OBSERVED AND UNOBSERVED REGIONAL DETERMINANTS OF FDI INFLOWS: MICRO LEVEL ANALYSIS OF THE FOOD INDUSTRY FIRMS IN RUSSIA

INTRODUCTION

Food industry plays a key role in each country. Moreover, the development of food industry is strategically important. That is why the process of globalization makes the problem of ensuring safe production vary important, especially while attracting foreign capital. Theoretically, the foreign capital inflow will help to renovate, modernize it and increase the productivity. But is it also interesting for foreign investors? What do foreign companies take into account when they invest in Russian food industry enterprises? Could it be special aspects of regional development (observed or unobserved) or only firm level data matters?

The main question is "In fact, what are the foreign investors intended to?" While investigation the FDI distribution in Russian food industry companies in this research we test a list of conceptual hypotheses to propose the explanation of existing mechanisms in this process.

THEORETICAL BACKGROUND

We follow the theoretical approach of two mechanisms of the FDI distribution:

- Hierarchical diffusion (when investors found new enterprises and create new projects in regions which already have FDI)
- Wave diffusion (when investors develop of new regions)

Within the framework of each of these mechanisms there could prevail different sorts of motives which move foreign investors. The four traditionally picked out are:

- resource-seeking
- market-seeking
- efficiency-seeking
- knowledge-seeking

FOOD INDUSTRY IN RUSSIA AS A PURPOSE OF INVESTMENT

Industries are heterogeneous in terms of purposes for foreign investors. This fact explains that different factors should determine the distribution of FDI among companies and regions. It leads to the idea of different models for different industries. Empirically it was also shown in (Banu Demir, Selin Sayek, 2008).

The food processing industry became a choice for the investigation owing to the following reasons:

- Leading position on the number of projects with FDI among other industries (according to Ernst & Young European Investment Monitor in 2011, Table 1)

Rank	Industry	Number of projects with FDI	Share in all projects	New jobs
1	Automobile industry	84	11%	17690
2	**Food processing industry**	**80**	**11%**	**9766**
3	Nonmetallic Mineral Mining and Quarrying	61	8%	3785
4	Chemical industry	57	8%	3169
5	Plant and equipment production	50	7%	1959
6	Transportation services	45	6%	294
7	Financial intermediation	43	6%	268
8	Professional services	29	5%	278
9	Production of plastics and synthetic rubber	29	4%	1914
10	Software engineering	25	3%	1284
	Other	227	31%	15379
	Total	740	100%	55786

Table 1 Projects with FDI in Russian industries from 2006 to 2010

- Fast-growing markets and those big sizes
- Possible long-term perspectives

This industry is interesting for foreign companies because of the access to a large sales market with effective demand, available resources and lower barriers and restrictions for technological processes and production itself.

This fact also make the problem of FDI attraction if food industry very important. It poses a question: will Russia benefit from that? Therefore the tendencies and potential consequences of transnational corporations should be analysed in terms of the correspondence with the "Doctrine of food security in Russian Federation" embraced in 2010. The key principles of this Doctrine are presence, availability (physical and economic), stability and safety for health. This investigation is made with an aim to understand whether these requirements are possible to be kept or a special policy should be pursued.

- Not strict dependence on resources (in comparison with other industries);
- A great number of firms (about 56 200 companies);
- A notable share of enterprises with more than 10% share of foreign capital;
- Homogeneity in terms of purposes of investment;
- Stability and law probability of technological leaps.

ELEMENTS OF SPATIAL ECONOMETRICS

Special econometric tools for this analysis are also proposed. The regional characteristics and the spatial lags (like factor of agglomeration, market potential and others) as determinants of the process are investigated in this research.

The spatial lags of regional variables are interpreted as characteristics of surrounding regions (in fact, all, but with weighting coefficients) to investigate the mechanism of wave diffusion in the FDI distribution.

