7)$$

where, F_{ij} –is the FDI flow from country j to country i; M_iM_j – an indicator characterizing the size of countries j and i (most often GDP); D_{ij} – the distance between countries.

Baz and Milner (2008), within their model of attracting FDI in host economies, focus on a limited number of factors:

$$FDI_{it} = \alpha + \gamma_1 (\text{Market Size})_{i(t-1)} + \gamma_2 (\text{Econ. Development})_{i(t-1)} + \gamma_3 (\text{GDP Growth})_{i(t-1)} + \sigma_i + \varepsilon_{it} \quad (8)$$

where, FDI_{it} – is the size of the inflow of FDI in the economy of country i over a period of time t; Market Size –host country size; Econ. Development – GDP per capita in the recipient country; GDP Growth – growth of real gross domestic product in the host country compared to the previous year; γ_1, γ_2, γ_3 – regression coefficients; α - free term of the equation; σ_i – fixed effects; ε_{it}, - random value.

Panibratov & Ermolaeva (2015), in the context of studying foreign investment from China and Russia, proposed the following model for attracting FDI into the economy of the recipient country:

$$FDI_{it} = \alpha + \beta_1 BIT_i + \beta_2 HGDP_{it} + \beta_3 HGDP_{pcit} + \beta_4 RULE_t + \beta_5 CORCONTR_t + \beta_6 CDIST_i + \beta_7 CIS_i + \beta_8 GEO_i + \varepsilon_{it}, \quad (9)$$

where, α – is a constant; ε – are the residues; $b_{1,\ 2,\ \ldots,8}$ – regression coefficients; i – country of the study (Russian Federation and China); t – time period of the study; FDI – the amount of attracting FDI in country i in year t; BIT – the presence of bilateral investment contracts between the donor country and the recipient country; HGDP – GDP of the host country; $HGDP_{pc}$ – GDP per capita in the recipient country; RULE – legal environment in the host country; CORCONTR – quality of the fight against corruption in the recipient country; CDIST – cultural differences between the donor country and the host country; CIS – membership in the Commonwealth of Independent States; GEO – affiliation of the host country to the Asian region.

Mehlis (2015), as part of a review of the main trends in mutual FDI between the Russian Federation and European Union countries, offers a very interesting model for assessing the FDI outflow from developing countries and countries with economies in transition:

$$FDI_n^{out} = FDI_1^{out} * GDP_1^{pc} / GDP_2^{pc} \quad (10)$$

where, FDI_n^{out} - potential volume of FDI outflow from developing and transition economies, billion US dollars; FDI_1^{out} - current average annual FDI outflow from developing and transition economies, billion US dollars; GDP_1^{pc} – GDP per capita in a developed country, US dollars; GDP_2^{pc} – GDP per capita in a developing country or a country in transition, USD.

Mariev, Drapkin, Chukavina & Rachinger (2016) studying the determinants of influx into the regions of the Russian Federation proposed an author's model for FDI attracting in host economies (countries, regions):

$$FDI_{ijt} = \exp(\alpha_0 + \alpha_1 LGDP_{jt} + \alpha_2 LGRP_{it} + \alpha_3 LDIST\_INV_j + \alpha_4 LDIST\_MSC_i + \alpha_5 LOPEN_{it} + \alpha_6 LCRIME_{it} + \alpha_7 LRDST_{it} + \alpha_8 LUNEMPL_{it})\ \varepsilon_{ijt,} \quad (11)$$

where, α_0 is a constant; ε are the residues; $\alpha_{1,\ 2,\ \ldots,8}$ - regression coefficients; j – country of study (donor country); t – time period of the study; i – region of the study (region - recipient in the host country, the Russian Federation is being studied); FDIijt – the amount of FDI from the country LGDP – the logarithm of the GDP of the donor country; LGRP – logarithm of GDP per capita in the host region of Russia i in year t; LDIST_INV –logarithm of distance between the capital of the donor- country j and Moscow; LDIST_MSC – logarithm of the distance between the receiving region i and Moscow; LOPEN – logarithm of trade openness of the receiving region of the Russian Federation i (calculated as the sum of exports and imports of the receiving region divided by the gross regional product) in year t; LCRIME – logarithm of the recorded number of crimes in the host region of Russia i in year t; LRDST – logarithm of the number of personnel engaged in research and development in the host region of the Russian Federation i in year t; LUNEMPL – logarithm of the share of unemployed in the total number of working population in the Russian region i in year t.

