

GCPMED 2020
Global Challenges and Prospects of the Modern Economic
Development

FACTORS AFFECTING REGIONAL FOREIGN ECONOMIC
ACTIVITY IN RUSSIA

N. A. Zaychikova (a)*, N. P. Persteneva (b)

*Corresponding author

(a) Samara State University of Economics, Soviet Army Str., 141, Samara, Russia, zajna@yandex.ru

(b) Samara State University of Economics, Soviet Army Str., 141, Samara, Russia, persteneva_np@mail.ru

Abstract

This paper generates fresh insight into the growing role of the regional component in global economic activity. The relevance of the research is confirmed by the overall importance of foreign economic activity as a impact factor in the development of national production. Moreover, foreign economic activity represents a tool for acquiring competitiveness. This paper provides an important opportunity to advance the understanding of foreign economic as an important component of the financial and economic stability of the Russian Federation. The aim of the study is a quantitative assessment of the impact of the regional socio-economic indicators in Russian on the results of the regional foreign trade, its import and export. The research investigates socio-economic processes that are developing in the regions of the Russian Federation. The paper studies the influence of socio-economic factors on the results of foreign economic activity, import and export to the Russian Federation, taking into account regional characteristics. The problems of constructing panel data models that reflect the dependence of regional imports and exports on socio-economic factors are solved. Factors that significantly affect the results of foreign economic activity in the Russian Federation region are identified. The statistical and econometric methods, in particular, the analysis of panel data, are applied in this he study.

2357-1330 © 2021 Published by European Publisher.

Keywords: Econometric modeling, export, import, regional economy



1. Introduction

The regional component is an increasingly important area in global economic activity. There is an urgent need to address the role of the regional component in the overall growth of the foreign economic activity value as a factor of national production development, a tool for gaining competitiveness and an element of the financial-economic stability of Russia. The special role of foreign economic activity determines the need for its analytical support, statistical information processing, and the use of economic and mathematical modeling methods. Based on the analysis of the main trends in the external economic activity of the regions of the Russian Federation, the conclusion was made that the parameters of socio-economic development have a significant impact on the foreign economic activity of the region. Therefore, they were taken as the basis for the study. A natural obstacle that limits the use of econometric modeling methods is the interdependence of socio-economic indicators of the region and the difficulty of identifying the main impact factors.

Mathematical and methodological support of an indicative approach to assessing the effectiveness of foreign economic activity was considered as one of the prerequisites for the work. The factors selected for this work are taken from the socio-economic statistics of the regions of the Russian Federation. Based on the analysis of the current situation, it is relevant to study the system of socio-economic indicators that reflect and characterize the foreign economic activity of the region in terms of import and export separately.

2. Problem Statement

Extensive research has shown the importance of studies on the efficiency factors of the regional economy and forecasting its development. However, up to now, the issues of quantitative and statistical assessment of this sector of the economy (including in the Russian Federation) have been paid far too little attention to. Since this study is based on statistical and econometric tools, it has been focused on the previous research carried out in this direction.

The most general approach is implemented in the paper (Melecky, 2017), where the authors suggest evaluating the region's development potential based on their own composite index. The regional policy based on an assessment of regional resources and capabilities represents the key factor affecting capacity. The author's methodological tools, including the formation of individual and integral indicators, are implemented in the work (Zhukov, 2018). The harmonic factor offered by the author acts as a measure for the balance of regional socio-ecological and economic systems development. Hypothetically, it should be closely related to the gross regional product (GRP). This approach was tested on statistical evidence from the regions of the RF Central Federal District.

A significant cohort of scientists uses the rate of economic growth as the main indicator of the effectiveness of the regional economy. They apply a wide range of factor variables. Namely, in the study Bazueva and Radionova (2020), methods of econometric modeling revealed a significant statistical relationship with the socio-demographic indicators of the region (life expectancy, mortality, education level, and population morbidity). The innovation factor using panel data is studied in detail in the paper (Rastvortseva, 2016). It is detailed with the indicators of patent activity and the number of people with higher education. The paper Balash et al. (2020) analyzes sigma- and beta- convergence at the regional

level. The authors conclude that the priority belongs to the impact of the region's geographical location in comparison with the factor of its industry specialization. Moreover, this conclusion applies not only to the rate of economic growth, but also to the investment activity of the region.

