

REVEALED COMPARATIVE ADVANTAGE OF RUSSIAN AGRICULTURAL EXPORTS

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Abstract

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This paper studies the issue of revealed comparative advantage in the case of the Russian foreign trade in agricultural products and foodstuffs. The objective of this study is to analyze specialization and the competitive performance of the Russian agricultural sector and to determine whether or not patterns of comparative advantage for Russia have undergone significant changes over the period 1998–2010. The analysis is performed using several measures of revealed comparative advantage: classical Balassa's index, Vollrath's index and Lafay index.

Balassa's index identified a group of products, which has relatively stable comparative advantage during the whole period. Among those products we can count cereals (wheat, barley, etc.), their by-products (for example bran of wheat) and products of their processing (cereals preparations, etc.), as well as oilseeds, vegetable oils and chocolate.

Vollrath's index showed that the number of products that have revealed competitive advantage was steadily growing during the period.

Lafay index, used in the analysis by regions, showed that Russia has comparative advantages in relation to CIS countries and Asian countries due to its geographical location and good trade relations.

Primary products have the comparative advantage in relation to EU and Asian countries. In relation to the Commonwealth of Independent States and Americas on the contrary the processed products have comparative advantages, while the most of primary products have comparative disadvantage.

In relation to the whole world, analysis has also revealed a shift of comparative advantage from by-products (e.g. bran of wheat, sunflower cake etc.) in 1998–2001 to primary products in 2002–2010 (wheat, barley, whole cow milk, sunflower seed etc.).

“revealed” comparative advantage, agricultural products, foodstuffs, foreign trade, Russia

Economic reforms that have started in Russia in the early 1990s have stimulated major changes in the structure and volume of the country's agricultural production and trade.

Since 1999, Russia's agricultural production has been growing rapidly. The average growth rate of gross agricultural production for 1999–2010 amounted to 2.4 percent per year (ICTSD, 2012).

The process of Russian agrifood sector's integration in the world economy is also accelerating and Russia becomes an active player in a number of food markets. During the 2000s, Russian agricultural import was growing considerably, from \$7 billion in 2000 to \$33 billion in 2008. This import growth has made Russia the second largest agricultural

importer among emerging markets, after China (Liefert, 2009).

Russia's agrifood export was growing alongside the increase in imports.

During the next few years, Russia expects further changes associated primarily with country's accession to the World Trade Organization. Reduction of some kinds of budgetary support and restrictions (tariff and non-tariff) will affect the competitiveness of Russian agricultural and food products in both domestic and international markets.

To be able to develop the country's strategy for the upcoming decades it is necessary to have a clear idea in relation to the competitiveness of

Russian agricultural exports. It is necessary to identify markets in which 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 Adam Smith's (1776) principle of absolute advantages. According to this theory, if a country has comparative advantage in the production of a good over another country it means that its opportunity costs of production are relatively lower than in the other country.

Neo-classical economists Eli Heckscher (1919) and Bertil Ohlin (1933) developed the idea of comparative advantages in a model based on differences in resource endowments.

However, it is well known 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, Balassa suggests that comparative advantage is "revealed" by observed trade patterns.

Comparative advantage from observed data is named "revealed" comparative advantage (RCA). In practice, this is a commonly accepted method for analyzing trade data. The Balassa index tries to identify whether a country has a "revealed" comparative advantage rather than to determine the underlying sources of comparative advantage.

Since then, the methodology proposed by Balassa is most often used in empirical studies of specialization and comparative advantage of countries, including Russia.

Tabata (2006) investigated changes in Russia's comparative advantage in 1994–2005 and found out the increasing competitiveness of oil and gas exports and contrary declining competitiveness in meat, plastics, and automobile production and stagnation in the machinery sectors.

Ahrend (2004) also argues that international competitiveness of Russian Federation remains limited to a small number of sectors that mainly produce primary commodities (particularly hydrocarbons) and energy-intensive basic goods.

Cooper (2006) argues that Russia possesses some very large non-competitive sectors, in particular the motor industry, civil aviation, shipbuilding, tractor and agricultural machine building, and light industry (i.e., textiles, clothing, and footwear).

Savin and Winker (2009) suggested that the Russian Federation has prospective advantages in some medium and high technological industries like pharmaceutical industry, electronic equipment, machinery building and railway transport as well as in some other industries.

However, there are a very limited number of studies conducted in relation to Russian exports of agricultural products and foodstuffs. This article presents one such analysis.

MATERIALS AND METHODS

The objective of this study is to analyze specialization and the competitive performance of the Russian agricultural sector and to determine whether or not the patterns of comparative advantage for Russian agricultural trade have undergone a significant changes over the period 1998–2010.

The classification of agricultural commodities used in the paper is the FAOSTAT Commodity List (FCL) that is based on the Standard International Trade Classification of the UN. It includes 683 commodities and covers crops and livestock, both primary and derived products. (FAOSTAT official website)

During the study, the commodities were first grouped into 19 groups according to their origin: Meat, Cereals and their preparations, Fats and offals, Fruits and nuts, Vegetables and mushrooms, Milk and milk products, Hides, skins and wool, Pulses and corn, Root crops, Tea and coffee and spices, Beverages, Cigarettes and tobacco, Live animals, Sugar, Vegetable oils and oil crops, Cotton and fibres, Eggs, Chocolate and Others.

Then the same goods were reshuffled into 3 groups depending on the degree of processing: primary products, processed or manufactured products and by-products.

Primary products are basic raw materials and goods without a manufacturing process.

