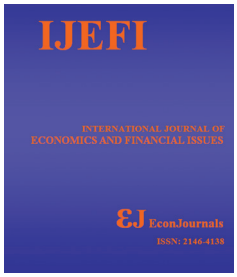

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Econometric Estimation of Bilateral Transboundary Trade between Russia and China

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ABSTRACT

The article focuses on the estimation of bilateral transboundary trade between Russia and China. The authors have suggested a hypothesis about the factors, which influence trade flows between the countries involved in trade relations. The research has resulted in a multiplicative model of the dependence of trade flow intensity upon several factors. Empirical estimation has shown that the coefficients used with the main variables of the model are relevant, thus proving the theoretical significance of the model. In the course of this research, the authors have concluded that the size of countries' economies and their membership in the World Trade Organization determine the intensity of trade flows between the countries.

Keywords: Transboundary Trade, Trade Flows, Gravity Model, Multiplication Model, Trade Turnover
JEL Classifications: F12, F17

1. INTRODUCTION

Current applied research works particularly focus on the problems of international cooperation between countries (Novy, 2013) including the trade relations between their cross-border regions (Martinez-Zarzoso, 2009, Anderson and Wincoop, 2003). Global experience shows that transboundary cooperation is the most significant trigger of international economic relations.

In the majority of countries, transboundary trade is instrumental in structural changes in national economies and internal markets, primarily in cross-border regions, due to increased volumes and efficiency of bilateral export/import operations (Simonovska and Waugh, 2014). Economic cooperation within transboundary trade has to concentrate on the efficient use of local resources and advantages on the one hand, and on the development of transboundary cooperation on the other hand (Livandovskaya and Tyurina, 2005). Rational use of the advantages granted by transboundary location triggers development of even the least prospective regions (the ones that may not seem prospective).

The relevance of estimating the intensity of trade flows is determined by the necessity of developing the principles of coordinated foreign trade policy with due consideration of national programs of export/import policy (Disdier and Head, 2008; Liu and Xin, 2011). The question at issue is to discover the factors that define trade flows between the countries involved in trade relations.

In order to find the answer to this question, the authors have conducted an empirical research of the transboundary trade between Russia and China.

Russia and China are two major neighboring nations; they have always been viewing each other as important strategic trade partners. In 2014, China became the leading foreign trade partner of Russia: Russian export into China accounted for 41.6 billion US dollars; the import volume comprised 53.7 billion US dollars.

The article (Tinbergen, 1962) was one of the first estimations of transboundary trade. The author used a gravity model of foreign trade: According to the author of the article, this simple model

connected the volume of export from one country into the other with the following explicative variables: Gross domestic product (GDP) of the exporting country, GDP of the importing country, and a geographical distance between the countries.

The authors selected these variables for explanation of export volumes for the following reasons: The volume of exported goods supplied for international exchange by a country depends on the size of its economy (GDP); the amount of goods to be sold in a country depends on the size of its market (GDP); trade volumes are also supposed to depend on the transportation cost, which is proportional to the distance between the countries involved. The author also added dummy variables for participation of partner countries in various trade agreements.

The following research works were the first to apply this model, though without a reliable theoretical justification: (Poyhonen, 1963; Prewo, 1978; Abrams, 1980).

In the course of our research, we have also reviewed the contemporary works, which focused on estimation of the gravity model of foreign trade in Russia (Kaukin, 2013, Oydup, 2011), in the BRICS countries (Troyekurova and Pelevina, 2014), in Central Asia (Pomfret, 2005), in the EU (Viorica, 2015), in the EAEC (Mogilat and Salnikov, 2015), and in Malaysia and OIC countries (Abidin, 2013).

We have also studied the peculiarities of constructing a gravity model in the following situations: Trading monopolistically competitive goods (Mishura, 2012), foreign trade quotas (Ulengin, 2015), specialization (Caporale, 2010, Anderson and Wincoop, 2004), patents (Picci, 2010), and economic crisis (Kahouli and Maktouf, 2015).

2. CONCEPT HEADINGS

Based on the Tinbergen gravity model and its structure and application, we have developed a multiplicative model of transboundary trade, using the variables from a gravity equation.

A working hypothesis of the current research is that the GDP and World Trade Organization (WTO) membership are the major determinant factors of trade flows between Russia and China.

We have assumed that the size of the exporter's economy is positively correlated with its production capacities and, consequently, has a positive effect on the intensity of trade flows, which can potentially be directed into the destination regions. Hence, we have expected to get a relevant positive coefficient with the variable being the GDP of an exporter country.