EMPIRICAL ANALYSIS

To propose the answer for the research question on the first step the data on Russian food industry companies (from RUSLANA database, on 2009 and on 2012, correspondingly about 5000 and 7000 companies) and on Russian regions in general (from the Federal State Statistic Service and the paper by Schepina I.N. (2012) "Analysis of innovative activity in Russian regions: multilevel approach", 82 regions) are used for

- analysis of descriptive statistics of each sample (on 2009 and 2012);
- comparison of samples and investigation the dynamics;
- testing the conceptual hypotheses: to control the influence of determinants on the probability to have more than 10% of foreign capital in a company the hierarchical binary-choice models on a sample of Russian food industry companies are estimated.

HIERARCHICAL STRUCTURE OF DATA

The idea of taking into account is to model the following structure of data: the investigated subjects (firms) are included or nested in larger objects (regions or subindustries. Therefore we obtain two variants of 2-level structures.

Multilevel and hierarchical models allow to

- take into account more sophisticated relations;
- solve a problem of autocorrelation which is usual for hierarchical data (connected with the similarity of objects (firms) in one group (region or subindustry));
- obtain effective estimates in case of unbalanced data (in different regions there are different numbers of enterprises).

MODEL SPECIFICATIONS

The general binary model has a traditional form

$\mathrm{P}(fdi_i = 1) = F(Firm_i, Region_j)$, where

i — company,

j — Russian region where the company is registered;

$fdi_i = 1$, if share of foreign capital is 10% and more, $fdi_i = 0$ — otherwise;

$\mathrm{P}(fdi_i = 1)$ — probability to have foreign capital (10% and more);

$Firm_i$ — characteristics of a company;

$Region_j$ — characteristics of a region;

$F(Firm_i, Region_j)$ — distribution function of linear combination of characteristics.

As $F\ \cdot$ the logistic function is chosen: $F(z) = \frac{\exp\ z}{1+\exp\ z}$, where $z_i = \alpha + \sum_k \beta_k Firm_{ki} + \sum_l \gamma_l Region_{lj}$.

The logistic distribution function has an interpretation of $\frac{\mathrm{P}(fdi_i = 1)}{\mathrm{P}(fdi_i = 0)} = \exp\ \alpha \cdot \exp\left(\sum_k \beta_k Firm_{ki}\right) \cdot \exp\left(\sum_l \gamma_l Region_{lj}\right)$ as odds ratio – the sensitivity to the variation of investigated characteristics of regions.

The logical complexification of a model allows not only to display the regional and subindustrial heterogeneity but also to determine the regions where the effect of some factors is irregular or more tangible and to discover for which subindustries it is significant and in which tendencies are different.

I. Model with random effect α_j (regional or industrial) – intercept:
$\mathrm{P}\ fdi_i = 1\ = \mathrm{P}\ z_i > 0\ $, where
$z_i = \alpha + \alpha_j + \sum_k \beta_k Firm_{ki} + \sum_k \gamma_l Region_{lj} + \varepsilon_i$, $\alpha_j \sim N\ 0, \sigma_\alpha^2\ $, α_j – independent variables, uncorrelated with ε_i and with regressors.

II. Model with random effects (regional or industrial): α_j – intercept, γ_{lj} – slope coefficient preceding the tested regional variables:
$\mathrm{P}\ fdi_i = 1\ = \mathrm{P}\ z_i > 0\ $, where
$z_i = \alpha + \alpha_j + \sum_k \beta_k Firm_{ki} + \sum_l\ \gamma_l + \gamma_{lj}\ \ Region_{lj} + \varepsilon_i$, $\alpha_j \sim N\ 0, \sigma_\alpha^2\ $,
$\gamma_{lj} \sim N\ 0, \sigma_\gamma^2\ $, α_j и γ_{lj} — independent variables, uncorrelated with ε_i and with regressors.

RESULTS

PRELIMINARY ANALYSIS

The samples were firstly analyzed using descriptive statistics and other preliminary tools. One discovered idea should be pointed out. From two investigated samples we can make a panel of 3442 companies and two years (2009 and 2012). The analysis of the dynamics in the dependent variable shows in general the reduction in foreign participation if Russian food industry (in terms of quantity of firms with 10% of foreign capital and more). In 92 companies the FDI took place and remained; in 3223 companies there was stable no foreign capital; 14 companies obtained foreign capital and 113 companies lost it.