Bazhenov & Zasukhina (2017) suggest creating an econometric model for assessing factors for FDI in the host economy by dividing them into two groups: macroeconomic factors and factors characterizing the development of society:

$$FDI \sim \log(GDP2) + \log(POP) + NEX + INFL + OPENNESS + RD + \log(HDI) + \log(IU) + \log(EDU) + DR + DUMMY, \quad (12)$$

where, FDI - is the net FDI inflow into the country. It is considered as the sum of all direct investments in the country from non-residents and consists of two parts: a decrease in net assets or an increase in net liabilities that are recorded as loans, and a net increase in assets or liabilities is recorded as a debit. GDP2 –GDP per capita; POP- population size of the host country; NEX – net exports of the recipient country; INFL – inflation; OPENNESS – the ratio of trade to GDP with the host economic system; RD – development costs from GDP in the recipient country; HDI – Human Capital Development Index; IU - Number of Internet users per 100 people; EDU - Number of university graduates per 100,000 people; DR – fixed effects; DUMMY – a variable that defines the pre-crisis and post-crisis periods.

Gornaya, Ischuk & Khalilova (2017) proposed using a regression model to calculate the influence of factors on the FDI inflow into the economy of the recipient country, based on the BDO International Business Compass methodology, which is aimed at assessing the investment attractiveness of a particular country of the world. In this case, the regression equation is as follows:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3, \quad (13)$$

where, Y – is the country's investment attractiveness index; b_0 – free term of equation; b_1 ,b_2 ,b_3 – regression coefficients; x_1 – Global Peace Index, which characterizes the level of security in the country, the degree of internal and international conflicts and the degree of militarization; x_2 – (Corruption Perceptions Index; x_3 – is the Legatum Prosperity Index, which measures the prosperity of countries in nine ways: economics, business, management, education, health, safety, personal freedom, social capital, and ecology.

Dellis, Sondermann & Vansteenkiste (2017) propose a model for assessing the impact of factors on FDI inflows in the host economy:

$$y_{i,t} = \alpha + \beta_1 gdp_{i,t} + \beta_2 taxr_{i,t} + \beta_3 openness_{i,t} + \beta_4 ULC_{i,t} + \beta_5 INST_{i,t} + D_i + \varepsilon_{it}, \quad (14)$$

where, $y_{i,t}$ – is the natural logarithm of the FDI inflow into the host country; $gdp_{i,t}$ – natural logarithm of nominal GDP; $taxr_{i,t}$ – annual tax revenue (% of GDP); $openness_{i,t}$ – measure of the openness of the country's economic system; $ULC_{i,t}$ – labor cost in the country; $INST_{i,t}$ – state of the institutional environment of the country; D_i –fixed effects; ε_{it}, - random variable; β_1, β_2, β_3, β_4, β_5 – regression coefficients; α - free term of the equation; i – country of study; t – time period of the study.

Kozhina & Lavrenchuk (2017), as part of a study of the FDI determinants in the regions of the Russian Federation, offer their model for assessing the influence of factors on attracting FDI to the economy of the recipient country:

FDI = f (Economic characteristics; Infrastructure; Policy; Civil society; Geographical characteristics; Ecology; Industrial), (15)

where, the economic characteristics of the country (region), such as market size, skilled labor, population migration, tax breaks, technological innovation, unprofitable enterprises, level of wages; infrastructure of the country (region): paved roads; political factors: investment risk, openness to foreign trade; civil society and institutional development: crime rate, population culture, urbanization rate, unemployment rate, proportion of people of retirement age; geographical characteristics of the region: climate, ports, large cities, ecology of the country (region): degree of environmental pollution; power generation