Processed products are products that have undergone transformation in form of manufacturing, processing. In this case, the processing does not include primary treatment, such as drying, sorting, activities associated with the storage of products. Products, affected only by the primary treatment, are included in the group of primary products.

A by-product is a secondary product derived from a manufacturing process. This group also includes the waste products, suitable for sale and further use.

The article contains a detailed analysis of Russian foreign trade through the three basic indices Balassa index, Vollrath index and Lafay index of "revealed" comparative advantage.

These indices are selected for this study for the following reasons. Firstly, they allow us to conduct analysis using available data. Secondly, these indices complement each other. Classic Balassa index (Balassa, 1965) estimates export flows of Russia and the world in general. Vollrath index (1991) allows us to assess trade flows not only in term of export values, but also taking into account values of import. Therefore, both supply and demand balances are embodied in the index. Using the Lafay index

we can analyze bilateral trade relations between countries and regions.

Comparative advantage from observed data is named “revealed” comparative advantage (RCA). In practice, this is a commonly accepted method for analyzing trade data. The Balassa index tries to identify whether a country has a “revealed” comparative advantage rather than to determine the underlying sources of comparative advantage. The index is calculated as follows.

$$RCA_j^i = \left(\frac{X_{ij}}{\sum_{j=1}^n X_{ij}} \right) / \left(\frac{\sum_{j=1}^t X_{ij}}{\sum_{j=1}^t \sum_{j=1}^n X_{ij}} \right), \quad (1)$$

where

X_{ij} ... represents exports,

i a country,

j a commodity and n is a set of countries,

t a set of commodities.

RCA is based on export performance and observed trade patterns. It measures a country's exports of a commodity relative to its total exports. If $RCA > 1$, then a comparative advantage is revealed.

However, since first suggested by Balassa, the definition of RCA has been revised and modified such that an excessive number of measures now exist.

Evaluating the shortcomings of Balassa's index, Vollrath (1991) suggests that the revealed competitiveness (RC) index is preferable since supply and demand balances are embodied in the index. It is important to point out that Balassa and Vollrath indices are based on different concepts and thus are not strictly comparable (Seymen, Utkulu, 2010).

The revealed competitiveness is calculated as the difference between relative export advantage (RXA_{ij}), which is the equivalent to the original Balassa index (RCA_{ij}), and its counterpart, relative import advantage (RMA_{ij}).

$$RMA_j^i = \left(\frac{M_{ij}}{\sum_{j=1}^n M_{ij}} \right) / \left(\frac{\sum_{j=1}^t M_{ij}}{\sum_{j=1}^t \sum_{j=1}^n M_{ij}} \right),$$

where

M_{ij} ... accounts for imports,

i a country,

j a commodity and

n a set of countries,

t a set of commodities.

$$RXA_j^i = RCA_j^i = \left(\frac{X_{ij}}{\sum_{j=1}^n X_{ij}} \right) / \left(\frac{\sum_{j=1}^t X_{ij}}{\sum_{j=1}^t \sum_{j=1}^n X_{ij}} \right).$$

The measure of Vollrath is the revealed competitiveness (RC), expressed as:

$$RC_j^i = \ln RXA_j^i - \ln RMA_j^i. \quad (2)$$

A positive RC reveals a comparative advantage, while a negative value reveals a comparative disadvantage (Vollrath, 1991).

The next index used in the paper is Lafay index. 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 (Zaghini, 2003).

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

$$LFI_j^i = 100 \left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^N (x_j^i - m_j^i)}{\sum_{j=1}^N x_j^i + m_j^i} \right) \frac{x_j^i + m_j^i}{\sum_{i=1}^N x_j^i + m_j^i}, \quad (3)$$

where x_j^i and m_j^i are exports and imports of product j of country i , towards and from the particular region or the rest of the world, respectively, and N is the 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 (Zaghini, 2003).

In the literature, there are a lot of other variations of the indices of revealed comparative advantage, but in this paper we focus on these three.

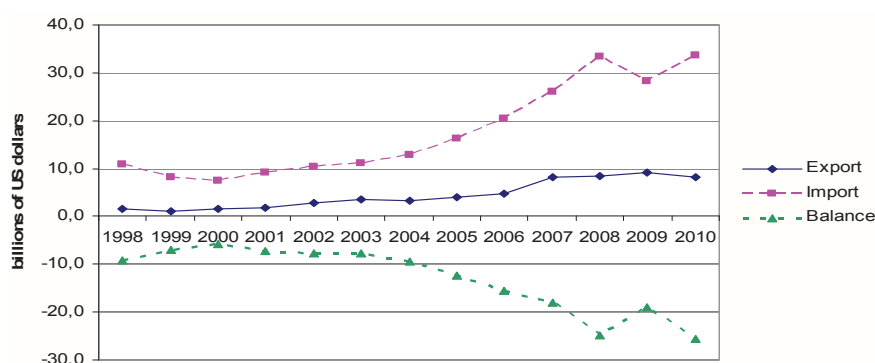
Russian foreign trade in agricultural products: current situation and key trends

Before we start to analyze the specialization and comparative advantages of Russian agricultural exports, it will be useful to conduct a brief overview of the current situation in the field of Russian foreign trade in agricultural products and foodstuffs.

The process of Russian agrifood sector's integration in the world economy in recent years is accelerating and the country becomes an active player in a number of food markets.

Considering the dynamics of Russia's foreign trade in agricultural products and foodstuffs, the following trends can be revealed. There is the significant growth of foreign trade turnover due to the expansion of both imports and exports. The negative trend in the dynamics of agrifood foreign trade deficit value appeared in 2000. Fig. 1 illustrates that the growth in imports value far exceeded growth in exports value, so Russia still retains on the traditional position of a net importer of agricultural products and foodstuffs.

