

# FOREIGN TRADE AND FOREIGN DIRECT INVESTMENT IN FOOD INDUSTRY ENTERPRISES IN RUSSIAN REGIONS

*Tatiana A. Ratnikova<sup>1</sup>, Anna A. Gladysheva<sup>2</sup>*

Preliminary draft

Please do not cite or distribute without the authors' permission

The purpose of this work is to study the distribution of FDI in the Russian regions and the effects of FDI on foreign trade and manufacturing activities of the Russian regions on the historical data of Rosstat regional statistics for selected industries (food industry). The results of the study are expected to help in the search for answers to the following question: "Is it possible to attract foreign investors to the food industry in Russia to stimulate export while there is a decline in import, or, in other words, is there any reason for the success of the export-oriented import substitution policy in this industry?". The analysis of regional data from 2007 to 2013 does not allow rejecting the efficiency of this policy for a group of regions. The heterogeneity of regions and the absence of the interconnection between FDI and further export of food production prevent from a strict dependence of reduction in import of intermediate products and raw materials on the decrease of the inflow of FDI.

## **Introduction**

### **Problem statement**

In the context of open export-oriented development economic policy the FDI is a traditional effective tool to upgrade the production and management technology and come into international markets. Traditionally the growth in the import of technologies, equipment, experts and specific raw materials related with the inflow of FDI is not considered as a negative process because the increase in foreign exchange earnings to the budget helps to cover these expenses. In addition, it creates favorable conditions for economic growth if this process does not lead to job losses uncompensated by creation of new jobs in the modernized enterprises and the gradual suppression of the domestic business because of their competition with companies that have FDI, if it promotes the competitiveness of domestic business, stimulating its export activity and expansion, followed by the creating new vacancies. However international experience shows that such an ideal course of events is not always observed.

Under conditions of import substitution policy the FDI is not an explicitly effective tool because it can be accompanied by the influx of import of materials, equipment and technology

---

<sup>1</sup> Senior Researcher, Faculty of Economic Sciences, Laboratory for Macro-Structural Modeling of the Russian Economy, National Research University Higher School of Economics. E-mail: [taratnikova@yandex.ru](mailto:taratnikova@yandex.ru)

<sup>2</sup> Researcher Intern, Faculty of Economic Sciences, Laboratory for Macro-Structural Modeling of the Russian Economy, National Research University Higher School of Economics. E-mail: [gladysheva.ann@gmail.com](mailto:gladysheva.ann@gmail.com)

that is generally contrary to the policy objectives. However the necessity to ensure the process of establishing a competitive local production of goods and services, and strategic objectives of exporting some products of domestic processing to international markets requires investments, technological innovation and networking with foreign partners that is very difficult to carry out without attracting FDI.

## **Literature review**

The interdependence of FDI and foreign trade is of interest for decades, so there are many theoretical and empirical investigations. The majority of such papers are based on the approach from the side of the investor or parent country. The problem statement for these works is whether the outflow FDI and export from a country are substitutes or complements. There are theoretical explanations for both kind of this relationship:

- According to proximity-concentration trade-off hypothesis (Belderbos and Sleuwaegen, 1998; Gopinath et al., 1997) and according to neoclassical theories (e.g. Dunning and Rugman (1985)) FDI and exports are substitutes. The horizontal FDI are expected to replace export (e.g. Kojima, 1975; Graham, 1996).
- The opposite kind of the relationship – complementarity – may be explained by spillover effects of multinational corporations on the productivity of local firms in the host countries resulting from vertical FDI (Brainard (1997); Co (1997); Marchant et al. (1999); Clausing (2000); Jensen (2002); Wilson, (2006)).

The empirical results on some researches gave controversial results: they depend on the entry mode of FDI (Connor, 1983; Pagoulatos, 1983); Overend et al. (1997) found that both market-seeking as well as resource-seeking motives for the FDI outflows may exist.

For the possible situation in Russian food industry the explanation of Hymer (1976) may be used (FDI is the import of intangible assets that requires the additional flow of resources).

Lubomudrov in his paper (2010), devoted to FDI in China, again wrote about the close relationship between the FDI and import of raw materials and components. FDI helps to solve the problem of establishing its own production in the recipient country and at the same time leads to the growth of imports necessary for production materials and equipment (that is not always desirable for a recipient economy). And not always the benefit from FDI compensates the cost of financing the import purchases.

These controversial results may be explained by the specificity of a particular industry of interest. But if we concentrate only on food industry the results are again ambiguous and should be investigated. For example, Gopinath et al. (1999) showed that US companies substitute export with FDI (so the inflow of FDI to recipient countries leads to the decline in food production, but no information on the type of this production – is it final or intermediate production).

Walkenhorst, P. (2001) investigated Polish food processing industry and showed that in Poland FDI inflow and export from investing countries of food production are complement and the increase of the former leads to the increase in the latter and vice versa. One of the explanations to that fact is that foreign affiliates probably face problems of obtaining intermediate inputs of sufficient quantity and quality from local sources. It leads to the necessity to import it from parent countries which increases the overall trade volume.

In some papers the analysis is made for all industries without separation of flows of FDI, import and export to different sectors. It was shown that the incentives to invest may be different in case of different sectors (e.g. Pusterla and Resmini, 2007), Therefore taking into account this fact should give more correct results. Even if the investigation is based on the data of one industry the design of the research does not allow making difference between the interdependence of FDI to the industry from the import of final goods and of intermediate goods.

Moreover, the resources for the industry of interest may be the products on the other one/ So the interdependence of FDI and import of resources and the trade of production could not be deeply investigated and the results may be ambiguous (flows of import and export of input and output were not separated).

The aim of this research is to fill this gap and to make the investigation of this kind for Russia.

Another aspect of interest is the following step – the relations of FDI and export of final goods as a goal of export-oriented policy.

There may be several explanations of the effect of FDI on export:

- For export-platform investments introduced by Ekholm et al. (2007) the incentive is to separate the process of production from the final market, so the FDI go to the company in first country and its final products are exported to another – third country.
- A more complicated scheme is for complex vertical FDI (Baltagi et al., 2007; Blonigen et al.; 2007, Boubacar, 2016). In this case the production is divided into several stages (in the easiest case intermediate production is located in one country, final stage of production is in another country).
- Also there may be the spillover effect: FDI bring new technologies, help to develop a company, increase its competitiveness that leads to the entry to foreign markets. The next step is the increase in the competitiveness in the industry that stimulates the development of domestic firms and increases their export activity.

The empirical interdependence of FDI inflow and export activity of a host country is questionable. However in spite of the papers with no effect detected (e.g. Gur, 2013) there are investigations with strong evidence of their complementarity. For instance, Bouras and Raggad (2015) demonstrated positive effect of FDI on export from a recipient country and vice versa.