Based on the study, we consider it appropriate to propose the following model for assessing the factors influencing the influx of FDI into the Russian economy:

$$LnFDI = b_0 + b_1GDPg_{it} + b_2lnTOI_{it} + b_3lnDefl_{it} + b_4IntUs_{it} + b_5Unempl_{it} + b_6LFTE_{it} + b_7HTE_{it} + b_8inst_{it} + b_9lnDB_{it} + b_{10}lnGC_{it} + b_{11}lnGRFDI_{it} + b_{12}RD(R)NC_{it} + b_{13}GRIRCI_{it} + b_{14}lnBTB_{it} + b_{15}lnLLP_{it} + b_{16}DBIRIri_{it} + +b_{17}DBPIri_{it} + \varepsilon_{it}, \quad (16)$$

where, lnFDI – is the logarithm of the inflow of FDI into the Russian Federation; b_0 -constant; ε-resdues; $b_{1, 2, \ldots, 15}$ - regression coefficients; i – country of the study (in our case, the Russian Federation); t –time period of the study; GDPg –GDP growth rate; TOI - trade openness index; Defl - GDP deflator; IntUs - the number of Internet users per 100 population; Unempl – unemployment rate; LFTE - percentage of population with higher education; HTE - share of high-tech exports in total exports; inst - the product of the indices of economic freedom and insolvency of the state; DB - country rating according to the level of business conditions; GC - the country's global competitiveness index; GRFDI - the country's global ranking in terms of; RD(R)NC – the rate of devaluation (revaluation) of the national currency (in our case, the Russian ruble);); GRIRCI - growth rate of interest rates on capital investments (interest rates on deposits in banks); BTB – business tax burden level; LLP - level of labor productivity; DBIRIri - difference between interest rates on investments in Russia and international interest rates,%; DBPIri - difference between the price of investments in Russia and international prices,%. Variables, not measured in percentages, are taken by the logarithm in order to move to elasticities.

In this case, it is necessary to carry out an empirical analysis of the factors proposed in the model in order to check the significance of their influence on the Russian economic system and eliminate those that correlate with each other, as well as highlight the main factors and on this basis to refine the proposed model.

3.3. Identification of Factors Influencing the Influx of FDI in Russia

Table 2. Checking the significance of the influence of the identified factors on the inflow of FDI in the Russian economy

Factor	r_{calc}	α	f	r_{crit}	Ratio r_{calc} and r_{crit}	R^2
GDPg	0.914	0.05	3	0.878	>	0.835
TOI	0.816	0.05	3	0.878	<	0.666
Defl	0.316	0.05	3	0.878	<	0.100
IntUs	0.229	0.05	3	0.878	<	0.052
Unempl	0.897	0.05	3	0.878	>	0.805
LFTE	0.456	0.05	3	0.878	<	0.208
HTE	0.227	0.05	3	0.878	<	0.051
inst	0.903	0.05	3	0.878	>	0.815
DB	0.883	0.05	3	0.878	>	0.780
GC	0.336	0.05	3	0.878	<	0.113
GRFDI	0.940	0.05	3	0.878	>	0.884
RD(R)NC	0.892	0.05	3	0.878	>	0.796
GRIRCI	0.615	0.05	3	0.878	<	0.378
BTB	0.884	0.05	3	0.878	>	0.781
LLP	0.558	0.05	3	0.878	<	0.311
DBIRIri	0.903	0.05	3	0.878	>	0.815
DBPIri	0.944	0.05	3	0.878	>	0.891

Source: developed by the author.

Based on the research, we can distinguish, in the framework of constructing a linear regression model of FDI

inflow in the economy of the Russian Federation (equation 1), seventeen fundamental indicators of influence. We note the need to verify the significance of the influence of the identified factors on the Russian economic system using the three verification methods described above in Table 2. At the same time, we round off the correlation and determination coefficients in the table and below to the third decimal place.

Based on the studies in Table 2, we can make the following selection of factors influencing the influx of FDI into the economy of the Russian Federation:

1. We note the growth rate of GDP (GDPg) as the main influencing indicator: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main factors of influence).

2. The Trade Openness Index (TOI) does not apply to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} < r_{crit}$; the value of the determining coefficient indicates the average dependence of FDI inflows on the factor (two of the three verification methods did not attribute the factor to the main influence factors).

3. The GDP deflator (Defl) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is weak; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of FDI inflows on the factor (three of the three verification methods did not attribute the factor to the main influence factors).

4. The number of internet users per 100 people (IntUs) does not belong to the main influencing indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is practically absent; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of FDI inflow on the factor (three of the three verification methods did not attribute the factor to the main influence factors).

