ADBI Working Paper Series

ASSESSMENT OF TRADE INTEGRATION PATTERNS BETWEEN THE RUSSIAN FEDERATION AND EAST ASIAN ECONOMIES USING PANEL-GRAVITY FRAMEWORK

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No. 1044
November 2019

Asian Development Bank Institute

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Suggested citation:

Rasoulinezhad, E., F. Taghizadeh-Hesary, and N. Yoshino. 2019. Assessment of Trade Integration Patterns between the Russian Federation and East Asian Economies Using Panel-Gravity Framework. ADBI Working Paper 1044. Tokyo: Asian Development Bank Institute. Available:https://www.adb.org/publications/trade-integration-patterns-russian-federation-east-asian-economies

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Abstract

This study is the first attempt to investigate the patterns of imports and exports between the Russian Federation and East Asian economies, namely, the People's Republic of China; Hong Kong, China; Macau, China; Japan; the Republic of Korea; and Mongolia. To this end, a panel-gravity trade model with series over 2001 to 2017 is provided to estimate the gravity variables in our models. The results revealed that gross domestic product (GDP) and income are more important in export patterns from the Russian Federation to the East Asia region, meaning that economic size and the income of population in East Asian economies are more essential in this pattern, compared to other variables. Moreover, the Russian Federation's export pattern with the East Asia region follows the hypothesis of Linder (1961), while the Russian Federation's import pattern with this region is in line with the Heckscher–Ohlin (H-O) hypothesis.

Keywords: foreign trade pattern, disaggregated trade data, Russian Federation, East Asia region, gravity model

JEL Classification: C21, C23, F10, F14

Contents

1. INTRODUCTION

Upendra Das and colleagues (2012), in their book entitled *Regional Trade and Economic Integration*, express that the East Asia region has become a dominant player in trade and will continue to be an important locus of world trade, and nations in different areas are trying to shift to this region. Following Dent (2017), this region accounts for nearly 30% of the world economy by most indicators, for example, production; trade; investment; and finance. The start of economic development of this region is well defined by Henderson (1997) and Dorn (1993), who expressed that economic liberalization and limiting the role of government in economic affairs (economic democracy) were the main engines of economic development in this region. These special characteristics of the East Asia region explain why other countries have, or intend to have, strong economic ties with this region.

The remarkable economic potentials of this region mean that the Russian Federation, which has been faced with the 2014 Western sanctions, have tried to penetrate more deeply into the markets of this region. Karaganov (2018) argues that the new cold war was created after imposing sanctions against the Russian Federation, and consequently, this country has increased its economic diplomacy to the East Asia region. In line with Svarin (2016), it is clear that after the Ukraine crisis and the Western sanctions, the Russian Federation has shifted towards reorientation to the East, which opens up many new economic opportunities to reduce the negative impacts of sanctions. Nasre Esfahani and Rasoulinezhad (2017) and Rasoulinezhad (2017a) proved that sanctions create trade divergence (TD) between a target nation and sanction imposers, while trade convergence (TC) is created between a target nation and nations who do not support the existing sanctions. Hence, we can predict that the Russian Federation, under the pressure of sanctions, will seek out TC with the East Asia region, and experience TD with the main sanction imposers (the United States and the European Union).

The economic potential of the East Asia region, and the tendency of the Russian Federation to pivot from the West to this region, raise the question of trade patterns between the Russian Federation and the East-Asian economies. Based on The World Bank database, the region of East Asia contains Japan; the Republic of Korea; the People's Republic of China (PRC); Mongolia; Macau, China; Hong Kong, China; the Democratic People's Republic of Korea; and Taipei,China. This region had an average of 4.27% economic growth during the period of 2010 to 2017, which is higher than the global average by 2.99% in this time period.

According to Trademap, the top three trading partners of the Russian Federation from the East Asia region (in the case of exports of the Russian Federation) are the PRC; the Republic of Korea; and Japan, while Macau, China and the Democratic People's Republic of Korea had the smallest import flows from the Russian Federation among East-Asian economies in 2017. Table 1 reports the Russian Federation's export flows to this region from 2001–2017.