As a consequence, we may expect the effect of the export-oriented import substitution policy controversial to the main goal (there may be a self-contradiction): the reduction of import of intermediary goods or technologies reduce the incentive of investors and lead to the decline in FDI flow which prevents the rise of export of final goods.

In this research we investigate the ongoing process of FDI distribution in the regions of Russia on empirical regional data and understand how they are consistent with:

- import of materials and components;
- import of technology;
- capability to come into global markets, to export final production.

Additional point that will be taken into account is the possible agglomeration effect of FDI. The investigation is made on the regional level so the objects in the sample cannot be treated as totally independent. This idea is widespread and may be called “agglomeration effect” (e.g. Buccellato and Santangelo, 2009), “within-county effect” (e.g. Cusi and Resmini, 2013), “spillover effect”, “effect of third agents” or “third-country effects” (e.g. Baltagi et al., 2007), “spatial effect” (e.g. Blonigen, 2007; Ledyeva, 2009). This dependence may be treated as the investment climate in a region (the investment activity in neighboring regions).

## **Research hypotheses**

**Hypothesis 1.** The presence of FDI in region's enterprises in the food industry accompanies with the related to the food industry import activity of a region.

- a. The more FDI the region has the more there is the necessity to import resources and semi-manufactured goods;
- b. The more FDI the region has the more there is the necessity to import technology;
- c. The more the region can import the more attractive it is for foreign investors.

**Hypothesis 2.** The presence of FDI in region's enterprises in the food industry accompanies with the growth of the region's competitiveness in the industry and the activity of enterprises on global market.

- a. The more FDI the region has the more the possibility to export production;
- b. The more the region exports the more attractive it is for foreign investors.

**Hypothesis 3.** There is a dependence of the inflow of FDI and foreign trade related to the industry on the previous level of FDI activity in other regions (investment climate or investment potential).

## Statistics of FDI in Russia

Foreign investment is an important aspect of international economic activity. Therefore, the general definition of the term "foreign direct investment (FDI)", as well as the common accounting standards, makes it possible to create a complete picture of financial investment flows between economic agents in different countries.

Such studies are mostly empirical that involves the use of statistics. The methodology of data collection and calculation of the various indicators of foreign direct investment plays an important role, both in the nature of the results themselves and the possibility of further comparisons with the results obtained on the basis of a different set of data. It explains the need for a common accounting standards and statistics on uniform principles. General FDI performance system also allows us to offer versatile methods of working with such data.

Implementation of these principles is provided by a special document "OECD Benchmark Definition of Foreign Direct Investment" and a large section "Balance of payments and international investment position manual" of the International Monetary Fund. In addition to aggregated data for empirical studies provided on the basis of these documents the materials on United Nations Conference on Trade and Development (UNCTAD) are used. It provides statistics on the activities of transnational corporations (TNCs). However in the case of research in Russia there are difficulties with the comparability and understanding of the methodology, data completeness, reliability and sometimes even availability.

For the empirical study of foreign direct investment and foreign capital there is a need in the comments to the definition of FDI and refinement of the investigated aspects of FDI. Among the research question arose we can find the following:

- How much investment (in monetary units) was received during the period?
- How much investment (in monetary units) was accumulated to a certain point in time (that is "accumulated" of "stock" investment also needs clarification)?
- How many organizations received or realized FDI?
- How many organizations have ever received FDI and have a certain share of foreign capital or are completely foreign?
- Has as a particular organization received or made FDI?

Problems may arise as in the study of the nature and motivation of the FDI, and in the study of their effects and consequences. In this work the emphasis is placed on research of factors determining the inflow of FDI.

It is important to give an overview of the available and accessible data on FDI in Russia, to draw attention to the proper use of these data - the adequacy of the analytical tools as well as the correct interpretation of the results according to research problems and applied methods. It is necessary due to the possible consequences of incorrect handling of data - there is a bias in the estimates due to a number of reasons:

- Self-selection bias (when the researcher does not take into account the features of sampling process);
- "Measurement errors" and the wrong form of the model in the assessment of the model with the data that is not relevant within the problem.

At this stage, we solved the problem of systematization of the existing methodological approaches to FDI accounting and available data sources.

Data sources of FDI and related measures in Russia:

- Macro- and meso-level data
  - Central Bank of Russia – from 2014 (after the Federal law since 2013 the CB is the only institution that provide the statistical accounting of FDI). The quarterly data is available on the level of regions by types of economic activity, countries of investors' origin and types of investment. The industrial flows may be investigated only on country level. The statistics on industrial level for regions is available only until 2013. These data was provided by Russian federal state statistic service (Rosstat) and the only data that allow investigation FDI processes on industrial and regional level.
  - Rosstat also has indicators as the number of companies with foreign capital, measures of their economic activity but they do not allow direct analyzing FDI inflow.
- Micro-level data
  - RUSLANA Bureau VanDijk database, Fira Pro, SPARK Interfax. These data bases give information on capital structure on firm-level. So we can construct a variable "share of foreign capital in a company" or binary variable "presence of foreign capital" or the status if a company for location choice investigations (1 if the share of foreign capital in a company is more than 10%). These data may be aggregated to the regional or industry level however it will be the number of companies with FDI but not the inflow of investments.
  - Information on investment projects from web-sites of companies and other web-sources.

## Data used for analysis

The empirical analysis was made with the use of indicators of economic activity in Russian regions for the industry "Manufacture of food products and beverages". The source of data is Russian Federal State Statistic Service (Rosstat) and authors' calculations based on these. We used all the available data on FDI that restricted our sample to the panel for regions 79 regions of Russia from 2007 to 2013. The key variables of interest are shown in the following table 1:

| Variables of interest |                                                                      |
|-----------------------|----------------------------------------------------------------------|
| Accumulated FDI       | Accumulated FDI (from all partner countries and from offshore zones) |
| Spatial lag of        | Accumulated FDI from all partner countries in other regions          |

|                 |                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| accumulated FDI | $SpatialLag(FDI) = W \cdot FDI$ , where W is a spatial weighting matrix based on inverse squares of distances between capitals of regions |
| Inflow of FDI   | Received FDI (from all partner countries and from offshore zones)                                                                         |
| $Im_{Mat}$      | Expenses for the purchase of imported raw material and semi-manufactured goods for the production and sale of goods (works, services)     |
| $Im_{Tech}$     | Import of technology from foreign countries                                                                                               |
| $Exp$           | Shipped goods for export                                                                                                                  |
| Output          | Shipped goods of own production, works and services on their own                                                                          |

**Table 1 Variables of interest. Source: Rosstat**

## Design of the research

### Roadmap of the research

The empirical analysis of FDI factors on regional data at the level of one particular industry can be summarized as the following study road map:

