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THE IMPACT OF THE DYNAMICS OF THE RUBLE EXCHANGE RATE ON THE INFLOW OF FOREIGN INVESTMENTS INTO THE RUSSIAN ECONOMY AND THE CONDITIONS OF SANCTIONS

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INTRODUCTION

The statistics on foreign direct investment (FDI) for 2017 published in early April by the Central Bank of Russia shows a change in the dynamics of an increase in FDI inflows to the Russian Federation that was outlined in 2016 and in the first three quarters of 2017. The slowdown in capital inflows in 4Q 2017 reflected the deteriorating sentiment of foreign investors associated with negative expectations of new US sanctions, as well as a drop in demand for Russian government bonds.

Positive investor sentiment was reflected by the positive dynamics of FDI flows in the first three quarters of 2017, when the level of incoming FDI amounted to USD 24.8 billion, which is more than 2 times compared to the same period in 2016. The increase in inflows over this period is due to transactions such as the sale of a 10% stake in the Russian petrochemical holding Sibur to the Chinese Silk Road Fund [1], the launch of the construction of a Mercedes-Benz automobile plant by the German company Daimler in the Esipovo industrial park, which became the first largest project after the introduction of anti-Russian sanctions by the Western company in Russia [2].

Existing assessments of the impact of sanctions on key macroeconomic indicators provide a rough understanding of their significance for foreign investors. Under the new conditions, foreign investors developed their own approaches to respond to the sanctions regime, depending on their sectoral specialization and the degree of orientation towards the Russian and/or foreign markets. Nevertheless, according to the results of 2017, the volume of foreign direct investment (FDI) attracted to Russia from the EU countries exceeded USD 14 billion (which is more than 6 times the level of 2016). Consequently, a high potential for investment cooperation remains between Russia and the EU countries, despite the sanctions regime.

Relevance of the study: portfolio and foreign direct investment are an important source of capital that complements domestic private investment and is often associated with creating new jobs, stimulating technological exchange and encouraging overall economic growth in host countries. Important factors in FDI inflows are the level of the exchange rate and its volatility. The need for an empirical analysis of the impact of the exchange rate on FDI inflows to Russia is caused by the currency crisis of 2014-2015, when the Russian ruble devalued due to the fall in world oil prices, as well as a number of foreign policy events.

The purpose of this study is to assess the impact of the level of the exchange rate and its trend on the inflow of direct and portfolio foreign investment in the Russian Federation. In accordance with the goal, the following tasks will be solved:

– Review of the theoretical and empirical literature on the role of the exchange rate in the inflow of foreign investment;

– Analysis of foreign direct investment flows in Russia and in the world;

– Building models that take into account the impact of the exchange rate of the national currency of Russia on the inflow of foreign direct investment in the sectors of the Russian economy;

– Evaluation of econometric models to study the influence of the exchange rate on the inflow of foreign direct investment to the countries of the world in order to test the hypotheses put forward in the work;

– Interpretation of the results and development of recommendations for the Russian foreign economic policy, taking into account the results of the study.

The initial data of the work were statistical databases, both international and Russian, in particular, open statistical data provided by the Central Bank of the Russian Federation, the Federal State Statistics Service, the Eurasian Economic Commission, regulatory and program documents regulating the activities of the regions of the Russian Federation with a special (special legal) regime for the implementation of entrepreneurial and other activities, as well as cases of the largest and most successful investment projects implemented on the territory of individual constituent entities of the Russian Federation.

1 Theoretical approaches to identifying foreign investment and assessing the impact of the exchange rate on their inflow of foreign investment

1.1 Overview of theoretical approaches to the definition of foreign investment

1.1.1 Literature review on FDI-exchange rate models

If the purchasing power parity (PPP) ratio remains constant, then there can be no relationship between FDI and exchange rates, as the change in the exchange rate compensates for the difference in relative inflation, while maintaining a constant return measured in local currency. The introduction of an exchange rate change variable in the FDI model indicates that there may be deviations in the PPP ratio in the long run. The level of the exchange rate can influence the decision on the localization and volume of production, as well as on domestic transfers of intermediate goods [3], [4]. The introduction of an exchange rate variable in the FDI model reflects the idea that short-term PPP adjustments or deviations can affect FDI. Such deviations in the PPP ratio may change the relative advantages of different buyers, or signal future PPP adjustments. Expected changes in the exchange rate may affect various aspects of investment decisions, including the timing of decisions [5] and debt denomination [4]. Therefore, modeling the relationship between FDI and exchange rates reflects some belief about the effects of short-term or long-term PPP deviations on cross-border investment.

The work of the American economist David Cushman [4] considers a two-period model in which a firm maximizes a certain equivalent of future profits expressed in national currency. It considers four cases:

1. the company manufactures and sells products abroad using foreign capital investments;
2. the firm manufactures and sells abroad using national capital investments;
3. the firm produces and sells in its own country, using foreign capital investments;
4. The firm produces in its own country exclusively for sale abroad.

This model includes conditions for both the real level of the exchange rate and the expected changes in the exchange rate based on the company's subjective estimates. In the first case, the comparative statics of David Cushman's model shows that the impact of changes in exchange rate levels or expectations of their impact on FDI depends on the income and cost structure of the investor. For example, in the first case, real appreciation of the foreign exchange rate is identified with a low level of foreign investment, but in the second case, it is identified with a high level of foreign investment, where the low cost of foreign investment reduces the marginal cost of foreign labor and capital. The impact of higher expected real exchange rate changes on FDI is high in 1-3 cases, and mixed in the 4th case. This model indicates that tests for the relationship between FDI and exchange rates can be vague and ambiguous.

More recent research by University of Massachusetts professors Kenneth Fruit and Jeremy Stein [6] examines the capital market imperfection model in American auctions, where companies are sold to the highest bidder. The returns from these acquisitions are random and depend on the entrepreneurial ability of the buyer. Investors offer the net present value (NPV) of expected returns if their wealth allows it. If the investor does not have the necessary financial resources, then he must borrow part of the amount. The imperfection of capital markets lies in the fact that lenders cannot know the real performance of the firm. As a result, lenders bear monitoring costs and cannot lend the full value of the asset. Thus, investors always bid less than the expected NPV. Any opportunity that allows an investor to increase leverage or increase their wealth allows them to raise rates up to the expected NPV. If a foreign investor's wealth is primarily denominated in their home currency, then a fall in the value of the US dollar will boost the value of the converted dollar by their wealth (wealth), allowing them to raise rates to the level of their expected NPV. For investors with limited solvency, the devaluation of the dollar should be associated with an increase in the ratio of foreign investment to domestic investment and greater benefits from cross-border acquisitions.

The study [7] uses a detailed, specific set of data on US targeted foreign acquisition transactions to systematically explore the relationship between the value of the dollar, flows of cross-border acquisitions, and the benefits derived from it. The results confirm preliminary evidence that the depreciation of the US dollar is associated with high levels of foreign acquisitions. and the benefits derived from them. However, the findings go beyond these conclusions and provide a deeper understanding of the nature of the exchange rate relationship. These new results provide a first step towards distinguishing between different FDI models.

After carrying out appropriate tests, taking into account the total volume of investments and relative corporate wealth, it was found that the volume of foreign investment to domestic investment does not have a consistent statistically significant relationship with the exchange rate. This result is inconsistent with the Froot and Stein model [6], which focuses on the asymmetry between domestic and foreign investors. The next step of this study was to identify the dependence of the benefits received by national companies on the exchange rate in the case of a transition from absolute to relative prices.

The results show that there is indeed a relationship between the exchange rate and the absolute volume of FDI, and a change in the lag by 3-4 quarters indicates that long-term and short-term deviations in purchasing power parity affect foreign investment. These findings are consistent with David Cushman's model [4], which explicitly includes exchange rate levels and changes. Acquisition gains have a statistically significant correlation with the exchange rate only if a short-term change in purchasing power parity has no effect on pricing. This result is

inconsistent with models that suggest that investors are quick to take advantage of short-term changes in purchasing power parity.

The key difference between the current test by Kathryn L. Dewenter (1995) and earlier tests by other researchers is the inclusion of a proxy for relative corporate wealth. This variable clearly affects the results. Given this proxy variable, relative FDI flows do not show exchange rate elasticity, and acquisition gains show significantly higher exchange rate elasticity. These findings suggest that corporate welfare plays an important role. Thus, in order to adequately test the Froot and Stein (1991) model, better measures of well-being are needed.

Thus, overall investment flows do not have a statistically significant correlation with the bilateral exchange rate, but there is one between the exchange rate and the gains from acquisitions. There are different exchange rate elasticities in the target industry in the data stream, but they are not present in the acquisition benefit data. Tests performed show that specific industries benefit from perfect exchange rates and welfare proxies. A closer examination of the implications of any model is possible with the use of accurate proxies and the availability of extensive data on the nature of investments. The most accurate results of models of the relationship between FDI and exchange rates can be achieved by taking into account country and sectoral characteristics.

1.1.2 Expected exchange rates and FDI flows

Investor expectations about exchange rates are a constant presence in international finance. However, the formation and updating of exchange rates remains an open question. This issue has been addressed in several survey-based studies ([8], [9], [10], [11]). Frankel and Fruit used data from surveys of central bankers, private bankers, corporate treasurers, and economists and found evidence that the expected future spot rate is inelastic relative to the current one. This means that in the event of exchange rate shocks, economic agents do not update their expectations about future exchange rate levels at the current level (as the random walk hypothesis implies), assuming an element of expected average exchange rate revaluation. Takagi [12] argues that the survey data indicate a trend in long-term expectations towards an attempt to reverse the exchange rate in the short term. That is, devaluation at the moment, as a rule, is accompanied by expectations of further devaluation in the short term and expectations of revaluation in the long term.

Empirical work on exchange rate expectations, apart from survey-based work, is extremely difficult to find. However, as noted by Frankel and Fruit [8], watching what people do and say in the market is the cornerstone of positive economics and allows you to learn more. In this study, based on the analysis of FDI data, an assumption is made about long-term expectations of the exchange rate. FDI data is particularly suitable for studying the long-term exchange rate

expectations of economic agents, since FDI involved in projects tend to have long time horizons, are not liquid, and the repatriation of profits from these projects depends on the exchange rate. Previous studies did not consider FDI data to examine exchange rate expectations.

The main idea of this study is the following: if economic agents believe that the expected average exchange rate revaluation in the long term will occur after exchange rate shocks, then this will have a significant impact on FDI. For example, if economic agents believe that after a large devaluation of a foreign currency, a gradual average change in this rate will follow over the entire life cycle of an invested project, this means that a cheap currency is a temporary phenomenon. This study assumes that accepting the above conditions will contribute to a positive inflow of FDI into the country, since cheap assets are temporary and can generate more income in the long run. If an average exchange rate revaluation is expected (i.e., an appreciation of the national currency against the currencies of other countries), then the repatriated profit will be worth more in the investor's national currency in the future. This scenario is in stark contrast to the exchange rate random walk hypothesis, which implies that expected future returns from foreign assets will be valued by the investor at the current exchange rate. Thus, under the random walk hypothesis, changes in the exchange rate should not affect FDI flows.

None of the existing research on exchange rate expectations based on survey data addresses the difference between the impact of large and small shocks on exchange rates. However, Takagi's study [12] mentions that the trend of the expected average exchange rate revaluation becomes noticeable during periods of sharp changes in the exchange rate. More recent literature from other areas of economics suggests that large and small shocks in various variables differ significantly in both their origin and effects [13]. Therefore, this study argues that economic agents may respond differently to small shocks, as opposed to large shocks, given their expectations about the future level of the exchange rate. With a high degree of probability, economic agents will consider large changes in the exchange rate as a significant component of excessive deviation from the set value. Therefore, expectations of an average revaluation would be especially noticeable after sharp and large changes in the exchange rate, rather than changes with a smooth trend.

Thus, if a sharp and large devaluation is followed by a gradual expected appreciation of the national currency in the country of investment, which in turn will benefit foreign investors, then there will be an expected increase in FDI flows to this country. For the same reason, a sudden large appreciation of a country's currency is likely to reduce FDI inflows. Using panel data on FDI flows from the United States to selected OECD countries, it was found There is already a statistically significant relationship between exchange rate changes and FDI flows.