Table 1: Russian Federation's Export Flows to the East Asia Region, 2001–2017 in thousand USD

	PRC	Hong Kong, China	Macau, China	Japan	Democratic People's Republic of Korea	Republic of Korea	Mongolia	Taipei, China
2001	5,596,013	152,652	0	2,426,637	61,773	1,108,095	215,703	257,928
2002	6,836,947	184,299	74	1,803,313	68,661	1,271,152	231,592	463,428
2003	8,257,599	321,793	462	2,421,423	110,714	1,323,618	284,091	836,560
2004	10,105,069	318,296	766	3,403,888	204,868	1,963,345	363,352	1,986,823
2005	13047,745	349,557	528	3,740,270	226,346	2,359,156	443,252	1,437,661
2006	15,757,053	354,019	45	4,624,672	190,434	2,606,727	489,976	931,105
2007	15,166,641	266,407	0	7,490,643	103,616	6,089,830	628,787	897,039
2008	21,147,334	366,069	2	10,429,043	96,882	7,787,223	1,098,488	1,036,535
2009	16,669,000	705,000	184	7,262,993	41,780	5,689,000	654,025	792,000
2010	19,783,043	819,059	0	12,493,562	45,797	10,407,938	936,566	1,796,255
2011	34,692,362	613,951	0	14,234,690	99,182	13,329,721	1,485,555	2,077,056
2012	35,766,830	1,410,760	10	15,588,027	58,428	13,865,479	1,851,413	3,326,934
2013	35,625,420	3,026,197	0	19,667,508	103,426	14,867,070	1,572,137	4,443,362
2014	37,414,604	1,247,076	6	19,830,781	82,157	18,081,831	1,460,431	3,909,498
2015	28,334,955	775,673	1,133	14,426,352	78,267	13,196,117	1,117,224	2,626,316
2016	28,021,250	697,638	61	9,384,192	68,051	10,027,147	895,672	2,703,290
2017	37,524,519	684,651	36	10,500,218	74,188	12,100,985	1,326,718	3,370,474

In the case of the Russian Federation's import flows from this region, the PRC, Japan, and the Republic of Korea are the top three importers in 2017, while Macau, China and the Democratic People's Republic of Korea stand as the lowest importers from the Russian Federation in the East Asia region. Table 2 shows the Russian Federation's import flows from this region over the period of 2001–2017.

Table 2: Russian Federation's Import Flows from the East Asia Region, 2001–2017, in thousand USD

	PRC	Hong Kong, China	Macau, China	Japan	Democratic People's Republic of Korea	Republic of Korea	Mongolia	Taipei, China
2001	1,646,501	14,891	64	870,782	16,659	726,498	36,520	165,531
2002	2,401,128	10,041	104	980,279	10,963	930,046	48,790	208,681
2003	3,308,671	7,567	202	1,882,939	2,957	1,330,636	35,643	261,999
2004	4,746,229	10,148	283	3,940,936	4,778	2,026,251	21,363	343,055
2005	7,264,583	18,587	319	5,833,521	6,872	4,005,290	22,402	492,369
2006	12,911,747	86,232	1,007	7,788,760	20,060	6,780,459	37,605	757,070
2007	24,406,610	105,330	2,790	12,715,798	33,715	8,838,286	48,217	1,215,275
2008	34,768,716	56,331	4,144	18,589,772	13,944	10,521,139	70,904	1,824,831
2009	22,859,880	37,702	4,051	7,255,706	7,800	4,867,899	63,000	921,490
2010	38,960,930	61,843	2,961	10,259,743	16,385	7,281,532	79,101	1,532,100
2011	48,038,378	81,978	4,400	15,012,611	14,510	11,575,682	89,115	2,037,104
2012	51,767,694	88,885	3,289	15,676,090	11,081	10,976,879	64,257	2,007,818
2013	53,173,086	172,184	2,347	13,560,500	9,291	10,305,436	40,927	1,915,060
2014	50,853,010	204,056	2,002	10,917,410	10,032	8,972,462	40,438	1,674,116
2015	35,199,264	192,390	2,738	6,818,557	5,665	4,532,320	43,502	1,326,859
2016	38,086,982	167,658	4,184	6,679,836	8,796	5,113,263	35,909	1,613,221
2017	48,373,353	219,871	622	7,763,938	3,719	6,919,726	41,143	1,929,745

The most exported commodities from the Russian Federation to this region are mineral fuels, wood, meat, and fish, while the most imported goods to the Russian Federation from this region are technology-based commodities (e.g., electrical machinery and vehicles). Hence, the export pattern of the Russian Federation to this region is one of natural resource-based commodities, and the import pattern of this country from the East Asia region is technology-based.