The size of the importer-country's economy is in its turn a characteristic feature of its internal market and reflects the volume of demand for the imported goods. Thus, we have expected that the intensity of commodity flow will be directly proportional to the volume of importer-country's economy. Therefore, we have assumed that the coefficient will be positive with the GDP of the importer country.

In our research, we have also checked the assumption that a membership in WTO influences the intensity of commodity flows between the countries involved. Hence, we have expected to get a positive relevant coefficient with the variable being the WTO membership of the country involved in trade relations.

The article uses the model of dependence of the trade flow intensity between the countries and export/import of the country on the volume of GDP. The multiplicative model is as follows:

$$E = a_0 Y_1^{a_1} Y_2^{a_2}, \quad (1)$$

Where E - is a unilateral trade flow from one country into the other; a_0 - an invariable; Y_1 - per capita GDP in Russia; Y_2 - per capita GDP in China; a_1 - elasticity of export(the exporter-country's GDP); a_2– elasticity of export(the importer-country's GDP). In order to define the dependence of bilateral export flown the GDP, the model has been applied in two aspects - separately for Russia and for China and their export flows.

In order to estimate the significance of WTO membership, we suggest dummy (Baldwin and Taglioni, 2006) variables D_1 for Russia and D_2 for China, which equal to 1 if a country is a member of WTO, and equal to 0 if a country is not a member of this organization. In this case, the model will be as follows:

$$T = a_0 Y_1^{a_1} Y_2^{a_2} e^{\gamma_1 D_1} e^{\gamma_2 D_2}, \quad (2)$$

Where, E is a bilateral commodity volume.

The models are negated by applying logarithms to the left and right sides:

$$\ln(E) = \ln(a_0) + a_1 \ln(Y_1) + a_2 \ln(Y_2), \quad (3)$$

$$\ln(T) = \ln(a_0) + a_1 \ln(Y_1) + a_2 \ln(Y_2) + \gamma_1 D_1 + \gamma_2 D_2. \quad (4)$$

The research is based on the data on the commodity turnover between Russia and China, and average per capita GDP in Russia and in China in 1992-2013. All information was obtained from official sources, such as the World Bank's website and the portal of Ministry of Economic Development of the Russian Federation. Figures 1 and 2 show the dynamics of empirical data.

3. RESULTS

The research work involved constructing the models of commodity flow intensity for Russia and China, as well as the model, which includes a dummy variable. The R^2 coefficient of determination serves as quantitative indicator of the models' validity: This coefficient shows a share of dispersion explained by this model in the total dispersion. Table 1 shows the results of regression estimation via the least-squares method in the econometric views package.

Results of the first two models can be described as follows: The explanatory force of the models is significant. The coefficient determinants equal to 0.96% in both cases. It means that 96%

of the trade is determined by the selected factors. Positive coefficients with GDP variables confirm the hypothesis about the dependence of trade flows on the GDP of the countries involved in trade relations. The equations of dependence and coefficients of regression are statistically relevant.

If the average per capita GDP in Russia goes up by 1% against its average values, the export from Russia into China increases by 0.289%. If the average precipitate GDP in China goes up by 1%, the Russian export into China increases by 0.763%.

Figure 1: Dynamics of commodity turnover between Russia and China in 1992-2013, million US dollars

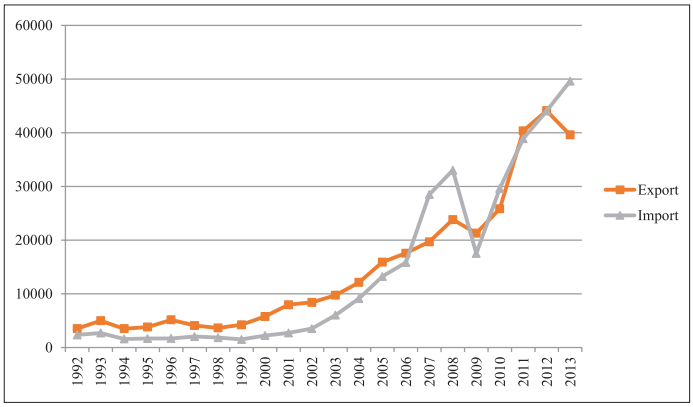
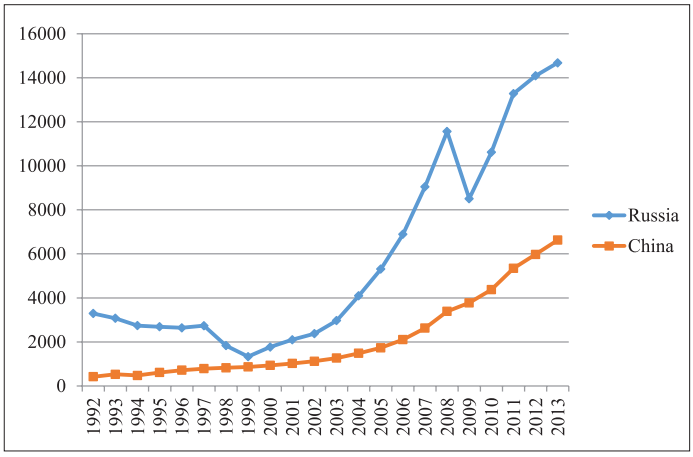