The paper then considers alternative literature on the relationship between exchange rate movements and FDI flows, which is also related to this industry. There is no consensus in this area on the impact of exchange rate changes on FDI flows, both in theory and in empirical results. This study makes its own contribution to this discussion by providing a new link through the expected revaluation of the exchange rate.

Thus, this study contributes to two separate areas of the economic literature. First, to the literature that studies exchange rate expectations using data based on actual investor behavior rather than surveys. Second, the literature linking exchange rate changes and FDI flows to a new explanation based on expected revaluation.

This study does not attempt to provide a comprehensive model of FDI. It is known from a large number of studies that FDI is influenced by a very large number of factors, including the specifics of a particular firm and problems at the country level. This study is limited to looking at the relationship between exchange rate movements and FDI flows.

The following section provides a brief overview of the literature linking FDI flows to exchange rate movements. Next, using a simple model, an explanation is given of why and how exchange rate expectations may affect FDI flows and some conclusions are drawn from the results.

1.1.3 Exchange rates and FDI

Significant work has been done in the field of studying exchange rates and FDI flows. A detailed review of significant international studies on this topic is presented in Blonigen [14]. The traditional understanding of this issue is presented in a study by McCulloch [15] and is summarized as follows: “Changes in the exchange rate should not have a significant impact on FDI flows, since if a foreign investor acquires his profits in the national currency, the low exchange rate will not affect the current present value of the investment.” Thus, this approach assumes the presence of "random walks" for the exchange rate and implies that the exchange rate in the future should be considered as the current one. This, in turn, implies an impeccable elasticity of expectations of the future exchange rate relative to the current one, which strongly contradicts the survey data presented in the work of Frankel and Froot [9].

However, on the other hand, "common sense" suggests that foreign investors are more likely to acquire a country's assets when that country's currency is devalued and weak. There are few arguments to refute this assertion. Fruit and Stein provide an explanation in terms of monitoring costs, while Blonigen provides specific characteristics of a firm's assets. It is likely that both arguments are correct. However, a third and relatively simpler alternative explanation for this phenomenon can be found in inelastic exchange rate expectations, when the current exchange rate is perceived to be weaker than expected. At least the future expectation approach

has never been discussed in the literature, arguing that the random walk hypothesis was the dominant paradigm in the field.

The random walk hypothesis cannot be considered completely unfounded. Obstfeld and Rogof [16] indicate that the random walk model of the exchange rate forecast is applied to all macroeconomic models, at least for short-term forecasts up to 1 year. This is an indicator of the level of efficiency in the foreign exchange market. On the other hand, the study by Obstfeld and Rogoff also notes that the random walk model is overcome by structural macroeconomic models on longer (two-, three-year) horizons. This comparative failure of the random walk model over longer horizons is important in FDI decisions and may well explain the research based on the Frankel and Froot surveys [8].

General issues of the impact of exchange rate volatility on FDI flows is a fairly well-studied area. A number of papers have argued that exchange rate volatility is likely to reduce FDI flows, as there is a factor of risk aversion among foreign investors. Dixit's study [17], using option-theoretic arguments, also showed that exchange rate volatility contributes to freezing the decisions of investors with neutral risks.

Thus, the empirical evidence for the relationship between devaluation and FDI flows is mixed. A number of studies have found a positive correlation between the devaluation of the US dollar and an increase in FDI flows to the US. At the same time, in a number of alternative studies, this relationship connection has not been proven.

However, in all these studies, currency devaluation was considered as a factor that stimulates FDI flows. As far as studies on exchange rate volatility are concerned, they are no less confusing. Goldberg and Kolstad's 1995 studies found a positive correlation between exchange rate volatility and FDI flows, while Eisenman's 1992 study refuted this relationship, and Kamp's 1993 study found a negative correlation. In turn, Cushman 1988 finds ambiguous evidence.

Previous studies in this area have not explored differences in the size of exchange rate shocks to FDI flows. However, in different sectors of the economy, it was noted that the impact of large shocks can differ significantly from the effects of small shocks. Therefore, the idea that investors' reactions to large exchange rate shocks differ from small ones requires careful consideration.

Therefore, assuming that investors are hoping for an inelastic expected future rate, an average devaluation can lead to different expectations depending on the size and speed of the devaluation. If investors believe that there is an artificially high component to a sharp devaluation, then such a devaluation will result in less change in the expected level of the long-term exchange rate than a gradual devaluation trend over a period. Therefore, when examining the impact of exchange rate changes on FDI flows, it is necessary to take into account not only

the overall devaluation over a given period, but also the relative size of the shocks over that period.

In addition, small changes in the exchange rate may be viewed by investors as offsetting the difference in inflation (and maintaining purchasing power parity) rather than changes in the real exchange rate. Therefore, these small fluctuations should not have a major impact on FDI flows. On the other hand, large fluctuations in the exchange rate may indicate deviations in the PPP ratio and create prerequisites for revaluation in the medium and long term. The expected average revaluation of the PPP ratio in the long term can be justified in the medium term of 3 to 5 years, given the existing empirical evidence in the PPP literature.

One characteristic difference between large and small exchange rate shocks is the asymmetry in the distribution of exchange rate devaluations. This approach was applied in the 1995 study by Ball and Mankiw [13], in which the authors used skewness to study the differential impact of large and small shocks on firms' price regulation. Similarly, the skewness in the distribution of exchange rate devaluations reflects the presence of a small number of large movements in either direction. For example, if the national currency was subject to an abnormally large devaluation during a certain period, this would manifest itself in the asymmetry in the distribution of devaluations during this period.

Here it is worth noting one more point - the kurtosis of devaluation, which reflects the presence of relatively large shocks. However, there is a significant difference between the different types of changes identified by kurtosis and asymmetry. The main difference depends on the problem of symmetry. A weighted tail of the distribution in econometric calculations means that there are large shocks, but they balance each other in both directions. On the other hand, high skewness indicates the presence of several relatively large changes in one direction. If large shocks have a disproportionate impact on expectations, as suggested in this study, a skewed distribution of devaluations will lead to expectations of a medium reversal and therefore affect FDI flows. However, in a distribution with a less than normal kurtosis (a flat-topped distribution), the presence of large shocks in opposite directions cancel each other out with no net effect on future exchange rate expectations and therefore no effect on FDI flows. In other words, high skewness can lead to expectations of a future mean reversal, but a tail-weighted distribution does not.

One way to identify the relationship between exchange rate asymmetries and FDI flows is to empirically examine the hypothesis that large exchange rate shocks generate an expected average revaluation. If the data show that FDI flows are highly dependent on exchange rate asymmetries, then this would be consistent with the hypothesis.

The paper then presents a simple model developed to demonstrate the possible impact of expected exchange rate values on FDI flows.

In this model, the possibility of investing an American company in the United Kingdom is considered. Assume that the model considers a freely scalable project where e, depending on the scale, its return decreases. In addition, for the sake of simplicity of the experiment, we will assume that the investment return is expressed in a single payment at a certain point in time (in the future). Finally, it is assumed that the management of the company is willing to speculate on behalf of the shareholders in order to maximize their profits.

Then the expected net profit of the American firm from the transaction can be expressed as follows:

$$\pi = N\left[\frac{R(N)\hat{e}_1}{(1+r)} - C(N)e_0\right](1)$$

Where:

N is a measure of the scale of the project,

R is income in British pounds arising at a future point in time,

C - project cost in British pounds

e_0 - exchange rate (US dollars ↔ British pound) at the time of investment,

ê_1 - expected exchange rate at the time of profit (in the future)

r is the opportunity cost of capital over the entire life cycle of the project.

The assumption of decreasing investment returns to scale is taken into account, R^' (N)<C^' (N). The firm then maximizes the value of π by choosing the appropriate value of N.

Given this setting, there is an expected maximizing dollar profit N that solves this problem. This optimal level N,N^* is a function of the opportunity cost of capital and the expected level of devaluation, d̂=log e_0⁄ê_1 so that:

$$N^* = N^*(r, \hat{d}); \qquad \frac{\partial N^*}{\partial r} < 0 \qquad \text{и} \qquad \frac{\partial N^*}{\partial \hat{d}} < 0\ (2)$$

This simple model demonstrates the relationship between the expected revaluation of the host country's currency and the increase in FDI flows to that country.

The inelasticity of expected future exchange rates, presented in Frankel & Froot (1987) (see [8]), implies that economic agents do not revise their expectations of the future performance of the exchange rate before the moment of its full formation. Analytically it looks like this:

$$\frac{d\hat{e}_1}{de_0} = \gamma < 1(3)$$

In addition, if we believe that future exchange rate inelasticity only occurs in the event of large shocks, then:

$$\frac{d\gamma}{\boldsymbol{de_0}} < 0 \ (4)$$

Equation (3) and (4) together imply:

$$\frac{dN^*}{de_0} < 0 \ (5)$$

In other words, the appreciation of the British pound raises expectations about the future level of e by less than the current appreciation, which creates speculation about future devaluation and reduces FDI inflows to the UK. The reverse situation occurs in the case of devaluation.

In addition, the provision for exchange rate inelasticity, which is the case in the case of large shocks, the equation suggests the following:

$$\frac{d^2N^*}{de_0^2} < 0 \ (6)$$

or a significant appreciation of the British pound will lead to a proportional decrease in FDI inflows and vice versa.

The above model suggests that it is necessary to find statistical evidence of a negative relationship between an appreciation in the exchange rate and FDI inflows. Moreover, relatively large exchange rate shocks should have a more than proportional effect on FDI flows. One way to identify the presence of these relatively large exchange rate shocks is to use the skewness in the distribution of exchange rate movements as a measure. The model would then be able to indicate that a positively skewed exchange rate distribution would lead to a significant reduction in FDI inflows. The following paragraph presents data in the context of these consequences.

Economic theories that address exchange rate expectations are critical but difficult to test empirically. Evidence based on survey data in Frankel and Fruit 1987 [9] and Tagaki 1991 [12] suggests that investors are pegged to the exchange rate. Thus, in this study, FDI data were examined to find indirect evidence on the formation of exchange rate expectations by international investors.

We use several methods to estimate panel data related to exchange rate movements and FDI flows from the US to 20 countries over the years (1980-1994 period under review). Contrary to our expectations, we find that the annual average devaluation does not have a sustainable positive impact on FDI flows. The volatility results are also not sustainable, although they are consistent with previous studies in which higher exchange rate volatility reduces FDI flows. However, the asymmetry of devaluations has a sustained positive impact on FDI inflows. Under the hypothesis put forward, the findings are seen as evidence that although investors adjust to

small changes in exchange rates, they treat relatively large shocks differently when shaping their expectations of future exchange rates. The finding lends credence to the idea that investors see big shocks as an artificially high component that shapes expectations of future moves in the opposite direction.

This adjustment in large shock expectations is consistent with exchange rate inelasticity or pegging described in the 1987 study by Frankel and Froot [9]. Taking into account the famous Dornbusch model of "exchange rate overshoot" [18], as well as the results of Engel and Hamilton (1990) [19], who examined the actual exchange rate data and rejected the random walk hypothesis in favor of the "long fluctuations" model for exchange rates , investors are unlikely to be irrational and remain pegged to the course.

The results obtained are of particular interest because they are derived from data from developed countries. There are several reasons to believe that these results may be even more pronounced in developing countries. Developing countries often lack direct markets or are underdeveloped. In addition, FDI flows to developing countries are mainly motivated by cost minimization and are likely to be more elastic to changes in exchange rates than FDI flows to developed countries. However, unfortunately, it is difficult to apply the considered model in the context of developing countries due to limited data.

2 Empirical analysis of the impact of the exchange rate on foreign investment

2.1 Overview of empirical research

2.1.1 Investor expectations and investments

The process of making an investment decision by a foreign investor can be described in terms of the procedure for organizing a financial call option. This follows from the fact that foreign direct investment (FDI) is generally a non-repayable investment. A call option gives its holder the right to pay a set price and receive an asset that has a certain price expression.