Despite some earlier studies focusing on trade between the Russian Federation and the East-Asian economies, such as that of Yennie-Lindgren (2018); Paramonov and Puzanova (2018); Rasoulinezhad (2018); Malle (2017); Malle and Cooper (2014); and Shlapentokh (1995), to our knowledge, there is little or no in-depth academic research investigating trade patterns between the Russian Federation and this region. Our study therefore contains academic novelties which present new insights to scholars and economists.

The remainder of this paper is structured as follows: section 2 discusses a brief literature view. Data description and model specification are represented in section 3. Section 4 presents the research findings, and lastly, section 5 concludes with a discussion and directions for further research.

2. LITERATURE REVIEW

Reviewing different databases reveals that there has been significant attention from scholars devoted to Russian trade with the East Asia region. One of the main reasons for this increased scholarly interest is that the Russian Federation, under the 2014 sanctions, has tried to conduct a trade pivot to this region. Due to the new potential of the Russian Federation–East Asia trade in the context of the Western sanctions against the Russian Federation, our study would have new insights for policy makers and scholars.

In this section, we briefly explain the literature related to our topic. Izotov (2017) investigated trade liberalization of the Russian Federation, especially under sanctions. He found that the Russian Federation's trade flows with some major nations in Asia have a tendency to increase due to their large markets and the potential in product manufacturing. The tendency of the Russian Federation to trade with the East-Asian markets has also been noted by Idrisov and colleagues (2016), who proved that for social stability and reducing the impact of variability, the Russian Federation is trying to diversify its trade partners, especially from East-Asian economies. Lukin and Yakunin (2018) expressed that the only way to develop the Asiatic Russian Federation is to increase foreign trade with East-Asian nations. Their findings are in line with those of Ostevik and Kuhrt (2018), who highlighted the relationship between development of the Russian Far East and economic ties with the East Asia region. In another study, Aalto and Forsberg (2016) argued that restructuration of the Russian Federation's geo-economy under economic sanctions leads to stronger economic cooperation between the Russian Federation and major East-Asian economies, such as the PRC, the Republic of Korea, and Japan. In a similar study, Fortescue (2016) investigated the Russian Federation's economic prospects in the Asia Pacific region. He concluded that under sanctions, the Russian Federation tries to replace revenues earned by resource exports to the West through an economic turn to the East. However, Gnidchenko's (2017) study is in contrast with these findings. He argues that under sanctions, the Russian Federation's economy should shift to perform an efficient import substitution that masks the trade problem due to the Russian Federation–Europe tension.

A number of scholars have tried to clarify some economic areas that would make a stronger economic tie between the Russian Federation and East-Asian nations. Yennie-Lindgren (2018), for instance, highlighted energy fields, which are important factors in Russian Federation-Japanese trade relations. These two countries are trying to increase their energy relations in the post-Fukushima period and reduce the effects of Japanese sanctions due to the Ukraine crisis. This result is in line with Paramonov and Puzanova (2018), who emphasized the role of stronger diplomacy from Tokyo in Eurasia to secure Japanese national energy security. In addition, Golobokov (2015) explained that the energy market has great potential for the PRC and the Russian Federation, especially in the crude oil and natural gas markets. Fernandez and Palazuelos (2011) argued that the future of the Russian Federation's gas exports to East Asia will be high and that East Asia will be the great player in developing the gas market of the Russian Federation in the future. The importance of the East Asia region in the future gas market has been discussed by Shi (2016), who emphasized the importance of this region in gas and liquefied natural gas (LNG) pricing and as a future trading hub.

The major findings of the above studies clarify that economic cooperation and trade ties between the Russian Federation and the East Asia region are important. To our knowledge, there have been no studies on the disaggregated trade patterns of the Russian Federation with the East-Asian region applying a gravity model. This paper tries to fill this gap in the literature.