- The primary analysis of original data - analysis of descriptive statistics, graphical analysis;
- Creating integrated indexes of investment attractiveness of Russian regions for a single industry;
- Clustering of regions;
- Investigation of statistical Granger causality among variables: export and import flows related with the industry and FDI;
- Estimation of the system of equations (the SUR - seemingly unrelated regressions, 3SLS);
- Checking for the necessity of taking into account the interdependence on estimated equations (if not necessary, further estimation is done for independent regression equations);
- Estimation of model on subsamples (based on identified clusters);
- Evaluation of the sensitivity of FDI to exports and imports (the importance of the factors);
- Construction and investigation of localization indices for FDI indicators and factors of interest (export, import of materials and technology);
- Study of the effects of FDI in the food industry in Russia according to the regional statistics

### Econometric analysis

Within clusters obtained we evaluated the system of equations. Each equation represents one regression with one of 4 dependent variables of interest. Thus, the robustness of results was tested and the differences in determinants of inward foreign investment in the food industry in Russia were identified in terms of the impact on the following values: the values of the accumulated FDI from all countries (total), inflows of FDI from all countries (total), volume of accumulated and inflow of "Net foreign" FDI (from countries not included in the list of offshore zones, according to the order of the Ministry of Finance of the Russian Federation). The rest of

the regression equations in the system have the variables of foreign trade as the dependent variables.

One of the most cited review papers - Faeth (2009) - allows you to get an idea about the evolution of approaches to the analysis of FDI. The work begins with the following ideas - empirical studies and theoretical models in. The paper noted that most of the factors affecting the implementation of FDI, have been identified yet in the early empirical work based mainly on interviews. This idea and the experience of a wide range of investigators who tested the possible determinants of FDI a long list of control variables should be included to avoid inconsistency of estimates because of missed variables. However such a list included to the model caused the problem of multicollinearity. So we constructed cumulative indices to solve this problem.

Therefore the additional explanatory variables in the regressions are the characteristics of the region, reflecting the potential motives of foreign investors, taking into account the specifics of the food industry. As control variables the values of investment attractiveness indices of the food industry (regional risk and potential, described above) were included.

To avoid problems of endogeneity and be able to talk about dependencies (at least in time sequence), covariates were taken for the period preceding the observation period of dependent variable.

The system was analyzed with two steps:

- 1) The first step was to assess the proposed system of equations to determine the feasibility of relationships for further meaningful research - a statistical study of Granger causality.

$$\begin{cases} FDI_t = \alpha_0 + \sum_{j=1}^2(\alpha_{1j} \cdot FDI_{t-j} + \alpha_{2j} \cdot Im_{Mat_{t-j}} + \alpha_{3j} \cdot Im_{Tech_{t-j}} + \alpha_{4j} \cdot Exp_{t-j}) + \varepsilon_t \\ Im_{Mat_t} = \beta_0 + \sum_{j=1}^2(\beta_{1j} \cdot Im_{Mat_{t-j}} + \beta_{2j} \cdot FDI_{t-j} + \beta_{3j} \cdot Im_{Tech_{t-j}} + \beta_{4j} \cdot Exp_{t-j}) + u_t \\ Im_{Tech_t} = \gamma_0 + \sum_{j=1}^2(\gamma_{1j} \cdot Im_{Tech_{t-j}} + \gamma_{2j} \cdot FDI_{t-j} + \gamma_{3j} \cdot Im_{Mat_{t-j}} + \gamma_{4j} \cdot Exp_{t-j}) + v_t \\ Exp_t = \delta_0 + \sum_{j=1}^2(\delta_{1j} \cdot Exp_{t-j} + \delta_{2j} \cdot FDI_{t-j} + \delta_{3j} \cdot Im_{Mat_{t-j}} + \delta_{4j} \cdot Im_{Tech_{t-j}}) + \mu_t \end{cases}$$

- 2) On the second step the system itself was estimated to determine the direction and strength of the relationship between foreign trade factors and FDI. The following general scheme was modified for each case, so the right parts of the equations are different. Also the test for interdependence of residuals was provided. If according to the result of a test the equations are independent and it is not necessary to estimate SUR, we switched to separate equations of the same form. The standardized coefficients are analyzed to determine the relative level of importance of each component.

$$\begin{cases} FDI_t = \alpha_0 + \alpha_1 \cdot FDI_{t-1} + \alpha_2 \cdot Im_{Mat_{t-1}} + \alpha_3 \cdot Im_{Tech_{t-1}} + \alpha_4 \cdot Exp_{t-1} + \alpha_5 \cdot FRisk_{t-1} + \\ \quad + \alpha_6 \cdot FPotential_{t-1} + \alpha_7 \cdot SpatialLagOfAccumulatedFDI_{t-1} + \varepsilon_t \\ Im_{Mat_t} = \beta_0 + \beta_1 \cdot FDI_{t-1} + \beta_2 \cdot Im_{Mat_{t-1}} + \beta_3 \cdot Im_{Tech_{t-1}} + \beta_4 \cdot Exp_{t-1} + \beta_5 \cdot FRisk_{t-1} + \\ \quad + \beta_6 \cdot FPotential_{t-1} + \beta_7 \cdot SpatialLagOfAccumulatedFDI_{t-1} + u_t \\ Im_{Tech_t} = \gamma_0 + \gamma_1 \cdot FDI_{t-1} + \gamma_2 \cdot Im_{Mat_{t-1}} + \gamma_3 \cdot Im_{Tech_{t-1}} + \gamma_4 \cdot Exp_{t-1} + \gamma_5 \cdot FRisk_{t-1} + \\ \quad + \gamma_6 \cdot FPotential_{t-1} + \gamma_7 \cdot SpatialLagOfAccumulatedFDI_{t-1} + v_t \\ Exp_t = \delta_0 + \delta_1 \cdot FDI_{t-1} + \delta_2 \cdot Im_{Mat_{t-1}} + \delta_3 \cdot Im_{Tech_{t-1}} + \delta_4 \cdot Exp_{t-1} + \delta_5 \cdot FRisk_{t-1} + \\ \quad + \delta_6 \cdot FPotential_{t-1} + \delta_7 \cdot SpatialLagOfAccumulatedFDI_{t-1} + \mu_t \end{cases}$$

Spatial lags are imposed to the model as a proxy to the investment climate in the area. Following the traditional approach to modelling spatial effects we use the spatial econometric tools to construct spatial lags of accumulated FDI in regions to control for the interdependence among regions in terms of FDI attractiveness and foreign trade incentive.

As a vector for all regions:

$$SpatialLagOfAccumulatedFDI_{t-1} = W \cdot AccumulatedFDI_{t-1}$$

As a component of a vector for region  $i$ :

$$SpatialLagOfAccumulatedFDI_{t-1,i} = \sum_{j=1}^N \omega_{i,j} \cdot AccumulatedFDI_{t-1,j}$$

$W$  – a spatial weighting matrix (here – inverse distance between capitals of regions),  $\omega_{i,j}$  – component of a matrix  $W$  (the value of the inverse distance between capitals of regions  $i$  and  $j$ ).