The fulfillment of the assumed obligations under the option is irreversible, since the option is irrevocable. An option, like an asset, can be sold to another investor. However, it is impossible to recover the money spent for its execution.

The firm has the right to spend funds now or in the future in exchange for the asset. This asset can be sold again to another company, however, in this case, the investment is non-refundable. At the same time, the future value of the asset received upon investment is uncertain.

The model of real options is used to study the behavior of an investor in the conditions of non-returnable investments. The model is used to see how non-return on investment creates the opportunity cost of investing in the face of an uncertain future value of an asset. The model also calculates the opportunity cost of the project when making an investment decision. To do this, the model considers two periods - present and future (usually next year) and assumes that the firm is risk neutral.

As an example, we will consider a firm that decides to invest in a production project, in which the investment is completely non-refundable. At the same time, if the project is an unclaimed market, then the company does not recover its costs. Conventionally, the cost of the project is I, and operating costs are 0. At the same time, the market value of products manufactured under the project is 200 c.u. However, with probability q, the price of products will rise to 300 USD, and with probability (1-q), the cost will fall to 100. In the future, the cost will be fixed at this already level.

As an example, let's take a discount rate of 10%, I=1600, q=0.5. Suppose the firm is investing in the current period. After calculating the net present value of the project, we get the following:

$$NPV = -1600 + \sum_{t=0}^{\infty} \frac{200}{(1.1)^t} = -1600 + 2200 = 600 \qquad (7)$$

Provided that the NPV of the project is positive, the company makes a positive investment decision.

If the firm decides to wait with the investment decision, then the next year the firm will invest only if the price rises to 300 USD. NPV in the second case will be 773 USD, which is higher than NPV in the base period. Thus, the investor should wait one year rather than investing right away. However, in the event of a price fall, it was not profitable for the firm to start its investment.

$$NPV = (0.5)\left[\frac{-1600}{1.1} + \sum_{t=1}^{\infty}\frac{300}{(1.1)^t}\right] = \frac{850}{1.1} = 773 \quad (8)$$

As a rule, in most cases, companies prefer to wait before making an investment decision. The value of an investment over different time periods can be calculated as the difference between two different NPV values. In this example, this is the difference between 773 c.u. and 600 USD, which is 173 USD. Thus, the firm may be willing to pay $173. more for the opportunity to implement investment decisions in future periods.

In the cases discussed, the investor's investment opportunity can be viewed as analogous to a call option on common stock, which gives the firm the right to meet the investment cost (strike price of the option).

2.1.1.1 Using the theory of real options to analyze the impact of the exchange rate on the inflow of foreign direct investment

In the framework of this study, it will be useful to highlight several premises used in the theory of real options. First, foreign direct investment is partially non-refundable, since a certain part of the investor's expenses cannot be returned. The sunk costs of a foreign company include: the purchase of a license to carry out activities, the registration of a company, marketing research, hiring personnel, legal costs, etc.

Secondly, as a rule, investment decisions on the direction of direct investment abroad are made in a situation of uncertainty. The main source of uncertainty, first of all, is the future expected value of the exchange rate. Thirdly, a company investing abroad can take advantage of the time lag and make an investment decision in the future, when more information about the market situation becomes available.

At the same time, the considered standard form of the reduced profit equation seems to be possible to interpret from the point of view of the theory of real options. In this case, the strike price of the option is the sunk loss associated with the investment; option exercise income is the expected discounted future cash flows; The cost of a call option is the cost of putting off an investment and making it in the future.

As shown in this study, companies that make direct investments abroad are usually divided into firms focused on the domestic market of the host country of investment, and firms focused on exporting their products from this country - that is, according to the motives that underlie the logic of accepting investment solutions.

In the case of market orientation, it is assumed that the firm undertakes FDI in order to sell products in the domestic market of the host country. As a rule, these are investments in non-tradable goods or tradable goods, which, due to costs and barriers, are not in demand in the markets of third countries. In the case of export-oriented firms, FDI involves the production of tradable goods, which are mostly exported from the host country. Thus, having different motives for investing in terms of market expectations, companies react differently to changes in the exchange rate, which determines their cost function. In this regard, it is necessary to represent the exchange rate equation, R, in units of domestic currency for foreign currency in the form:

$$\frac{dR}{R} = \mu \cdot dt + \sigma \cdot dz \quad (9),$$

Where

μ is the growth rate of the exchange rate;

σ – exchange rate volatility;

z - Wiener process.

So, firms focused on the domestic market have the following profit equation:

$$\pi_M = (R) = P_f R - W_f R \quad (10),$$

Where

Pf is the foreign market price

Wf is the level of wages in the foreign market

In each time period, the firm is faced with a double choice problem in such a way that:

$$V_0(R) = \max\left\{\xi_M(R) - k, \frac{1}{1+\Delta t\rho} E[V_0(R') \mid R]\right\} \quad (11),$$

Where

V0 is the optimal expected net present value;

k - sunk costs.

$\xi_M(R) = (P_f - W_f)R/(\rho - \mu)$ – the expected net gain from the fact that the firm enters the market;

ρ is the discount rate;

Δt is the time interval;

R is the exchange rate in period t+1;

μ - growth rate of the ruble exchange rate;

$\frac{1}{1+\Delta t\rho} E[V_0(R') \mid R]$ – the value of the wait option.

When solving the choice problem using the Bellman equation, the boundary value for the exchange rate (Rh) that the investor receives is obtained:

$$R_H = \frac{k(\rho-\mu)}{P_f - W_f}\frac{\beta}{\beta-1} \quad (12), \text{ where}$$

$$\beta = \sigma^{-2}\left[-(\mu - 0.5\sigma^2) + \sqrt{(\mu-0.5\sigma^2)^2 + 2\sigma^2\rho}\right] \quad (13)$$

From a content point of view, the value of Rh can be interpreted as follows. Since the profit function in the model is an increasing function of R, there is a point RH at which, if the actual exchange rate is above the boundary rate (R > RH), then the expected net present value minus the sunk cost of entry (k) is greater than the value of the wait option, and thus the optimal solution would be to enter the foreign market in the current time period.

The lower the RH value, the more likely the firm is to enter the market. This condition can be written as:

$$\frac{dR_H}{dk} > 0, \quad \frac{dR_H}{dW_f} > 0, \quad \frac{dR_H}{d\sigma} > 0, \quad \frac{dR_H}{d\mu} < 0 \quad (14)$$

Next, consider the second case for firms that are export-oriented. For these firms, the profit equation is written as follows:

$$\pi_c(R) = P_d - W_f R \quad (15),$$

where

Pd is the price that the investor will receive in the foreign market;

Wf is the wage level in the FDI host country.

The profit equation above shows that a company that is export-oriented from the country of investment benefits from the depreciation of the currency of the host country.

In the same way as in the previous case, the company is faced with the problem of a double choice in each time period:

$$V_0(R) = \max\left\{\xi_c(R) - k, \frac{1}{1+\Delta t\rho} E[V_0(R') \mid R]\right\} \quad (16),$$

where $\xi_c(R) = P_d / \rho - W_f R / (\rho - \mu)$ describes the expected net present value of an export-oriented company when it enters a foreign market. As in the previous case, solving the problem using the Bellman equation, we obtain the boundary value of the exchange rate (RL) for an export-oriented investor:

$$R_L = \left(\frac{P_d}{\rho} - k\right)\frac{(\rho-\mu)a}{W_f(a+1)} \quad (17),$$

where

$$a = \sigma^{-2}\left[(\mu - 0.5\sigma^2) + \sqrt{(\mu - 0.5\sigma^2)^2 + 2\sigma^2\rho}\right] \quad (18).$$

Thus, there is a conditional point RL , for which, if the condition that R< RL is preserved, the company makes foreign investments in the current time period, and the following conditions are also preserved:

$$\frac{dR_L}{dk} < 0, \ \frac{dR_L}{dW_f} < 0, \ \frac{dR_L}{d\sigma} < 0, \ \frac{dR_H}{d\mu} < 0 \quad (19).$$

Let us illustrate these assumptions with examples from practice. First, consider the example of a market-oriented company. Let's say that a foreign food company (D) decides whether to invest in building a yogurt plant in Russia. At the same time, there is a condition that all the company's products will be supplied only to the Russian market due to high trading costs and a specific demand curve, as well as that the foreign company receives all the profit from the company in rubles and repatriates in US dollars.

Suppose that for the company D under consideration, the threshold RH is R1=70 rubles. for 1 dollar, and it corresponds to a profit of p1 = 10 million US dollars (in other words, the firm will invest if the ruble exchange rate is not lower than this value R > R1).

Next, we introduce the following assumptions. Suppose that in the Russian region of presence the cost of the license required for the construction of the enterprise suddenly increases (sunk costs - k). Let the cost of the license be $500,000. Accordingly, the amount of profit decreased to p2 = 9.5 million US dollars at the same level of the exchange rate. To offset the decline in profits, the ruble exchange rate would need to appreciate to R2, which would correspond to a profit of $10 million. This situation can be illustrated using Figure 1.

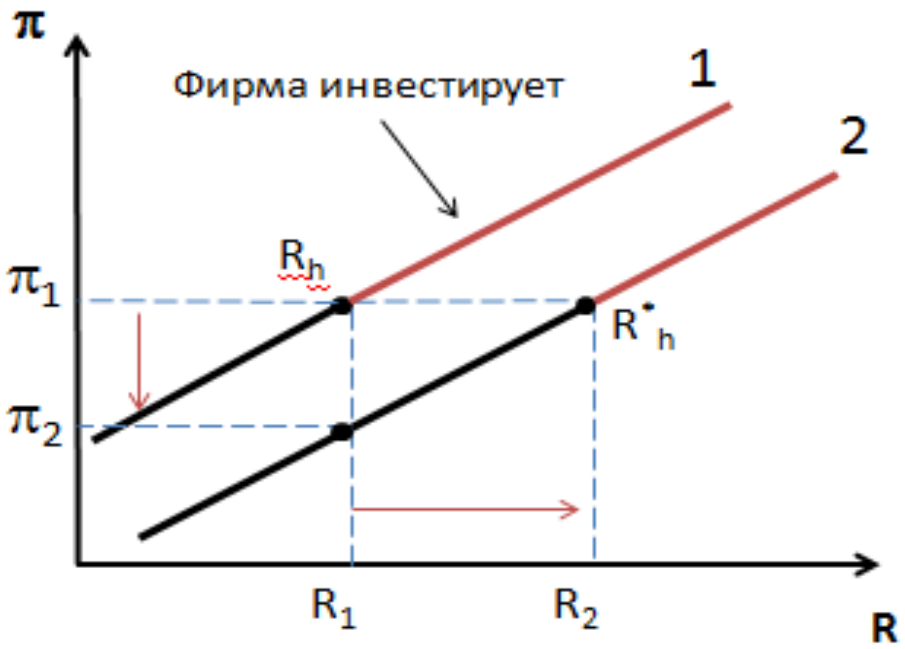

Figure 1 – Exchange rate profit function for a market-oriented firm with rising sunk costs, volatility, or wages

Source: compiled by the authors.

Secondly, the level of wages in the Russian region is growing (w). In this case, the situation is similar to the example above and is equivalent to the sunk cost case. With an increase in wages in the region, the profit of the enterprise at the same exchange rate R1 decreases to the value π2, and the threshold value of the exchange rate at which the firm will still invest in the construction of a yogurt production enterprise will move to the point R*h equal to the exchange rate R2. Since wage growth reduces profits to π2, a higher ruble exchange rate can offset the company's costs.

Third, consider the case of an increase in the volatility of the ruble exchange rate (σ). Let us assume a situation of a sharp increase in the level of volatility of the ruble exchange rate (σ).

This, in turn, represents an increase in foreign exchange risks for company D when investing in a new venture in Russia. From a graphical point of view, the described case can be fully described using the figure above. Thus, the increased currency risks represent a decrease in the expected profit to the level of π2. In order to return to the profit level π1, the company needs to wait for the real exchange rate of the ruble to rise to the value of R2.