5. The unemployment rate (Unempl) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

6. The percentage of the population with higher education (LFTE) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is weak; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of FDI inflow on the factor (three of the three verification methods did not attribute the factor to the main influence factors).

7. The share of high-tech exports in total export (HTE) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is practically absent; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of FDI inflows on the factor (three of the three verification methods did not attribute the factor to the main influence factors).

8. The product of the indices of economic freedom and state insolvency (inst) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

9. The country's rating according to the level of business conditions (DB) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

10. The country's Global Competitiveness Index (GC) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is weak; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of FDI inflows on the factor (three of the three verification methods did not attribute the factor to the main influence factors).

11. The country's global rating on FDI (GRFDI) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

12. The rate of devaluation of the national currency (RD(R)NC) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

13. The growth rate of interest rates on investments (GRIRCI) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is noticeable; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of FDI inflow on the factor (two of the three verification methods did not attribute the factor to the main influence factors).

14. The level of business tax burden (BTB) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale,

indicates that it is strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

15. The level of labor productivity (LLP) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is noticeable; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of the FDI inflow on the factor (two of the three verification methods did not attribute the factor to the main influence factors).

16. The difference between the interest rates on investments in Russia and the international interest rates (DBIRIri) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

17. The difference between the investment price in Russia and international prices (DBPIri) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates a high dependence of FDI inflows on the factor (three of the three verification methods attributed the factor to the main influence factors).

Thus, checking the significance of the influence of the identified factors on the FDI inflow into the Russian economy (table 2) allows us to identify nine main factors that need to be included in the final model (formula 17):

$$\begin{aligned}\ln FDI = {} & b_0 + b_1 GDPg_{it} + b_2 Unempl_{it} + b_3 inst_{it} \\ & + b_4 \ln DB_{it} + b_5 \ln GRFDI_{it} + b_6 RD(R)NC_{it} \\ & + b_7 \ln BTB_{it} + + b_8 DBIRIri_{it} + b_9 DBPIri_{it,} \quad (17)\end{aligned}$$

we should note that from the nine identified factors, only the country's rating in terms of business conditions has a positive impact on FDI inflows into the Russian Federation, and the country's global rating in terms of FDI, the difference between the interest rates on investments in Russia and international interest rates, as well as the difference between the price of investments in Russia and international prices are neutral for the FDI influx into the Russian economy, the other five factors do not positively impact FDI inflows in the Russian Federation. Thus, Russia needs a mechanism for selecting the optimal set of factors for stimulating FDI inflows into its economic system.

3.4. Creating a Model for Assessing The Impact of FDI on the Economy of the Russian Federation

Given the importance of evaluating the impact of FDI on the economies of host countries, we note a significant scientific discussion regarding the creation of appropriate economic and mathematical models, including the impact of FDI on the economic system of developing recipient countries.

Based on the neoclassical model, Malley & Moutos (1994) proposed a model for assessing the impact of FDI on the host economy with a focus on the recipient country's national income and investment restrictions on multinational companies (maximizing profits and minimizing costs):

$$E = (1-P_i)H+w_m\eta(X+X^*)+T-r^*D, \quad (18)$$

where, E – is the national income of country; P_i – the price of the intermediate product; H – issue at the enterprise with FDI; w_m –issue at the enterprise with FDI; η – number of domestic goods; X – demand for domestic goods; X* - export of domestic goods; T – state budget surplus; r* - interest on external debt; D – external debt.

De Mello & Jr (1997), based on the Barro R. & Sala-i-Martin (1992) model, proposed using a model for assessing the impact of FDI on the economy of the recipient country, considering FDI in the form of foreign capital stock, focusing on the positive impact of FDI on the host economy growth:

$$c/c = A[\beta + \eta(1-\beta)]k_d^{\beta+\eta(1-\beta)-1}k_w^{\alpha\eta(1-\beta)}-p, \quad (19)$$

where, c – consumption per unit of labor; A – general productivity of production; k_d и k_w – armed labor of domestic and foreign capital, respectively; β – return on domestic capital; α - the elasticity of the marginal rate of replacement of domestic capital by foreign; η – intertemporal elasticity of replacing domestic capital with foreign; *p* – intertemporal utility rate.