We need to clarify that we have data of a panel structure. But since the tests for fixed or random individual effects showed their insignificance, we estimate a model as for pooled data and the lagged dependent variable as a regressor did not cause inconsistency of estimates.

## Indices of regional investment risk and potential in the food industry

On this step of work we designed integral indicators of investment potential and investment risk for the inflow of FDI in the food industry of the Russian Federation regions. The construction was carried out on the basis of two groups of variables that reflect positive and negative correlation with FDI (the term "risk" is used for a group of factors presumably hindering FDI, the term "potential" - for the factors contributing to FDI). Indices are based on the principle similar to that used by the agency "Expert" for the creation of investment risk and potential indices of Russian regions - the indices are calculated from subindices for different aspects of influence on the investment attractiveness. Indicators included in the indexes are presented in Appendix 3. The method of constructing the indices is described in the Borzykh (2015).

The collected indicators for calculation indices are shown in Table 1.

| Record with a specialization in the industry                                                                                                                                                                    | Group (index) |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|
| The share of innovative products, works and services in the volume of shipped goods of own production, works and services on their own. According to the industry, "Manufacture of food products and beverages" | potential     | innovative |
| Retail turnover of food, beverages and tobacco                                                                                                                                                                  | potential     | consumer   |
| Profitability (unprofitability) of goods, products, works and services. According to the industry, "Manufacture of food products and beverages"                                                                 | potential     | industrial |
| Shipped goods of own production, works and services on their own. According to the industry, "Manufacture of food products and beverages"                                                                       | potential     | industrial |
| The structure of the gross regional product. Share of Section A "Agriculture, hunting and forestry" in the GRP                                                                                                  | potential     | resource   |
| Agricultural production in current prices (final data)                                                                                                                                                          | potential     | resource   |
| Sown area of agricultural crops                                                                                                                                                                                 | potential     | resource   |
| The share of profitable organizations. According to the industry, "Manufacture of food products and beverages"                                                                                                  | potential     | financial  |
| The share of loss-making companies according to the financial statements. According to the industry, "Manufacture of food products and beverages"                                                               | risk          | financial  |
| The average monthly nominal wage per employee for the full range of organizations. According to the industry, "Manufacture of food products and beverages"                                                      | risk          | economic   |
| Expenses for the purchase of raw materials, purchased semi-finished products                                                                                                                                    | risk          | economic   |



|                                                                                                                                                |      |          |
|------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| and components for the production and sale of goods (works, services). According to the industry, "Manufacture of food products and beverages" |      |          |
| The structure of the gross regional product. Share of Section D "Manufacturing" in the GRP                                                     | risk | economic |
| Cost of goods, products, works and services. According to the industry, "Manufacture of food products and beverages"                           | risk | economic |

**Table 2 Indicators of the functioning of the food industry and agriculture in the regions of Russia for constructing indices.**

Source: Rosstat

Clustering based on these indices allows us to select cluster of the Moscow city, Moscow region and St. Petersburg (which confirms the strong contrast of these regions to the rest of regions showed in the study of FDI indicators themselves). The main conclusion of this part of a study: the investment attractiveness of the food industry has no direct connection with the inflows of foreign investment to the region. It is reasonable to talk about the strong heterogeneity of the regions as FDI recipients in one sector, the general trends cannot be identified.

Finally we constructed four subsamples for the following estimation based on clusters. It is necessary to check the results for robustness and determine differences of some groups of regions:

- Whole sample (79 regions)
- Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions)
- Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions)
- Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions)

## Localization indices

Localization index (LI) is the ratio of the proportion of the area (region, group of regions) in the country in terms of one industry to proportion of the area in country in terms of all industries.

For a factor X the localization index is calculated by the following formula:

$$LI_r^X = \frac{X_r^i}{X_r^{all\_i}} \bigg/ \frac{X_{all\_r}^i}{X_{all\_r}^{all\_i}}$$

$X_r^i$  – Value of the factor X for the industry i in the area r (region, group of regions);

$X_r^{all\_i}$  – Value of the factor X across all sectors (all\_i) in the area r;

$X_{all\_r}^i$  – Value of the factor X for the industry i in the country as a whole (all\_r);

$X_{all\_r}^{all\_i}$  – Value of the factor X across all sectors (all\_i) in the whole country (all\_r).

The interpretation of the index: if the value of localization index for the factor X is greater than 1 it indicates that in the industry i of a selected group of regions r the indicator X is more important than it is for this group of regions in terms of all industries. For example, for the FDI it means that the investor is interested in the allocation of capital in sector i of this group of regions. Similar analysis can be done for the volume of shipped products and import of raw

materials in the food industry to identify the regions that are the most and the least active in comparison with the whole country and all sectors as a whole involved in this kind of foreign trade activities.

According to the calculated localization indices for FDI indicators, output and foreign trade three categories of regions were separated:

- "All periods  $LI > 1$  (no more than one period  $LI < 1$ ) " - characterizes the regions with a high level of activity throughout the observation period;
- "As usual,  $0 < LI < 1$ " - characterizes the regions where for almost all considered periods the factor has relatively small values, but not zero;
- "All periods  $LI = 0$  (no more than one period  $LI > 0$ ) " - characterizes the regions where the factor has zero values for the whole observation period.

## Empirical results

### Econometric analysis

According to Granger causality analysis the equations of the next step were corrected – some of the variables were excluded because of stable insignificant coefficients. In cases of questionable results they were held in a model. After this preliminary step we estimated the main system of regression equation for testing our hypotheses.

First main result of the estimation consists in the independence of regression equations. Therefore the estimation was made separately for each of them.

The FDI inflow is affected by the previous value of accumulated FDI. No spatial effect is observed of the accumulated FDI in previous period.

The effect of trade on FDI:

- For import of raw materials and intermediary goods positive and strongly significant coefficients are obtained for all the subsamples (with and without excluding offshore investment). The role of this factor is relatively substantial (in Appendix 2 the table with standardized estimated coefficients is presented).
- The import of technology also has a positive effect on FDI inflow but only for non-capital regions.
- Export of food production does not have any effect on FDI inflow.

The effect of FDI on import:

- The impact of the change in FDI is significant for the further inflow of import of resources for food industry only for subsamples with capital region. When Moscow city, Moscow region and Saint Petersburg are excluded from a sample the effect vanishes.
- For “true foreign” FDI the effect is questionable – the accumulated FDI stimulate import of resources for food industry, the received FDI reduce it. This may be a statistical phenomenon explained by high heterogeneous sample and jumping dynamics in figures on both variables. Another explanation consists in controversial dependences those give such a strange result after aggregation. Nevertheless, we cannot say that there is a strong interdependence between FDI in a previous year and future import of resources for food industry from foreign countries.
- The effect of FDI on import of technology is not observed for all the estimated models.