Fourthly, let us consider the case of an increase in the growth rate of the ruble (μ). For example, let today the ruble exchange rate (R1) is 80 rubles. for 1 US dollar. At this rate, the firm will not invest. Let the firm expect the ruble to appreciate by 10% in the future to the level of R2. As a result, the expected profit will rise and the firm will be ready to invest at a lower ruble exchange rate in the considered time period (today). This situation can be shown in Figure 2.

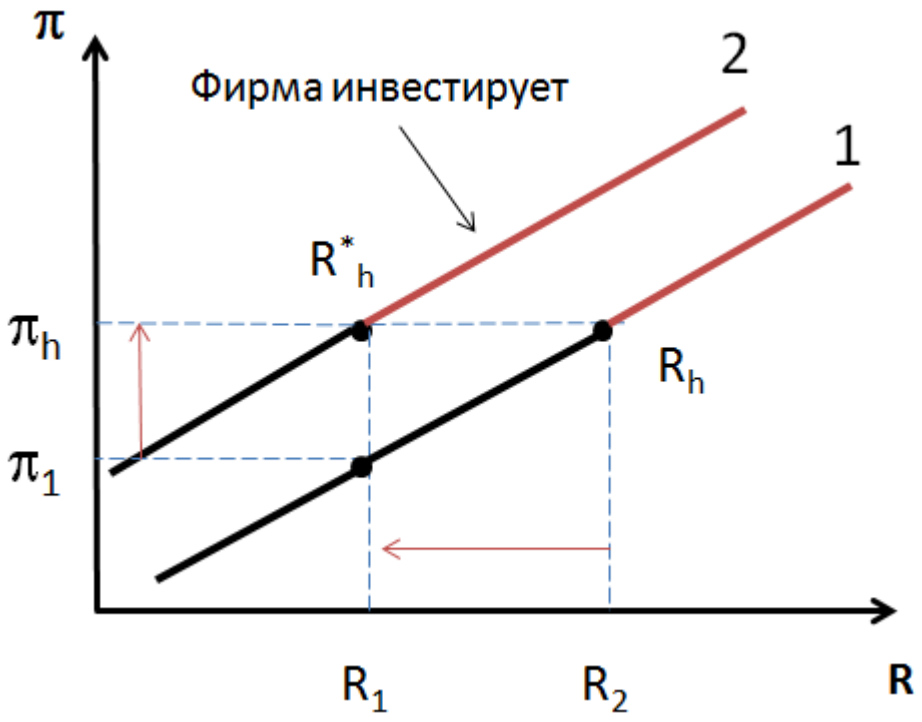

Figure 2 - Exchange rate profit function for a market-oriented firm with an increase in the growth rate of the local currency exchange rate

Source: compiled by the authors.

Next, we will consider the case of a firm focused on exporting its products to international markets. Such a company is understood as an enterprise that directs its investments in order to export its products. As an example, consider a coal company that is investing in the construction of a coal mining and processing plant in Russia. For the sake of simplicity, let's assume that:

1) the products of this plant are supplied only to foreign markets;

2) all profit as a result of production in Russia is received by the company in US dollars (or other foreign currency, depending on the country of origin of the company).

Thus, the firm benefits from the depreciation of the local currency (the currency of the country of investment and production), that is, from the depreciation of the ruble. This is due to the fact that the main production costs of the company are expressed in rubles, and it receives revenue in US dollars.

By analogy with the previous case (when the company was oriented to the domestic market), let's say that, for a coal company, there is some threshold value of the exchange rate RL. Let us assume that this threshold value is equal to R1, the value of which is 70 rubles. for 1 USD, and at the same time it corresponds to a profit of $\pi 1$ = 10 million USD. In this case, the firm will invest under the condition that the ruble exchange rate does not exceed this value, that is, R < R1.

For the purpose of a more detailed analysis of some hypotheses of the theory of real options for firms focused on the export of their products from countries of investment abroad, it is also proposed to consider several options for possible events and situations.

First, we will introduce the assumption that the cost of the national license required for the construction of the plant suddenly rises, which falls into the category of sunk costs in investments - k. Let's say that the cost of this license is a certain value, for example, 500 thousand US dollars. Accordingly, the amount of profit of a coal company at the exchange rate equal to R1 will decrease to the level $\pi 2$ = 9.5 million US dollars (Figure 3). In this case, it will be in the company's interest to compensate for this decrease in profits, since the value of sunk costs has increased. For this reason, it is beneficial for the company if the ruble exchange rate falls to the value of R2, at which the company's profit will correspond to the minimum required value of $\pi 1$, (10 million US dollars), and the new optimum point will be R*2.

Figure 3 – Exchange Rate Profit Function for an Export-Oriented Firm

Source: compiled by the authors.

At the beginning of the investment process, the exchange rate threshold is RL. With this value, the company receives the minimum level of required profit from the project, which corresponds to the value of the ruble exchange rate at the level R1. In a situation where the value of sunk costs rises, the exchange rate threshold will shift to the R*L point. In the new situation, the value of the exchange rate will be R2. Thus, a foreign coal company can compensate for the growth of sunk costs by reducing the exchange rate of the local currency (ruble) from R1 to R2. A fall in the value of the exchange rate will mean lower costs for a firm investing directly abroad. Under these conditions, it becomes possible to obtain the minimum required profit equal to π1.

Consider the following situation, where the coal industry experienced an increase in wages (w), which led to an increase in costs. This case can be considered by analogy with the previous one. In general, in order to compensate for the appeared costs, it is necessary to reduce the exchange rate to the value of R2.

Let's consider the third case, which describes an increase in the growth rate of the ruble (μ). In this regard, the foreign investor has expectations of its further strengthening. Suppose, for example, that the current exchange rate of the ruble (R1) is 75 rubles. for 1 US dollar. In this case, the firm will not invest abroad. However, he will invest in a new enterprise at the rate R2, in order to obtain the minimum required profit π1.

Fourthly, suppose that the level of volatility (σ) of the ruble exchange rate rises sharply, representing increased foreign exchange risks for the coal firm. Increased currency risks are associated with a decrease in expected profit to the level of π2. In this situation, in order to return to the level of profit equal to the value of π1, the coal company needs to wait for the real exchange rate of the ruble to fall to the value of R2. This will allow her to compensate for the increased costs.

2.1.2 Theoretical model of the impact of exchange rate expectations on FDI inflows

W. Broll considers a model that describes the impact of exchange rate expectations on the inflow of foreign direct investment (FDI) [20]. For example, the paper describes an American company that sends FDI to the United Kingdom of Great Britain. The model defines flexible changes in the project. So, from a financial point of view, the project can be expanded or reduced. At the same time, the investment project itself may have diminishing returns to scale. Moreover, the assumption is introduced that the project profit appears as a lump sum at some point in the future. Thus, the model defines two periods - the present period and the period in the future.

The paper introduces the assumption that the goal of managers is to maximize profits. Under these conditions, managers may exhibit opportunistic behavior - speculate on behalf of shareholders. The model introduces a caveat: it does not explain vertical FDI, that is, export-oriented FDI. This is explained by the fact that in this case the company is attracted only by the domestic market of the country of presence, since all products are supplied directly to the domestic market of the country of presence.

Based on the above provisions, the expected profit of the firm is determined as follows:

$$\pi = N\left[\frac{R(N)E(e_1)}{1+r}\right] - C(N)e_0 \qquad (20),$$

Where:

N - characteristics of the investment project;

R - revenue in local currency in the future period of time for the implemented investment project;

C – costs of the project in local currency at the considered point in time;

e0 is the exchange rate during the investment period;

(e1) is the expected future exchange rate during the period of receipt of the proceeds;

r is the discount rate;

Since the model assumes diminishing returns to scale, R'(N)<C'(N), there is an optimal combination of investment project parameters that maximizes TNC profits. In this regard, there is some value of the exchange rate, which maximizes the value of the project profit.

N* is such a function of the opportunity cost of capital of the investment project and the expected exchange rate of the local currency (d=log e0/e1). This value can be written as:

$$N^* = N^*(r,d), \quad \partial N^*/\partial r < 0, \quad \partial N^*/\partial d < 0 \qquad (21)$$

This equation explains why a rise in the host currency above the expected exchange rate will lead to higher FDI flows.

A study by Frankel and Froot showed that agents, as a rule, do not change their estimates of their expectations regarding the future indicators of the exchange rate of the national currency of the host country in full [21]. Analytically, this can be represented as:

$$\frac{d\hat{e}_1}{de_0} = \gamma < 1 \qquad (22).$$

The paper makes the assumption that the low elasticity of investors in relation to their exchange rate expectations is more significant in the case of large shocks to the national currency, so that:

$$\frac{d\gamma}{de_0} < 0 \qquad (23).$$

Therefore, equations (14) and (15) imply that:

$$dN^*/de_0 < 0 \qquad (24).$$

Thus, an increase in the exchange rate of the British currency stimulates an increase in expectations about the future level of the exchange rate. At the same time, an expectation of future devaluation is created, which helps to reduce FDI inflows into the country.

Another situation occurs in the case of a depreciation of the British currency. However, taking into account that the value of elasticity can be high for significant shocks, Equation 46 can be written as follows:

$$d^2N^*/de_0^2 < 0 \qquad (25).$$

Thus, a larger change in the value of the British currency will contribute to a larger change in FDI flows. The considered model reveals a negative relationship between the current exchange rate of the national currency and foreign direct investment. Also, larger shocks in exchange rate fluctuations should have a larger impact on FDI inflows. In order to identify

shocks in the exchange rate of the national currency, it seems possible to use the indicator of asymmetry in the distribution of fluctuations in the exchange rate of the national currency. Thus, a positive asymmetric distribution of the growth of the national currency exchange rate indicators can contribute to the reduction of foreign direct investment in the country. This allows us to represent the parsed model in the following form:

$$N^* = N^*\left(\overset{-}{e_0}, \overset{+}{E}(e_1), \overset{-}{r}\right) \quad (26).$$

Based on the results of the analysis of the above model, it can be noted that the optimal value of the characteristics of an investment project depends negatively on the exchange rate of the country hosting investment projects, and also has a negative dependence on the discount rate. Also, the optimal value of the characteristics of the investment project (N*) has a positive dependence on the expected value of the exchange rate in future periods of time.

2.1.3 Empirical Analysis of the Impact of Exchange Rate Expectations on FDI Inflows in Developed and Developing Countries

In order to practically test the assumptions from the theory, Chaklabati and Shlonik in their study [22] used data from 1982 to 1995 characterizing FDI flows to OECD countries directed there from the USA. At the same time, OECD statistics were used. OECD statistics for member countries are distinguished by such advantages as data accuracy, their structure and the continuity of time series. Moreover, sample homogeneity is determined by such factors as political risk, level of economic development, institutional environment. These factors are usually key when investors make their investment decisions. Moreover, OECD statistics compare favorably with other sources in that it makes it possible to determine the type of investment project (in a newly created or existing enterprise) with its help. However, this option is not available to all developed countries, since not all Central Banks of member countries work strictly in accordance with the statistical methodology of the OECD.

Based on the OECD FDI statistics and the IMF international financial statistics for monthly exchange rate values, the study calculated monthly devaluation values.

Next, a regression estimate was performed using panel data to determine the relationship between FDI and monthly exchange rate fluctuations in OECD countries. The model considered the flow of FDI as a dependent variable. While the independent variables were such variables as the average value, standard deviation, the coefficient of asymmetry of the monthly devaluation of the exchange rate of the currency hosting FDI countries. The model was evaluated using fixed effects, which are country-specific effects that are constant over an extended period of time. The model specification is as follows:

$$FDI_{it} = \alpha_1 + \beta_1 D_{it} + \beta_2 D_{it}^{\sigma} + \beta_3 D_{it}^{skew} + \varepsilon_{it} \quad (27),$$

Where

– FDIit - foreign direct investment from the US to country i in year t,

– D – monthly devaluation value

– D6 – standard deviation value

– Dskew – asymmetry value.

As part of the regression analysis, three hypotheses were put forward:

Hypothesis 1: A significant positive relationship is assumed between the average devaluation and the flow of foreign direct investment (FDI) to the destination country. This is justified by the fact that investors expect a more attractive exchange rate in the future [23].

Hypothesis 2: A significant positive relationship is assumed between the standard deviation of the exchange rate and the amount of FDI inflows [24] [25].