The main reason for the growth of imports during the analyzed period was the sustained growth of consumer demand in the situation of slow increase in the domestic production capacities (Gaidar, 2011). The GDP average annual growth over 2000–



1: Russia's foreign trade flows in agricultural products and foodstuffs

Source: Federal State Statistics Service of Russian Federation (2012)

2008 was about 7 percent. GDP growth increased consumer's income and demand for food.

In the economic crisis period (1998–1999), the ruble depreciated sharply in both nominal and real terms. It can explain why imports fell in those years.

Agricultural exports grew primarily due to the increase in exports of wheat and sunflower oil. Commodity structure of export is discussed below.

World prices for agricultural products have had a significant impact on the volume of foreign trade. They have risen since 2000 and surging in 2006–2008. The price growth has been highest for bulk crops, such as wheat and soybeans, and much less for meat and processed foods (Liefert, 2009).

The most important agricultural trade items

Considering the commodity structure of Russian agrifood trade, the list of top ten most important agricultural products consists of the following items (Tab. I).

In the early 2000s Russia became one of the major suppliers of wheat in the world market: it was the third after the US and the EU in exports of wheat. Wheat has become the basic item of Russian agrifood export leaving behind even such traditional items as fish, sea products and alcoholic beverages. Since then, Russia holds its position in this market. According to the Food and Agriculture Organization, in 2010, the value of wheat exported by Russian Federation was \$2.069 billion that is 35.4% of total exports of the country and a fifth position in the world export of wheat (Gaidar, 2011).

A major reason explaining why Russia has become a grain exporter in the 2000s is because the reduction of the livestock sector during transition period substantially reduced domestic demand for feed grain (Liefert, 2009). Therefore, Russia exports mainly feed wheat, while imports high quality wheat and seeds.

In the structure of foreign trade there is another favorable trend. The share of oilseeds in the export

1: Top export and import commodities of Russian Federation in 2010

Rank	Commodity	Export		Commodity	Import	
		Value (1 000 \$)	share in total agricultural export (%)		Value (1 000 \$)	share in total agricultural import (%)
1	Wheat	2 069 121	35.4	Meat-Cattle Boneless	1 620 276	5.1
2	Sunflower oil	379 106	6.5	Pork	1 415 210	4.5
3	Food Prep	306 094	5.2	Cheese of Whole Cow Milk	1 256 247	4.0
4	Chocolate Prsnes	288 454	4.9	Sugar Raw Centrifugal	1 158 735	3.6
5	Cigarettes	278 133	4.8	Tobacco unmanufactured	1 032 564	3.2
6	Barley	197 095	3.4	Food Prep Nes	968 251	3.0
7	Beverages Alcoholic	159 172	2.7	Beverages Alcoholic	957 442	3.0
8	Soybean oil	144 653	2.5	Wine	822 924	2.6
9	Pastry	132 807	2.3	Chicken meat	779 840	2.5
10	Sunflower Cake	111 534	1.9	Tomatoes	773 582	2.4

Source: FAO (2012)

structure fell while that of sunflower oil increased. In 2010, Russia was the fifth largest exporter of sunflower oil, with the value of export amounted to \$ 379 million. This trend (originated in 2000s) was conditioned by the expansion of processing facilities and increase in the domestic output of vegetable oils. As a result, in 2005, Russia became a net exporter of sunflower oil while preserving its status of net exporter of sunflower seeds (Gaidar, 2011).

On the import side there is a following situation. During the entire post-Soviet period, Russia is among the five largest importers of raw sugar (in 1997–2004, 2006 and 2007 – the first in the world), among the top ten largest importers of pork, among the ten largest importers of beef and veal (with the exception of 1999 and 2000 when it was ranked 11th and 15th, respectively) and in the top twenty of the largest importers of chicken meat (Gaidar, 2011).

However, in the last decade, Russia, having switched from white sugar imports in the 1990s, to mainly imports of raw sugar for refining by domestic mills (OECD-FAO).

According to OECD forecast, rapid growth in domestic sugar beet production in Russia, stimulated by higher prices and tariff protection, is expected to lead to further growth in sugar production and export.

Briefly describing the territorial structure of international trade in agricultural products and foodstuffs (Tab. II), the following can be said.

The territorial structure of exports has changed significantly during the period. If at the end of the 90's most of the country's agrifood exports went to EU countries, in the last years the largest importers of Russian agricultural products and foodstuffs are Asian and CIS countries. However it should

be noted that absolute value of export flows to EU was increasing during the whole period (in USD, in current prices). Its share declined due to the growth of exports to other regions.

The share of export to Africa in the total export value has increased extremely from 2.2% in 1998 to 20.3% in 2010. This was due to the growth of exports of wheat and barley, mainly to Egypt and some other African countries.

The major importers of Russian wheat are Egypt and Turkey which in 2010 accounted for 41.5% and 11.6% of Russian exports of wheat respectively. Large supplies of barley are delivered to Saudi Arabia, Libya and Iran (ICTSD, 2012).

CIS countries are important trading partners of Russia in terms of both exports and imports. Economic relations between Russia and these countries evolved over time of USSR. These facts, as well as their geographical location determine their significant share in Russian foreign trade.