- Statistically significant spatial effect of accumulated FDI is observed for the future value of import of technology to non-capital regions. It is positive but relatively small.

The effect of FDI on export:

- Positive and quite large influence of accumulated and received FDI from all countries on export is observed for subsamples with capital regions. For the case of “true foreign” FDI the effect is much less and observed only for received FDI in the same subsamples. These results do not allow to say anything about strong interdependence for all regions but there is evidence of the absence of the interaction between FDI inflows and export of final production.
- In a subsample without non-active regions the effect of received FDI from non-offshore countries spatial effect of accumulated FDI is negative and is relatively small. This result is not robust and it only raises a question for the further investigations.

The interesting fact is that with excluding capital regions (Moscow city, Moscow region and Saint Petersburg) the estimated effect is bigger. The results for subsamples without capital regions are statistically worse (R-squared fell substantially). It means that the tendencies are different in the capital regions and in the rest country. It may be the sign that these regions are responsible for general results because of a big share in investigated values. It means that the future research of inward FDI in food industry should be provided on subsamples of regions or for each region separately.

The excluding of non-active regions (regions which did not receive FDI in the period 2007-2013 year) does not affect the result. Consequently the regions where the FDI inflow was zero can be modelled as the regions with nonzero foreign investment activity.

## **Analysis of localization indices**

Comparison of localization indices reveals the following patterns:

- There is a bit of regions where the level of FDI to the food industry is higher than the national average: 4-5 from 79 for the inflow of FDI, 10-13 of 79 for the accumulated FDI.
- There are no regions where FDI inflows and accumulated FDI are higher than the national average, when export and import of materials are zero.
- There are almost no regions that do not have significant amounts of FDI and high export (0-4 from 79).
- The lack of export takes place only in case of the absence or a low level of FDI (similar to import, but less obviously).
- The high level of import of raw materials in 28 regions out of 79 is combined with the lack of FDI and in 13 of 79 with no accumulated FDI. This suggests that the imported raw materials are used by a significant number of domestic enterprises and the decline in imports may affect them.
- Regions with high export activity that did not receive FDI are rare - 6 out of 79 regions, but high values of exports with zero accumulated FDI takes place in 18 regions.

The differences in the tendencies for the accumulated and received FDI suggests that the lack of FDI can be attributed to different causes and may be due to the specifics of particular regions. For example, historically the region can provide themselves with food industry products

(a niche in the market is occupied and the foreign investors are not interested in investing in that region - there is no accumulated FDI) and successfully export. There are also several regions where the import of raw materials is a substitute for attracting foreign capital - cooperation with foreign suppliers eliminates the region from attracting FDI, while it can be peculiar to Russian companies and companies with foreign investors who came before - the accumulated investment is nonzero.

If we divide all the regions into three groups according to the level of localization index (values of the index for the whole period under review are mostly zero; non-zero values but below the national average; values are in majority cases higher than the national average), it is possible to draw conclusions about how do FDI relate to foreign trade processes in food processing industry in these regions:

- A high proportion of exports of food industry products can be in regions where there are no FDI (Tambov region, the Republic of Adygea, Karachay-Cherkess Republic, the Altai Territory). This can be explained by the fact that in these regions a high proportion of exports of food products is due to the low level of exports of other goods; the share of output in this industry there is also more than the national average;
- The absence of exports can be observed in regions where there are no FDI (with the exception - the Jewish Autonomous Region), however, it can be accompanied by the import of raw materials, but not by import of technology);
- Import of raw materials and semi-manufactured goods for food industry and export of products can be observed in regions without both inflow and accumulated FDI. At the same time the share of output in food industry at these regions is typically lower than generally in Russia. Although there are regions where this share is higher – these are Republics where the access of foreign investors is limited because of the historical development traditions in production, specialization and isolation of the economies of these regions (Republic Adygea, Republic of Dagestan, Kabardino-Balkaria Republic).
- A high proportion of the food industry on the import of raw materials and semi-manufactured goods usually is accompanied by the high inflow of FDI or It takes place in regions with a great share of accumulated FDI (with the exception - Saratov area).
- Regions leading in FDI, as a rule, have been active in export activities and are the leaders in the share of food industry in the import of materials and semi-manufactured goods, and in some regions in the import of technology).

## Conclusion

Some persistent patterns may be noted: if the food industry in the region has high FDI figures, the export and import of raw materials will be intensive there (the share of the food industry, as a rule, is higher than the average for the region); leading positions of the food industry by the export of products combined with the lack of FDI is observed in the regions where export as a whole is small, so that the presence of such regions would not be the reason to proof the idea of the possibility of high export performance in the absence of FDI.

Econometric analysis gives controversial general results. However deeper investigation allows making some comments. Excluding from a sample of capital regions (City of Moscow, Moscow region and Saint Petersburg) has a great effect on the results. The hypotheses are more likely to be confirmed in these subsamples.

The only stable interconnection that was determined is the effect on previous import on FDI. The opposite dependence is true if we treat offshore investment as foreign.

Strict dependence of FDI and exports of industry and import of technologies for food production is absent. The mechanisms of the spread of FDI and these trade flows are different and have different tendencies. This is confirmed by the analysis of localization indices and econometric analysis of systems of regression equations. The hypotheses could be confirmed for some groups of regions while in general there is no definite tendency.

The analysis of localization indices also allows concluding that in the regions the relationship of foreign trade and FDI varies. However, in all regions it can be noted that this dependence is weak and, in particular, the role of FDI in production of the industry is small. This dependence is stronger in regions dominated by industries that need imported raw materials (usually relatively new subindustries for the Russian food industry, which have no sufficient raw materials in Russia).

There is almost no dependence on the FDI level in neighboring regions (spatial lag) except import of technology in noncapital regions (it can be explained as the proxy for investment climate of surrounding regions for future business).

This heterogeneity suggests the possibility of a successful import-substitution policy with future cooperation with foreign investors.

The general conclusion is that the inflow of import of raw materials attracts FDI and the restriction on this inflow may reduce the received foreign investment. But a further reaction of export on FDI is questionable and the reduction in FDI will not cause problems for the increase in export of food production (however for capital regions the negative effect may exist).