3. DATA DESCRIPTION AND MODEL SPECIFICATION

The data used in this paper cover the period from 2001 to 2017 for the bilateral trade between the Russian Federation and six East-Asian economies (i.e., the PRC; Hong Kong, China; Macau, China; Japan; the Republic of Korea; and Mongolia). It should be noted that due to the lack of data, we had to omit two nations: the Democratic People's Republic of Korea and Taipei,China. The dependent variables in this study include disaggregated trade data – imports (IM) and exports (EX) – in thousand US dollars from Trade Map (http://www.trademap.org), while our independent variables contain real GDP (Y) measured in thousand USD by deflating nominal GDP according to the base year of 1990; GDP per capita (YP) measured in thousand USD; difference in income (DYP); exchange rate (EXC); Trade Intensity Index (TI); financial openness (KAOPEN), measured in percent gathered from CEPII (http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6); multilateral resistance term (MRT); and distance (DIS), measured in kilometers and gathered from CEPII (http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6).

In order to analyze trade patterns for the Russian Federation with East-Asian economies, the gravity model theory is conducted econometrically. The earliest papers, those of Tinbergen (1962) and Poyhonen (1963), proposed the following simple gravity equation:

$$\ln Ex_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 lnY_j + \beta_3 lnD_{ij} + \varepsilon_{ij}$$

Here, the bilateral export flows (EX) between two different nations (i, j) directly depend on GDP (Y) of country I and GDP of the importing nation j, while they indirectly depend on the distance between the two countries (D). A large number of scholars extended the above equation to bilateral trade and added different regressors to reach better estimation results. In line with recent developments in the primary gravity model, particularly Rasoulinezhad (2018) and Rasoulinezhad and Jabalameli (2018) in a panel data framework, we begin with the following disaggregated trade gravity models for the Russian Federation:

$$LnEX_{ijt} = \delta_1 + \delta_{2a}\ln(Y_{it}Y_{jt}) + \delta_{2b}\ln(YP_{it}YP_{jt}) + \delta_{2c}\ln(DY_{ijt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt} \quad (1)$$

$$LnIM_{ijt} = \delta_1 + \delta_{2a}\ln(Y_{it}Y_{jt}) + \delta_{2b}\ln(YP_{it}YP_{jt}) + \delta_{2c}\ln(DY_{ijt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt} \quad (2)$$

Where, EX_{ijt} and IM_{ijt}, as two major subsections of bilateral foreign trade, show exports and imports of goods, respectively, between the Russian Federation (i) and a trading partner (country j) from the East Asia region at time point t. While $Y_{it}Y_{jt}$ denotes the joint GDP of the Russian Federation (i) and a trading partner j from the East Asia region at time t, $YP_{it}YP_{jt}$ is the joint income (GDP per capita) for the Russian Federation (i) and a trading partner (country j) from the East Asia region. DYP_{ijt} represents the difference income between the Russian Federation (country i) and a trading partner j from the East Asia region. By using the coefficient of this variable, we can interpret the existence of Linder's hypothesis (negative coefficient) or the H-O trade hypothesis (positive coefficient) in trade patterns between the Russian Federation and East-Asian economies. Furthermore, EXC_{ijt} refers to the official exchange rate of a trading partner j. TI_{ijt} and $KAOPEN_{ijt}$ represent the Trade Intensity Index (as a proxy for trade openness) and the Chinn-Ito index (as a proxy for financial openness, which is upon the binary dummy variables that codify the tabulation of constraints on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)), respectively. It should be noted that Trade Intensity Index (TI_{ijt}) highlights the value of trade between two nations based on their importance in global trade flows. In our model, we calculate it for our export-based gravity model as the share of the Russian Federation's exports going to a trade partner in the East-Asia region divided by the share of world exports going to the partner. On the other hand, for our import-based gravity model, this variable is defined as the share of the Russian Federation's imports coming from a trade partner in the East Asia region divided by the share of world imports coming from the partner. DIS_{ijt} is the geographic distance between capital cities in the Russian Federation and a trading partner j from the East Asia region. Furthermore, BORDER is dummy variable, capturing bi-nominal values. BORDER takes a value of 1 if Russian Federation (i) and a trading partner j from the East Asia region have a common geographic border, or takes 0 otherwise. REM_{ijt} denotes the Multilateral Resistance Term (MRT), which was first proposed by Anderson and Wincoop (2003), who – in a general equilibrium framework – achieved the following gravity equation:

$$X_{ij} = \frac{Y_i . Y_j}{Y_w} . \left(\frac{t_{ij}}{P_i . P_j}\right)^{1-\sigma}$$

