

## **“REVEALED” COMPARATIVE ADVANTAGE: PRODUCTS MAPPING OF THE RUSSIAN AGRICULTURAL EXPORTS IN RELATION TO INDIVIDUAL REGIONS**

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**Abstract.** This paper studies specialization and competitive performance of the Russian agricultural sector through analysis of “revealed” comparative advantage of country’s agricultural and food exports over the period 1998–2010. The aim of this analysis is to identify the main segments of the Russian agricultural export from the two points of view: international competitiveness and country’s trade balance. For the purpose of detailed analysis all commodities exported and imported by the Russian Federation can be divided into separate groups according to two parameters: the revealed comparative advantage (RSCA index by Dalum et al. [1998] and Laursen [1998]) and domestic trade-balance (trade balance index by Lafay [1992]). This analytical tool is named “products mapping”. In accordance with this methodology, we distinguished four groups of products. In the first group products have a comparative advantage and positive trade balance (5% of the exported goods, about 50% of the value of total agricultural exports). There was also identified an opposite group: all items have comparative disadvantage and negative trade balance (80% of items account for only about 30% of total exports, but 95–99% of the total imports). Further we identified one controversial group where products have comparative disadvantages, but have a positive trade balance. In most cases the products have comparative advantages in relations to the CIS, EU or Asian countries, while trade in these products in relation to countries located in Africa and Americas in most cases does not exist.

**Key words:** foreign trade, comparative advantage, trade balance, agricultural products, Russia

### **INTRODUCTION**

This paper presents an analysis of Russia’s international trade in agricultural and food-stuffs in terms of its comparative advantage. Relevance of the topic is determined by the growing role of Russia in the international agricultural market. During the 2000s, Russian

agricultural import increased from \$7 billion in 2000 to \$33 billion in 2008. Country's agrifood exports also increased, albeit at a slower pace.

In such circumstances, it would be useful to identify markets where Russian products have comparative advantage, and therefore they have prospects for further development.

In the theories of international trade, comparative advantage is an important concept for explaining trade patterns.

The concept of comparative advantages was first developed by the classical economist David Ricardo [1817] building on principle of absolute advantages (1776) by Adam Smith.

Smith and Ricardo explained the occurrence of absolute and comparative advantages as the result of differences in labor productivity. Eli Heckscher (1919) and Bertil Ohlin (1933) developed the idea of comparative advantages in a model based on differences in factors endowments.

The idea of exploring the comparative advantage from observed trade patterns belongs to Hungarian economist Béla Alexander Balassa [1965].

He noted that measuring comparative advantage and testing the Heckscher-Ohlin theory have some difficulties since relative prices under autarky are not observable. Given this fact, Balassa [1965] proposes that it may not be necessary to include all constituents effecting country's comparative advantage. Instead, he suggests that comparative advantage is "revealed" by observed trade patterns, and in line with the theory, one needs pre-trade relative prices which are not observable.

This method considerably simplifies the calculations but does not determine the underlying sources of comparative advantage.

Due to the fact that it allows us to process large amounts of data, using readily available figures on trade flows between countries, method of Balassa is often used by economists in the analysis of foreign trade patterns.

A few such studies exist with respect to Russia. For example, Tabata [2006] investigated changes in Russia's comparative advantage in 1994–2005 by revealed comparative advantage (RCA) index, revealed comparative disadvantage index, and trade specialization index (TSI). The results of his work show the increasing competitiveness of oil and gas exports (and secondarily those of armaments, selected base metals, roundwood, and fertilizers) and declining competitiveness in meat, plastics, and automobile production and stagnation in the machinery sectors.

Westin [1998] has examined the pattern of revealed comparative advantage of Russia in its trade with the EU using the Balassa index, and an index based on import-export ratios. His findings show that Russia reveals a comparative advantage in primary products and that there is no sign of change in terms of manufacturing export, which is still suffering from being unsalable on Western markets due to weakness in quality.

Ahrend [2004] argues that international competitiveness of Russian Federation – as measured by revealed comparative advantage remains limited to a small number of sectors that mainly produce primary commodities (particularly hydrocarbons) and energy-intensive basic goods.

These studies are based on the traditional use of the Balassa index. However, after Balassa other researchers have created different versions of this index. Modifications of

the Balassa index, its combinations with other indexes allow researchers to develop effective tools for the analysis of trade flows between countries.

In this paper we have used one of these tools, named "products mapping". This tool was used by Widodo [2009] and applied to ASEAN countries. "Products mapping" method enables us to assess products exported by particular country or by the group of countries from two different points of view, i.e. domestic trade-balance and international competitiveness. This analysis allows us to identify basic segments where Russia is competitive in the global markets. This tool can also help us to identify potentially promising areas and important trends in the structure of Russia's foreign trade.

## MATERIAL AND METHODS

The idea of this article is to examine the structure of Russian foreign trade in agricultural products from the point of view of its specialization and the competitive performance over the period 1998–2010.

The aim of the analysis is to distinguish from the total agricultural export flows specific groups of products from the point of view of comparative advantage and trade balance, to trace the changes that have occurred in these groups over the period and to explain why these changes have taken place.

The classification of agricultural commodities used in the paper is the FAOSTAT Commodity List (FCL) that is originally based on the Standard International Trade Classification of the United Nations. All value figures are calculated at current prices in USD.