Another group of authors examines the foreign economic activity of Russian regions. Among the significant factor indicators, the authors noted the number of people employed, the cost of fixed assets, and the sectoral structure of the regional economy (Fedorenko et al., 2019; Zaychikova, 2020). Methods of time series analysis, forecasting, and multi-factor econometric models were used in the research. A similar study on the regions of the Eurasian Economic Union (EAEU) countries, supplemented by an analysis of structural changes, was conducted in (Gomon & Belenkaya, 2019).

Some studies are narrowly focused on a single group of factors. For example, the study of the impact of the production and infrastructure factor on the level of economic development (Baskakova & Malafeev, 2016) using econometric analysis based on the production function can be mentioned. Besides, the study of the relationship between state support measures and resource support for innovative developments in the regions (Donichev et al., 2018), performed using the methods of factor and correlation analysis, also belongs to this research domain. The authors suggest to identify factors that significantly affect the indicators of regional foreign economic activity and evaluate models that can be used to build forecasts of its results. They apply mathematical and statistical methods and using the panel data analysis methodology.

3. Research Questions

This paper quantitatively assesses how the factors of socio-economic development of Russian regions impact the results of the regions' foreign trade, import and export. Specifically, the study assesses socio-economic processes taking place in the regions of the Russian Federation. Surprisingly, there is a certain lack of research on comprehensive statistical analysis of regional development factors in the Russian Federation. In particular, there are practically no works devoted to foreign economic activity at the regional level. It has not been sufficiently studied, what factors are essential for the development of imports and exports. The question, why some regions actively cooperate with other countries, and others do not, is remained unstudied. Our research aims at partially bridging this gap.

4. Purpose of the Study

This study therefore set out to study the influence of socio-economic factors on the results of foreign economic activity in general. In particular, the focus is set on the import and export of Russian regions.

To achieve this goal, the following issues should be tackled:

- to conduct a theoretical study and formulate hypotheses about the impact of socio-economic factors on the import and export of Russian regions;
- to collect and group statistical data for further processing;
- to build panel data models that reflect the dependence of regional imports and exports on socio-economic factors;
- to choose the best statistical quality models from the panel data models;

- to confirm or reject theoretical hypotheses about the influence of socio-economic factors on regional indicators of foreign economic activity.

5. Research Methods

General scientific, statistical and econometric methods were used in the study. General scientific methods include analysis and synthesis. The analysis revealed regional peculiarities of foreign economic activity. Using synthesis, the common features of import and export at the regional level were determined. Statistical methods were used to group the data. Econometric methods were applied for modelling. In particular, the analysis of panel data was carried out with econometric methods. Calculations were performed using the Gretl econometric package.

6. Findings

For analysis, data were collected for 84 regions of the Russian Federation. They were obtained from the Federal State Statistical Service (Federal State Statistical Service, 2020). The paper considers import (IM) and export (EX) by regions of the Russian Federation in US dollars as endogenous variables. Exogenous variables that characterize changes in imports and exports are represented with 13 socio-economic factors for 2017 and 2018. The absolute values of these factors for the considered periods are taken. The research is based on the construction of panel data analysis models. The approach of building panel data models with fixed effects (cross-section FE – cross-section fixed effects) was used. This approach is based on the introduction of individual effects that allow excluding the influence of an unobserved variable (constant in time) and get unbiased estimates of parameters. The FE model assumes the introduction of dummy variables for sample, and coefficients for dummy variables give estimates of individual effects. The main hypothesis of the study is that imports and exports have a pronounced regional specific nature; therefore, a model with fixed effects is best suited for describing such data.