Where, Y_i and Y_j show the GDP_s of the nations; Y_w denotes the GDP of the whole world; and σ is the elasticity of substitution. P_i and P_j represent the multilateral resistance (MRT) of the exporting or the importing country, respectively, and are calculated from a Dixit-Stiglitz price index as:

$$P_i = \left(\sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} . s_j\right)^{1/(1-\sigma)}, P_j = \left(\sum_i \left(\frac{t_{ij}}{P_i}\right)^{1-\sigma} . s_i\right)^{1/(1-\sigma)}$$

Baier and Bergstrand (2009) expressed that since the calculation of the above equations for the MRT is not easy, we can instead derive this variable as the GDP weighted average of distance from trading partners, which is the basis of the calculation of this variable in our study.

Furthermore, to resolve the multicollinearity error in our econometric models, we enter joint GDP (Y_iY_j); income (YP_iYP_j); and difference in income (YD_{ij}) separately in our equations and break down each gravity model for exports and imports into three different models, as follows:

Table 3: Gravity Equations of the Research

Gravity equations for export flows	Eq.1	$LnEX_{ijt} = \delta_1 + \delta_{2a}\ln(Y_{it}Y_{jt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt}$
	Eq.2	$LnEX_{ijt} = \delta_1 + \delta_{2b}\ln(YP_{it}YP_{jt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt}$
	Eq.3	$LnEX_{ijt} = \delta_1 + \delta_{2c}\ln(DY_{ijt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt}$
Gravity equations for import flows	Eq.1	$LnIM_{ijt} = \delta_1 + \delta_{2a}\ln(Y_{it}Y_{jt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt}$
	Eq.2	$LnIM_{ijt} = \delta_1 + \delta_{2b}\ln(YP_{it}YP_{jt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt}$
	Eq.3	$LnIM_{ijt} = \delta_1 + \delta_{2c}\ln(DY_{ijt}) + \delta_3 \ln EXC_{ijt} + \delta_4 \ln TI_{ijt} + \delta_5 \ln KAOPEN_{ijt} + \delta_6 \ln REM_{ijt} + \delta_7 \ln DIS_{ijt} + \delta_8 BORDER + \varepsilon_{ijt}$

4. EMPIRICAL FINDINGS

4.1 Preliminary Tests

The Im; Pesaran; and Shin test (IPS) and the ADF-Fisher Chi-Square are two common panel unit root tests, which are used to test the existence of unit root tests of series. These two panel unit root tests specify a separate ADF (Augmented Dickey-Fuller) regression (Nasre Esfahani and Rasoulinezhad, 2015; Rasoulinezhad 2017b):

$$\Delta y_{it} = \alpha y_{it-1} \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + X_{it}^{'} \delta + \varepsilon_{it}$$

The results of the unit root tests reveal that the variables are not stationary at levels, while they are stationary at the first difference, rejecting the null hypothesis and highlighting the existence of a panel unit root.

In next phase, the panel cointegration test introduced by Pedroni is conducted for groups where all series are I(1). As shown in Tables 4–5, the null hypothesis of no cointegration at the 1% significance level is rejected.