## References

- Baltagi, B. H., Egger, P., & Pfaffermayr, M. (2007). Estimating models of complex FDI: Are there third-country effects? *Journal of Econometrics*, 140(1), 260–281.
- Belderbos, R., Sleuwaegen, L., (1998). Tariff jumping DFI and export substitution: Japanese electronics firms in Europe. *International Journal of Industrial Organization*. 14 (5): 601-638.
- Blonigen, B. A., Davies, R. B., Waddell, G. R., & Naughton, H. T. (2007). FDI in space: Spatial autoregressive relationships in foreign direct investment. *European Economic Review*, 51(5), 1303–1325.
- Borzykh, D.A. (2015). Dynamic ranking of health in Russian regions on Rosstat data in 2005-2012. *Accounting and statistics*, 39 (3), 84-96. [Динамическое рейтинговое здоровья населения регионов РФ по данным Росстат за 2005–2012 гг. // Учет и статистика. 2015. Т. 39. № 3. С. 84-96.]
- Boubacar, I. (2016). Spatial determinants of U.S. FDI and exports in OECD countries. *Economic Systems*, 40 (1), 135-144
- Bouras, H., & Raggad, B. (2015). Foreign Direct Investment and Exports: Complementarity or Substitutability An Empirical Investigation. *International Journal of Economics and Financial Issues*, 5(4). Retrieved from <http://search.proquest.com/openview/c9357c99359e874f9f64888a9adf89f8/1?pq-origsite=gscholar&cbl=816338>
- Brainard, S.L. (1997). An empirical assessment of the proximity-concentration trade-off between multinational sales and trade. *American Economic Review*, 87 (4), 520–544.

- Buccellato T., Santangelo F. (2009). Foreign Direct Investments Distribution in the Russian Federation: Do Spatial Effects Matter? Economics Working Papers 99. London: Centre for the Study of Economic and Social Change in Europe, SSEES, UCL, 2009.
- Casi, L., & Resmini, L. (2014). Spatial complexity and interactions in the FDI attractiveness of regions: Spatial complexity in the FDI attractiveness. *Papers in Regional Science*, 93, S51–S78
- Clausing, K.A. (2000). Does multinational activity displace trade? *Economic Inquiry*, 38(2), 190–205.
- Co, Y.C. (1997). Japanese FDI Into the U.S. automobile industry: an empirical investigation. *Japan and the World Economy*, 9(1), 93–108.
- Connor, J. (1983). Determinants of FDI by Food and Tobacco Manufacturers.” *American Journal of Agricultural Economics*, 65, 394–404.
- Dunning, J., and A. M. Rugman. (1985). The Influence of Hymer’s Dissertation on the Theory of FDI. *American Economic Review*, 75, (2), 228–232.
- Eckholm, K., Forslid, R., & Markusen, J. R. (2007). Export-Platform Foreign Direct Investment. *Journal of the European Economic Association*, 5(4), 776–795.
- Faeth, I. (2009). Determinants of foreign direct investment a tale of nine theoretical models. *Journal of Economic Surveys*, Vol. 23. No 1, 165-196.
- Gopinath, M., D. Pick, and U. Vasavada. (1997). The Economics of Foreign Direct Investment and Trade with an Application to the U.S. Food Processing Industry. Seminar Paper, U.S. Dept. of Agriculture, Economic Research Service.
- Gopinath, M., D. Pick, and U. Vasavada. (1999). The Economics of Foreign Direct Investment and Trade With An Application To The U.S. Food Processing Industry. *American Journal of Agricultural Economics*, 81:442–452.
- Graham, E. M. (1996). *The Relationship Between Trade and Foreign Direct Investment in the Manufacturing Industry: Empirical Results for the United States and Japan*. Institute for International Economics, Washington, DC.
- Gur, N. (2013). Does Financial Integration Increase Exports? Evidence from International Industry-Level Data. *Emerging Markets Finance and Trade*, 49(s5), 112–129
- Hymer, S. H. (1976). *The International Operations of the National Firms: A Study of Direct Foreign Investment*. Cambridge, MA: The MIT Press.
- Jensen, C. (2002). Foreign direct investment, industrial restructuring and the upgrading of Polish exports. *Applied Economics*, 34(1), 207-217.
- Kojima, K. (1975). International Trade and Foreign Investment: Substitutes or Complements. *Hitotsubashi Journal of Economics*, 16, 1–12.
- Ledyaeva, S., Suomen Pankki (Helsinki), & Siirtymätalouksien tutkimuslaitos. (2007). *Spatial econometric analysis of determinants and strategies of FDI in Russian regions in pre- and post-1998 financial crisis periods*. Helsinki: Bank of Finland, Institute for Economies in Transition BOFIT. Retrieved from [http://www.suomenpankki.fi/bofit\\_en/tutkimus/tutkimusjulkaisut/dp/Documents/dp1507.pdf](http://www.suomenpankki.fi/bofit_en/tutkimus/tutkimusjulkaisut/dp/Documents/dp1507.pdf)
- Lubomudrov A.V. (2010). Foreign direct investment to China economy. *Russian politic herald*. No 2, 3-7.
- Marchant, M.A., Saghaian, S.H., Vicker, S.S. (1999). Trade and foreign direct investment management strategies for U.S. processed food firms in China. *The International Food and Agribusiness Management Review*, 2, 131–143.

Overend, C., J. M. Connor, and V. Salin. (1997). Foreign Direct Investment and U.S. Exports of Processed Foods: Complements or Substitutes” In S. R. Henneberry, ed., *Foreign Direct Investment and Processed Food Trade, Proceedings of the Conference of NCR-182 “Organization and Performance of World Food Systems* (pp. 31–56). Stillwater, OK: Oklahoma State University.

Pagoulatos, E. (1983). FDI in United States Food and Tobacco Manufacturing and Domestic Economic Performance. *American Journal of Agricultural Economics*, 65, 405–11.

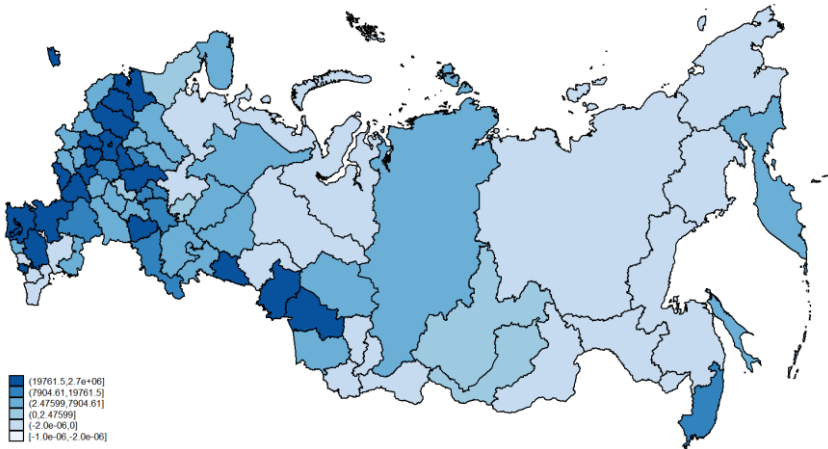
Pusterla, F., & Resmini, L. (2007). Where do foreign firms locate in transition countries? An empirical investigation. *The Annals of Regional Science*, 41(4), 835–856.

Walkenhorst, P. (2001). The geography of foreign direct investment in Poland’s food industry. *Journal of Agricultural Economics*, 52(3), 71–86.