The analysis presented in this paper was conducted using the analytical tool, named "products mapping" (Fig. 1). This tool enables to assess leading exported products from two different points of view, i.e. domestic trade-balance and international competitiveness [Widodo 2009]

The revealed symmetric comparative advantage (RSCA) by Dalum et al. [1998] and Laursen [1998] is the indicator of comparative advantage, and trade balance index (TBI) by Lafay [1992] is the indicator of export-import activities.

RSCA > 0	<b>Group B:</b> Comparative Advantage Net-importer (RSCA > 0 and TBI < 0)	<b>Group A:</b> Comparative Advantage Net-exporter (RSCA > 0 and TBI > 0)
	RSCA < 0	<b>Group D:</b> Comparative disadvantage Net-importer (RSCA < 0 and TBI < 0)
	TBI < 0	TBI > 0
	Trade Balance Index (TBI)	

Fig. 1. Product mapping scheme  
 Source: Widodo [2009].

Measuring the comparative advantages in this paper is based on the Balassa index. RCA (revealed comparative advantage) is expressed through export performance and observed trade patterns. It measures a country's exports of a commodity relative to its total exports.

$$RCA = (X_{ij} / X_{it}) / (X_{nj} / X_{nt}) = (X_{ij} / X_{nj}) / (X_{it} / X_{nt}) \quad (1)$$

where:  $X$  – exports;

$i$  – a country;

$j$  – a commodity;

$n$  – a set of countries;

$t$  – a set of commodities.

In normal situations, if  $RCA > 1$ , then a comparative advantage is revealed. However, to perform the “product mapping” we use RSCA index that is formulated as follows:

$$RSCA = (RCA_{it} - 1) / (RCA_{ij} + 1) \quad (2)$$

The RSCA index is a simple decreasing monotonic transformation of revealed comparative advantage (RCA) or Balassa index.

The values of  $RSCA_{ij}$  index can vary from  $-1$  to  $+1$ . The  $RSCA_{ij}$  greater than zero implies that country  $i$  has comparative advantage in group of products  $j$ . In contrast,  $RSCA_{ij}$  less than zero implies that country  $i$  has comparative disadvantage in group of products  $j$  [Dalum et al. 1998].

Trade balance index (TBI) is employed to analyze whether a country has specialization in export (as net-exporter) or in import (as net-importer) for a specific group of products. TBI is simply formulated as follows [Lafay 1992]:

$$TBI_{ij} = (x_{ij} - m_{ij}) / (x_{ij} + m_{ij}) \quad (3)$$

where:  $TBI_{ij}$  – trade balance index of country  $i$  for product  $j$ ;

$x_{ij}$ ,  $m_{ij}$  – represent exports and imports of group of products  $j$  by country  $i$ .

Values of the index range from  $-1$  to  $+1$ . Extremely, the TBI equals  $-1$ , if a country only imports, in contrast, the TBI equals  $+1$ , if a country only exports. Indeed, the index is not defined when a country neither exports nor imports. A country is referred to as “net-importer” in a specific group of product if the value of TBI is negative, and as “net-exporter” if the value of TBI is positive [Widodo 2009].

The next index used in the paper is Lafay index. This index was applied in the second part of the paper when it became necessary to analyze bilateral trade flows.

Using this index we consider the difference between each item's normalized trade balance and the overall normalized trade balance. Thereby LFI index is used to eliminate the influence of cyclical factors, which can affect the magnitude of trade flows in the short run and to focus on the bilateral trade relations between the countries and the regions.

For a given country  $i$  and for any given product  $j$  the Lafay index is defined as:

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

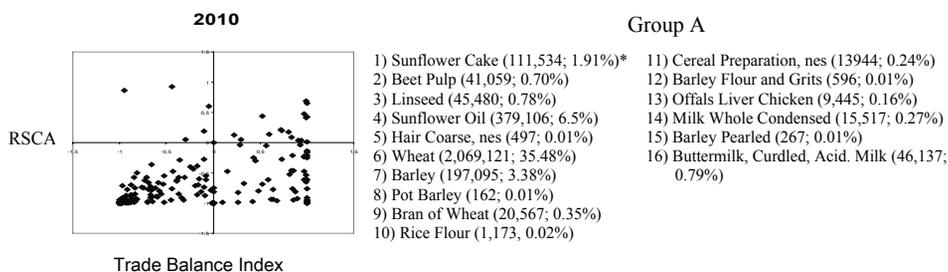
where:  $x_j^i, m_j^i$  – exports and imports of product  $j$  of country  $i$ , towards and from the particular region or the rest of the world, respectively;  
 $N$  – number of items.

Positive values of the Lafay index indicate the existence of comparative advantages in a given item; the larger the value the higher the degree of specialisation. On the contrary, negative values points to de-specialisation.

## RESULTS AND DISCUSSION

According to the described methodology, authors conducted an analysis and distinguished four specific groups of products from the total agricultural export flows.

Authors have identified a group that creates the foundation of the country’s exports. It contains the best products in term of their comparative advantage and trade balance. Authors also isolated a group that has no revealed comparative advantage and keeps negative trade balance as opposed to the first group [Widodo 2009]. Results of product mapping are presented in Figure 2.