Table 4: Pedroni Cointegration Tests

Export-based Gravity Models		Statistic	Prob.	Weighted Statistic	Prob.
Eq.1	Panel v-statistic	1.26	0.63	0.17	0.29
	Panel rho-statistic	–2.11*	0.00	–1.43*	0.03
	Panel PP-statistic	–3.43*	0.00	–2.27*	0.00
	Panel ADF-statistic	–3.66*	0.00	–3.32*	0.00
	Group rho-statistic	–1.06*	0.00	–	–
	Group PP-statistic	–3.86*	0.00	–	–
	Group ADF-statistic	–4.31*	0.00	–	–
Eq.2	Panel v-statistic	1.52*	0.04	0.62	0.13
	Panel rho-statistic	–2.94*	0.01	–3.62*	0.03
	Panel PP-statistic	–3.11*	0.02	–2.49*	0.00
	Panel ADF-statistic	–4.81*	0.00	–2.16*	0.04
	Group rho-statistic	–3.18*	0.00	–	–
	Group PP-statistic	–2.71*	0.03	–	–
	Group ADF-statistic	–3.83*	0.00	–	–
Eq.3	Panel v-statistic	0.31	0.28	–0.41	0.62
	Panel rho-statistic	–3.19*	0.04	–0.61	0.49
	Panel PP-statistic	–2.42*	0.00	–4.19*	0.00
	Panel ADF-statistic	–3.43*	0.00	–3.14*	0.04
	Group rho-statistic	–1.18*	0.00	–	–
	Group PP-statistic	–3.28*	0.00	–	–
	Group ADF-statistic	–2.93*	0.00	–	–

Note: * show statistical significance at the 5% level.

Source: Output of software Eviews 9.0.

Table 5: Pedroni Cointegration Tests

Import-based Gravity Models		Statistic	Prob.	Weighted Statistic	Prob.
Eq.1	Panel v-statistic	2.51	0.23	–1.19	0.42
	Panel rho-statistic	–3.09	0.41	–2.28	0.19
	Panel PP-statistic	–2.43*	0.05	–4.28*	0.04
	Panel ADF-statistic	–2.31*	0.00	–2.82*	0.00
	Group rho-statistic	–0.62	0.28	–	–
	Group PP-statistic	–4.18*	0.00	–	–
	Group ADF-statistic	–2.72*	0.00	–	–
Eq.2	Panel v-statistic	–3.14	0.50	–1.42	0.66
	Panel rho-statistic	1.72	0.70	3.28	0.16
	Panel PP-statistic	–2.47	0.37	–4.63*	0.00
	Panel ADF-statistic	–4.64*	0.00	–3.79*	0.00
	Group rho-statistic	–3.43*	0.04	–	–
	Group PP-statistic	–2.51*	0.01	–	–
	Group ADF-statistic	–4.42*	0.00	–	–
Eq.3	Panel v-statistic	2.16	0.28	–1.72	0.13
	Panel rho-statistic	–1.28	0.10	–1.28	0.44
	Panel PP-statistic	–2.82**	0.07	–3.27*	0.04
	Panel ADF-statistic	–2.66*	0.00	–3.82*	0.00
	Group rho-statistic	–2.56*	0.54	–	–
	Group PP-statistic	–3.18*	0.00	–	–
	Group ADF-statistic	–3.66*	0.00	–	–

Note: * and ** show statistical significance at the 5% and 10% levels.

Source: Output of software Eviews 9.0.

4.2 Panel-Gravity Estimations' Results

By employing a popular panel cointegration estimator, the Fully Modified Ordinary Least Squares (FMOLS) estimator, the empirical findings in each model (gravity models based on imports and exports) are achieved as follows:

4.2.1 Gravity Trade Equations for Export Flows

Based on the existence of 3 different variables, that is, economic size; income; and differences in income, we have 3 gravity trade equations in the case of export flows between the Russian Federation and East-Asian economies. The estimation results for these three equations are seen in Table 6:

Table 6: Estimations for Export Flows between the Russian Federation and East-Asian Economies

Model	Variables	Eq.1	Eq.2	Eq.3
Export-based Gravity Models	Joint GDP	0.74 (0.01)	–	–
	Joint income	–	0.69(0.04)	–
	Difference in income	–	–	0.47(0.00)
	The Trade Intensity Index	0.47 (0.00)	0.51(0.04)	0.46(0.02)
	The Chinn-Ito index	0.38 (0.04)	0.44 (0.00)	0.46 (0.00)
	Exchange rate	0.21 (0.00)	0.24 (0.00)	0.19 (0.05)
	The MRT	0.27 (0.00)	0.27 (0.02)	0.19 (0.00)
	Geographic distance	–0.17 (0.04)	–0.20 (0.01)	–0.21 (0.04)
	Common border	0.07 (0.03)	0.07 (0.00)	0.09 (0.05)

Source: Authors' compilation from Eviews 9.0.