During the analyzed period there were no significant changes in the structure of Russian agricultural import. Agricultural and food imports from EU are still more than a third of total imports. Russia's largest trading partner in the EU is Germany (18% of the total agricultural exports from EU in 2010). Germany supplies Russia with meat and meat products (pork, cattle meat, chicken meat, fat of pigs, offals), cheese of whole cow milk and other products.

The share of Asia countries in the total Russian agrifood import is slowly increasing. Vietnam, Thailand, Pakistan and China are the main Asian suppliers of Russia's market.

The main supplier of food to Russia from the Americas is Brazil. According to the FAO, in 2010 it accounted for over 85% of Russia's imports of raw

II: Territorial structure of the Russian agricultural export, %

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU	44.2	33.4	42.9	32.2	31.9	24.3	19.7	15.1	17.4	13.3	14.3	11.9	13.7
CIS	29.4	31.7	39.5	38.7	28.8	39.5	47.3	43.6	44.2	36.3	42.8	36.8	36.6
Africa	2.2	1.1	4.9	5.2	16.4	8.6	11.8	17.5	12.0	22.3	13.6	17.3	20.3
Asia	18.6	28.7	10.4	19.6	19.4	24.0	18.2	21.1	23.5	25.8	27.3	31.1	25.3
Americas	3.4	3.8	1.4	2.4	1.5	1.6	1.2	1.0	1.0	0.7	0.9	1.2	1.7
Others	2.3	1.3	0.9	2.0	2.1	2.1	1.7	1.7	1.9	1.5	1.0	1.8	2.3

Source: FAO, author's calculations (2012)

III: Territorial structure of the Russian agricultural import, %

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU	35.4	50.7	31.3	32.1	37.0	34.9	34.6	32.3	34.9	35.4	34.3	33.9	37.0
CIS	17.4	12.7	28.2	20.5	12.5	18.5	22.0	19.4	13.2	12.5	12.2	11.1	11.3
Africa	2.3	4.4	2.9	2.9	3.9	3.8	3.7	3.5	3.7	4.0	3.8	4.4	4.3
Asia	12.2	14.2	11.8	10.7	14.4	14.0	13.2	14.2	14.6	15.1	15.6	16.7	17.4
Americas	25.0	9.8	22.2	29.5	30.7	27.3	24.9	29.0	31.4	31.2	31.3	31.5	27.0
Others	7.7	8.2	3.7	4.2	1.4	1.5	1.6	1.7	2.1	1.7	2.8	2.4	2.9

Source: FAO, author's calculations (2012)

sugar, almost 45% of Russia's imports of beef and almost 40% of all Russian imports of pork. Uruguay, Paraguay and Argentina are also large suppliers of meat of bovine animals (ICTSD, 2012).

The United States accounted for more than 63% of Russian imports of chicken meat (second supplier was Brazil – almost 24%). Before 2010, the U.S. chicken meat represented about 70% of total Russian imports of chicken meat and about 22% of the consumption of chicken meat in Russia (Gaidar, 2011).

In 2010, this figure dropped to 42.3% as a consequence of the ban on the import of U.S. chicken meat to Russia from sanitary reasons. In August 2010, import of U.S. chicken meat was again allowed.

Revealed comparative advantages of Russian agriculture

How it comes up from the analysis by Balassa's index (formula 1), calculated on the basis of trade flows between Russia and the whole world, in a modern Russia's agricultural export, the comparative advantage belongs mostly to crops (wheat, barley), their by-products (bran of wheat) and products of their processing, such as barley pearled, pot barley, barley flour and grits, cereal preparations, rice flour, flour of mixed grain, flour of sorghum etc.

Over the period, comparative advantages in oil crops and oils, mainly sunflower seeds and cake, and sunflower oil were also observed.

It is not possible to present in this article results of calculations for all 683 agricultural commodities,

exported or imported by Russian Federation. Therefore, we present the values of Balassa's index by products groups according to their origin (Tab. IV).

Bold indicates the cases where RCA is greater than one, which means this product group has a comparative advantage. Despite the grouping, RCA confirmed the initial results. Cereals and their preparations, vegetable oils and oil crops, chocolate and cocoa products are groups that have comparative advantages.

The most important trends in values of Balassa's index are the following. At the beginning of the period, the high value of the RCA index was observed in the group "Hides, skins and wool". But later their exports significantly decreased and they lost a comparative advantage. It likely happened because of the continued decline in the livestock sector and because in 1998 the licensing for export of hides and skins of cattle, sheep and other animals was established.

There was a weakening of comparative advantage in a group of vegetable oils and oil crops in 2002. It happened as a result of decline in exports of oilseeds from Russia (mainly sunflower seeds), however, with a slight simultaneous increase in exports of sunflower oil.

There is also a gradual increase in revealed comparative advantage of the group "Cereals and their preparations"

Analyzing the same set of products using Vollrath's index (formula 2), we observe approximately the same patterns. However, using this index, one interesting trend was found. For the analyzed