\*Products are presented in decreasing order of the index RSCA. In brackets next to the name of the product its value is specified (in thousands of US dollars), as well as its share in total Russian export.

Fig. 2. Products mapping of Russian export in 2010

Source: FAO, author’s calculation (2012).

According to the results of “products mapping”, the largest number of the agricultural products exported by Russian Federation is part of the group D (the bottom left area on diagram on Fig. 2). They have no revealed comparative advantage and keep negative trade balance. Production of these commodities is ineffective due to economic, historical, natural or geographical factors within the Russian Federation, so country has to import them. Such goods are, for example, tropical fruits (bananas, apricots, coconut, etc.), meat, and most of the meat products, tea, coffee, etc.

But considering the value of products in each group instead of the number of products, authors have completely different results.

According to the results of calculations, much of the export value is concentrated in group A (Table 1). In 1998, the group A comprised 43.8% of the total value of agricultural exports, in 2002–2003 it increased to almost 60%, in 2007 reached its maximum of 65.7% and in 2010 it was 50.6%.

Table 1. The share of individual groups in the total value of Russian agricultural export in 1998–2010 (%)

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Group A	43.8	35.3	32.9	30.8	59.3	56.9	40.8	53.1	51.0	65.7	59.1	59.4	50.6
Group B	1.3	0.8	6.9	5.0	4.5	5.3	8.3	3.6	4.1	0.4	0.5	0.4	2.2
Group C	20.4	6.4	15.4	18.7	11.7	7.2	11.3	13.0	12.2	9.5	9.9	15.0	15.7
Group D	34.5	57.5	44.8	45.6	24.4	30.6	39.6	30.3	32.7	24.3	30.5	25.2	31.5
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: FAO, author's calculation [2012].

From the domestic point of view, leading exported products are supposed to be the products that can give bigger amount of foreign exchange for domestic economy. It means that the higher the share of a specific product in the total domestic exports, the more significant the contribution of the exported product to the domestic economy becomes. Such product can be considered as foreign exchange creator for domestic economy [Widodo 2009].

Wheat has the greatest weight in the group A and accounted for 42.02% of total exports in 2002, 31.3% in 2006 and 35.5% in 2010, while the whole group A represented 59.3, 51 and 50.6% of total exports respectively.

We can see that the first three groups of products for the entire investigated period have not exceeded the share of 3–4% of the total import (with the exception of 2003 and 2004 when the share of groups A, B and C for a total was 5–7%, which in fact is also not a big amount) – Table 2.

Thus, there is a situation when 5% of the exported goods, belonging to group A, account for about 50% total agricultural exports. In turn, 80% of items included in the group D, account for only about 30% of total exports, but 95–99% of the total imports. On this basis, we can consider the contents of the group A as the foundation of the Russian agri-food export.

Table 2. The share of individual groups in the total value of Russian agricultural import in 1998–2010 (%)

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Group A	0.2	0.3	0.2	0.8	0.8	1.3	2.6	1.9	1.5	1.8	1.5	0.7	0.6
Group B	0.8	0.5	1.3	1.3	2.0	3.2	3.2	1.2	1.2	0.2	0.2	0.2	0.6
Group C	1.6	0.2	1.2	1.3	1.0	0.5	1.0	1.5	1.4	1.1	0.9	1.4	0.8
Group D	97.4	99.1	97.2	96.6	96.2	95.0	93.2	95.5	95.9	96.8	97.4	97.7	98.0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: FAO, author's calculation [2012].

During the analyzed period, the structure of Russia's foreign trade in agricultural products has undergone some changes.

At the beginning of the period, in 1998, wheat had no comparative advantage and sunflower seed (20.7% of the total export) and hides (wet, salted) cattle (14.6%) constituted the basis of group A. Later they have lost their relevance. In the case of sunflower seed it was likely caused by increase in production capacity for oilseed processing and by the increase of the export of vegetable oils instead of raw materials (sunflower seeds), as it was in the 1990s. In relation to hides (wet, salted) cattle, the reduction of export performance was caused by the continued decline in the livestock sector and by the establishment of licensing for export of hides and skins of cattle, sheep and other animals.

During the analyzed period there were significant changes in the volumes and structures of these groups. In 1998 group A comprised 43.8% of the total value of agricultural exports, in 2002–2003 increased to almost 60% of the total value and in 2007 reached its maximum of 65.7% of the total value of Russian agricultural exports. In 2010 its share was 50.6%. Despite some fluctuations, the overall trend can be assessed as a steady growth of the share of the group A in the total value of Russian agricultural exports.

At the same time, there is a reduction in the share of groups D and C in the total exports value. These trends can be considered as a strengthening of the comparative advantages of Russian exports on the whole.

It should be noticed that group C products are also important. They do not have comparative advantages, but have a positive trade balance. The comparative disadvantage in this case, may occur in relation to the whole world, while in bilateral trade with individual regions or countries comparative advantages quite possibly exist.

To test this hypothesis, we analyzed bilateral trade flows between Russia and individual regions. In this case, LFI index, which is used exactly for the analysis of comparative advantage on bilateral level, is the most suitable.

A detailed analysis of this group using the LFI index shows that some products actually have revealed comparative advantages in relation to particular regions.

