ON THE EMPIRICAL DISTRIBUTION OF THE BALASSA AND GRUBEL LLOYD INDEX OF SERBIAN FOOD PRODUCTS

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ARTICLE INFO	ABSTRACT
	The research analyzes the comparative advantage of Serbia's agricultural food product exports using the Balassa (RCA) and Grubel-Lloyd (GL) indexes, covering 2005–2024. Results for 2024 show a strong RCA in wheat and a significant advantage in flour, corn, barley, groats, and processed fruit. The greatest RCA growth occurred in barley and spices, while chocolate and dairy products saw the steepest decline. The analysis of trade structure indicates that Serbia maintains a predominantly inter-industry trade pattern across most product groups. However, there is notable growth in intra-industry exchange, as evidenced by an increase in the GL index for tea, live animals, cereal products, and chocolate. The highest GL index growth in inter-industry trade was recorded for processed fish. Overall, the study highlights Serbia's stable export surplus in agri-food trade and evolving trade dynamics, especially the increasing presence of intra-industry trade in selected product categories.

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Introduction

In the modern economy, special attention is given to improving the competitiveness and sustainability of enterprises, and the need for business transformation is no longer questioned but seen as essential. Competitiveness and business success are based on continuous development, which includes adequate financing, efficient use of resources, increasing market share, pricing strategies, research and development, service provision, and above all, quality (Porter, 1990). Competitiveness is also strongly linked to the level of technological advancement, the application of knowledge, and research efforts (Ignjatijević et al., 2020, 2022; Leão & da Silva, 2021). In contrast to this microeconomic understanding of competitiveness, the concept of international competitiveness is often associated with the effects of economic policy and global economic trends. Thus, the aim of this research is to analyze the comparative advantage of Serbia's agricultural food product exports using the Balassa index (RCA) while looking at the level of intra- or inter-industry character of the exchange using the Grubel Lloyd index (GL). An overview of the literature is presented below. The research method is then described, followed by results and discussion. The last section contains concluding remarks.

Literature review

Numerous authors have analyzed the competitiveness of various industrial sectors using the RCA index, with a particular emphasis on the food industry. Bojnec et al. (2005) and Bojnec and Marčeta (2022) examined the reforms in Slovenia's food industry, while Prodanović et al. (2021) determined the competitiveness of Serbian honey and analyzed the influencing factors to create an adequate strategy for maintaining and strengthening its competitive position. Jaklič and Svetličič (2017) highlighted that success in foreign markets largely depends on knowledge and adherence to administrative procedures. A significant obstacle to effective international integration lies in the lack of expertise and experience in marketing and management. Several studies conducted by Majkovič et al. (2006), Mizik (2021), Ignjatijević and Cvijanović (2022), Svatoš and Smutka (2012), De Castro and Hnát (2017), as well as Blažková and Chmeliková (2015) and Blažková (2016), reached similar conclusions, identifying products with a positive comparative export advantage and emphasizing the crucial role of structural changes in achieving this advantage. These authors also underline the importance of small enterprises in food processing, which helps reduce the dominance of foreign companies in domestic markets. However, integration into international trade flows increases foreign trade dependence, and Smutka et al. (2017) concluded that EU accession has led to a higher dependence on EU markets. Countries with lower export competitiveness tend to export a greater share of low-processed and semi-processed products with lower unit values (Đurić et al., 2020). Countries with lower export competitiveness tend to export a greater share of low-processed and semi-processed products with lower unit values. Interest in the organic products as premium organic products in the Serbian market [A1] (Vapa-Tankosić et al., 2018; Vapa-Tankosić et al., 2020

Materials and methods

The subject of this research is the analysis of the level of specialization and the revealed comparative advantage in the export of selected agri-food product groups from Republic of Serbia on the international market. The aim is to identify comparative advantages and propose economic measures to stimulate and accelerate the export of agri-food products The research covers the period from 2005-2024, a period of surplus in foreign trade exchange of agri-food sector. To analyze the competitiveness of Serbia's agri-food industry at the sectoral level, researchers employed the Revealed Comparative Advantage (RCA) index and the Export Specialization Indicator (GL), while dynamic analysis was conducted through comparisons of quantitative indicators based on methodologies developed by Havlik, Landesmann & Stehrer (2001), Ignjatijević et al. (2021), Saboniene et al. (2013), and Czarny & Żmuda (2018). The theory of comparative advantage was developed by Balassa, who based his approach on the relationship between export shares and the ratio of exports to imports. He introduced the concept of export performance, which compares a country's industry-specific exports to the global export level of the same product, thereby assessing its comparative advantage. The original RCA coefficient is defined by a:

$$RCA = h\left[\frac{X_i}{M_i}\right] \times \left(\frac{\sum_{i=1}^{n} X_i}{\sum_{i=1}^{n} M_i}\right) \times 100 \text{ , formula}$$

Where X is the export value and M is the sign for the import value. Index i indicates the processed food sector as a whole or products of that sector. In practice, the most commonly used form is the Balassa index, which reflects the logarithmic value of the relative coverage of imports by exports for individual sectors or products, compared to the coverage ratio at the national level. This index is designed to highlight products that demonstrate comparative advantage by having export volumes exceed import volumes.