The main part of the study is preceded by an analysis of atypical observations in the data set under study. To improve the quality of the initial empirical data in order to obtain reliable results of statistical research, the resulting indicators of the activity of the subject of the Russian Federation, import and export of the region, were tested for the presence of atypical values. Thus, based on the results of the analysis for atypical observations, a statistical array was obtained that includes 79 spatial objects. Table 1 demonstrates the description of the socio-economic indicators tested in the study.

Table 1. The description of the socio-economic indicators

Exogenous (explanatory) variable	Variable	Unit of measure
Average annual number of employees	L1	thousand people
Average monthly nominal accrued salary of employees of organizations	L2	rub.
Per capita monetary income of the population	PLL1	rub.
The volume of goods produced and shipped, works performed and services provided (mining)	EXTR	mln.rub.
The volume of goods produced and shipped, works performed and services provided (processing)	MF	mln.rub.
Fixed assets	PR1	bln.rub.

Agricultural products	PR2	mln.rub.
Net financial result (profit minus loss) in the economy	PR3	mln.rub.
Retail turnover	TR	bln.rub.
Investment capital	I	bln.rub.
Formation of the residential premises total area	INFR1	thousand sq. meters
Consumer price index	PLL2	%
Density of public roads per 1000 km ² of territory	INFR2	km

Source: authors.

As a result of the research, panel data models with fixed effects were built for import and export. Estimates of model parameters for import and export are shown in Tables 2 and 3 respectively.

Table 2. Estimates of model parameters for import

Explanatory variable	Coefficient	Standard error	t-statistics	P-value
const	-262,157	433,311	-0,605	0,5469
EXTR	-0,007	0,002	-2,719	0,0081
MF	0,005	0,001	3,968	0,0002
I	3,145	1,723	1,825	0,0719

Source: authors.

Table 3. Estimates of model parameters for export

Explanatory variable	Coefficient	Standard error	t- statistics	P-value
const	-7124,300	2281,190	-3,123	0,0025
L1	6,960	3,268	2,130	0,0363
MF	0,007	0,003	2,696	0,0086
PR3	0,011	0,006	2,007	0,0482
I	9,830	4,674	2,103	0,0387

Source: authors.

Estimates of regression coefficients for variables in both models are significant according to the Student criterion at a significance level of 5%, except for the coefficient for variable I-investment capital in the import model, which is significant at 1% significance level. The hypothesis about the presence of fixed effects was tested for both models, and the following results were obtained: test statistics Welch F (78, 26.8) = 245.89, p-value = P (F(78, 26,8) > 245,89) = 4,29196 e-027, which is less than any acceptable level of statistical significance. And that allows accepting the null hypothesis that there are fixed effects for the import model. Test statistics Welch F (78, 26,9) = 113,624, p-value = P(F(78, 26,9) > 113,624) = 9,49424 e-023, which is less than any acceptable level of statistical significance. And that allows accepting the null hypothesis that there are fixed effects for the export model. The import model includes the volume of shipped goods of own production and services performed in-house, for mining and processing industries. The coefficients for these variables have different signs, which could be caused by the state policy to increase the share of exports of manufacturing products, including exports of high-tech goods. In 2018, export growth to the Russian Federation was achieved within many types of products, and non-primary exports were also growing quite dynamically (Gomon & Belenkaya, 2019). In such circumstances, the increase in the volume of shipped goods of own production and of services made by mining, leads not to

an increase in exports but demonstrates an increase in the manufacturing industry and private consumption. That can give a weak inverse relationship under the total increase in exports.