In 1998 there was 28 items in the group C. As we can observe in the Table 3, each product (with rare exceptions) has a comparative advantage in relation to at least one region. For example, rapeseeds have comparative disadvantage in relation to African and American countries, but it have positive values of LFI index in relations to Commonwealth of Independent States – CIS, Asian countries and especially to the EU. The export of rapeseed in Europe is important and promising area for Russia, since European countries use it for bio-fuel production. Exports of rapeseed in the EU amount to 68.2% of the total Russian exports of this commodity.

Wheat has a comparative advantage in relation to all regions with the exception of America. Barley has a positive value of LFI in relation to Asian countries, etc.

In this group 9 out of 28 products have a comparative advantage in relation to Asian countries, 13 products in relation to CIS as well as EU countries and only one product in relation to Africa.

Considering the group C in 2002, we see that the largest number of the products have a comparative advantage in relation to EU (31 items out of 55), Asian countries (26 items) and CIS countries (22 items) – Table 4.

Table 3. Values of LFI index in relation to specific regions in 1998

Specification	Asia		Africa		Americas		CIS		EU	
	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export
Anise, Badian, Fennel, corian	-0.065	16.8	x	0	x	0	0.013	4.4	-0.115	79.1
Barley	0.016	41.0	x	0	x	0	-1.677	7.4	-13.081	46.8
Bran of Wheat	-0.047	76.3	x	0	x	0	-0.034	2.0	-0.684	21.7
Broad beans, Horse Beans (dry)	-0.002	0	x	0	x	0	x	0	0.087	100
Cocoa husks, Shells	x	0	x	0	x	0	0.092	100	x	0
Cocoon (unrecled) Wastes	0.000	10.7	x	0	x	0	-0.020	0	0.200	89.3
Food Wastes	x	0	x	0	x	0	0.006	100	x	0
Grease including Lanolin Wool	-0.011	0	x	0	x	0	0.001	50.0	x	0
Hair (carded/ /combed)	-0.004	0	x	0	x	0	x	0	0.040	100
Hair (fine)	0.005	99.2	x	0	x	0	-0.023	0	-0.233	1.0
Lard	-0.006	0.2	x	0	x	0	0.021	2.8	-0.830	97.0
Lard Stearine Oil	x	0	x	0	x	0	0.005	100	x	0
Mushrooms and Truffles	0.000	0.3	x	0	x	0	x	0	-0.472	99.7
Mustard Seed	0.000	30.2	x	0	x	0	0.375	68.9	0.004	0.9
Nuts	-0.289	99.9	-0.336	0	x	0	-0.008	0	-0.314	0
Oilseeds	0.009	84.9	x	0	x	0	-0.004	0.7	0.070	14.4
Rapeseed	0.008	6.6	x	0	x	0	0.079	0.8	5.426	68.2
Raspberries	-0.007	0	-0.067	0	x	0	x	0	0.229	100
Skins (wet, salted) Goats	x	0	x	0	x	0	x	0	0.028	100
Skins with Wool Sheep	0.015	77.4	x	0	x	0	-0.036	13.8	0.012	8.8
Soybeans	0.059	99.4	x	0	x	0	0.076	0.6	-0.664	0
Strawberries	-0.224	0	-3.800	0	x	0	-0.001	0	-2.338	0
Tapioca of Cassava	x	0	x	0	x	0	0.009	100	-0.004	0
Vegetables in Temporary Preservatives	-0.136	61.2	x	0	x	0	-0.000	0.2	-1.660	38.6
Wheat	0.660	48.7	4.204	4.5	x	0	1.356	29.6	8.904	15.0
Wool (degreased)	0.008	12.4	x	0	x	0	0.856	30.3	2.591	57.3
Wool (greasy)	0.009	17.7	x	0	x	0	-1.169	2.8	2.444	67.4
Wool Hair Waste	x	0	x	0	x	0	0.084	17.2	0.362	82.8

x means that there was no trade in this commodity with this particular region.

Source: FAOSTAT, author's calculations [2013].

