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SPECIALIZATION OF RUSSIA IN INTERNATIONAL TRADE: DEVELOPMENT IN THE CHANGING INTERNATIONAL ENVIRONMENT

Abstract:

International economic relations are important for the countries' economic growth, especially in the modern world of global value chains and rapid technological development. Russia is known for its comparative advantage in natural resources and for its intentions to diversify the economy. Indeed, specialization in natural resources is not associated with sustainable economic growth. We analyze Russia's specialization in trade over the period 2009-2018 including the year 2014 when economic and financial sanctions were introduced. We follow the dynamics of Russia's comparative advantages in different categories of goods in trade with all world countries, BRICS countries and Eurasian Economic Union over these years. Our aim is to shed more light on the current specialization of Russia in order to understand the possibilities of diversifying the economy. We analyze short term consequences of difficulties in international relations that Russia faces, and provide an insight into the long run development of trade. We conclude that Russia currently has a prevailing comparative advantage in material-intensive industries and needs to develop innovations in order to diversify its economy and obtain a comparative advantage in the other categories of goods, including high-tech sector. The results can be useful for development of economic policy.

Keywords:

Comparative advantage, Balassa index, Lafay index, specialization, international trade, export, Russian regions

JEL Classification: F14, F50, F43

1 Introduction

International economic relations are important for the countries' economic growth, especially in the modern world of global value chains and rapid technological development. Russia is known for its comparative advantage in natural resources and for its intentions to diversify the economy. Indeed, specialization in natural resources is not associated with sustainable economic growth.

We analyze Russia's specialization in trade over the period 2009-2018 including the year 2014 when economic and financial sanctions were introduced. We follow the dynamics of Russia's comparative advantages in different categories of goods in trade with all world countries, BRICS countries and Eurasian Economic Union over these years.

Sanctions decreased the possibilities of international loans for the Russian businesses, limited technological cooperation, mainly in the energy sector and caused investment outflow, rise in inflation and decrease in real income of population (Nasulea et al., 2015; Nelson, 2017). All this makes it relevant to analyze the consequences of sanctions for international trade of Russia with the world overall and with specific groups of countries. Besides, it makes it important to understand the situation and perspectives for various groups of industries.

Our aim is to shed more light on the current specialization of the Russian economy in order to understand the possibilities of its diversification. We analyze short term consequences of the difficulties in international relations that Russia has and formulate suggestions for improvement of the Russia's comparative advantage in international trade.

According to neoclassical trade theories, the reasons for a country's specialization in international trade are comparative advantages based on differences in productivity across sectors (Ricardo's model) or differences in production factor endowment (Heckscher-Ohlin-Samuelson model).

In order to find out Russia's specialization, we analyze the comparative advantage indexes. Two versions of modified Balassa Revealed Comparative Advantage (RCA) index, as well as Lafay index are used (Vollrath, 1991; Savin and Winker, 2009).

Our paper is structured as follows. The next section is devoted to the literature review. Then measures of comparative advantage are analyzed. Afterwards the results are presented and conclusions follow.

2 Literature review

Russia currently specializes in natural resources, which is not beneficial for the long run economic development (Lyubimov, 2019). However, the export structure of Russia varies across the partner countries. Namely, Russia exports relatively larger share of manufactured goods to the countries of Newly Independent States than to the European Union and China, while in trade with the EU and China Russia's main exports are natural resources. Such situation is linked to the history of cooperation with the countries of the former Soviet Union and to different levels of technological development of these countries (Garanina, 2009).

Razumnova and Prusova (2009) found that during the period 1998-2006 within BRICS countries, Russia strengthened its comparative advantages in the field of material-intensive goods by increasing its export of raw materials. In various categories of goods belonging to manufacturing industries, no stable comparative advantages were revealed.

Lyubimov (2019) estimates the level of complexity of the Russian export for the years 1995-2016 in comparison with the other BRICS countries. He concludes that the current technological level of Russia is relatively low and fragmented, preventing Russia from successful diversification of the economy. Nowadays Russia exports a relatively more diversified set of its products to its neighbors, whose economic growth is relatively low. Although between 1995 and 2016 the technological level of Russia improved due to the national efforts and international spillovers, it is not sufficient for meeting the challenges of international competition. One of the author's main conclusions is that Russia would benefit from increasing trade with developed countries.

In the papers described above various measures of international trade, including modified RCA indexes and Lafay index, were used.