Hypothesis 3: The asymmetry of the monthly exchange rate devaluation of the host FDI currency has a significant effect in one direction on FDI flows [26].

It is assumed that it usually takes one year on average for a foreign investor to make a decision and respond to a change in the value of the exchange rate. The results of empirical regression estimation using the least squares method (OLS) are presented in Table 1.

Table 1 - Regression estimation using the least squares method

Variable	Coefficient Standard error	Standard error	t-statistics	P > |t|
Average depreciation of the national currency	-9,062	11,833	-0,76	0,44
Exchange rate devaluation standard deviation	3,035	10,172	-0,29	0,76
Exchange rate devaluation asymmetry	293,0	145,5	2,01	0,04
Exchange rate constant	1,204	305,2	3,94	0,00

Source: [22].

Based on the results of the analysis, the following results were obtained. Thus, neither the average devaluation nor the volatility of the devaluation have any significant impact on the flow of foreign direct investment (FDI). However, the significance of the monthly devaluation asymmetry has a statistically very significant impact on FDI inflows into the country. The results

obtained suggest that the devaluation of the currency is able to increase the volume of FDI in this country in the future time period.

As an alternative to the OLS methodology, this study used the Generalized Least Squares (GLS) approach. This method can help to take into account heteroscedasticity, which is associated with differences in FDI stocks in developed and developing countries.

It is also important to note the presence of an autocorrelation between the volume of foreign direct investment and the value of the exchange rate. The autocorrelation may be related to the situation when additional financing of investment projects with the participation of a foreign company contributed to the growth of the national currency exchange rate.

After carrying out the Likelihood ratio test, which reveals heteroscedasticity, it was found that the value of the error variance indicator differs between countries. This was corrected in the study.

The findings of the study are broadly consistent with those found in other studies on FDI, such as the Kamp study [27] and the Cushman study [28].

In order to avoid the direct influence of specific factors in the US economy through the US dollar (for example, monetary policy), the papers often substitute dollar exchange rates for the value of special drawing rights (SDR / SDR). Since the SDR refers to the basket of major currencies of the OECD countries, fluctuations in the exchange rate of currencies in the SDR basket will have less of an impact on FDI than the US currency. This approach is used in a number of works [29].

2.1.4 Analysis of the impact of exchange rate expectations on foreign direct investment inflows in developing countries

In the work of O. Morrissey and M. Udokerdmonkol, an analysis was made of the impact of exchange rate expectations on FDI in developing countries [30]. In the paper, the researchers refer to the work of Chakrabarti and Sholnik discussed above [31]. Despite the fact that the model proposed by the authors was developed to test the statistical significance of the influence of the exchange rate and its expectations on FDI in developed countries, in this paper the model was tested in relation to developing countries.

In contrast to the work of their predecessors, the authors of Chakrabarti and Sholnik indicate that foreign investors will maintain their positions on the exchange rate in the future time period. In particular, the researchers believe that in the case of an average reversal of the exchange rate during its devaluation, the foreign currency will be relatively cheap in a limited period of time.

As in their previous work for developed countries, Chakrabarti and Sholnik put forward three hypotheses to test:

Hypothesis 1: the upcoming depreciation of the foreign currency reduces the volume of incoming foreign direct investment in the country under consideration;

Hypothesis 2: The volume of foreign direct investment flows increases if the national currency of the country of investment depreciates;

Hypothesis 3: The high volatility of the national currency of the country of investment discourages incoming foreign direct investment.

In order to test the hypotheses outlined above, the model of Chakrabarti and Sholnik has undergone a number of changes. Thus, foreign direct investment began to be given by a function whose independent variables were the exchange rate (level), exchange rate fluctuations, and exchange rate shocks. Also, the modification of the model was the use of a proxy variable in relation to the exchange rate asymmetry and the addition of additional independent variables, such as market size; salary; export potential of the country; current inflation rate. These additional variables reflect important factors that determine the level of FDI in a country.

This model has been applied to a number of developing economies such as Tunisia, Morocco, Pakistan; China; Malaysia; Bolivia; Costa Rica; Paraguay; Uruguay; Venezuela, and looks like this:

$$FDI_{i,t} = \beta_0 + \beta_1 \Delta REER_{i,t} + \beta_2 FXD_{i,t} + \beta_3 TFXD_{i,t} + \beta_4 X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (28),$$

Where

- incoming FDI to developing countries;

REERit is the real effective exchange rate of the FDI host country;

FXDit - the exchange rate of the two countries, adjusted for inflation;

TFXDit is the time component of the exchange rate of the currencies of the pair of countries under consideration;

Xit is the value of other variables involved in the model;

μit - effects on the country, changing over time.

Moreover, it is necessary to note the role of ε, which reflects errors in the specification of the model, which are associated with the consequences of the implementation of economic policy, the role of state institutions, and differences in the level of liberalization of the investment regime.

For the inflation-adjusted exchange rate of the two countries, the model uses the average level of the exchange rate between the two countries (the value of the national currency in question against the US dollar). At the same time, the level of the exchange rate is adjusted for inflation (FXD).

Despite the apparent simplicity of solving the problem, within the framework of the study, the problem of limited data in the countries under study arose. To solve the problem, a proxy variable of the expected change in the exchange rate of the national currency was used as a measure of the change in the real effective exchange rate (REER) in the country to which FDI is directed.

Morrissey's study suggests that the nominal exchange rate tends to equilibrium [32]. In this regard, fluctuations in the nominal value of the exchange rate indicates how its value will change in the future period.

Thus, a change in the REER indicator (both downward and upward) within the framework of the estimated model indicates that one can expect strengthening/depreciation of the national currency in case of its deviation from the equilibrium state. For example, economists Goldfan and Valdes in their work [33] analyze empirical data on real exchange rates in ninety-three developing economies in the period 1960-1994. Data analysis showed that an overvalued exchange rate can contribute to current account deficits. transactions as a result of the loss of competitiveness of the national currency. With the appropriate policy of the national Central Bank, such a situation can lead to a waste of national foreign exchange reserves.

Correction of this situation is possible through the implementation of an appropriate monetary policy measure - the nominal devaluation of the national currency. Thus, inflated estimates of the level of the real exchange rate in most cases shifted the value of the nominal devaluation.

While the value of the effective exchange rate can provide useful information to decision makers about the competitiveness of the country of investment [34]. To determine whether the value of the effective exchange rate is overvalued or undervalued at a given point in time, it is necessary to compare it with the value of the base period index.

For modeling purposes, it is necessary to understand whether the value of the real effective exchange rate (REER) will be an effective indicator for determining the equilibrium value of the national currency exchange rate. In order to solve the practical problem of determining the value of the real effective exchange rate of the national currency, a proxy variable is often taken.

In the theoretical premise, it is assumed that if the economic situation of the state improves, the REER value increases relative to the base period. This, in turn, means that an increase in both direct and portfolio investments will be recorded in the country.

From a macroeconomic point of view, this situation is not optimal in the long run, since the “expensive” national currency contributes to the formation of a negative current account balance: imports exceed exports due to a decrease in the competitiveness of national exports. In this regard, the national Central Bank of the country of investment can make an adjustment by

entering the foreign exchange market and buying up foreign currency. This can help devalue the national currency [35]. Such a measure, in turn, can contribute to a decline in the level of FDI inflows into the country [20]. The expected devaluation of the local currency reduces the current inflow of foreign direct investment into the country.

The opposite situation is also possible, when the exchange rate of the national currency decreases - the currency depreciates. At the same time, in the theoretical scenario, among the main factors of the exchange rate, one can single out: a trend component, a cyclical component, as well as a component that cannot be predicted. Based on the analysis of these three factors, one can make an assumption about the level of the exchange rate in the future and build its long-term trend [32].

In the work of economists Goldfan and Valdez, an empirical analysis of data reflecting the dynamics of real exchange rates in 93 countries of the world over the period from 1960 to 1994 was carried out [33].

In international practice, the international competitiveness of a country is usually assessed using average exchange rates of key trading partners by assigning weights that depend on the trade position of that partner. In this case, as a rule, there is an adjustment in the differences in inflation rates between different countries trading with each other.

In his work, the economist P. Newbold recorded that random and / or non-permanent factors contribute to the appearance of exchange rate fluctuations [36]. His work is fundamentally different from that of researchers Chakrabarti and Sholnik. The difference is that the study controls for determinants that are among the determinants that influence the decision of international corporations to direct their investments abroad. These factors are:

– Real GDP growth. This factor has been taken into account because a large domestic market allows for the promotion of economies of scale to stimulate FDI inflows [37] [38];

– The share of exports in GDP. This factor was also chosen because a country's export orientation tends to attract foreign direct (FDI). In particular, export opportunities and high potential are a key factor in attracting international corporations. Also, it is assumed that an export-oriented economy tends to have stronger investment climate factors;

– Share of manufacturing output in GDP. To calculate this indicator, a proxy variable is used, which in turn helps to determine the degree of industrialization of the host country. This indicator also helps to determine the quality of the workforce, the use of high technologies.

– The number of telephone lines helps characterize the level of infrastructure development, which is a determining factor in attracting FDI.

– The level of wages in the economy, which affects the attraction of FDI in the national economy.

– The rate of inflation in the economy, which determines the macroeconomic conditions and allows you to determine the impact on the inflow of foreign direct investment.

The volume of portfolio investments reflects the confidence of foreign investors in the national market. In most cases this indicator is taken as a proxy variable.

3 Globalization and development of investment processes in the national economy

3.1 Dynamics, volumes and structure of foreign direct investment in the world

In 2016, global FDI flows fell by about 2% to $1.75 trillion. Investment in developing countries has declined even more - by 14%, and is moving to the least developed countries. In 2017, the decline in global investment flows continued by 16%, amounting to $1.52 trillion. The largest decline was recorded in developed countries (-27%) mainly due to a rebound in the UK and the US after a sharp increase in 2016, which was the main factor in the decline in foreign direct investment (FDI) in the world (Figure 4) . However, Australia recorded an 11% increase in FDI inward in 2017.

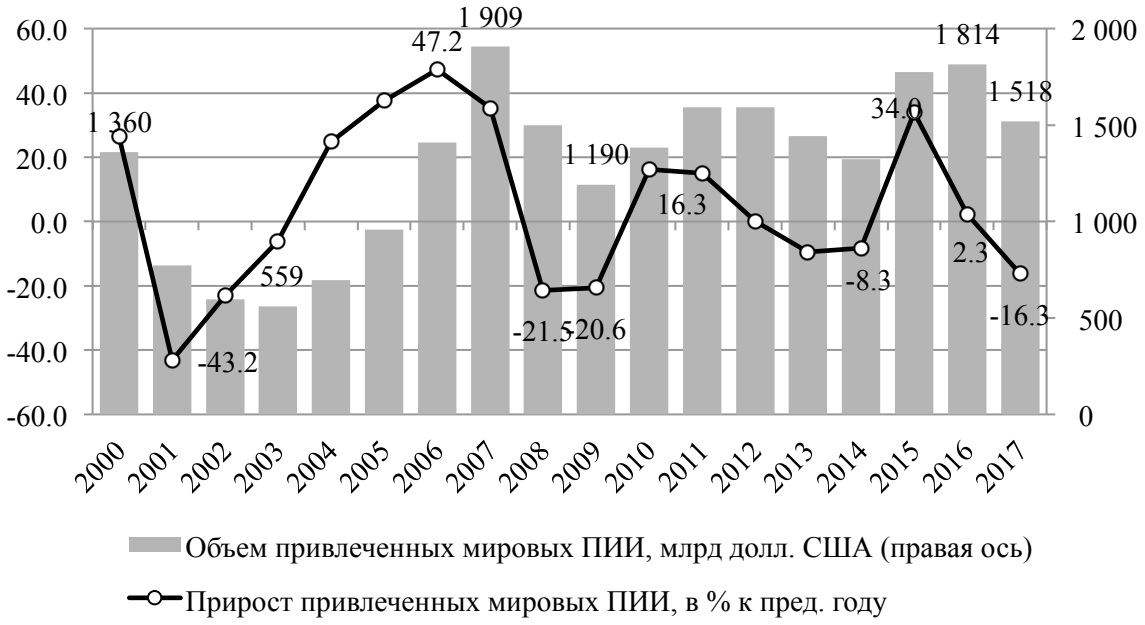

Figure 4 - Dynamics and growth of attracted FDI in the world, 2000 - 2017

Source: compiled by the authors based on [39].