IV: The values of Balassa's index by products groups according to their origin

	1998	2000	2002	2004	2005	2006	2007	2008	2009	2010
Meat	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
Cereals and prep.	1.7	1.5	4.9	3.4	4.2	3.8	4.9	3.8	4.1	4.1
Fats and offals	0.2	0.4	0.2	0.7	0.7	0.8	0.7	0.8	1.0	1.3
Fruit and nuts	0.3	0.4	0.2	0.4	0.2	0.3	0.1	0.1	0.1	0.1
Vegetables and mushrooms	0.2	0.4	0.1	0.4	0.3	0.3	0.2	0.2	0.2	0.1
Milk and milk products	0.8	1.4	0.6	0.7	0.6	0.7	0.5	0.6	0.5	0.5
Hides, skins and wool	10.2	5.5	2.1	1.9	1.4	1.5	0.7	1.0	0.8	0.9
Pulses and corn	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.5	0.4
Root crops	1.2	0.3	0.2	0.7	0.5	0.7	0.8	1.1	0.8	1.2
Tea and coffee and spices	0.4	0.2	0.2	0.6	0.5	0.5	0.4	0.5	0.4	0.5
Beverages	0.6	0.6	0.6	0.4	0.4	0.5	0.4	0.5	0.5	0.6
Cigarettes and tobacco	0.1	0.3	0.8	1.4	1.6	1.5	1.2	1.7	1.8	2.0
Live animals	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1
Sugar	0.8	1.7	1.2	1.1	0.7	0.7	0.7	0.5	0.5	0.5
Vegetable oils and oil crops	6.4	7.4	1.4	2.5	2.6	3.3	2.3	2.6	2.7	2.8
Cotton and fibres	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Eggs	1.7	2.0	0.9	1.1	0.6	1.0	0.6	0.6	0.5	0.6
Chocolate	1.1	1.6	1.1	1.8	1.5	1.4	1.1	1.3	1.0	1.3
Others	0.3	0.5	0.4	0.8	0.7	0.6	0.5	0.6	0.5	0.6

Source: FAO, author's calculations (2012)

V: The values of Vollrath's index by products groups according to their origin

	1998	2000	2002	2004	2005	2006	2007	2008	2009	2010
Meat	-2.1	-1.8	-3.1	-2.6	-2.5	-2.8	-3.0	-2.7	-2.8	-2.6
Cereals and prep	1.1	0.7	2.5	1.8	2.4	2.4	2.8	2.7	2.8	2.7
Fats and offals	-2.5	-1.3	-2.4	-1.0	-1.1	-1.2	-1.0	-1.0	-1.0	-1.0
Fruit and nuts	-1.0	-1.0	-1.7	-1.1	-1.9	-1.8	-2.5	-2.6	-2.6	-2.7
Vegetables and mushrooms	-1.6	-1.0	-1.8	-1.0	-1.3	-1.3	-2.1	-1.8	-2.2	-2.7
Milk and milk products	0.0	0.9	-0.3	-0.3	-0.5	-0.1	-0.4	-0.3	-0.4	-0.8
Hides, skins and wool	4.7	3.8	7.2	3.1	2.8	2.8	2.3	2.4	2.4	2.1
Pulses and corn	0.4	-1.2	-1.2	-0.7	-0.7	-0.8	-1.0	-0.8	0.4	0.2
Root crops	1.7	0.1	0.1	1.0	0.6	1.1	1.3	1.5	1.0	1.3
Tea and coffee and spices	-1.0	-1.9	-2.1	-1.1	-1.1	-1.0	-1.2	-0.9	-1.1	-0.9
Beverages	-0.5	-0.2	-0.3	-1.0	-1.1	-0.5	-1.0	-0.8	-0.7	-0.5
Cigarettes and tobacco	-3.5	-1.8	-0.7	-0.0	0.2	0.2	-0.0	0.4	0.3	0.6
Live animals	0.8	0.9	-0.1	-0.1	-1.7	-2.8	-3.7	-3.0	-2.8	-2.2
Sugar	-1.4	-0.8	-1.0	-0.6	-1.0	-0.9	-0.9	-1.0	-0.6	-1.0
Vegetable oils and oil crops	2.3	2.2	0.7	1.6	1.7	2.2	1.7	1.9	2.0	1.8
Cotton and fibres	-0.6	-4.0	1.8	-3.1	-3.2	-3.6	-4.3	-5.2	-4.8	-2.7
Eggs	0.1	2.9	0.9	0.7	-0.2	0.2	-0.3	-0.3	-0.3	-0.5
Chocolate	0.4	0.4	-0.2	0.3	0.2	0.3	-0.0	0.1	-0.1	0.1
Others	-0.6	0.1	-0.4	0.2	0.1	0.0	-0.4	-0.2	-0.4	-0.3

Source: FAO, author's calculations (2012)

period, the number of products that have revealed competitive advantage has grown steadily and increased from 13 to 46 items. This trend can be seen as increasing total competitiveness of the Russian agricultural exports. Then, we present the values of Vollrath's index by products groups according to their origin (Tab. V).

Throughout the whole analyzed period, cereals and their preparations, vegetable oils and oil crops, as well as hides and skins had comparative advantage.

However, the calculation of the Vollrath's index by groups of products revealed some inconsistencies. Two groups (root crops and eggs) possess the revealed comparative advantages. But the calculation of the same RC index for individual components of these groups showed comparative advantages for none of them. Most likely this discrepancy arose from the grouping of products, and Vollrath's index is not suitable for the analysis of such aggregations.

Anyway, it is clear that these two indexes are not enough for a full, well-designed analysis. Further analysis is performed using the Lafay index (formula 3) and based on the geographical structure of foreign trade. Calculation of the LFI index identified comparative advantages in the following groups (Tab. VI).

The detailed analysis of revealed comparative advantage identified differences depending on the geographical areas of foreign trade. Tab. IV shows that Russia has comparative advantages in larger amount of products in trade relations with CIS countries and Asian countries. This mainly occurs

due to the geographical location of these regions, and hence lower transportation costs, as well as due to the well-established trade relations.

During the analyzed period, "Cereals and their preparations" have had positive values of LFI index in relation to all regions. Moreover, there was a noticeable increase in the value of the index over time.