Table 4. Values of LFI index in relation to specific regions in 2002

Specification	Africa		Americas		CIS		EU		Asia	
	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export
1	2	3	4	5	6	7	8	9	10	11
Homogenic Meat Preparations	x	0	-0.193	0	0.067	95.6	-0.111	0.7	x	0
Cotton Lint	x	0	x	0	x	0	0.040	100	x	0
Leather (use, waste)	x	0	x	0	x	0	0.001	100	x	0
Cereals	x	0	x	0	0.000	100	x	0	x	0
Meat Extracts	x	0	x	0	0	0	x	0	x	0
Tapioca of Cassava	x	0	x	0	x	0	0.001	66.7	x	0
Grease including Lanolin Wool	x	0	x	0	0.006	100	x	0	x	0
Skins (wet, salted) Goats	x	0	x	0	x	0	0.003	100	x	0
Jute	x	0	x	0	0.005	100	x	0	x	0
Hides	x	0	x	0	x	0	0.034	100	x	0
Roots and Tubers	x	0	x	0	x	0	0.020	100	x	0
Cotton Waste	x	0	x	0	0.007	23.0	0.104	77.5	x	0
Skins with Wool Sheep	x	0	x	0	0.003	2.5	0.004	0.9	0.294	96.7
Wool (greasy)	x	0	x	0	x	0	1.857	94.2	0.070	5.2
Coffee Substitutes, Concentrated Coffee	x	0	x	0	0.005	72.7	x	0	x	0
Cake of Rapeseed	x	0	x	0	x	0	0.718	100	x	0
Wool Degreased	x	0	x	0	0.100	10.1	2.166	52.7	1.031	37.1
Flax Tow Waste	x	0	x	0	0.002	2.7	0.267	73.0	0.060	24.1
Hair Fine	x	0	x	0	x	0.0	0.046	16.5	0.157	83.8
Flax Fibre and Tow	x	0	x	0	0.002	0.5	1.111	68.3	0.343	31.2
Hair Coarse	x	0	x	0	x	0	x	0	0.089	100
Hides (wet, salted) Cattle	x	0	x	0	0.108	1.5	28.174	91.8	0.959	4.6
Peas (green)	-0.906	0	x	0	0.007	33.6	0.061	66.4	x	0
Milk (whole, evaporated)	x	0	x	0	2.015	99.0	-0.128	1.0	0.002	0
Broad Beans, Horse Beans (dry)	x	0	x	0	x	0	0.307	100	x	0
Rye	x	0	x	0	0.006	1.5	1.625	92.7	0.068	5.7
Chick Peas	x	0	x	0	0.015	5.0	-0.000	0.9	1.011	94.1
Forage Products	x	0	x	0	-0.002	0	0.322	99.6	0.001	0.4

Table 4 cont.

1	2	3	4	5	6	7	8	9	10	11
Bread	0.531	0.02	4.570	6.6	-0.198	87.7	-1.851	3.2	-0.439	4.4
Cow milk (whole, fresh)	x	0	0.265	0.5	-0.168	36.1	-0.532	0.5	1.016	62.7
Currants	x	0	x	0	x	0	0.003	100	x	0
Dried Mushrooms	x	0	0.248	1.4	-0.002	0	0.482	86.0	-0.953	5.2
Flour of Rye	x	0	x	0	-0.036	39.6	-0.001	0	0.014	15.9
Flour of Wheat	-2.417	0	-7.626	0.3	-2.836	13.8	-2.653	0.2	6.556	85.6
Ice Cream and Edible Ice	x	0	2.660	1.8	1.145	79.3	-2.674	3.7	0.209	11.5
Juice of Grapefruit	x	0	-0.005	0	-0.110	92.4	-0.095	5.5	-0.023	2.1
Juice of Pineapples	-3.323	0	0.032	0.4	-0.118	82.9	-0.109	4.2	0.011	12.3
Leguminous vegetables	x	0	x	0.0	-0.007	0	0.031	100	x	0
Lentils	x	0	0.164	3.8	0.024	30.0	0.035	25.2	-0.057	39.0
Meat of Beef (dried, salted, smoked)	x	0	x	0	0.001	75	-0.002	0	x	0
Milk (skimmed dry)	x	0	-0.563	0	-1.055	13.5	2.089	60.4	0.724	22.2
Milk (whole dried)	14.875	0.8	0.860	1.5	-1.988	77.3	-0.512	2.5	0.202	12.1
Mixes and Doughs	x	0	0.043	0.2	0.133	26.3	0.207	72.4	-0.262	0
Molasses	x	0	x	0	-0.538	8.7	0.588	41.0	0.488	50.3
Oats	x	0	x	0	-0.030	0	-0.006	0	0.017	21.4
Oil Essential	-0.604	0	-1.609	0	0.022	1.4	-1.268	4.0	3.763	94.6
Preparations of Beef Meat	x	0	-0.008	0	-1.242	93.5	-0.424	0	0.004	3.3
Pulses	x	0	x	0	-0.020	0	0.014	100	-0.004	0
Rapeseed	x	0	x	0	-0.002	0.0	2.053	95.9	0.066	4.0
Straw Husks	x	0	x	0	x	0	0.001	100	x	0
Strawberries	-31.115	0	0.506	0.7	-0.008	0	1.982	99.4	-0.084	0
Sugar (refined)	-7.854	0	0.264	0.0	3.043	97.7	-27.086	0.2	-15.982	2.0
Vegetables in Temporary Preservatives	30.813	2.0	-0.037	0	-0.036	0.2	0.427	25.0	0.559	69.1
Yogh (concentra- ted or not)	x	0	0.199	0.1	1.630	96.5	-7.321	0	0.089	1.9

Source: FAOSTAT, author's calculations [2013].

In regard to the Africa and the Americas, Russia's foreign trade with these regions in the most of the investigated products simply do not exists.

Some of the products are exported only in one direction and have comparative advantages in relation to the region. Thus, for example, straw husks, pulses, leguminous vegetables, currants, hides, cake of rapeseed and and several other products Russia exported only to EU countries and this items have positive values of LFI index in relation to this region.

In 2006, the product structure of the group C underwent certain changes. Some items moved to this group from the group D, but in general, the essence of the group C remained the same. The largest number of the products still have a comparative advantage in relation to the EU (26 items out of 56), Asian countries (22 items) and CIS countries (20 items) – Table 5.