The identified trend contrasts sharply with other macroeconomic indicators, such as global GDP and international trade growth, which have improved significantly over the past year. The fall in FDI flows to developed countries (by -27%) was the main driver of the global downturn.

Developing countries experienced a 2% increase in inward FDI to $653 billion. At the same time, the largest flows were recorded in the countries of Latin America and Asia, which remain the largest recipients of FDI after the EU countries, as well as the

USA and Canada. Slight growth was recorded in developing countries in Asia, Latin America and the Caribbean. At the same time, developing Asian countries have regained their positions as the largest FDI recipient region in the world.

Emerging economies experienced a 17% decline in 2017 to USD 55 billion, mainly due to a decrease in the activity of foreign investors in the Russian Federation and in a number of CIS countries (Figure 5).

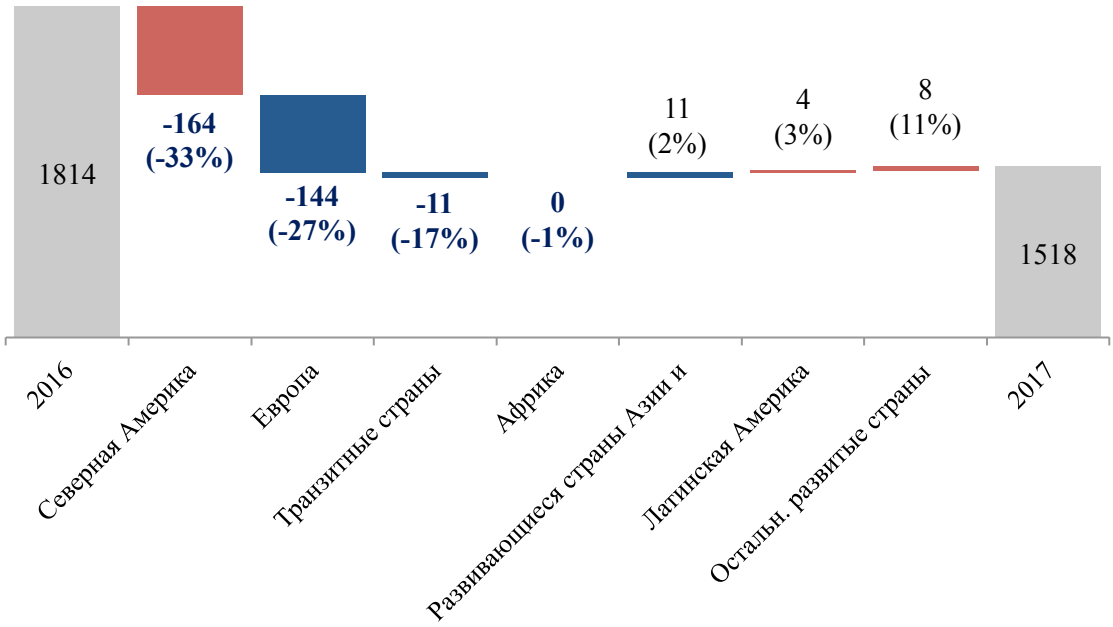

Figure 5 - Regional distribution of changes in FDI flows in the world for 2016-2017

Source: compiled by the authors based on [39].

These trends are associated with significant uncertainties that influenced the recovery of FDI dynamics in 2017. The recovery of monetary policy in the United States after almost a decade of low interest rates has led to a significant shift in the structure of capital flows, in particular in the group of developing countries.

The decline in investment activity in developed countries was partly facilitated by the rising cost of capital, which created a barrier to FDI from TNCs, which had accumulated significant corporate debt. Economic policies in developed countries have also contributed to the decline in inward FDI. Thus, the decision of the UK to withdraw from the European Union (Brexit), statements by the US Presidential Administration on the revision of key trade agreements (NAFTA, Chamber of Commerce and Industry) increased the uncertainty of investors in 2017. For countries with economies in transition and for developing countries, the uncertainty of 2017 contributed to a decrease in

volumes investment flows in different regions.

After a three-year growth, the volume of M&A transactions decreased by 23% to $666 billion in 2017. The number and number of direct equity transactions also decreased (by 17% and 32%, respectively). In value terms, the volume of transactions did not exceed USD 571 billion (Table 2). First of all, the reduction in transactions is associated with a decrease in the number of projects in developing countries.

Table 2 - Distribution of FDI flows, mergers and acquisitions, the number of projects related to investments in capital, by regions of the world (2016-2017), USD billion

Regions of the world	FDI flows			Cross-border mergers and acquisitions			Declared volumes of private equity projects		
	2016	2017	Rates of growth, %	2016	2017	Rates of growth, %	2016	2017	Rates of growth, %
World	1814	1518	-16	869	666	-23	834	571	-32
developed countries, including	1109	810	-27	794	553	-30	254	282	11
EU countries	500	370	-26	363	127	-65	148	146	-1
North American countries	494	330	-33	372	295	-21	69	105	53
developing countries, including	638	653	2	69	100	44	515	261	-49
African countries	50	49	-1	10	3	-64	94	41	-57
Latin American countries	139	143	3	18	24	34	74	61	-17
Asian countries	448	459	2	42	73	74	347	158	-54
Countries with economies in transition	67	55	-17	51	31	57	65	28	-56

Source: compiled by the authors based on [39].

Global investment flows are now starting to slowly recover (Figure 6). Higher expectations for economic growth in major regions, a rebound in trade growth and a recovery in corporate profits could support a modest increase in foreign direct investment (FDI). In 2018, their growth will continue to 1.85 trillion US dollars. This level is still below the 2007 peak. Policy uncertainty and geopolitical risks could hinder the recovery, and changes in tax policy could significantly affect cross-border investment.

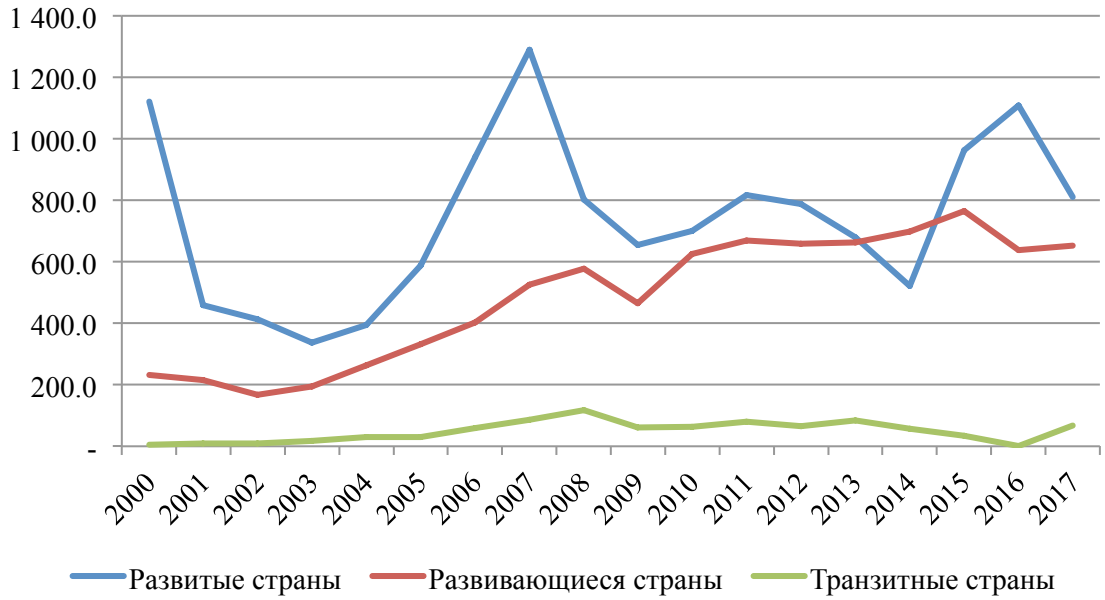

Figure 6 - Dynamics of attracted FDI in various groups of countries in 2000-2015

Source: compiled by the authors based on [39].

A more detailed breakdown of FDI flows by country, representing different groups of regions, is presented in Table 3

Table 3 - Directed FDI flows in various regions and countries of the world in 2010-2015

Region/country	2010	%	2011	2012	2013	2014	2015	%
World	1391,9	100,0%	1557,6	1308,8	1310,6	1318,5	1474,2	100,0%
The developed countries	983,4	70,7%	1128,0	917,8	825,9	800,7	1065,2	72,3%
EU	478,9	34,4%	491,7	351,7	272,9	296,4	487,1	33,0%
Germany	125,5	9,0%	77,9	62,2	40,4	106,2	94,3	6,4%
Ireland	22,3	1,6%	-1,2	22,6	29,0	43,1	101,6	6,9%
Netherlands	68,4	4,9%	34,8	6,2	70,0	56,0	113,4	7,7%
USA	277,8	20,0%	396,6	318,2	307,9	316,5	300,0	20,3%
Japan	56,3	4,0%	107,6	122,5	135,7	113,6	128,7	8,7%
Developing countries	358,0	25,7%	373,9	357,8	408,9	445,6	377,9	25,6%
Africa	8,7	0,6%	6,1	12,4	15,5	15,2	11,3	0,8%
South Africa	-0,1	0,0%	-0,3	3,0	6,6	7,7	5,3	0,4%
Asia	291,5	20,9%	318,6	302,4	358,9	397,6	331,8	22,5%
East Asia	196,3	14,1%	213,3	216,2	233,2	289,8	226,1	15,3%
China	68,8	4,9%	74,7	87,8	107,8	123,1	127,6	8,7%
Hong Kong, SAR	88,0	6,3%	96,0	84,1	81,0	125,1	55,1	3,7%
Southeast Asia	61,1	4,4%	62,0	54,7	78,8	75,3	66,7	4,5%
Singapore	35,4	2,5%	31,5	18,3	39,6	39,1	35,5	2,4%

Region/country	2010	%	2011	2012	2013	2014	2015	%
South Asia	16,3	1,2%	12,9	8,9	2,2	12,1	7,8	0,5%
India	15,9	1,1%	12,5	8,5	1,7	11,8	7,5	0,5%
Western Asia	17,8	1,3%	30,4	22,6	44,7	20,4	31,3	2,1%
S. Arabia	3,9	0,3%	3,4	4,4	4,9	5,4	5,5	0,4%
Turkey	1,5	0,1%	2,3	4,1	3,5	6,7	4,8	0,3%
UAE	2,0	0,1%	2,2	2,5	8,8	9,0	9,3	0,6%
Latin America and the Caribbean	57,3	4,1%	48,3	41,5	32,3	31,4	33,0	2,2%
Brazil	22,1	1,6%	11,1	-5,3	-1,2	2,2	3,1	0,2%
Chile	10,5	0,8%	13,6	17,0	8,4	11,8	15,5	1,1%
Mexico	15,0	1,1%	12,6	22,5	13,1	8,3	8,1	0,5%
Brit. Virgin Islands	53,4	3,8%	59,9	54,1	103,3	81,2	76,2	5,2%
Cayman Islands	9,4	0,7%	7,0	3,2	11,0	8,7	8,3	0,6%
transit countries	50,5	3,6%	55,7	33,2	75,8	72,2	31,1	2,1%
Russia	41,1	3,0%	48,6	28,4	70,7	64,2	26,6	1,8%

Source: compiled by the authors based on [39].

The outlook for FDI is moderately positive in most regions, with the exception of Latin America and the Caribbean. Developing countries as a group are expected to receive only about 10% of global FDI inflows. At the same time, strong growth is expected in emerging Asia, where an improvement in the economic outlook in large countries is likely to boost investor confidence. FDI to Africa is also expected to pick up, driven by a modest increase in oil prices, as well as progress in regional integration.