According to the coefficients of the independent series, represented in Table 3, the considerable points are as follows:

The first highlighted point in Table 6 is that the Russian Federation's exports are more sensitive to changes in economic size, than GDP per capita (Income) and differences in income. A 1% increase in joint GDP leads to a 0.74% increase in export flows between the Russian Federation and East-Asian economies, whereas the effects of this on export flows are 0.69% and 0.47% in the case of the joint income and differences in income, respectively. This finding is consistent with the fact that bigger economies in East-Asian region such as the PRC; Japan; and the Republic of Korea demand more imported commodities from the Russian Federation in comparison to smaller economies in this region. Next, the findings prove the existence of a positive impact running from income to export flows between the Russian Federation and East-Asian economies. A 1% increase in joint income accelerates the Russian Federation's export flows with the East-Asian nations by nearly 0.69%. Moreover, the estimation results show that the difference between incomes has a significant and positive coefficient for the Russian Federation's exports to countries in the East Asia region. This positive sign (+0.47) for income differences reveals that export flows running from the Russian Federation to East-Asian economies are consistent with the Linder hypothesis. The fourth finding is that the influence of the Trade Intensity Index is significantly positive. A 1% increase in the Trade Intensity Index leads to an average of a 0.48% ([0.47%+0.51%+0.46%]/3) increase in the Russian Federation's export flows to the East-Asian nations. Regarding the Chinn-Ito index as a proxy for financial

openness, it impacts positively on the Russian Federation's export flows to the East Asia region. A 1% increase in financial openness accelerates the Russian Federation's export flows to the East Asia region by an average of 0.42% ([0.38%+0.44%+0.46%]/3). The sixth major estimation result is that the bilateral exchange rate has a positive and significant influence on the Russian Federation's export flows to the region of East Asia. Based on its coefficient, a 1% increase in the bilateral exchange rate leads to an increase of the Russian Federation's export flows into the East-Asian economies by an average of 0.21% ([0.21%+0.24%+0.19%]/3). The MRT and common geographic border have positive coefficients for the Russian Federation's export volume to East-Asian economies, while the geographic distance is statistically significant and negatively impacts on the export volume of the Russian Federation to East Asia.

4.2.2 Gravity Trade Equations for Import Flows

The other important part of foreign trade, import flows, was analyzed, and the following estimation results, listed in Table 7, are achieved.

Table 7: Estimations for Import Flows between the Russian Federation and East-Asian Economies

Model	Variables	Model I	Model II	Model III
Import-based Gravity Models	Joint GDP	0.63 (0.04)	–	–
	Joint income	–	0.53(0.00)	–
	Difference in income	–	–	–0.43(0.04)
	The Trade Intensity Index	0.53 (0.02)	0.53(0.00)	0.56(0.01)
	The Chinn-Ito index	0.41 (0.00)	0.40 (0.00)	0.40 (0.00)
	Exchange rate	0.21 (0.03)	0.25 (0.00)	0.21 (0.04)
	The MRT	0.34 (0.00)	0.27 (0.03)	0.31 (0.04)
	Geographic distance	–0.16 (0.04)	–0.19 (0.01)	–0.17 (0.00)
	Geographic border	0.54 (0.00)	0.50 (0.01)	0.52 (0.00)

Source: Authors' compilation from Eviews 9.0.

Regarding to our first regressor, joint GDP, the estimation findings show the positive effect of this variable on the Russian Federation's imports from the East Asia region, which means that higher economic size will encourage importing from the Russian Federation into this region. Similarly, a 1% increase in GDP will lead to an increase of the Russian Federation's import flows by about 0.63%. Moreover, it was found that the Russian Federation's import flows from the East Asian economies are influenced by joint income by nearly 0.53%. The difference in income bears a negative sign for the Russian Federation's imports from the region, revealing that the Russian Federation's import flows from this region are consistence with the H-O hypothesis. Trade Intensity Index, as a proxy for trade openness, has a significant positive sign, and its 1% increase may lead to an increase of the Russian Federation's imports from the East Asia region by nearly 0.54% ([0.53%+0.53%+0.56%]/3). The impact of financial openness (the Chinn-Ito index) is found to be positive for the import flows of the Russian Federation from the East Asia region. A 1% increase in financial openness accelerates the Russian Federation's import flows from this region by nearly 0.40% ([0.41%+0.40%+0.40%]/3). The results reveal that the bilateral exchange rate is a positive influential factor on the Russian Federation's import flows from the East Asia region. A 1% increase in this variable, which is a depreciation of the Russian Federation's national currency against the national