Table 5. Values of LFI index in relation to specific regions in 2006

Specification	Africa		Americas		CIS		EU		Asia	
	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export
1	2	3	4	5	6	7	8	9	10	11
Apple juice (single strength)	0.164	0.0	0.432	0.4	-0.586	93.5	-1.308	0.1	0.184	5.8
Berries	x	0	-0.179	0	x	0	1.591	100	-0.001	0
Bran of Pulses	x	0	x	0	x	0	x	0	-0.002	100
Bran of Rice	x	0	x	0	x	0	x	0	0.005	100
Bran of Wheat	x	0	x	0	-0.012	0	-1.309	0	1.879	100
Broad Beans, Horse Beans (dry)	x	0	x	0	x	0	0.437	72.6	x	0
Cake of Linseed	x	0	x	0	x	0	0.013	100	x	0
Cake of Oilseeds	x	0	x	0	x	0	0.012	96.0	x	0
Cake of Rapeseed	x	0	x	0	0.010	2.1	3.044	81.4	0.422	16.5
Cereal Preparations	x	0	6.755	7.6	0.260	76.9	-0.560	12.3	-1.345	1.9
Chick Peas	x	0	x	0	-0.047	2.4	0.265	15.4	0.964	82.2
Cigarettes	20.526	0.1	-0.505	0	7.108	70.2	-16.091	0.7	-26.225	20.2
Coffee Substitutes, Contrated Coffee	x	0	0.038	100	x	0	x	0	x	0
Cow milk (whole, fresh)	x	0	x	0	0.201	59.5	-0.551	0	0.738	40.3
Cranberries	x	0	-0.006	0	x	0	0.036	100	x	0
Dregs from Brewing/ Distilling	x	0	x	0	0.000	0.5	0.360	60.6	x	0.0
Dried Mushrooms	x	0	0.636	3.7	-0.009	0	0.525	79.4	-0.310	2.5

Table 5 cont.

1	2	3	4	5	6	7	8	9	10	11
Flax Tow Waste	-0.257	0	x	0	0.002	6.9	0.147	91.3	-0.005	1.4
Flour of Wheat	x	0	2.664	0.5	-0.743	23.4	-1.606	0	11.778	76.1
Food Wastes	x	0	x	0	0.000	100	x	0	x	0
Forage Products	x	0	x	0	-0.007	0	0.257	99.0	0.001	0.8
Germ of Wheat	x	0	x	0	0.000	100	x	0	x	0
Hair Coarse	x	0	x	0	-0.046	0	x	0	0.104	99.7
Hemp Tow Waste	x	0	x	0	x	0	x	0	x	0
Hides	x	0	x	0	x	0	0.100	100	x	0
Hides (wet, salted) Cattle	x	0	x	0	-0.090	23.0	0.363	67.3	0.036	9.6
Honey (natural)	x	0	x	0	x	0	x	0	x	0
Ice Cream and Edible Ice	x	0	2.687	1.0	0.938	82.8	-1.883	2.4	0.857	13.2
Juice of Pineapples	x	0	0.089	0.4	0.025	89.7	-0.078	0.1	0.019	9.5
Linseed Oil	x	0	0.013	1.2	-0.008	67.9	-0.002	23.5	0.000	3.7
Molasses	x	0	x	0	0.217	33.5	1.079	21.0	1.596	45.5
Nuts	-2.107	0	-0.066	0.0	0.006	1.2	0.084	1.1	4.730	97.6
Oats	x	0	x	0	-0.016	5.4	-0.011	0	0.091	53.6
Oilseeds	x	0	x	0	-0.452	0	1.402	97.1	-0.496	2.9
Other Fructose and Syrup	x	0	0.064	0.9	0.002	5.3	-0.172	0	0.000	0.2
Peas (dry)	0.164	0.0	-3.666	0.1	0.002	7.8	5.123	78.0	0.604	14.1
Peas (green)	-0.211	0	-0.004	0	x	0	0.620	100	x	0
Preparations of Beef Meat	0.821	0.1	-0.048	0	0.277	60.0	-0.323	0	0.607	39.4
Prepared Meat	0.164	0.2	-0.004	0	0.025	79.5	-0.054	0	0.030	20.2
Rapeseed	x	0	x	0	0.002	0.2	7.447	95.9	0.009	0.1
Rapeseed oil	x	0	x	0	-0.022	1.0	16.596	99.0	-0.004	0
Res. Fatty Subs	x	0	x	0	-0.003	100	x	0	-0.036	0
Rice Flour	x	0	0.320	15	0.009	78.9	-0.028	0.6	-0.038	5.6
Roots and Tubers	x	0	x	0	x	0	0.001	100	0.000	100.0
Safflower oil	x	0	x	0	x	0	-0.001	0	x	0
Sausages of Pig Meat	x	0	-8.149	0	2.252	89.8	-6.166	0	1.210	10.0
Skins (wet, salted) Calves	x	0	x	0	0.000	0.3	0.790	99.7	x	0
Skins (dry, salted) Goats	x	0	x	0	0.001	100	x	0	x	0
Straw Husks	x	0	x	0	0.001	36.0	0.008	64.0	x	0
Sugar (refined)	-19.265	0	-0.775	0.1	-6.698	84.0	-10.670	1.2	3.383	14.7
Vegetable Products for Feed	x	0	-0.196	0	x	0	0.198	68.4	-0.026	0

Table 5 cont.