Fedyunina and Averyanova (2019) revealed that for the export-intensive Russian manufacturing companies the import of high-tech semi-finished products positively affects the export of high-tech products. Based on these findings the authors suggest that in case protectionist measures need to be introduced, they should be implemented gradually and selectively for import of foreign semi-finished products so that Russian exporters have access to the components that are not currently produced within the country.

Along with development of high tech industries, innovations in various industries are important for diversification of the economy. Among the factors crucial for the firm level innovations in the Russian regions are institutions and human capital; foreign direct investment and the already existing regional innovative output; besides, both competitive environment and state subsidies proved to stimulate innovations; the results vary across regions (Davidson et al., 2018).

Based on the analysis of the literature we conclude that it will be useful to consider several indexes for more detailed understanding of Russia's comparative advantages in international trade. Besides, it is worthwhile analyzing comparative advantages in trade with specific groups of countries, as trade structure of Russia varies substantially across countries.

3 Data and Methods

We calculate the indexes based on the COMTRADE statistical data, category SITC Rev.3 for the period 2009-2018.

One of the indexes that are best known nowadays was introduced by Bela Balassa (1965). This index allows comparing export of a certain good by a country with the world export. This index was named a Revealed Comparative Advantage index (RCA) as it helps determine a country's comparative advantage based on data. The index can be calculated using the following formula:

$$RCA_{ij} = (x_{ij}/X_i)/(x_{wj}/X_w) \quad (1)$$

where x_{ij} and x_{wj} are export of good j by country i and the world export of good j; and X_i and X_w represent total export of a country under consideration and total world export.

However, this index does not account for import of the country thus not allowing us to correct for intra-industry trade while calculating the country's comparative advantages.

Below we analyze the modifications of this index and the alternative indicators suggested in the literature that we apply in this paper.

RCA1. The first index used in our work is the index suggested by Garanina (2008) for the analysis of the Russia's comparative advantages in international trade. She introduced an index

designed to take into account both export and import in various sectors of the economy, this way taking into consideration intra-industry trade:

$$RCA1_{ij} = \left(X_{ij}^k - M_{ij}^k\right)/\left(X_{ij}^k + M_{ij}^k\right) \quad (2)$$

where X – export, M – import, i denotes a good, and j, k – trading partners.

The index varies from -1 to 1.

In case of Russia the results are strongly affected by the dynamics of the world prices of the main exporting goods, natural resources, mainly oil and gas, their prices being volatile.

RCA2. The second index is a modified Balassa index suggested by Greenaway and Milner (1993):

$$RCA2_{ij} = \ln\left(\left(X_{ij}/X_{it}\right)/\left(M_{ij}/M_{it}\right)\right) * 100 = \ln\left(\left(X_{ij}/M_{ij}\right)/\left(X_{it}/M_{it}\right)\right) * 100 \quad (3)$$

where X – export, M – import, i – a country under consideration, j – a good or a sector, t – a set of other goods or sectors.

This approach to calculating the RCA index allows avoiding a situation when the index is equal to zero, in case export of a certain good is equal to its import, as it can occur with RCA1 considered above.

LFI. Another index of international specialization, where both export and import of a certain industry are taken into account was suggested by Lafay (1992). For instance, Zaghini (2005) uses this index to analyze the evolution of trade specialization for ten countries that joined the European Union in 2004. The index is calculated according to the following formula:

$$LFI_j^i = 100\left[\left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i}\right) - \frac{\sum_{j=1}^N \left(x_j^i - m_j^i\right)}{\sum_{j=1}^N \left(x_j^i + m_j^i\right)}\right]\frac{x_j^i + m_j^i}{\sum_{j=1}^N \left(x_j^i + m_j^i\right)} \quad (4)$$

where x – export, m – import of a good j by a country i to the rest of the world, N – the number of goods.

According to this index, country i's comparative advantage in production of good j is calculated as a deviation of a normalized trade balance of good j from an overall normalized trade balance, multiplied into the share of trade in good j in the overall trade volume.

Positive value of the Lafay index reflects the presence of comparative advantage in this good.

A more detailed analysis of the comparative advantage indexes is provided by Savin and Winker (2009), who study trade specialization of the transition economy of Russia and analyze its perspectives of development.

Our research is based on five categories of goods (Razumnova and Prusova, 2009).

The first category is *material-intensive goods*, such as food and life animals; raw materials; mineral fuel.

The second category is *labor-intensive goods*, such as textile fiber.