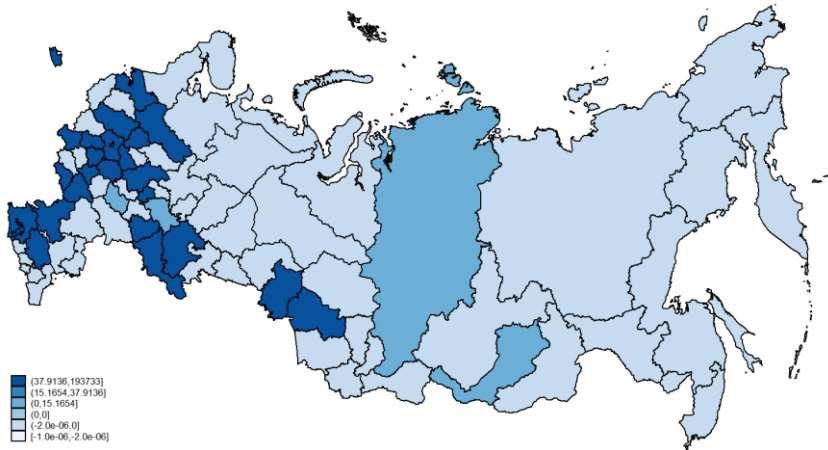
Wilson, N. (2006). Linkages amongst foreign direct investment, trade and trade policy: an economic analysis with applications to the food sector. In: Selected Paper Prepared for the Presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California.

# Appendix 1

## Quintile distribution of variables in Russian regions



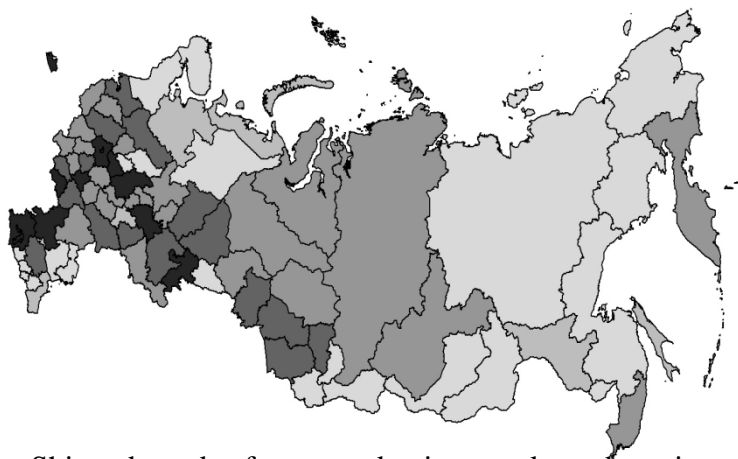
Accumulated FDI from all partner countries, 2013



Received FDI in from partner countries, 2013



## Quintile distribution of variables in Russian regions



Shipped goods of own production, works and services on their own, 2013



Shipped goods for export, 2013



Expenses for the purchase of imported raw material and semi-manufactured goods for the production and sale of goods (works, services), 2013



Import of technology from foreign countries, 2013

## Appendix 2

|                                                                                                                                            | Whole sample (79 regions)                    | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) | Whole sample (79 regions)                          | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>VARIABLES</b>                                                                                                                           | <b>Received FDI in all partner countries</b> |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>Received FDI except FDI from offshore zones</b> |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI in all partner countries (t-1)                                                                                             | <b>0.778***</b>                              | <b>0.777***</b>                                                                                          | <b>0.163*</b>                                                                                                                                               | <b>0.147</b>                                                                             |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Expenses for the purchase of imported raw material and semi-manufactured goods for the production and sale of goods (works, services, t-1) | <b>0.217***</b>                              | <b>0.219**</b>                                                                                           | <b>0.309***</b>                                                                                                                                             | <b>0.325***</b>                                                                          | <b>0.281***</b>                                    | <b>0.296***</b>                                                                                          | <b>0.369***</b>                                                                                                                                             | <b>0.385***</b>                                                                          |
| Import of technology from foreign countries (t-1)                                                                                          | <b>0.0409</b>                                | <b>0.0412</b>                                                                                            | <b>0.111***</b>                                                                                                                                             | <b>0.116***</b>                                                                          | <b>-0.0210</b>                                     | <b>-0.0225</b>                                                                                           | <b>0.161***</b>                                                                                                                                             | <b>0.167***</b>                                                                          |
| Shipped goods for export (thousand rubles, the value of the index for the year, t-1)                                                       | <b>0.0415</b>                                | <b>0.0367</b>                                                                                            | <b>0.135</b>                                                                                                                                                | <b>0.128</b>                                                                             | <b>0.0873</b>                                      | <b>0.0835</b>                                                                                            | <b>0.119</b>                                                                                                                                                | <b>0.112</b>                                                                             |
| Spatial lag of accumulated FDI in all partner countries (t-1)                                                                              | <b>-0.0451</b>                               | <b>-0.0500</b>                                                                                           | <b>-0.0301</b>                                                                                                                                              | <b>-0.0270</b>                                                                           |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI except FDI from offshore zones (t-1)                                                                                       |                                              |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>0.504***</b>                                    | <b>0.502***</b>                                                                                          | <b>0.211**</b>                                                                                                                                              | <b>0.202**</b>                                                                           |
| Spatial lag of accumulated FDI except FDI from offshore zones (t-1)                                                                        |                                              |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>-0.00629</b>                                    | <b>-0.00468</b>                                                                                          | <b>-0.0312</b>                                                                                                                                              | <b>-0.0271</b>                                                                           |
| Control variables                                                                                                                          | ...                                          | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      | ...                                                | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      |
| Observations                                                                                                                               | 395                                          | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      | 395                                                | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      |
| R-squared                                                                                                                                  | 0.733                                        | 0.726                                                                                                    | 0.391                                                                                                                                                       | 0.372                                                                                    | 0.609                                              | 0.602                                                                                                    | 0.396                                                                                                                                                       | 0.384                                                                                    |