Walz (1997), based on the Grossman&Helpman model of endogenous innovation (1993) proposed his model for assessing the impact of FDI on the host economy, with a focus on attracting new technologies to the economy of the recipient country through FDI and also arguing that discriminatory policies in relation to such investments have a discouraging effect on economic growth in the host state:

$$g_u = \sigma(I^m n^m + I^u n^a + I^b n^a)\ln\lambda, \quad (20)$$

where, g_u – growth rate of utility in steady-state; σ – share of the new product in consumptionдоля; I^m, I^u, I^b – the intensity of production in the field of imitation, companies with FDI and domestic enterprises; n^m – share of simulated goods in the country; n^a – share of new goods produced in the investing country; λ – exogenous growth rate of innovation.

Borensztein, De Gregorio & Lee (1998) using the Barro & Sala-i-Martin (1992) endogenous growth model as a basis, proposed a model for assessing the FDI impact on the host economy, arguing that FDI can be represented as the amount of foreign (high-tech) goods:

$$g = 1/\sigma\,[\psi F(n^*,N/N^*)^{-1}H-p], \quad (21)$$

where, g – output growth rate; σ – intertemporal elasticity of consumption replacement; ψF – costs of foreign companies; n* - amount of foreign goods; N – total amount of goods in the country; N* - total number of goods in the world; H –stock of human capital; p – intertemporal utility preference rate.

Solomon (2011) based on the model of Borensztein, De Gregorio & Lee (1998) developed a model for assessing the FDI impact on the host economy, focusing on the GDP growth per capita in the recipient country:

$$g_{it} = \Delta\log y_{it} = b_0 + b_1\log FDI_{it-1} + b_2H_{it-1} + b_3\log FDI_{it-1}*H_{it-1} + b_4\log y_{it-1} + b_5\log FDI_{it-1}*\log y_{it-1} + b_6FIN_{it-1} + b_7\log FDI_{it-1}*FIN_{it-1} + b_8ECOENV_{it-1} + b_9\log FDI_{it-1}*ECOENV_{it-1} + b_{10}POLENV_{it-1} + b_{11}\log FDI_{it-1}*POLENV_{it-1} + b_{12}A_{it-1} + \gamma_i + u_i + \varepsilon_{it,} \quad (22)$$

where, git = Δlog yit - growth of GDP per capita in the recipient country; FDI – increase in FDI in the host economy; H – human capital; FIN – the financial development of the host state; ECOENV – the quality of the economic environment in the recipient country; POLENV – the quality of the political environment in the recipient country; A - contains management and policy variables that are used as determinants in cross-country research; γ – time variables; u – variables specific to a particular state; b_0 - constant; ε - residues; $b_{1, 2, \ldots, 12}$ - regression coefficients; i – country of the study; t – time period of the study; $\log FDI_{it-1}*\log y_{it-1}$ – the relationship between FDI and GDP per capita in the host country; $\log FDI_{it-1}*FIN_{it-1}$ – the relationship between FDI and the financial development of the recipient country; $\log FDI_{it-1}*ECOENV_{it-1}$ - the relationship between FDI and the quality of the economic environment in the host economy; $\log FDI_{it-1}*H_{it-1}$ - the relationship between FDI and human capital in the recipient country; $\log FDI_{it-1}*POLENV_{it-1}$ - the relationship between FDI and the quality of the political environment in the host economy.

Ma (2011) proposes to consider the impact of FDI on the GDP of the country, for which he is using the modified Cobb-Douglas function in the form of a regressive model:

$$Yd = F(Kd, Ld, E)e^{z} = F(Kd, Ld, E)e^{z+\varepsilon} = F(Kd, Ld, E)e^{\sum y, X+\varepsilon}, \quad (23)$$

where, Yd – is the GDP; Kd - is the level of accumulated capital; Ld - is the amount of labor used; E - the amount of accumulated knowledge; Z - external influence on the output; $z = \sum y$, X - is the external influence.

X denotes variables that influence the variable Y. ε - is a random term or random variable characterizing deviations of the real value of the resultant attribute from the theoretical one found by the regression equation. Koritsky (2014) proposes to assess the impact of FDI on the economy of the recipient country using the modernized Cobb-Douglas function, taking into account the change in human capital per employed in the economy. The regression model used in this case:

$$\ln y_i = \ln A + \alpha\ln k_i + \gamma\ln h_i + \varepsilon_i, \quad (24)$$

where, k_i – is the capital-labor ratio in the economy of the country (region) i; h_i – is the average level of education of one employed in the economy of the country (region) i; ε_i – random residue.