The third category is *capital-intensive* goods, such as electrical current, iron and steel, non-ferrous metals.

The fourth category is *low-tech* products, such as organic chemicals, non-organic chemicals, pharmaceutical products, plastic, office machinery and data-processing machinery.

Finally, the fifth category is *high-tech* products, such as machines and transport, professional and research equipment, photo equipment, watches.

The analysis based on these categories allows us to understand the comparative advantages of Russia in various groups of industries, while considering trade with different groups of countries.

4 Results

Being one of the main exporters of oil and gas in the world, Russia has positive trade balance, affected, however, by the dynamics of the world oil prices. During the period 2009-2018 material-intensive goods prevailed in the Russia's export. In 2018 export of these goods accounted for 60% of total export of the Russian Federation. In the import structure the largest share, 27.75%, belonged to the high-tech goods for the period under consideration, while labor-intensive goods accounted for 17.51% and capital-intensive goods for 18.52%. Some of the imported high-tech goods belong to the categories of the investment goods and components, and are therefore significant for the Russian enterprises.

Overall, Russia increased its export and import during the period 2009-2018. While in 2009 export of all goods was 301.8 bln $US, in 2018 it became 451.5 bln $US; import increased from 170.8 bln $US to 240.2 bln $US over the same period. However, after the sanctions were introduced in 2014 the volume of trade significantly decreased, export falling to 343.9 bln $US and import to 182.8 bln $US in 2015[1]. Such dynamics of international trade of Russia between 2009 and 2018 is linked with the economic and financial nature of the sanctions (Nasulea et al., 2015; Nelson, 2017).

The structure of trade over the whole period reflects specialization of Russia in international trade, emphasizing namely the importance of natural resources in export and high tech goods in import. The next question of interest is the structure of trade with specific groups of countries compared to the world overall. In the table below are the comparative advantage indexes calculated according to the approaches analyzed in the previous section.

Table 1: Comparative advantage indexes of Russia in trade with the world overall

Modified Balassa index (RCA1)										
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Material-intensive goods	0.74	0.78	0.79	0.79	0.79	**0.79**	**0.78**	0.72	0.74	0.78
Labor-intensive goods	-0.55	-0.63	-0.62	-0.55	-0.52	**-0.47**	**-0.34**	-0.33	-0.41	-0.39
Capital-intensive goods	0.09	-0.02	-0.16	-0.16	-0.17	**-0.10**	**0.10**	0.03	0.02	0.06
Low-tech goods	-0.42	-0.43	-0.37	-0.36	-0.32	**-0.26**	**-0.30**	-0.45	-0.47	-0.42
High-tech goods	-0.63	-0.68	-0.77	-0.70	-0.68	**-0.69**	**-0.56**	-0.65	-0.66	-0.59
Modified Balassa index by Greenaway and Milner(RCA2)										
Material-intensive goods	134.29	151.50	162.59	165.44	161.89	**158.35**	**144.80**	137.18	150.42	146.8
Labor-intensive goods	-181.5	-201.74	-197.5	-174.5	-167.2	**-157.00**	**-134.4**	-112.5	-125.7	-144.3
Capital-intensive goods	-38.38	-58.37	-84.99	-83.57	-85.41	**-75.73**	**-42.74**	-37.92	-34.36	-50.16
Low-tech goods	40.89	28.10	23.56	27.46	21.57	**15.19**	**9.34**	27.09	24.61	5.73
High-tech goods	-205.2	-222.29	-257.4	-226.0	-215.7	**-226.58**	**-189.1**	-199.4	-195.8	-198.1
Lafay index (LFI)										
Material-intensive goods	25.63	28.06	30.14	30.10	29.67	**28.77**	**25.44**	26.81	27.82	26.84
Labor-intensive goods	-7.49	-8.20	-7.44	-7.56	-7.69	**-7.50**	**-6.70**	-5.56	-5.92	-6.83
Capital-intensive goods	-3.36	-4.95	-6.93	-6.75	-6.47	**-5.49**	**-3.21**	-1.71	-1.99	-3.42
Low-tech goods	-3.29	-3.41	-2.90	-2.77	-2.65	**-2.70**	**-3.67**	-3.23	-3.70	-4.24
High-tech goods	-11.49	-11.49	-12.87	-13.02	-12.87	**-13.08**	**-11.85**	-16.31	-16.21	-12.34

[1] Russia Trade Indicators. WITS – World Integrated Trade Solution. The World Bank. https://wits.worldbank.org/countrysnapshot/en/RUSSIA

Table 1 shows that comparative advantages of Russia differ substantially across the categories of goods.