On the contrary, the prospects for FDI inflows to Latin America and the Caribbean are reduced due to uncertainty about the macroeconomic and political outlook. Flows to emerging economies are likely to recover once their economies reach the level of development recorded in 2016. Flows to advanced economies are expected to be stable in 2018.

The decline in investment activity is a complicating phenomenon, especially given the huge investment needs associated with the Sustainable Development Goals (SDGs). Progress towards achieving the Sustainable Development Goals requires heavy investment in basic infrastructure, energy, water and sanitation, climate change mitigation, and health and education, investment in productive capacity to create jobs.

The decline in investment activity is primarily associated with the decline in FDI

in developed countries, whose share in 2017 was about 53% in the global inflow of FDI. While in the 2000s the share of developed countries in global FDI flows exceeded 80% (Figure 7).

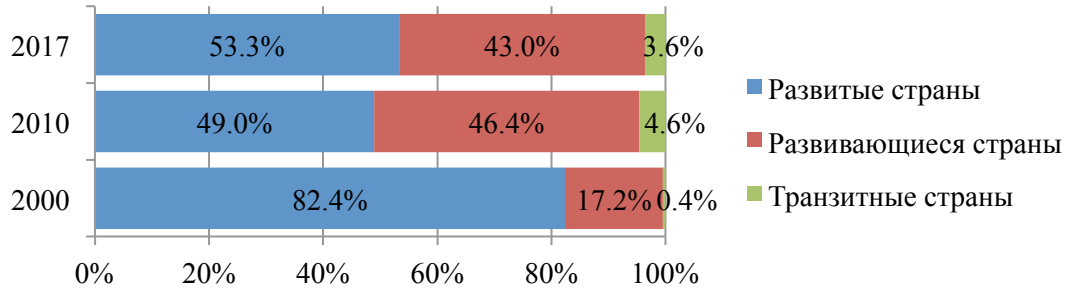

Figure 7 - Distribution of FDI flows between developed, developing countries and countries with economies in transition

Source: compiled by the authors based on [39].

Moreover, half of the ten largest recipients of investments are developing countries. In 2017, the US was the largest recipient of FDI, amounting to $311 billion. China came second in this indicator, the value of which in 2017 amounted to 144 billion US dollars (Figure 8).

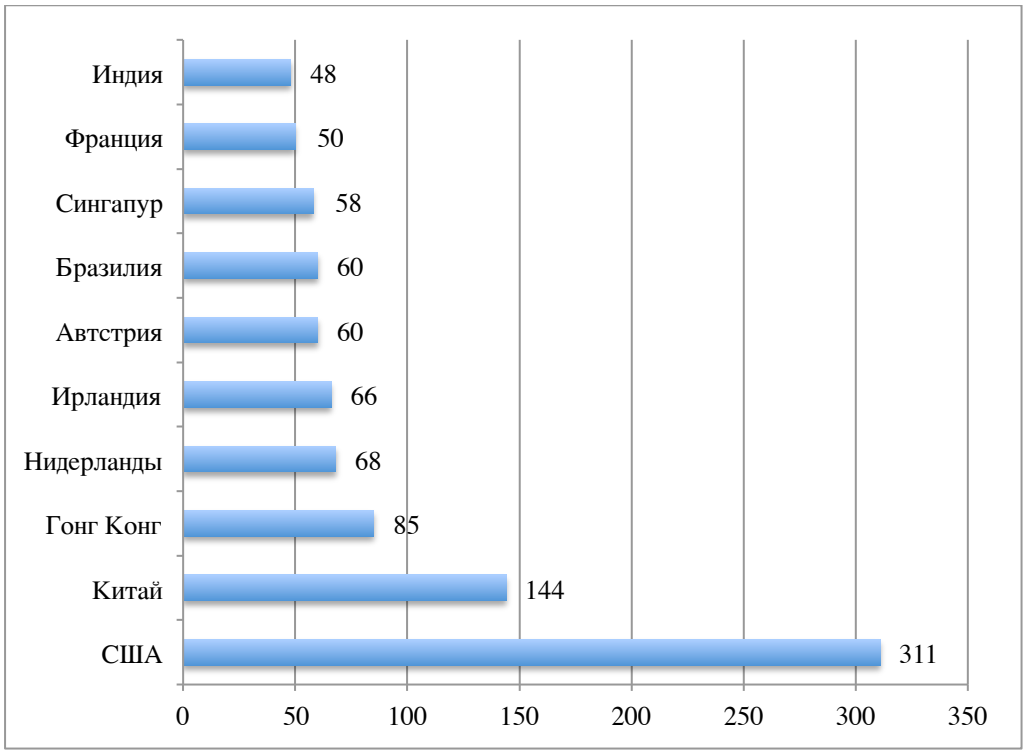

Figure 8 - Estimated FDI inflows in the top ten recipient countries in 2017

Source: compiled by the authors based on [39].

The current trend is a reflection of increased volatility in the global economy, weakening global demand, slow growth in some commodity-exporting countries, measures to combat tax havens and a sharp decline in the profits of transnational corporations (TNCs). According to the UNCTAD forecast, in the short term (in 2018) global FDI flows will increase, however, they will remain below the pre-crisis level for a long time to come (table 4).

Table 4 - Flows of attracted FDI in various groups of countries in 2013-2018

Country group	2013	2014	2015	2016	2017	2018*
Volume, billion dollars						
Total in the world	1 427	1 277	1 750	1525	1518	1730-1880
including						
The developed countries	680	522	963	872	870-930	938-998
Developing countries	662	698	749	600	690-735	738-818
transit countries	85	56	38	52	40-55	43-56
Growth, in % to prev. year						
Total in the world	-6	-11	37	-13	~7	~8
including						
The developed countries	4	-23	84	-9	~6	~8
Developing countries	1	-5	7	-20	~8	~9
transit countries	30	-33	-32	37	~13	~12

Source: compiled by the authors based on [39]

With regard to the sectoral distribution of FDI, according to a survey conducted by UNCTAD, in the group of developed countries, the most promising sectors for investment by foreign investors are: the ICT sector, professional services, computers and electronics. In developing countries (Africa, Latin America, Asia), the most promising industry for investment is agriculture and the food industry. In countries with economies in transition, the food industry, agriculture, and the public utilities sector (Figure 9) became promising sectors for attracting FDI to the national economy, according to the survey results.

Figure 9 - The most promising sectors (types of activity) for attracting FDI in different regions / groups of countries (in % of the number of investment promotion agencies surveyed)

Source: compiled by the authors based on [39].

4 Assessing the impact of the exchange rate on foreign investment inflows

4.1 Empirical evaluation on a sample of countries around the world

Below are the results of empirical estimates of the impact of the real exchange rate on the inflow of foreign direct investment in different samples. The first model was evaluated on a sample of OECD and BRICS countries from 1990 to 2016. The second model was evaluated for 22 industries in Russia from 2005 to 2016. The third model was evaluated for the regions of Russia from 2000 to 2016. The basis for econometric assessments is the theory of real options, respectively, the hypotheses that are put forward by this theory are tested.

To assess the impact of the exchange rate on the inflow of foreign direct investment into country i in year t, the following model with fixed individual effects was estimated

$$\ln FDI_{it} = \alpha + \beta_1 REER_{it} + \beta_2 \ln REER * ExpShare_{it} + \beta_3 \ln Interrate_{it} + \beta_4 \ln GDP_{it} + \beta_6 \ln Inflation_{it} + \varepsilon_i \quad (29),$$

$\ln REER_{it}$ – logarithm of the real effective exchange rate of country i in year t;

lnREERit*ExpShareit is the cross term of the product of the logarithm of the real effective exchange rate of country i in year t and the ratio of exports to GDP of country i in year t;

lnInterRateit is the logarithm of real interest rates on a loan for country i in year t;

lnGDPit is the logarithm of GDP at constant prices of country i in year t;

lnPortfolioit is the logarithm of the ratio of portfolio investment to GDP for country i in year t.

lnlnInflationit is the logarithm of the inflation rate for country i in year t;

εi are fixed individual effects per country.

The model does not include indices of the country's investment attractiveness due to a high correlation with other explanatory variables, in particular, the ratio of portfolio investment inflows to the country's GDP, since portfolio investments are made in countries with a favorable investment climate. Also, the model does not include the exchange rate volatility variable due to the lack of a sufficient number of observations on this indicator.

The hypotheses to be tested are as follows:

1) the growth of the real effective exchange rate of the country contributes to the growth of the inflow of foreign direct investment into the country;

2) the more the country is export-oriented, the stronger the exchange rate, the inflow of foreign direct investment slows down;

3) an increase in the interest rate as a proxy for the cost of capital will have a stimulating effect on the inflow of foreign direct investment into the country;

4) with the growth of GDP as an indicator of a larger domestic market and an increase in the purchasing power of citizens in the country, the inflow of FDI into it also grows;

5) the growth of inflation has a negative impact on the inflow of foreign direct investment, since low inflation can serve as an indicator of macroeconomic stability and lower foreign exchange risks.

Data on the inflow of foreign direct investment into the OECD countries and the BRICS countries, on the export of goods and services of countries, inflation, GDP, portfolio investment, interest rates on loans in selected countries were taken from the World Bank database [40], data on real The effective exchange rate was taken from the IMF database [41]. Taking into account the fact that for some indicators that were used as variables in the model, there were no data for a number of countries, the total number of observations was 500.

The results of the regression assessment with individual fixed effects are shown in Table 5.

Table 5 - Results of model evaluations on a sample of OECD and BRICS countries

Variable	Coefficient	Standard error
Course Log	1,108***	0,276
Exchange rate log*Export share	0,231***	0,059
Interest Rate Log	-0,159***	0,055
GDP log	0,679***	0,049
Portfolio investment log	0,174***	0,024
Inflation Log	-0,054***	0,051
R^2 within	0,3811	
R^2 between	0,8583	

Source: authors' calculations.

According to the estimates obtained, almost all the hypotheses put forward are not rejected at the 1% significance level, only the coefficient at the variable of the logarithm of the inflation rate is not significant. This can be explained by the fact that if inflation rises to a situation of high risks, there is, according to economic theory, an increase in economic activity, which, in turn, can contribute to the inflow of foreign direct investment. The coefficients for the variables of the exchange rate, GDP, portfolio investment have the expected positive sign and are highly significant. This means that with the growth of GDP in the country, the purchasing

power of the population and the volume of the domestic market are growing, which makes it profitable for foreign investments in this country with a focus on meeting the needs of the domestic market. With the strengthening of the exchange rate, the export of goods becomes unprofitable, while imports, on the contrary, are profitable, and under the assumption of the interchangeability of capital and goods and the mobility of capital, instead of importing goods, foreign direct investment can come into the country, which allow the production of previously imported goods on its territory. The growth in the inflow of portfolio investments into the country indicates a high degree of confidence in this country on the part of investors, which also contributes to the growth in the inflow of foreign direct investment. The coefficient with a variable interest rate has a negative sign and is highly significant, which means that with an increase in the interest rate in the country, the inflow of foreign direct investment into it will decrease, which may be due to the fact that in this case the cost of capital will increase and further business development with participation, including foreign capital, will become difficult. The coefficient at the cross term - the product of the logarithm of the exchange rate and the share of exports has a positive sign, which does not correspond to the hypothesis put forward. This result can be explained by the fact that the share of labor-intensive goods in the exports of the countries included in the sample is not so large, but the share of capital-intensive goods in exports is high, so if the exchange rate strengthens, domestic producers in export-oriented countries will attract foreign investment necessary for the purchase of equipment and other capital resources for the production of their products.