It is very important group in Russian agricultural exports. This group makes up a large share of the total export value of the country and shows high growth rates in recent years. In 1998, its share in the total volume of Russian agricultural exports accounted for 19.9%, and at the end of the period it was already 46.8% of all exports. "Cereals and their preparations" significantly strengthened its position in relation to the countries of Africa and Asia.

The reduction in values of the LFI index for analyzed period occurred in the following groups: "Milk and milk products" (in relation to all regions), "Hides, skins and wool" (most notably in relation to EU), "Vegetable oils and oil crops" (in relation to all regions).

For further analysis Russian exports and imports, have been regrouped into three groups depending on the degree of processing.

Considering the overall foreign trade of the Russian Federation from the point of view of this classification, the following trends can be identified (Tab. VII).

At the beginning of the period from 1998 to 2001, the comparative advantages were observed in group of by-products (for example, bran of wheat, sunflower cake).

VI: Revealed comparative advantage of Russian agricultural export by geographical area of foreign trade (LFI index)

	EU			CIS			Africa			Asia			Americas		
	1998	2010	AM	1998	2010	AM	1998	2010	AM	1998	2010	AM	1998	2010	AM
Meat	-3.5	-1.4	-3.0	-2.2	0.3	-1.3	0.0	-0.0	0.0	-3.5	-0.2	-1.2	-0.6	-0.9	-0.7
Cereals and prep	0.2	0.2	3.1	3.5	6.7	8.2	6.8	46.3	32.8	11.7	22.7	20.8	0.0	0.2	0.3
Fats and offals	-0.7	-0.6	-0.9	-0.0	1.7	0.6	x	x	-0.0	-0.0	0.2	-0.0	-0.1	-0.0	-0.0
Fruit and nuts	-0.5	-0.7	-0.8	-3.1	-11.5	-7.3	-4.5	-21.7	-15.6	0.1	-10.9	-7.4	-0.1	-0.3	-0.3
Vegetables and mushrooms	-1.0	-0.5	-0.5	-1.6	-5.6	-3.6	-0.9	-2.2	-1.3	-0.8	-6.2	-3.8	0.1	0.0	0.1
Milk and milk products	-0.7	-1.4	-1.1	2.1	-1.8	0.3	-0.1	-0.0	0.0	0.6	0.2	0.4	-0.0	-0.0	0.0
Hides, skins and wool	7.2	0.6	3.3	0.2	0.0	-0.0	1.0	0.0	0.3	0.4	0.4	1.0	1.1	0.1	0.7
Pulses and corn	-0.3	1.7	-0.1	0.0	-0.2	-0.4	-0.0	1.1	0.5	0.4	0.7	0.6	-0.0	-0.2	-0.1
Root crops	-0.2	0.1	-0.1	0.9	-0.2	0.1	-0.0	-1.5	-0.9	0.1	0.0	-0.2	-0.0	-0.0	0.0
Tea and coffee and spices	-0.2	-0.1	-0.4	1.2	2.1	1.2	-0.5	-2.9	-1.8	-7.4	-4.1	-7.0	-0.0	-0.1	-0.0
Beverages	-1.3	-0.4	-0.6	-3.7	-2.9	-4.7	0.1	-0.4	-0.1	0.3	0.2	0.2	0.9	1.3	1.0
Cigarettes and tobacco	-1.7	-0.0	-0.8	-1.8	6.5	2.2	-1.4	-6.5	-6.1	-2.5	-1.7	-3.0	-0.5	-0.1	-0.3
Live animals	0.0	-0.3	-0.3	0.1	0.0	0.0	-0.0	-0.0	-0.0	0.1	0.1	0.1	0.0	-0.0	0.0
Sugar	-0.7	0.1	-0.2	1.6	0.3	2.1	-1.4	-0.0	-0.5	0.2	0.6	-0.0	-0.9	-0.3	-0.6
Vegetable oils and oil crops	5.1	4.1	4.1	1.3	0.4	0.2	7.7	1.9	5.5	0.3	-0.4	1.2	0.1	0.0	-0.1
Cotton and fibres	0.3	0.0	0.0	-2.4	-2.1	-3.7	-0.0	-0.0	-0.2	-0.0	-0.1	-0.0	-0.0	0.0	-0.0
Eggs	-0.0	-0.1	-0.1	0.4	0.1	0.2	x	x	0.0	0.1	0.1	0.1	-0.0	-0.0	-0.0
Chocolate	0.2	-0.1	-0.1	1.6	0.3	1.6	-6.7	-4.0	-10.6	0.0	-0.3	-0.6	0.0	0.1	0.1
Others	-2.3	-1.0	-1.5	1.7	5.9	4.1	-0.1	-10.0	-1.9	-0.0	-1.4	-1.1	-0.0	-0.1	0.0

*AM is an arithmetic mean of the values of LFI index during the analyzed period

Sources: FAO, author's calculations (2012)

VII: The values of Balassa's index by products groups depending on the degree of processing

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Primary products	1.2	0.8	0.9	1.0	1.4	1.4	1.1	1.2	1.1	1.4	1.1	1.2	1.2
Processed products	0.5	0.9	1.0	1.0	0.6	0.7	1.0	0.9	0.9	0.7	0.9	0.9	0.9
By-products	4.3	5.1	2.5	1.6	0.6	0.5	0.6	0.4	0.3	0.3	0.5	0.4	0.6

Source: FAO, author's calculations (2012)

In 1998 and during the period from 2002 to 2010, the positive value of the index was indicated in the group of primary products (for example, wheat, barley etc.). Processed products have had a comparative disadvantage during the whole period.