According to all three indexes Russia had a comparative advantage in material-intensive goods during the whole time period under consideration. However, in 2014 deterioration in this category of goods occurred, due to the limits imposed by the sanctions and decrease in oil prices.

In labor-intensive and capital-intensive goods Russia was decreasing its comparative disadvantage in 2009-2018 according to all three indexes. Russia strengthened its positions in these categories of goods during 2014-2015.

In low-tech and high-tech categories a comparative disadvantage is observed. In 2014-2015 the situation slightly improved, but the tendency was not retained and the situation of Russia in these categories of goods deteriorated over the period 2009-2018.

The next question is the changes in trade destinations after the year 2014, when the trade volumes with a number of developed countries decreased due to the sanctions.

BRICS countries were chosen for the analysis of comparative advantages, as these countries play a substantial role in international trade, and are important trading partners of Russia. In 2018 China occupied the second place in terms of GDP after USA and the first place in trade volumes. Russia, Brazil and India belonged to the top 15 countries in terms of GDP volume in 2018. Each of these countries accounts for more than 1% of international goods turnover. Analysis of dynamics of trade turnover between Russia, Brazil, India and China over the years 2013-2018 showed that Russia's export to these countries increased in absolute and relative terms. Import in absolute terms slightly decreased, but the share of import from these countries relative to the overall import of Russia increased. In the export structure of Russia natural resources and the related goods prevailed during the period under consideration.

Analysis of Russia's comparative advantage in trade with the other BRICS countries during the period 2009-2018 is presented in Table 2 below.

Table 2: Comparative advantage indexes of Russia in trade with BRICS countries

Modified Balassa index (RCA1)										
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Material-intensive goods	0.46	0.50	0.67	0.74	0.73	**0.70**	**0.69**	0.72	0.77	0.86
Labor-intensive goods	-0.84	-0.85	-0.86	-0.86	-0.86	**-0.85**	**-0.74**	-0.67	-0.81	-0.79
Capital-intensive goods	0.07	-0.42	-0.64	-0.66	-0.70	**-0.63**	**-0.47**	-0.58	-0.50	-0.43
Low-tech goods	-0.64	-0.72	-0.67	-0.75	-0.74	**-0.78**	**-0.77**	-0.82	-0.81	-0.84
High-tech goods	-0.39	-0.59	-0.74	-0.67	-0.69	**-0.63**	**-0.51**	-0.71	-0.71	-0.61
Modified Balassa index by Greenaway and Milner(RCA2)										
Material-intensive goods	115.86	162.39	190.24	212.77	214.55	**202.26**	**184.42**	200.55	222.45	241.40
Labor-intensive goods	-230.99	-198.13	-228.8	-235.5	-225.7	**-225.61**	**-174.3**	-142.4	-202.9	-228.9
Capital-intensive goods	30.95	-37.73	-123.5	-133.6	-144.8	**-122.11**	**-88.31**	-112.7	-87.86	-106.4
Low-tech goods	-133.83	-131.82	-135.3	-168.6	-160.7	**-180.37**	**-188.6**	-211.8	-202.9	-259.9
High-tech goods	-66.66	-84.44	-163.1	-138.0	-138.6	**-120.45**	**-98.03**	-157.1	-154.9	-155.5
Lafay index (LFI)										
Material-intensive goods	23.78	27.73	35.29	36.29	36.15	**35.69**	**32.85**	33.90	36.25	38.54
Labor-intensive goods	-15.90	-15.36	-16.14	-16.37	-16.49	**-16.45**	**-13.62**	-9.75	-11.46	-13.63
Capital-intensive goods	2.07	-1.23	-3.77	-4.28	-4.21	**-3.95**	**-3.13**	-2.63	-2.54	-3.76
Low-tech goods	-5.84	-5.81	-5.65	-6.27	-5.04	**-5.86**	**-7.80**	-5.27	-7.04	-9.18
High-tech goods	-4.11	-5.33	-9.74	-9.36	-10.41	**-9.44**	**-8.30**	-16.25	-15.21	-11.97

According to all three indexes, in trade with BRICS countries Russia has comparative advantages in material-intensive goods during the period 2009-2018. Dynamics in 2014 is similar to that in trade with all world countries.

In all other categories of goods Russia has a comparative disadvantage in trade with BRICS countries during the period under consideration. There is positive dynamics in 2014 for high-tech goods and negative dynamics for low-tech goods. However, positive dynamics is not sustained during the upcoming years.