The following conclusions were made based on the coefficients of the import model: with increasing mining by 1 million rubles the import will decrease on average by 0.007 million rubles rebus sic stantibus; by increasing the volume of shipped goods of own production, works and services provided domestically by 1 million imports will increase on average by 0.005 million rebus sic stantibus; with the increase in investment by 1 billion imports will increase by an average of 3.145 million rebus sic stantibus. The coefficients of the constructed model for export show that an increase in the average annual number of the population employed by 1 thousand people the regional exports will increase by an average of 6.96 million rebus sic stantibus; by increasing the volume of shipped goods of own production, self-provided works and services by 1 million rubles the region's exports will increase at a rate 0.007 million rebus sic stantibus; the increase in the net financial result (profit minus loss) in the economy by 1 million rubles the regional exports will increase by an average of 0.011 million rebus sic stantibus; with an increase in investment by 1 billion rubles, imports will increase by an average of 9.83 million dollars rebus sic stantibus.

7. Conclusion

Based on the findings from the study, the conclusion can be made that the main hypothesis was confirmed, i.e. foreign economic activity has pronounced regional characteristics. Regions differ significantly in terms of import and export volumes. Significant influence of the volume of mining and shipped goods of own production, works and services performed by own forces, investments on regional imports was revealed. It also should be noted that there is the significant impact of the average annual number of employees, the volume of goods shipped, works and services provide, the net financial result (profit minus loss) in the economy, and investment on regional exports. Therefore, this confirms the fact that Russian exports are mainly represented by raw materials. Positive values of coefficients in models indicate a direct relationship of variables. This suggests that regions with high employment, large investment volumes, and efficient businesses are active players in the foreign market.

Acknowledgments

The reported study was funded by RFBR and FRFC according to the research project № 19-510-23001.

References

- Balash, V., Balash, O., & Faizliev, A. (2020). Economic growth patterns: Spatial econometric analysis for Russian regions. *Information*, 11(6), 289.
- Baskakova, I., & Malafeev, N. (2016). The impact of infrastructure capital on regional economic development and performance: New evidence from Russian regions. In *Proceedings of the 3rd International Multidisciplinary Scientific Conference on Social Sciences and Arts, SGEM 2016* (pp. 769-776). Stef92 Technology Ltd.
- Bazueva, E. V., & Radionova, M. V. (2020). Econometric assessment of social indicators' influence on the regional economic growth dynamics (case study of the subjects of the Volga Federal district). *Economic and Social Changes-Facts Trend Forecast*, 13(2), 56-70.

- Donichev, O.A., Fraimovich, D. Yu., & Grachev, S. A. (2018). Regional system of economic and social factors in the formation of innovation development resources. *Economic and Social Changes-Facts Trend Forecast*, 11(3), 84-99.
- Federal State Statistic Service (2020). Foreign trade. <http://www.gks.ru/folder/11193>
- Fedorenko, R. V., Czegledy, T., & Zaichikova, N. A. (2019). Development of foreign economic activity at the regional level: Impact factors modeling. *Central European Researchers Journal*, 5(1), 64-72 .
- Gomon, I. V., & Belenkaya, E. G. (2019). Analysis of the foreign economic activity of the Russian Federation in 2016-2018. *Journal of Economy and Business*, 4-1, 81-84.
- Melecky, L. (2017). Review of relevant approaches for evaluation of development potential: Use for the EU regions. In A. Kocourek (Ed.), *Proceedings of the 13th International Conference on Liberec Economic Forum* (pp. 78-86). Technical Univ Liberec.
- Rastvortseva, S. (2016) Impact of the innovations on regional growth over time: Dynamic econometric modeling. In M. Lukes, J. Misar, J. Mares, O. Dvoulety, M. Spacek, & I. Svobodova (Eds.), *Proceedings of the 4th International Conference on Innovation Management, Entrepreneurship and Corporate Sustainability (IMECS)* (pp.621-633). Vysoka Skola Ekonomika & Praze.
- Zaychikova, N. A. (2020). Multifactor econometric export models of the Russian Federation region. *Bulletin of the Altai Academy of Economics and Law*, 1(7), 96-101.
- Zhukov, R. (2018). Economic assessment of the development level of the central federal district regions of the Russian Federation. *Econometric Approach Statistika – Statistiks and Economy Journal*, 98(1), 53-68.