	1	2	3	4	5	6	7	8	9	10	11
Vegetables in Temporary Preservatives		x	0	-0.151	0	0.000	0.1	1.352	46.4	-1.505	48.5
Wool (degreased)		x	0	x	0	-2.999	36.4	1.429	41.9	0.358	21.7
Wool (greasy)		x	0	x	0	-0.729	6.3	0.633	54.9	0.282	38.8
Wool Hair Waste		x	0	x	0	0.007	30.4	0.118	69.6	x	0
Yogh (concentrated or not)		x	0	0.051	0.0	1.124	98.3	-3.217	0	0.105	1.7

Explanations as in Table 3.

Source: FAOSTAT, author's calculations (2013).

The following products showed the highest values of the index: cigarettes in relation to Africa (LFI = 20.5) and CIS countries (LFI = 7.1); flour of wheat in relation to Asia (LFI = 11.8), rapeseed and rapeseed oil in relation to the EU (LFI = 7.5 and LFI = 16.6, respectively).

In 2010, 4 out of 52 items included in the group C had a comparative advantage in relation to African countries, 28 in relation to Asian countries, 16 products in relation to CIS, 22 items in relation to EU countries and 7 products in relation to Americas – Table 6.

Table 6. Values of LFI index in relation to specific regions in 2010

Specification	Africa		Americas		CIS		EU		Asia	
	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export	LFI	% of export
1	2	3	4	5	6	7	8	9	10	11
Apple juice (single strength)	x	0	-0.016	0.4	-0.911	89.9	-0.836	0.2	0.076	3.1
Bran of Cereals	0.010	5.6	x	0	x	0	-0.045	0	1.831	94.4
Bran of Maize	x	0	x	0	x	0	-0.007	0	0.056	100
Buckwheat	x	0	x	0	0.001	9.7	0.063	81.1	0.028	9.2
Cake of Linseed	x	0	x	0	x	0	0.021	89	x	0
Cake of Oilseeds	x	0	x	0	-0.007	0	0.024	100	x	0
Cake of Rapeseed	x	0	x	0	x	0	2.397	64.7	5.177	35.3
Cashew Nuts with Shells	x	0	x	0	x	0	x	0	0.006	100
Cereals	x	0	x	0	0.009	100	-0.001	0	x	0
Chick Peas	0.010	3.5	0.335	1.2	-0.176	7.2	0.007	1.4	2.605	86.8
Cigarettes	0.005	0.0	0.109	0.0	1.201	88.7	-8.989	1.4	-37.29	2.7
Coffee Substitutes, Concentrated Coffee	x	0	0.010	13.3	0.000	80	x	0	x	0

Table 6 cont.

1	2	3	4	5	6	7	8	9	10	11
Cotton Linter	x	0	x	0	x	0	x	0	0.217	100
Dregs from Bre- wing/Distilling	x	0	x	0	0.003	19.4	0.087	59.3	0.123	21.3
Eggs Liquid	x	0	x	0	0.000	100	x	0	x	0
Flax Tow Waste	x	0	x	0	0.000	6.8	-0.025	91.7	-0.046	0.8
Flour of Roots and Tubers	x	0	x	0	x	0	0.000	100	x	0
Flour of Rye	x	0	x	0	0.006	65.1	-0.018	0	0.119	32.1
Flour of Wheat	x	0	0.835	0.5	0.085	30.3	-0.786	0.1	10.194	55.7
Food Wastes	x	0	x	0	x	0	0.004	100	x	0
Germ of Maize	x	0	x	0	0.000	100	x	0	x	0
Hair (carded/ /combed)	x	0	x	0	-0.024	91.1	0.002	8.9	x	0
Hair (fine)	x	0	x	0	0.003	100	x	0	-0.109	0
Hides	x	0	-0.028	0	x	0	0.002	89.5	0.001	10.526
Meat (dried)	x	0	x	0	x	0	1.166	100	x	0
Meat	x	0	x	0	x	0	0.277	100	-0.082	0
Milk (whole, evaporated)	x	0	x	0	0.109	99.9	-0.036	0	0.003	0.1
Millet	x	0	x	0	-0.094	4.4	0.073	78.6	0.054	14.6
Molasses	x	0	-0.003	0	0.050	29.4	0.250	14.6	3.775	56.0
Mustard seed	x	0	x	0	0.000	0.2	0.180	37.4	1.179	62.4
Nuts	-0.448	0	-2.998	0	0.000	0.6	0.178	29.6	1.582	69.7
Oats	x	0	x	0	-0.003	5.8	-0.007	0.2	0.280	94.0
Other Fructose and Syrup	x	0	-0.149	6.4	0.002	90.0	-0.001	0	-0.022	3.6
Peas (dry)	x	0	-14.402	0.0	-0.000	13.8	1.737	65.8	3.382	20.4
Peas (green)	-0.270	0	-0.026	0	0.000	0.2	0.501	99.8	-0.001	0
Pig meat	x	0	x	0	0.000	15.9	0.012	55.3	x	0
Plums and Sloes	x	0	x	0	0.000	11.5	0.000	15.4	x	0
Preparations of Beef Meat	x	0	-6.692	0	-0.002	84.1	-0.472	0.0	0.427	10.3
Rapeseed	x	0	-1.654	0	-0.000	0.8	1.300	85.6	1.691	13.7
Rapeseed Oil	x	0	-0.074	0	-0.010	0.1	10.136	94.3	1.896	4.4
Res. Fatty Substances	x	0	x	0	0.015	72.4	0.011	5.1	0.181	22.4
Roots and Tubers	x	0	-0.020	0	0.001	89.6	-0.002	5.2	0.000	6.3
Rye	x	0	x	0	0.007	73.7	-0.074	0	0.095	26.3
Sausages of Pig Meat	x	0	-12.37	0	0.356	81.8	-6.098	0.0	0.024	1.0
Skin Furs	x	0	28.707	12.1	x	0	-0.672	71	3.966	15.5
Soybean Oil	1.033	16.5	-0.064	0	-0.901	0.3	9.594	82.5	-1.265	0.7
Straw Husks	x	0	-0.036	0	-0.001	7.1	0.003	52.4	0.008	40.5