Silajdzic & Mehic (2015) focuses on the impact of FDI on the change in per capita GDP in the recipient country, for which is proposed the following model:

$$RGDPpc_{it} = \beta_0 + \beta_1\ln FDI_{it-1} + \beta_2\ln GDPpcCV_{it-1} + \beta_3DIit + \beta_4GB_{it} + \beta_5OP_{it} + \beta_6R\&Dbus_{it} + \beta_7R\&Dgov_{it} + \sum\beta TimeD_t + \sum\beta CountryD_i + \varepsilon_{it,} \quad (25)$$

where, RGDPpcit refers to changes in real GDP per capita (GDPpc) of country i in period t; FDI_{it-1} denotes the stock of FDI in the manufacturing sector, expressed as a fraction of the total gross value added in production (%) of country i in the period t-1; $GDPpcCV_{it-1}$ denotes GDP per capita of country i in the period t -1; DI_{it} - domestic investments of country i in period t; GB_{it} denotes the state balance (% of GDP) of country i in period t; OP_{it} denotes the share of exports and imports in GDP of country i in period t; R & $Dbus_{it}$ denotes R&D expenditures by business sector (% of GDP) of country i in period; R & $Dgov_{it}$ denotes the R & D expenditures by state sector (% of GDP) of country i in period t; TimeD denotes time variables, they are included to evaluate independent variables with greater accuracy, CountryD denotes the country variables used to control specific, time-independent country effects , and ε_{it} is a random term or random variable; β_1, β_2, β_3, β_4, β_5, β_6, β_7 – regression coefficients; β_0 - is the free term of the equation; i – country of study; t – time period of the study.

Summing up the research and the models considered, we will offer an author's model for assessing the impact of foreign direct investment on the economy of the recipient country, taking into account Spillover effects (in our case, the Russian Federation):

$$\ln GDPpc = b_0 + b_1\ln DID_{it} + b_2\ln QIE_{it} + b_3InU_{it} + b_4\ln PS_{it} + b_5\ln HC_{it} + b_6IL_{it} + b_7EEFP_{it} + b_8EDI_{it} + b_9PI_{it} + b_{10}FDI_{it} + b_{11}\ln SE_{it} + b_{12}\ln QMP + b_{13}\ln PF + \varepsilon_{it,} \quad (26)$$

where, lnGDPpc – logarithm of the change in GDP per capita in the Russian Federation; b_0 -constant; ε -residues; $b_{1, 2, \ldots, 13}$ - regression coefficients; i – country of the study (in our case, the Russian Federation; t – time period of the study; lnDID – the degree of infrastructure development (the logarithm of the number of phone users in the country per 100 people); lnQIE – logarithm of the quality of the institutional environment; InU – urbanization (the logarithm of the share of urban population in the total population of the country); lnPS – logarithm of the index of political stability; lnHC – logarithm of the number of years spent on education by people over 16 years old; IL – share of domestic investment in total investment in the country (%); EEFP – export growth of enterprises with foreign capital (%); EDI – indicator of economic development (%), growth rate of real GDP denominated in US dollars; PI – increase in public investment in total investment in the country (%); FDI – increase in foreign investment in total investment in the country(%); lnSE logarithm of the sum of the side effects of attracting FDI in the country's economy; lnQMP – logarithm

of the quality of monetary policy in the country; lnPF – logarithm of price factors.

We note that the proposed model requires verification in the framework of empirical analysis and elimination of the main correlated factors of the host economy of Russia that are affected by the attracted FDI.

3.5. Identification of the Impact of Spillover Effects from Attracting FDI in the Russian Economy

In addition to identifying the main factors influencing the influx of FDI in Russia, we consider it appropriate to carry out the same identification regarding the impact of Spillover effects from attracting FDI in the economic system of the Russian Federation (table 3).