Figure 2: Dynamics of the average per capita Gross domestic product in Russia and in China in 1992-2013, US dollars



If the average per capita GDP in Russia goes up by 1% against its average values, the import from China into Russia increases by 0.908%. If the average precipitate GDP in China goes up by 1%, the import from China into Russia increases by 0.715%.

These data confirm that the GDP of an exporter country reflects its production capacities; the GDP of an importer country shows the capacity of its market. In general, these two variable are directly proportionate to the trade volumes. Table 2 shows the influence of these factors on the intensity of trade flows.

Effect of the first factor shows a more efficient use of increased production capacities in China and its better planned industrial policies. Effect of the second factor confirms that the Russian market is saturated with imported Chinese goods faster than the Chinese market is saturated with Russian goods. It is obviously explained by the fact that Russian export is mostly focused on raw materials and not on finished products and goods.

Results of the third model can be explained as follows: The explanatory force of model is also significant. The determination coefficient is equal to 0.99.

China has been a member of WTO since 2001; Russia - since 2012. Inclusion of dummy variables allows estimating the effect of WTO membership, which is seen, for example, in the intensity of transboundary trade. The dependence equation and coefficient of regression are statistically relevant. The relevance of coefficient with the γ_2 dummy variable for China confirms the assumption about a significant connection between the intensity of trade flows and WTO membership. The annual commodity turnover between China and Russia became on average by $e^{0.447} \approx 1.56$ times higher after China joined the WTO. Inclusion of the D_1 variable has proved irrelevant for Russia. The reasons for that can be as follows: First, the effect was insignificant due to the weakening of the ruble and global economic instability.

4. CONCLUSION

The research involved estimation of the constructed theoretical model of the dependence of trade flow intensity on several factors, including the model with a dummy variable. Based on the type of

Table 1: Bilateral trade between China and Russia

Model	Variable	Value (t-statistics)	Equation of dependence	Coefficient of determination R^2 (F-value)
Export flow	a_0	3.444 (2.74)*		0.96 (237.77)*
	a_1	0.289 (2.60)*	$E = 3.444 Y_1^{0.289} Y_2^{0.763}$	
	a_2	0.763 (7.81)**		
Import flow	a_0	0.018 (6.28)**	$E = 0.018 Y_1^{0.908} Y_2^{0.715}$	0.96 (256.70)**
	a_1	0.908 (5.75)**		
	a_2	0.715 (5.155)**		
With dummy variable included	a_0	2.706 (2.45)*		0.99 (449.45)**
	a_1	0.546 (6.87)**		
	a_2	0.537 (6.44)**	$T = 2.706 Y_1^{0.546} Y_2^{0.537} e^{0.447 D_2}$	
	γ_2	0.447 (4.82)**		
	γ_1	Inclusion of variable is statistically irrelevant		

*Significant at 5%, **Significant at 1%.

Table 2: Dependence of trade flow intensity on the following factors

Cause	Country	Effect
Increase in the exporter-country's production capacity by 1%	Russia	Increase in the commodity flow from Russia into China by 0.289%
	China	Increase in the commodity flow from China into Russia by 0.715%
Increase in the importer-country's market capacity by 1%	Russia	Increase in the commodity flow from China into Russia by 0.908%
	China	Increase in the commodity flow from Russia into China by 0.763%

the theoretical model, a method of least squares has been used for its estimation. The value of model's coefficients, obtained in the course of econometric estimation, is consistent with the theoretical hypotheses suggested.

The following conclusions can be made based on the research results: First, a GDP is a significant factor, which determines trade flows between countries. The GDP of an exporter country reflects its production capacities; the GDP of an importer country shows the capacity of its market.

The results show that currently the Russian market is saturated with imported Chinese goods faster than Chinese market can be saturated with Russian goods. It is probably explained by the fact that Russian export is mostly focused on raw materials whereas China mostly exports finished products and goods.