4.2 Determining the impact of the exchange rate on the inflow of foreign investment into the Russian economy

4.2.1 Empirical assessment on a sample of industries in the Russian Federation

To assess the impact of the exchange rate on the inflow of foreign direct investment in the context of Russian industries, a model with fixed individual effects was evaluated:

$$\ln FDI_{it} = \alpha + \beta_1 \ln REER_t + \beta_2 \ln REER_t * ExpShare_{it} + \beta_3 \ln Corrupt_t + \beta_4 \ln(\quad (31),$$
$$\beta_5 \ln Volatility_t + \beta_6 \ln InflationRUS_t + \beta_7 Rating_t + \beta_8 Pereschet_t + \varepsilon_i \quad (30)$$

where lnREERt is the logarithm of Russia's real effective exchange rate in year t;

lnREERt*ExpShareit is the cross term of the logarithm of the real effective exchange rate of Russia in year t and the share of exports in production in industry i in year t;

lnCorruptt is the logarithm of the corruption perception index in Russia in year t;

lnCOCt is the logarithm of the interest rate on loans in Russia in year t;

lnVolatilityt is the logarithm of the volatility of the nominal ruble exchange rate in year t;

lnInflationRUSt is the logarithm of the inflation rate in Russia in year t;

Ratingt - credit rating of Russia in year t;

Pereschett is a dummy variable needed to control for changes in the accounting for foreign direct investment that have occurred since 2009; the variable takes the value 0 until 2008 inclusive, 1 - from 2009.

εi - fixed individual effects on the industry.

The model does not include portfolio investments, since there are no adequate statistical data on the dynamics of portfolio investments by sectors of the Russian Federation.

The following hypotheses were tested:

1) the growth of the real effective exchange rate of Russia contributes to the growth of the inflow of foreign direct investment in the industry of the Russian Federation;

2) the more the industry is export-oriented, the less is the increase in foreign investment in it with the strengthening of the exchange rate;

3) with the growth of corruption in Russia, the inflow of FDI into Russian industries is declining;

4) with the growth of interest rates in Russia, the inflow of FDI in the industry increases;

5) with an increase in the volatility of the nominal exchange rate, the inflow of FDI in the industry of the Russian Federation is declining;

6) with the growth of inflation in Russia, the inflow of foreign direct investment in the industry is declining;

7) with the growth of Russia's credit rating, the inflow of foreign direct investment in the industry increases.

Data on FDI inflows by Russian industries are taken from the official website of the Central Bank of the Russian Federation [42] and Rosstat. Data on the index of the real effective exchange rate of the ruble against foreign currencies were taken from the IMF IFS database [41], data on the volume of merchandise exports and gross value added of industries were taken from the Rosstat databases: section "National accounts" [43] and

section "Industrial production" [44]. To eliminate missing values in these databases, the data were completed as follows: for the variable lnREERt*ExpShareit "Cross member of the logarithm of the real effective exchange rate of Russia in year t and the share of exports in the production of industry i in year t" export of services by industry (type of activity) is represented by the values of indicators of foreign trade (exports) in services, which are based on the 6th edition of the "Manual on the balance of payments and international investment position" of the International Monetary Fund (BPM6, 2009) and the "Manual on statistics of international trade in services, 2010" of the Department Economic and Social Affairs of the United Nations (Table 6).

Table 6 - Correspondence of the types of activities of the service sector with the types of services based on the international classification

Industry (type of activity)	Type of service
Construction	Construction services (or building services
Wholesale and retail trade; repair of motor vehicles, motorcycles, household products, etc.	Maintenance and repair services;
Transport and communications	Technical, trade-intermediary and other business services
Financial activities	Transport services; Telecommunication, computer and information services

Sources: [45], [46].

The annual volatility of the ruble exchange rate was calculated on the basis of data on the average monthly nominal exchange rate of the US dollar against the ruble, collected from the databases of the Central Bank of the Russian Federation (section "External Sector Statistics") [42], Rosstat (section "Russian Finance") [47]. Data on Russian inflation are presented in the “Prices in Russia” section of Rosstat [48]. Data on the long-term interest rate in Russia are taken from the OECD database [49]. The Corruption Perceptions Index for the Russian Federation is taken from the Transparency International rating [50], and the long-term credit rating of the Russian Federation is taken from the Trading Economics rating [51].

In this model, unlike the other evaluated models (for countries and regions of the Russian Federation), the average Russian inflation was used as a variable, since the level of inflation in a particular industry does not affect the inflow of FDI into this industry,

what matters is the difference in regional inflation levels, reflecting either the rate of economic development of the territory, or a decrease in the real purchasing power of the population of the territory, which will affect the inflow of FDI.

The sample consists of 22 industries of the Russian Federation with indicators from 2005 to 2016. Thus, the number of observations (including missing values for some variables) is 197.

The results of the regression assessment with individual fixed effects are shown in Table 7.

Table 7 - The results of model evaluations on a sample of industries in the Russian Federation

Variable	Coefficient	Standard error
Course Log	2,989*	1,703
Exchange rate log*Export share	-0,023	0,250
Corruption Index log	1,944	2,076
Interest Rate Log	3,922***	1,472
RF credit rating	0,675	0,575
Rate Volatility Log	-0,239	0,149
Inflation Log	3,164	4,124
Dummy on recount	-0,870*	0,475
R^2 within	0,1378	
R^2 between	0,1283	

Source: authors' calculations.

According to the results obtained, only the coefficients for the real exchange rate and interest rate variables are significant. As the interest rate rises, FDI inflows grow as the price of capital rises. With the strengthening of the exchange rate, the inflow of foreign direct investment in any industry increases, since FDI in this case acts as a substitute for imported goods, which have become more expensive for the consumer from Russia. The coefficients for the variables of the cross term, inflation, credit rating, volatility have the expected signs, however, are statistically insignificant due to the small number of observations.

4.2.2 Empirical evaluation on a sample from the regions of the Russian Federation

To assess the impact of the exchange rate on the inflow of foreign direct investment into the region of the Russian Federation i in year t, the following model with fixed individual effects was estimated:

$$\ln FDI_{it} = \alpha + \beta_1 \ln REER_t + \beta_2 \ln REER_t * ExpShare_{it} + \beta_3 \ln Corrupt_t + \beta_4 \ln + \beta_6 \ln Volatility_t + \beta_7 \ln Inflation_{it} + \varepsilon_i \quad (32),$$

где $\ln REER_t$ – логарифм реального эффективного обменного курса России в год t;

lnREERt*ExpShareit is the cross member of the logarithm of the real effective exchange rate of Russia in year t and the share of exports in the GRP of region i in year t;

lnCorruptt is the corruption perception index in Russia in year t, which is calculated as the ratio of the place occupied by Russia in the rating to the number of countries participating in this rating;

lnCOCt is the logarithm of the long-term interest rate in Russia;

lnVRPit is the logarithm of the gross regional product of region i in year t;

lnVolatilityt is the logarithm of the volatility of the nominal exchange rate in Russia in year t;

lnInflationt is the logarithm of the inflation rate of region i in year t;

εi - fixed individual effects on the region.

The model does not include the variables of portfolio investment inflow to the region due to the lack of adequate statistical data, as well as investment attractiveness indices, since they negatively strongly correlate with the indices of freedom from corruption, which are included in the model.

The following hypotheses were tested:

1) the growth of the real effective exchange rate of Russia contributes to the growth of the inflow of foreign direct investment in the regions;

2) the more the region is export-oriented, the less is the increase in foreign investment in it with an increase in the exchange rate;

3) with the growth of corruption in Russia, the inflow of FDI to the regions is declining;

4) with the growth of interest rates in Russia, the inflow of FDI to the regions increases;

5) with the growth of the gross regional product of the region, the inflow of foreign direct investment into it increases;

6) with an increase in the volatility of the nominal exchange rate, FDI inflows to the regions of the Russian Federation are declining;

7) with the growth of inflation in the region, the inflow of foreign direct investment into it decreases.

Data on FDI inflows to Russian regions are taken from the official website of the Bank of Russia [42] and supplemented by Rosstat data [43]. Data on the real effective exchange rate of Russia are also taken from the official website of the Central Bank of the Russian Federation [42]. Data on exports, GRP and the level of inflation of the regions are taken from the statistical collection of Rosstat "Regions of Russia. Socio-economic indicators" [52]. Transparency International's Corruption Perceptions Index [50] is by construction interpreted as follows: the higher the score or the place occupied by Russia, like any other country, the more widespread corruption is in the country. Data on the interest rate in the Russian Federation are taken from the OECD database [49]. The annual volatility was calculated on the basis of data on the average monthly nominal exchange rate of the US dollar against the ruble, collected from the databases of the Central Bank of the Russian Federation (section "External Sector Statistics") [42], Rosstat (section "Russian Finance") [47].

The sample consists of all regions of the Russian Federation with indicators from 2000 to 2016. Thus, the number of observations (including missing values for some variables) is 1212.

The results of the regression assessment with individual fixed effects are shown in Table 8.

Table 8 - Results of model estimates on a sample from the regions of the Russian Federation

Variable	Coefficient	Standard error
Course Log	1,997***	0,536
Exchange rate log*Export share	-0,025	0,033
Corruption Index log	-1,840***	0,723
Interest Rate Log	1,021***	0,210
GRP log	1,103***	0,088
Rate Volatility Log	0,048	0,042
Inflation Log	-0,702	1,573
R^2 within	0,3165	
R^2 between	0,5307	

Source: authors' calculations.

Judging by the coefficients of determination, the quality of the model is at the proper level. With the real effective exchange rate variable, the expected positive coefficient is obtained, which is significant at the 1% level. Thus, the strengthening of the real exchange rate has a positive effect on the inflow of foreign direct investment into the regions of Russia. The coefficients for the variables corruption, GRP and interest rates have the expected signs and high statistical significance. With the growth of corruption in Russia, the inflow of foreign direct investment into the regions is declining, as the investment climate is deteriorating and the costs of doing business are increasing, and the risks for potential foreign investors are increasing. The growth of the gross regional product indicates an increase in the purchasing power of the population of the region and an increase in the size of the domestic market, which is seen as an incentive for FDI in the region. Unfortunately, the obtained coefficient at the cross term of the logarithm of the exchange rate and the share of exports in the GRP of the region, although it has the expected negative sign in accordance with the hypothesis put forward, however, is not statistically significant. The coefficients for the exchange rate volatility and regional inflation rate variables are also insignificant. The insignificance of the coefficient for nominal exchange rate volatility can be explained by the fact that the exchange rate volatility was calculated for Russia as a whole, so the indicator does not differ between regions in the same year, and in fact the real effective exchange rate can vary significantly between regions. The insignificance of the coefficient at the regional level of inflation is explained by the fact that inflation has a bidirectional effect on FDI inflows to the region. The hypothesis put forward was based on the fact that low inflation is an indicator of stability and low foreign exchange risks for investors, so its growth has a negative effect on FDI inflows. On the other hand, an increase in inflation may indicate economic growth and an increase in business activity, which, in turn, contributes to the growth of FDI in the region.

CONCLUSION

Currently, despite the sanctions pressure, foreign companies continue to invest in Russia, making investments focused on the domestic Russian market (food, manufacturing) due to the need to localize production due to the devaluation of the ruble after 2014. The second group includes companies that subject to counter-sanctions from the agricultural sector, which moved production to Russia to avoid procedures for importing agricultural products. embargoed goods.

The decrease in FDI inflows recorded in 2015-2016 is associated with a drop in the interest of foreign (especially Western) investors in Russia. The situation can be changed by improving the assessments of investors' risks in relation to the Russian market. Risks can be mitigated by improving investment climate factors of a regulatory, macroeconomic and political nature.

In addition, as the examples show, localization strategies can encourage FDI inflows into the Russian economy. At the same time, local markets benefit greatly from the localization of production by foreign manufacturers in Russia, which is associated with supporting the development of local producers by providing new skills and technologies.

It can be expected that the positive dynamics of FDI inflows to Russia in future periods will be facilitated by the regulatory measures that are currently being discussed by the Russian Government. Among the latest initiatives, these include: simplification of the import of foreign raw materials for the production of goods in Russia and subsequent export due to exemption from customs duties and VAT [53], the formation of a Russian-Chinese fund of 1 billion US dollars to finance projects in the field of mining industry [54]; the proposal of the Ministry of Finance to reduce the MET for joint ventures of Gazprom and its foreign partners in order to protect the interest of foreign investors in participating in the development of new fields in Russia [55].

Moreover, there is reason to expect an increase in FDI inflows due to the planned capital amnesty, which will be carried out due to new Western sanctions in 2018 through Eurobond mechanisms [56], as well as the creation of new offshore zones in Russia [57]. This option may prove to be the most effective mechanism for protecting against risks, as well as allowing the return of capital to Russia without paying taxes.

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