Table 3. Checking the significance of the Spillover effects of attracting FDI in the Russian economy

Factor	r_{calc}	α	f	R_{crit}	Ratio R_{calc} and r_{crit}	R^2
DID	0.563	0.05	7	0.666	<	0.317
QIE	0.822	0.05	7	0.666	>	0.676
U	0.614	0.05	7	0.666	<	0.377
PS	0.845	0.05	7	0.666	>	0.714
HC	0.304	0.05	7	0.666	<	0.092
IL	0.770	0.05	7	0.666	>	0.593
EEFP	0.443	0.05	7	0.666	<	0.196
EDI	0.937	0.05	7	0.666	>	0.878
PI	0.799	0.05	7	0.666	>	0.638
FDI	0.803	0.05	7	0.666	>	0.645
lnSE	0.908	0.05	7	0.666	>	0.824
QMP	0.886	0.05	7	0.666	>	0.785
PF	0.537	0.05	7	0.666	<	0.288

Source: developed by the author.

Based on the studies in table 3, we can make the following selection of factors influencing the Spillover effects of attracting FDI in the Russian economy:

1. The degree of infrastructure development (DID) does not apply to the main indicators (factors) of influence, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is noticeable; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of the resulting indicator on the factor (two of the three verification methods did not attribute the factor to the main influence factors).

2. The quality of the institutional environment (QIE) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{crit}$; the value of the determination coefficient indicates the average dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

3. Urbanization (U) does not belong to the primary influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is noticeable; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of the resulting indicator on the factor (two of the three verification methods did not attribute the factor to the main influence factors).

4. The Political Stability Index (PSI) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates the average dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

5. The number of years spent on education by people over 16 years old (HC) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is weak; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of the resulting indicator on the factor (three of the three verification methods did not attribute the factor to the main influence factors).

6. The share of domestic investment in the total volume of investments in a country (IL) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates the average dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

7. The increase in exports of enterprises with foreign capital (EEFP) does not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is weak; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of the resulting indicator on the factor (three of the three verification methods did not attribute the factor to the main factors of influence).

8. The Economic Development Index (EDI) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates a high dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

9. The increase in public investment in total investment in the country (PI) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates the average dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

10. The increase in foreign direct investment in total investment in the country (FDI) refers to the main influence indicators, because: the value of the correlation coefficient,

according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates the average dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

11. The logarithm of the sum of Spillover effects of attracting FDI in the country's economy (lnSE) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is very strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates a high dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

12. The quality of monetary policy in the country (QMP) refers to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is strong; $r_{calc} \geqslant r_{cri}$; the value of the determination coefficient indicates a high dependence of the resulting indicator on the factor (three of the three verification methods attributed the factor to the main influence factors).

13. Price factors (PF) do not belong to the main influence indicators, because: the value of the correlation coefficient, according to the Chaddock scale, indicates that it is noticeable; $r_{calc} < r_{crit}$; the value of the determination coefficient indicates a low dependence of the resulting indicator on the factor (two of the three verification methods did not attribute the factor to the main influence factors.

Thus, checking the significance of the factors influencing FDI on the Russian economic system, including Spillover effects (table 3), allows us to identify eight main factors that will be included in the final model (equation 27):

$$\ln GDPpc = b_0 + b_1 \ln QIE_{it} + b_2 \ln PS_{it} + b_3 IL_{it} + b_4 EDI_{it} + b_5 PI_{it} + b_6 FDI_{it} + b_7 \ln SE_{it} + b_8 \ln QMP, \quad (27)$$

where, lnGDPpc – is the logarithm of the change in GDP per capita in the Russian Federation; b_0 – is constant; ε - residues; $b_{1, 2, \ldots, 8}$ - regression coefficients; i – country of the study (in our case, the Russian Federation); t – time period of the study; lnQIE – logarithm of the quality of the institutional environment; lnPS – logarithm of the index of political stability; IL – share of domestic investment in total investment in the country (%); EDI- indicator of economic development (%), growth rate of real GDP denominated in US dollars; PI – increase in public investment in total investment in the country (%); FDI – increase in foreign investment in total investment in the country (%); lnSE logarithm of the sum of the Spillover effects of attracting FDI in the country's economy; lnQMP – logarithm of the quality of the monetary policy in the country.

Summing up the empirical analysis, we note that in the framework of economic and mathematical modeling, one can see the trend of the FDI influence on predominantly economic factors of the economic system of the Russian Federation, as well as the importance of Spillover effects from attracting FDI to the Russian economy.