The Eurasian Economic Union (EAEU) countries (Russia, Armenia, Kyrgyz Republic, Belarus, Kazakhstan) are another group of countries with whom Russia is developing international economic relations. Although these countries account for smaller trade volumes with Russia than BRICS countries, there is a potential of trade development with them. During the period 2013-2018 trade volume of Russia with EAEU increased, while import volumes slightly decreased in absolute value and the share of import in the total import of Russia increased.

In Table 3 below we present the comparative advantage indexes across five categories of goods to analyze trade of Russia with the other EAEU countries.

Table 3: Comparative advantage indexes of Russia in trade with the EAEU countries

Modified Balassa index (RCA1)										
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Material-intensive goods	0.22	0.65	0.81	0.62	0.43	**0.28**	**0.29**	0.27	0.30	0.34
Labor-intensive goods	0.71	-0.26	-0.07	-0.28	0.00	**0.17**	**0.31**	0.18	0.23	0.18
Capital-intensive goods	0.50	0.36	0.34	0.34	0.40	**0.35**	**0.44**	0.29	0.27	0.29
Low-tech goods	0.28	0.51	0.72	0.19	0.29	**0.08**	**0.15**	0.28	0.37	0.30
High-tech goods	0.84	0.76	0.65	-0.28	-0.03	**0.11**	**0.35**	0.21	0.25	0.33
Modified Balassa index by Greenaway and Milner(RCA2)										
Material-intensive goods	-47.07	84.39	163.42	92.15	31.39	**8.32**	**-7.33**	-6.92	-3.65	0.30
Labor-intensive goods	83.22	-124.19	-76.66	-108.6	-59.64	**-16.13**	**-4.10**	-26.67	-19.63	-34.30
Capital-intensive goods	17.95	4.31	9.63	18.68	25.09	**23.51**	**27.46**	-4.09	-11.03	-11.53
Low-tech goods	-35.63	43.42	119.38	-12.33	-0.16	**-34.24**	**-37.30**	-5.51	12.30	-8.81
High-tech goods	150.30	127.50	94.40	-108.9	-66.21	**-27.03**	**6.50**	-19.97	-15.03	-2.63
Lafay index (LFI)										
Material-intensive goods	-9.67	11.29	14.23	16.99	6.53	**1.73**	**-1.47**	0.96	1.00	1.79
Labor-intensive goods	3.32	-12.61	-11.34	-8.31	-4.16	**-1.19**	**-0.23**	-1.19	-0.79	-1.90
Capital-intensive goods	1.75	-1.49	-4.03	1.39	2.38	**2.10**	**2.28**	0.71	-0.22	-0.27
Low-tech goods	-0.72	0.16	0.36	-0.20	0.03	**-0.92**	**-0.95**	0.15	0.46	0.00
High-tech goods	5.32	2.64	0.78	-9.86	-4.79	**-1.72**	**0.39**	-0.63	-0.45	0.38

With the EAEU countries Russia tends to have comparative advantage in all five categories of goods according to the first index in 2009-2018. However, the other two indexes demonstrate changing comparative advantages and disadvantages in various categories of goods, along with the increase of comparative advantage in material-intensive goods.

5 Conclusion and policy recommendations

Results show that trade of Russia with BRICS countries and the EAEU was growing during the period 2013-2018. Specialization of Russia in natural resources increased during the period under consideration.

Analysis of the comparative advantage indexes showed that under sanctions imposed by a number of developed countries Russia has increased its export in certain categories of goods with BRICS countries and the EAEU in 2013-2018. Besides, Russia improved its position in the world in capital-intensive and labor-intensive goods partly due to the improved comparative advantage with BRICS countries.

Russia has developed its comparative advantages in material-intensive goods. The same time, position of Russia in high-tech and low-tech goods weakened.

Meanwhile, for the long run economic development it is important to diversify the economy. Therefore, development of high-tech sectors and innovations in all sectors are needed. Economic openness, import of the intermediary goods and foreign direct investment associated with advanced technologies are important for this. In innovation the activities of government and of enterprises are essential, both in terms of technological innovations and improved management practices.

Besides, it is important for the manufacturing enterprises to find their niches in the global value chains. In this process it is worth aiming at specialization on the production stages that involve human capital and R&D. It is also relevant to attain higher value added in processing of natural resources and to develop technologies in the energy sector.

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