Standardized coefficients; clustered standard errors; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

|                                                                                      | Whole sample (79 regions)                                                              | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) | Whole sample (79 regions)                                                              | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>VARIABLES</b>                                                                     | <b>Shipped goods for export (thousand rubles, the value of the index for the year)</b> |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>Shipped goods for export (thousand rubles, the value of the index for the year)</b> |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI in all partner countries (t-1)                                       | <b>0.241*</b>                                                                          | <b>0.258*</b>                                                                                            | <b>-0.0379</b>                                                                                                                                              | <b>-0.0431</b>                                                                           |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Received FDI in all partner countries (t-1)                                          | <b>0.213**</b>                                                                         | <b>0.212**</b>                                                                                           | <b>-0.0331</b>                                                                                                                                              | <b>-0.0374</b>                                                                           |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Spatial lag of accumulated FDI in all partner countries (t-1)                        | <b>-0.0300</b>                                                                         | <b>-0.0367</b>                                                                                           | <b>0.0110</b>                                                                                                                                               | <b>0.0129</b>                                                                            |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI except FDI from offshore zones (t-1)                                 |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>0.204</b>                                                                           | <b>0.216</b>                                                                                             | <b>-0.0468</b>                                                                                                                                              | <b>-0.0504</b>                                                                           |
| Received FDI except FDI from offshore zones (t-1)                                    |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>0.158*</b>                                                                          | <b>0.157*</b>                                                                                            | <b>-0.0125</b>                                                                                                                                              | <b>-0.0172</b>                                                                           |
| Spatial lag of accumulated FDI except FDI from offshore zones (t-1)                  |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>-0.0358</b>                                                                         | <b>-0.0429*</b>                                                                                          | <b>0.0133</b>                                                                                                                                               | <b>0.0163</b>                                                                            |
| Control variables                                                                    | ...                                                                                    | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      | ...                                                                                    | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      |
| Observations                                                                         | 395                                                                                    | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      | 395                                                                                    | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      |
| R-squared                                                                            | 0.882                                                                                  | 0.878                                                                                                    | 0.850                                                                                                                                                       | 0.838                                                                                    | 0.877                                                                                  | 0.873                                                                                                    | 0.850                                                                                                                                                       | 0.837                                                                                    |
| Standardized coefficients; clustered standard errors; *** p<0.01, ** p<0.05, * p<0.1 |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          |                                                                                        |                                                                                                          |                                                                                                                                                             |                                                                                          |

|                                                                                      | Whole sample (79 regions)                                                                                                                    | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) | Whole sample (79 regions)                                                                                                                    | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>VARIABLES</b>                                                                     | <b>Expenses for the purchase of imported raw material and semi-manufactured goods for the production and sale of goods (works, services)</b> |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>Expenses for the purchase of imported raw material and semi-manufactured goods for the production and sale of goods (works, services)</b> |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI in all partner countries (t-1)                                       | <b>0.114*</b>                                                                                                                                | <b>0.118*</b>                                                                                            | <b>0.0132</b>                                                                                                                                               | <b>0.0126</b>                                                                            |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Received FDI in all partner countries (t-1)                                          | <b>-0.0516</b>                                                                                                                               | <b>-0.0536</b>                                                                                           | <b>-0.0265</b>                                                                                                                                              | <b>-0.0277</b>                                                                           |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Spatial lag of accumulated FDI in all partner countries (t-1)                        | <b>0.00155</b>                                                                                                                               | <b>-0.000973</b>                                                                                         | <b>0.00611</b>                                                                                                                                              | <b>0.00417</b>                                                                           |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI except FDI from offshore zones (t-1)                                 |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>0.204**</b>                                                                                                                               | <b>0.213**</b>                                                                                           | <b>0.0184</b>                                                                                                                                               | <b>0.0179</b>                                                                            |
| Received FDI except FDI from offshore zones (t-1)                                    |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>-0.108***</b>                                                                                                                             | <b>-0.112***</b>                                                                                         | <b>-0.0489</b>                                                                                                                                              | <b>-0.0501</b>                                                                           |
| Spatial lag of accumulated FDI except FDI from offshore zones (t-1)                  |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>-0.00607</b>                                                                                                                              | <b>-0.0108</b>                                                                                           | <b>0.00751</b>                                                                                                                                              | <b>0.00518</b>                                                                           |
| Control variables                                                                    | ...                                                                                                                                          | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      | ...                                                                                                                                          | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      |
| Observations                                                                         | 395                                                                                                                                          | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      | 395                                                                                                                                          | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      |
| R-squared                                                                            | 0.928                                                                                                                                        | 0.925                                                                                                    | 0.899                                                                                                                                                       | 0.895                                                                                    | 0.933                                                                                                                                        | 0.930                                                                                                    | 0.900                                                                                                                                                       | 0.896                                                                                    |
| Standardized coefficients; clustered standard errors; *** p<0.01, ** p<0.05, * p<0.1 |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          |                                                                                                                                              |                                                                                                          |                                                                                                                                                             |                                                                                          |

|                                                                                      | Whole sample (79 regions)                          | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) | Whole sample (79 regions)                          | Sample of regions excluding regions which did not receive FDI in the period 2007-2013 year, (55 regions) | Sample of regions excluding the Moscow city, Moscow region, St. Petersburg and regions which did not receive FDI in the period 2007-2013 year, (52 regions) | Sample of regions without the Moscow city, Moscow region and St. Petersburg (76 regions) |
|--------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>VARIABLES</b>                                                                     | <b>Import of technology from foreign countries</b> |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>Import of technology from foreign countries</b> |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI in all partner countries (t-1)                                       | <b>-0.0369</b>                                     | <b>-0.0325</b>                                                                                           | <b>0.0643</b>                                                                                                                                               | <b>0.0648</b>                                                                            |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Received FDI in all partner countries (t-1)                                          | <b>0.105</b>                                       | <b>0.105</b>                                                                                             | <b>0.147</b>                                                                                                                                                | <b>0.149</b>                                                                             |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Spatial lag of accumulated FDI in all partner countries (t-1)                        | <b>0.0312</b>                                      | <b>0.0313</b>                                                                                            | <b>0.0598**</b>                                                                                                                                             | <b>0.0647**</b>                                                                          |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |
| Accumulated FDI except FDI from offshore zones (t-1)                                 |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>-0.0827</b>                                     | <b>-0.0823</b>                                                                                           | <b>0.0419</b>                                                                                                                                               | <b>0.0409</b>                                                                            |
| Received FDI except FDI from offshore zones (t-1)                                    |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>0.130</b>                                       | <b>0.131</b>                                                                                             | <b>0.197</b>                                                                                                                                                | <b>0.200</b>                                                                             |
| Spatial lag of accumulated FDI except FDI from offshore zones (t-1)                  |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          | <b>0.0417</b>                                      | <b>0.0436</b>                                                                                            | <b>0.0685**</b>                                                                                                                                             | <b>0.0751**</b>                                                                          |
| Control variables                                                                    | ...                                                | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      | ...                                                | ...                                                                                                      | ...                                                                                                                                                         | ...                                                                                      |
| Observations                                                                         | 395                                                | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      | 395                                                | 275                                                                                                      | 380                                                                                                                                                         | 260                                                                                      |
| R-squared                                                                            | 0.877                                              | 0.877                                                                                                    | 0.831                                                                                                                                                       | 0.834                                                                                    | 0.880                                              | 0.880                                                                                                    | 0.842                                                                                                                                                       | 0.844                                                                                    |
| Standardized coefficients; clustered standard errors; *** p<0.01, ** p<0.05, * p<0.1 |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |                                                    |                                                                                                          |                                                                                                                                                             |                                                                                          |