This result poses more questions and shows that the situation in the industry has changed a lot. Therefore the following steps of the research require deep analysis of samples.

ECONOMETRIC MODELING. 2009 YEAR SAMPLE

According to the results, the hierarchical diffusion of foreign investors is motivated by seeking of local market and by seeking of the efficiency through

- better transport infrastructure (lower transportation costs);
- better investment environment.

For the attractiveness in general there was found no dependence on

- Primary (agricultural) resources and agricultural production;
- GRP – a level of economic development or effective demand (if GRP is really a good proxy, but it is questionable; the better variable may be the density of hard-surfaced public roadways which is highly significant);
- Innovation potential.

When the investors develop new regions they take into account almost all the investigated regional characteristics. Besides transport infrastructure and investment environment of surrounding regions additionally was shown the significance of the following motives:

- Seeking of resources (positive effect of Return to sales in animal husbandry in neighboring regions);
- Seeking of knowledge and innovations:
    - "Active diffusors" as neighbors has a negative impact on probability to the FDI (strong competition because of import of innovations);
    - "Regions with locally concentrated innovations" as neighbors attract foreign investors;
    - "Quiet innovative regions" as neighbors attract the DFI
    - "Active innovators" as neighbors have no impact on the foreign investors.

These results are reasonable for almost all the most important subindustries (mostly for main and large subindustries). However, some exceptions are observed:

- For variables Return to sales in crop production and animal husbandry different (positive or negetive) effects for subindustries based on vegetative raw materials and raw materials of animal origin were obtained;
- Subindustries highly-sensitive to tested variables form 2 groups:
    - Large subindustries with a low level of foreign control, but attractive (e.g. processing and preserving of meat;

manufacture of sugar, cocoa, chocolate and sugar confectionery; manufacture of prepared animal feeds);

- Subindustries with a low level of foreign control because of administrative and other reasons (e.g. distilling, rectifying and blending of spirits).

ECONOMETRIC MODELING. 2012 YEAR SAMPLE

Estimation of these models confirms the contemplation of the changes in the food industry in Russia. Some other determinants become to be significant and for some the direction of the influence changes (from positive to negative and vice versa, but highly significant in both cases).

The most remarkable brief results:

- Density of hard-surfaced public roadways in a region of an investigated company and in neighboring ones is a strong attractor for the foreign capital (the importance of this determinant has no radical changes);
- The investment environment (the FDI inflows) and GRP positively affect the probability to have more than 10% of foreign capital;
- In case of investigating wave diffusion the results differ from the 2009 year sample: contrary to the questionable insignificance in some modifications of spatial lagged variables the FDI inflows and GRP negatively influence the dependent variable (owing to the bigger negative coefficient for some regions and subindustries the aggregated coefficient becomes signinficant and negative – probably the level of competition became stronger) and in some modifications the influence is positive;
- Resource-seeking motive also plays other role in comparison with 2009 year according to the obtained results:
- In case of taking into account subindustrial heterogeneity, bigger agricultural output leads to the outflow of foreign capital (in terms of spatial lagged variable also);
- The variable Cropped lands in all the modifications of a model is stably significant, the coefficient is always negative;
- There is a confirmation of the result for 2009: effect of Return to sales in animal husbandry in neighboring regions is still positive, but the effect for a region of the investigated country becomes negative in 2012.

CONCLUSION

In this research the question of interest was concerning to the determinants of the distribution of the foreign capital in Russian food industry companies.

According to the analysis based on the approach of four main motives of investors and two mechanisms of their distribution, transport infrastructure, size and the level of development of a market are the most important attractors. The food processing industry is heterogeneous itself: the resources in different subindustries influence the probability to have the foreign capital (positive, negative or zero).

The innovation activities in regions could not be noticed as important determinants but in some cases they have a negative impact or were used as proxies for the level of development and the situation in the economy of regions.

It is important to mention that in dynamics the scale and the direction of effects also changes. Between 2009 and 2012 significant modifying in motives and determinants of the foreign participation in Russian food industry took place. The more precise research could help to propose the explanation for these movements in the investigated process.

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