Secondly, the WTO membership influences the intensity of transboundary trade. Effect of the WTO membership is obvious for China: After the country joined this organization, the annual commodity turnover between China and Russia has gone up by 1.5 times. The WTO membership has had no significant effect on Russia yet.

REFERENCES

Abidin, I.S.Z., Bakar, N.A.A., Sahlan, R. (2013), The determinants of exports between Malaysia and the OIC member countries: A gravity model approach. ScienceDirect, 5, 12-19.

Abrams, R. (1980), International trade flows under flexible exchange rates. Federal Reserve Bank of Kansas City Economic Review, 65, 3-10.

Anderson, J., Wincoop, E. (2003), Gravity with gravitas: A solution to the border puzzle. American Economic Review, 93, 170-192.

Anderson, J., Wincoop, E. (2004), Trade costs. Journal of Economic Literature, 42(3), 691-751.

Baldwin, R., Taglioni, D. (2006), Gravity for Dummies and Dummy for Gravity Equations. CERP Discussion Paper No. 5850.

Caporale, G.M., Sova, A.M., Sova, R. (2010), Trade flows and trade specialization: The case of China. China Economic Review, 34, 261-73.

Disdier, A., Head, K. (2008), The puzzling persistence of the distance effect on bilateral trade. The Review of Economic and Statistics, 90(1), 37-48.

Kahouli, B., Maktouf, S. (2015), The determinants of FDI and the impact of the economic crisis on the implementation of RTAs: A static and dynamic gravity model. International Business Review, 24, 518-529.

Kaukin, A.S. (2013), Empirical estimations of the gravity model of Russian foreign trade. Vneshnetorgovaya Deyatelnost, 4, 71-84.

Liu, X., Xin, X. (2011), Transportation uncertainty and international trade. Transport Policy, 18, 156-162.

Livandovskaya, A.D., Tyurina, E.A. (2005), Estimation of integration of Primorsky Krai into the economy of Asia-Pacific region. Asia-Pacific Region, 1, 34-39.

Martinez-Zarzoso, I., Nowak-Lehmann, D.F., Nicholas, H. (2009), Are regional trading agreements beneficial? Static and dynamic panel gravity models. North American Journal of Economics and Finance, 20, 46-65.

Mishura, A.V. (2012), Estimation of gravity models of interregional trade in monopolistically competitive goods in Russia. Mikroekonomicheskiy Analiz: Metody I Rezultaty, 12(4), 52-58.

Mogilat, A., Salnikov, V. (2015), Estimation of the Potential of Bilateral Trade Relations Between EAEC Countries via the Gravity Model of the Trade Between Russian Regions. Center of Macroeconomic Analysis and Short-term Forecasting.

Novy, D. (2013), Gravity redux: Measuring international trade costs with panel data. Economic Inquiry, 51, 101-121.

Oydup, T. (2011), Estimation of transboundary factors of the territorial organization of economy in frontier territories of Tyva republic. Naucny Zhurnal KubGAU, 74(10), 49-57.

Picci, L. (2010), The internationalization of inventive activity: A gravity model using patent data. Research Policy, 39, 1070-1081.

Pomfret, R. (2005), Trade policies in Central Asia after EU enlargement and before Russian WTO accession regionalism and integration into the word economy. Economic System, 29(1), 32-58.

Poyhonen, P. (1963), Toward a general theory of international trade. Ekonomiska Samfundets Tidskrift, 16, 69-78.

Prewo, W. (1978), Determinants of the trade pattern among OECD countries from 1958 to 1974. Jahrbucher Fur National Ekonomieund Statistik, 193, 341-358.

Simonovska, I., Waugh, M.E. (2014), The elastic of trade: Estimates and evidence. Journal of International Economics, 92, 34-50.

Tinbergen, J. (1962), Shaping the World Economy: Suggestions for an International Economic Policy. New York: Twentieth Century Fund. p242.

Troyekurova, I.S., Pelevina, K.A. (2014), Gravity models of BRICS foreign trade. Izvestiya Saratovskogouniversiteta. Novaya seria. Ekonomika. Upravleniye. Part 2. Pravo, 14(1), 133-142.

Ulengin, F., Cekyay, B., Palut, P.T., Ulengin, B., Kabak, O., Ozaydin, O., Ekici, S.O. (2015), Effects of quotas Turkish foreign trade: A gravity model. Transport Policy, 38, 1-7.

Viorica, E. (2015), Econometric analysis of foreign trade efficiency of E.U. Members using gravity equations. Science Direct, 20, 670-678.