currency of its partner from the East Asia region, encourages the Russian Federation's imports from the East-Asian economies by nearly 0.23% ([0.21%+0.25%+0.21%]/3). We make the observation that the MRT has attained a positive sign for the Russian Federation's imports from the East-Asian economies. Regarding geographic distance as a proxy for transportation cost, it shows a negative impact on the Russian Federation's import flows from this region. Finally, we identify evidence that having a common geographic border is highly significant and that it shows a positive impact on the Russian Federation's import flows from this region. A 1% increase in the existence of a common geographic border increases the Russian Federation's imports from this region by nearly 0.09% (an average of coefficients in the case of the Western European region (0.09% = Exp [(0.11+0.09+0.06)/3]-1).

4.2.3 Import–Export Comparison

Based on the findings of the magnitudes of the variables' impacts on import and export flows between the Russian Federation and the East Asia region, we can compare these magnitudes among import and export flows, which clarifies the importance of each variable in these two parts of foreign trade. As shown in Table 8, GDP and income are more important in the export pattern from the Russian Federation to the East Asia region. This means that economic size and the income of the population in East-Asian economies are more essential in this pattern. A comparison of signs of difference in incomes reveals that the Russian Federation's export pattern with the East Asia region follows the Linder hypothesis, while the Russian Federation's import pattern with this region is in line with the H-O hypothesis. Furthermore, trade openness; the MRT; bilateral exchange rate; and the existence of a common border have a bigger magnitude in the Russian Federation's import pattern, while financial openness and geographic distance are more important in the Russian Federation's export pattern.

Table 8: Import–Export Comparison

Variables	Export Flows from the Russian Federation to the East-Asian Region (in %)	Import Flows of the Russian Federation from the East-Asian Region (in %)
Joint GDP	0.74	0.63
Joint income	0.69	0.53
Difference in income	0.47	–0.43
The Trade Intensity Index	0.48	0.54
The Chinn-Ito index	0.42	0.40
Exchange rate	0.21	0.23
The MRT	0.23	0.28
Geographic distance	–0.19	–0.16
Geographic border	0.08	0.09

5. CONCLUDING REMARKS

This paper analyzed the trade patterns of the Russian Federation with the East Asia region during the period of 2001–2017 using panel data analysis. This study was informed by a series analysis in the form of the gravity model, which included disaggregated trade flows as dependent variables, and GDP; income; difference in income; the Trade Intensity Index (TII) as a proxy for trade openness; the Chinn-Ito index as a proxy for financial openness; the bilateral exchange rate; the multilateral resistance term; geographic distance; and geographic border as explanatory variables.

In the case of the Russian Federation's export flows to the East Asia region, it was revealed that the Russian Federation's exports are more sensitive to changes in economic size than GDP per capita (income) and differences in income. The positive sign for income differences proved that export flows running from the Russian Federation to East-Asian economies are consistent with the Linder hypothesis. Moreover, we found that a 1% increase in the bilateral exchange rate leads to an increase of the Russian Federation's export flows into the East-Asian economies by an average of 0.21%.

Regarding the Russian Federation's imports from the East Asia region, it was found that higher economic size will encourage the Russian Federation's imports from East Asia. A 1% increase in GDP will lead to an increase of the Russian Federation's import flows by about 0.63%. Moreover, the difference in income bears the negative sign for the Russian Federation's imports from the region, revealing that the Russian Federation's import flows from this region are consistent with the H-O hypothesis. Furthermore, a 1% depreciation of the Russian Federation's national currency against the national currency of its partner from the East Asia region encourages the Russian Federation's imports from the East-Asian economies by nearly 0.23%.

Based on a comparison export and import patterns of the Russian Federation with the East Asia region, the results revealed that GDP and income are more important in the export pattern from the Russian Federation to the East Asia region. This means that economic size and the income of the population in East-Asian economies are more critical factors in this pattern. Moreover, the Russian Federation's export pattern with the East Asia region follows the Linder hypothesis, while the Russian Federation's import pattern with this region is in line with the H-O hypothesis.

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