The results of calculations indicated that Russia has a comparative disadvantage in processed products compared with primary products. But this is generally in relation to the whole world. Next, we calculate the Lafay index for individual regions.

In the trade with CIS countries primary products generally have comparative disadvantage. However, it is worth noting that some of the products in this group have positive values of LFI. For example, such products are wheat (6.2% of total export, LFI = 3.37), whole cow milk (0.67% of total export, LFI = 0.31), sunflower seed (0.2% of total export, LFI = 0.24), etc. In parentheses there are the shares of each commodity in the total exports of the country for 2010 and the value of LFI index.

Processed products have significant comparative advantages in relation to CIS countries. They are

VIII: *LFI index in relation to CIS countries*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Primary products	-1.3	-7.6	-5.6	-3.2	-6.2	0.2	-4.4	-1.9	-10.6	-7.4	-10.3	-12.2	-11.3
Processed products	0.6	7.4	5.4	3.0	6.3	-0.5	3.4	1.2	9.8	6.3	9.1	10.8	9.7
By-products	0.7	0.2	0.2	0.2	-0.1	0.3	0.9	0.6	0.8	1.1	1.3	1.4	1.6

Sources: FAO, author's calculations (2013)

IX: *LFI index in relation to European Union*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Primary products	3.4	-3.1	-1.6	0.9	7.1	5.8	3.4	3.6	2.1	4.0	-0.0	-0.4	-0.6
Processed products	-8.9	-3.4	-4.4	-4.5	-7.7	-5.9	-3.1	-2.9	-1.2	-3.4	0.6	1.2	0.9
By-products	5.5	6.5	6.0	3.7	0.6	0.1	-0.3	-0.7	-0.8	-0.6	-0.6	-0.8	-0.3

Sources: FAO, author's calculations (2013)

X: *LFI index in relation to Africa*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Primary products	-0.2	-2.0	-20.2	-3.3	14.9	9.1	-2.2	1.5	-2.3	0.3	3.8	7.9	8.8
Processed products	-0.5	1.2	19.7	2.7	-15.2	-9.3	2.0	-1.6	2.3	-0.3	-3.9	-7.8	-8.5
By-products	0.7	0.7	0.5	0.6	0.3	0.3	0.1	0.1	-	0.0	0.1	-0.1	-0.3

Sources: FAO, author's calculations (2013)

XI: *LFI index in relation to Asia*

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Primary products	2.6	6.5	1.6	6.1	8.4	12.3	2.4	7.5	6.7	11.3	10.7	7.6	2.6
Processed products	-2.9	-7.3	-3.7	-9.8	-8.6	-12.5	-3.5	-8.0	-7.1	-11.8	-11.3	-8.1	-3.7
By-products	0.4	0.7	2.2	3.7	0.2	0.2	1.1	0.6	0.4	0.5	0.6	0.4	1.1

Sources: FAO, author's calculations (2013)

cereal preparations (for example, flour of wheat (0.55%, LFI = 1.02), infant food (1.36%, LFI = 0.37)), beer of barley (2.28% of total export, LFI = 0.84), cigarettes (11.6%, LFI = 2.46), tobacco products (3.19%, LFI = 1.06) sugar refined (0.82%, LFI = 1.62), sausages of pig meat (1.38%, LFI = 0.75), food preparations nes. (11.2%, LFI = 3.21) and others.

In relation to the European Union, at the beginning of the analyzed period, the comparative advantage was observed in the group of by-products. In 1998, as well as in 2001–2007, primary products showed positive values of LFI. In the last three years of the analyzed period, processed products have had revealed comparative advantages.

Positive values of the LFI index were observed in cases of following primary commodities: furs skin (4.7% of total export, LFI = 1.05), barley (0.3%, LFI = 0.63), peas (2.8%), rapeseed (2.7%, LFI = 0.35); and following processed products: sunflower oil (7.4%, LFI = 1.46) and rapeseed oil (11%, LFI = 0.34).

In relation to Africa, we can observe noticeable fluctuations in the values of the index caused by volatile trade flows between Russia and this region. In recent years, the comparative advantages of primary products have strengthened because of growth in exports of wheat.

In 2010, the comparative advantages were found in the cases of only 3 items: wheat (90.3% of total export, LFI = 29.85), barley (2.4% of total export, LFI = 2.71) and sunflower oil (3.7% of total export, LFI = 4.32).

In relation to the Asian countries, there is a strong revealed comparative advantage in the group of primary products. The group of by-products has also showed the positive value of the LFI index throughout the whole period.

The list of products with comparative advantage includes primary products (wheat (52.3% of total export, LFI = 14.76), barley (10.8%, LFI = 6.14)), manufactured goods (flour of wheat (1.44% of total export, LFI = 0.92), sunflower oil (8.26%, LFI = 1.89))

XII: LFI index in relation to Americas

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Primary products	-0.2	-2.4	-0.0	-0.4	-0.5	0.0	-0.4	-0.4	-0.3	-0.6	-0.3	-0.4	-0.4
Processed products	-0.5	-0.9	0.0	0.5	0.5	0.1	0.4	0.4	0.4	0.7	0.4	0.4	0.5
By-products	0.7	3.3	-0.0	-0.1	-0.1	-0.1	-0.0	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1

Sources: FAO, author's calculations (2013)

as well as by-products (bran of wheat (1.28%, LFI = 0.29), sunflower cake (2.67%, LFI = 0.61) etc.)