4. Discussion

Long-term stable development of the economy of the Russian Federation is not possible without attracting FDI and assessing their impact on the country's economic system, taking into account Spillover effects, which requires study, as well as the identification of factors influencing the influx of FDI and their Spillover effects. At the same time, there is a long-term downward trend in FDI inflows into Russia, which requires detailed studies of the causes of this situation and the identification of factors whose influence will allow a negative trend to change to a positive one. Separately, there is a not very clear understanding of the FDI impact on the Russian socio-economic system. At the same time, despite the tremendous scientific interest in the problems voiced by foreign and Russian scientists, the processes associated with attracting FDI in the Russian economy and their impact on the economic system of the Russian Federation, taking into account Spillover effects, require further research and verification of a number of hypotheses.

The hypothesis that FDI plays a significant role in the Russian economy, while dynamically increasing its absolute and relative values, is refuted during the study. The current state of attracting FDI and their impact on the economic system of the Russian Federation is characterized by significant problems, which has led to a decrease in their role for the country's economy and the effect of their attraction. The above situation requires the identification of factors influencing the attraction of FDI in the Russian economy, as well as determining the Spillover effects of such attraction.

The study shows that there is sufficient opportunity to identify factors influencing the influx of FDI in Russia based on economic and mathematical modelling. At the same time, based on a statistical assessment, nine main influence factors of FDI from seventeen indicators on the Russian economic system are identified. Also, based on a synthesis of foreign and local experience regarding the development of economic and mathematical models for assessing the attraction of FDI in developing countries, including the Russian Federation, a basic model of such an assessment is formed, which, after checking the significance of the influence of the factors making up the model on the resulting indicator, is adjusted towards reduction of such factors (nine out of seventeen initially identified factors). The study confirms the hypothesis that there is a sufficient opportunity to identify the influence of Spillover effects from attracting FDI in the Russian economy based on economic and mathematical modeling based on a study of the development of Russian and foreign scientists, a model for assessing the impact of foreign direct investment on the economic system of the Russian Federation, including thirteen factors and the Spillover effects is formed. At the same time, relying on a statistical assessment, eight main factors from thirteen indicators affecting Spillover effects in the Russian economic system have been identified, which allowed us to form the final economic and mathematical model of such an influence.

Given the above, we can note that the goal of the study, set at the beginning of the work, is achieved. The key value of the article is the identified combination of the main factors influencing the influx of FDI into Russia, as well as the combination of the main Spillover effects of attracting FDI in the country's economy. In this regard, it is possible to highlight certain limitations in the application of the results of this article, namely: the identified factors and Spillover effects require verification in the framework of economic and mathematical modeling and practice. At the same time, the formulated limitations do not reduce the scientific and practical value of this article and characterize to a greater extent, the prospects for further scientific research.

5. Conclusions

FDI plays a vital role in the development of the economies of developing countries, which requires their study in all possible angles, where special attention is paid to the problems of attracting FDI and assessing the Spillover effects of their attraction to the national economy. Given the current development of the Russian economy, we note that it is the solution to the problems of attracting FDI that will provide a significant impetus to the long-term development of the Russian economic system, as well as increase its competitiveness in the global markets for the sale of products (works, services).

The identified sets of key factors will help clearly to build a policy of attracting FDI in the Russian economy, as well as to emphasize its development. The formed model for assessing the attraction of FDI in the Russian Federation will allow us to model the influence of public and private institutions on the flow of such investments into the Russian economic system. The formed model for assessing the impact of FDI on the Russian economy, as well as the identified factors of such influence, will allow more accurately calculate the socio-economic effects for the state and its individual entities, including legal entities and households. The proven importance of assessing the Spillover effects of attracting FDI in Russia will allow them to be taken into account when developing a state policy for attracting and using FDI.

The practical implementation of the proposals and conclusions of this article should be considered in the context of their importance for improving the efficiency of functioning and increasing the competitiveness of the economic system of the Russian Federation. Separately, we note additional opportunities for the development of appropriate state and municipal strategies, as well as programs regarding the attraction and use of FDI, taking into account the Spillover effects.

Prospects for further research based on and using the scientific results of the study are to build adequate economic and mathematical models: development of the country's economy, taking into account the attraction of FDI; assessing the impact of FDI on the development of the state economic system, taking into account the Spillover effects of their attraction.

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