Table 6 cont.

	1	2	3	4	5	6	7	8	9	10	11
Tobacco Products		-0.340	3.8	8.417	2.3	0.280	78.1	-10.45	6.7	-2.941	4.2
Vegetable Products for Feed		x	0	x	0	x	0	0.318	100	x	0
Whey (condensed)		x	0	x	0	x	0	x	0	x	0
Wool (greasy)		x	0	0.121	0.3	0.000	0.1	0.154	17.7	2.801	81.9
Wool Hair Waste		x	0	x	0	0.002	36.3	0.030	63.7	-0.021	0

Explanations as in Table 3.

Source: FAOSTAT, author's calculations (2013).

The results support the earlier suggestion that in bilateral trade with individual regions products of the group C have comparative advantages despite of comparative disadvantages in relation to the whole world.

In most cases the products have comparative advantages in relations to CIS, EU or Asia countries, while trade in these products with the countries of Africa and Americas in most cases does not exist.

## CONCLUSIONS

The analysis presented in this paper was conducted using the analytical tool, named "products mapping", that enables to assess leading exported products from two different points of view, i.e. domestic trade-balance and international competitiveness.

According to the results of "products mapping", the largest number of the agricultural products exported by Russian Federation is part of the group D. They have no revealed comparative advantage and keep negative trade balance. Production of these commodities is ineffective due to economic, historical, natural or geographical factors within the Russian Federation, so country has to import them. Such goods are, for example, tropical fruits (bananas, apricots, coconut, etc.), meat, and most of the meat products, tea, coffee.

But considering the value of products in each group instead of the number of products, we got completely different results. According to the results of calculations, the most of the export value is concentrated in group A. Wheat and sunflower oil has the greatest weight in this group.

Thus, there is a situation when 5% of the exported goods, belonging to group A, account for about 50% of total agricultural exports. In turn, 80% of items included in the group D, account for only about 30% of total exports, but 95–99% of the total imports. On this basis, authors can consider the contents of the group A as the foundation of the Russian agri-food export.

Further authors identified one controversial group where products have comparative disadvantages, but have a positive trade balance. Authors have assumed that items in this group have comparative advantages only in bilateral trade in relation to specific regions/countries. To test this assumption authors calculated LFI index (by Lafay (1992)) for each product/aggregation in this group in relations to five regions: European Union

(EU), Commonwealth of Independent States (CIS), Africa, Asia and Americas as well as in relation to selected important countries.

The results support the suggestion that in bilateral trade with individual regions products of this group have comparative advantages in relation to specific region or country despite of comparative disadvantages in relation to the whole world. For example, rapeseeds have comparative disadvantage in relation to African and American countries as well as to the whole world, but rapeseeds have a strong comparative advantage in relation to the EU since European countries use rapeseeds for bio-fuel production.

In most cases the products have comparative advantages in relations to the CIS, EU or Asian countries while trade in these products in relation to countries located in Africa and Americas in most cases does not exist.

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## **„UJAWNIONA” PRZEWAGA KOMPARATYWNA: ANALIZA ROSYJSKIEGO HANDLU ZAGRANICZNEGO PRODUKTAMI ROLNYMI W ROZBICIU NA REGIONY**

**Streszczenie.** W artykule zanalizowano zagadnienia handlu zagranicznego Rosji produktami rolnymi w latach 1998–2010. Wszystkie eksportowane produkty podzielono na grupy według dwóch parametrów: ujawnionych przewag komparatywnych (wskaźnik RSCA) oraz krajowego bilansu handlowego. W ten sposób uzyskano cztery grupy produktów: cechujące się przewagą komparatywną i dodatnim bilansem handlowym (5% eksportowanych produktów; około 50% wartości eksportu produktów rolnych), charakteryzujące się ujemnym bilansem handlowym i brakiem przewagi komparatywnej (w tej grupie 80% produktów ujętych ilościowo stanowi zaledwie 30% wartości eksportu, a jednocześnie 95–99% importu), produkty bez przewagi komparatywnej, a jednocześnie zachowujące dodatni bilans handlowy oraz produkty z przewagą komparatywną i ujemnym bilansem handlowym. Na podstawie analiz można wywnioskować, że w przypadku większości produktów Rosja ma przewagę komparatywną nad krajami WNP, UE oraz azjatyckimi, chociaż wobec krajów afrykańskich i z obu Ameryk ta przewaga nie występuje.

**Słowa kluczowe:** handel zagraniczny, przewaga komparatywna, bilans handlowy, produkty rolne, Rosja

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