In relation to with the countries of North, Central and South America processed products have had comparative advantages since 2000. These products are, for example, beverages (both alcoholic (21.5% of total export, LFI = 0.83) and non-alcoholic (1.7%, LFI = 0.04)), cereal preparations (0.97%, LFI = 0.02), oils of vegetable origin (0.21%, LFI = 0.004) etc.

Thus, LFI index allowed us to form a clearer picture of the specialization and comparative advantages of Russian agricultural exports in bilateral relations with individual regions. According to results, it can be argued that primary products have the comparative advantage in EU countries and in Asian countries. In relation to the Commonwealth of Independent States and countries of North, Central and South America on the contrary the processed products have comparative advantages, while the group of primary products have comparative disadvantage.

CONCLUSIONS

The analyses of specialization and comparative advantage of Russian agricultural export are presented in this article. These analyses used several indices of revealed comparative advantage, which were calculated for the period from 1998 to 2010.

How it comes up from the analysis by Balassa's index, in a modern Russia's agricultural export, the comparative advantage belongs mostly to crops (wheat, barley), their by-products (bran of wheat) and products of their processing, such as barley pearled, pot barley, barley flour and grits, cereal preparations, rice flour, flour of mixed grain, flour of sorghum etc. Russia has a great potential for the production of grain, primarily due to the large land area. Development of production capacities, favorable weather conditions of recent years, the improvement of transport infrastructure led to the situation when cereals, especially wheat, became a strategically important element of Russian agricultural exports.

The most important trends in values of Balassa's index are the following. There was a weakening of comparative advantage in a group "Hides, skins and wool" and "Vegetable oils and oil crops". In the first case is most likely resulted from the continued decline in the livestock sector and because in 1998 the licensing for export of hides and skins of cattle, sheep and other animals was established. In the case

of vegetable oils and oil crops, it happened as a result of decline in exports of oilseeds from Russia (mainly sunflower seeds), however, with a simultaneous increase in exports of sunflower oil.

Analyzing the same set of products using Vollrath's index, we observe that the number of products that have revealed competitive advantage grew steadily. This trend can be seen as increasing total competitiveness of the Russian agricultural exports.

Analysis using the Lafay index provided the following results. The comparative advantage of production varies depending on the region, participating in the international trade. Russia has more significant comparative advantages in relation to CIS countries and Asian countries. This mainly occurs due to the geographical location of these regions, and hence lower transport costs, as well as due to the well-established trade relations.

At the beginning of the study period from 1998 to 2001, the comparative advantages were observed in group of by-products (e.g. bran of wheat, sunflower cake etc.).

From 2002 to 2007, the positive value of the index was indicated to a greater extent in primary products (wheat, barley, whole cow milk, sunflower seed etc.).

Primary products have the significant comparative advantage in relation to EU and to Asian countries. In trade with countries of the Commonwealth of Independent States and the countries of Americas on the contrary the processed products have greater comparative advantages.

In conclusion we can say the following. The most important agricultural products for Russia in terms of comparative advantages are cereals (mainly wheat and barley) and oil seeds and vegetable oils (sunflower oil). Significant changes in the comparative advantage were associated with the strengthening of their positions on a number of regional markets. Russia has more significant comparative advantages in trade relations with CIS countries and Asian countries due to its geographical location and good trade relations. There were no significant movements towards any growth of comparative advantage in processed products over the period.

An effective trade policy should focus on supporting the export of products with the highest comparative advantage. With respect to Russian Federation, such specialization, while maintaining a reasonable proportion of the self-sufficiency for

basic foodstuffs, enables country to take advantage of foreign trade.

After Russia's accession to WTO, the possibilities for state regulation of foreign trade are limited. In these circumstances, the government may use measures which are not related to the regulation of foreign trade, such as subsidies to agricultural enterprises, improving the availability of credit and

other measures aimed at increasing production capacity, infrastructure development in fields which have a comparative advantage, and thus are more promising. In addition the development of production capacity in the country will improve the comparative advantages of processed products with a higher degree of value added.

SUMMARY

This paper studies the issue of revealed comparative advantage in the case of the Russian Federation. The objective of this study is to analyze specialization and the competitive performance of the Russian agricultural sector and to determine whether or not the patterns of comparative advantage for Russia have undergone a significant changes over the period 1998–2010.

The analysis is performed using several measures of revealed comparative advantage: classical Balassa's index of revealed comparative advantage, Vollrath's index and Lafay index.

During the analysis by the Balassa's index, there was identified a group of products, having relatively stable comparative advantage during the whole period. This group includes cereals (wheat, barley), their by-products (bran of wheat) and products of its processing (barley pearled, pot barley, cereal preparations etc), oil crops, vegetable oils and chocolate.

Vollrath's index showed that the number of products having revealed competitive advantage grew steadily during the period. For the analyzed period, the number of such products has grown steadily and increased from 13 to 46 items. This trend can be seen as increasing total competitiveness of the Russian agricultural exports.

Lafay index showed the following results. Analysis by groups and by region showed significant comparative advantages in relation to CIS countries and Asian countries.

Analysis by groups according to the degree of processing revealed a shift of comparative advantage from by-products (e.g. bran of wheat, sunflower cake etc.) in 1998–2001 to primary products in 2002–2010 (wheat, barley, whole cow milk, sunflower seed etc.).

Primary products have the significant comparative advantage in relation to EU countries and Asian countries. In trade with the Commonwealth of Independent States and Americas, on the contrary, the processed products have greater comparative advantages.

However, in relation to the whole world, there were no significant movements towards growth of comparative advantage of processed products over the period.

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