To analyze the level of specialization within intra-industry trade—defined as the simultaneous export and import of similar or identical product groups within the same sector—the Grubel-Lloyd index is used. This index is calculated for a specific product group i, where X represents export value and M import value. The index ranges from 0 to 1, with higher values indicating a greater degree of intra-industry trade specialization, while lower values suggest that trade is predominantly inter-industry, meaning countries are exchanging different types of products. Intra-industry trade is typically associated with more developed economies, where product differentiation and market segmentation play a larger role. The Grubel-Lloyd index is calculated using the following formula:

$$G_i^t = \left(\sum_{i=1}^{n}\left(X_i^t + M_i^t\right) - \sum_{i=1}^{n}\left|X_i^t - M_i^t\right|\right) / \sum_{i=1}^{n}\left(X_i^t + M_i^t\right)$$

where is:

- index of intra-industrial trade of sector i in year t,

- export of commodity group i in year t,

- import of commodity group i in year t i t [2005 - 2024].

Results and discussion

The research results indicate that the agriculture and food industry sector represents an important economic segment. The period that preceded these movements[A1] was a period of transition, when the entire economy, including agriculture, was faced with numerous challenges. International isolation, the disintegration of the country and customs and trade restrictions, which led to the loss of traditional markets and a deficit in foreign trade, should definitely be mentioned here. . Nevertheless, if we take into account the data from 2005 and 2024, we conclude that the situation has changed, and that export growth has been achieved various segments of agricultural and food products, such as cereals, vegetables and fruits, animal feed, and others. This indicates a successful market adjustment and a positive foreign trade balance of this sector. The increase in exports was accompanied by an increase in imports, which is the result of increased propulsivity of the sector, due to the growth of domestic demand, demand for specific products and the increased needs of the processing industry for raw materials that are not produced in sufficient quantities in Serbia.

Table 1. Dynamics of export and import of agricultural and food products of Serbia (thousand $)

Products	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	Δ2024/2015 EXPORT	Δ2024/2015 IMPORT
	2005	2005	2015	2015	2024	2024		
00 - Live animals	2.444,1	8.341,4	58.622,5	31.391,6	44.108,0	42.147,1	-14.515	10.756
01 - Meat and meat products	32.940	15.230,8	97.136,5	100.635,7	103.150,7	343.772,3	6.014	243.137
02 - Dairy products and birds' eggs	11.670,7	12.389,2	89.474,1	49.256,3	224.142,6	240.531,2	134.669	191.275
03 - Fish, crustaceans, molluscs and products thereof	2.184	53.446,4	5.799,5	78.874,9	16.235,3	160.148,4	10.436	81.274
04 - Cereals and cereal-based products	183.579,8	41.521,8	638.078,3	85.919,5	1.104.202,2	350.884,5	466.124	264.965
05 - Vegetables and fruit	261.928,4	160.561,8	763.642,9	302.653,8	1.162.665,6	786.231,2	399.023	483.577
06 - Sugar, sugar products and honey	175.734,3	40.730,2	114.151,2	33.217,8	91.526,9	99.653,8	-22.624	66.436
07 - Coffee, tea, cocoa, spices and products thereof	44.524,4	120.450,6	83.081,1	210.122,4	276.754,9	546.824,2	193.674	336.702
08 - Animal feed	18.533,4	49.020,6	109.897,3	65.355,9	397.276,1	179.917,2	287.379	114.561
09 - Miscellaneous food products and products thereof	42.584,2	89.113,1	126.113	149.135,3	398.981,0	357.872,9	272.868	208.738

Source: RZS * In 2005, SITC, rev 3.

Exports of agricultural and food products of the Food and Live Animals Section (Sections 0) of SITC in 2024 amounted to $3,819,043.30 thousand, while imports amounted to $3,107,982.80. In the analyzed year, an increase in foreign trade was recorded, with a more significant increase in imports of $2,001,419.60 thousand. The largest exports in 2024 were recorded by the sections: Vegetables and Fruits ($1,162,665.60 thousand) and Cereals and Cereal-Based Products ($1,104,202.20 thousand), while these sections also recorded the largest increase in exports in 2024 compared to 2015: Cereals and Cereal-Based Products (an increase of $466,123.90 thousand); Vegetables and fruits (an increase of $399,022.70 thousand) and Animal feed (an increase of $287,378.80 thousand). In comparison with these years, the export of the Live Animals section in 2005 was at a significantly lower level ($2.4 million) compared to 2015 ($58.6 million) and 2024 ($44.1 million). The Cereals and cereal-based products sections ($183.6 million), Vegetables and fruits ($261.9 million) and Sugar, sugar products and honey ($175.7 million) already achieved an enviable export result. We can also conclude that the total value of agricultural and food exports increased from $776 million in 2005 to $2,085.99 million in 2015 (Table 1).

Table 2. Values of the RCA and GL indices of the Serbian agricultural and food products section in the period 2005-2024

Sections	RCA 2005	RCA 2008	RCA 2015	RCA 2024	GL 2005	GL 2008	GL 2015	GL 2024
00 - Live animals	-0.53	0.64	0.47	0.03	0.45	0.42	0.7	0.98
01 - Meat and meat products	0.33	0.29	-0.03	-0.9	0.63	0.71	0.98	0.46
02 - Dairy products and birds' eggs	-0.03	0.28	0.45	-0.05	0.97	0.72	0.71	0.96
03 - Fish, crustaceans, molluscs and their products	-1.37	-1.29	-1.95	-1.71	0.08	0.13	0.14	0.18
04 - Cereals and cereal products	0.62	0.66	1.5	0.86	0.38	0.4	0.24	0.48
05 - Vegetables and fruit	0.21	0.18	0.69	0.29	0.76	0.82	0.57	0.81
06 - Sugar, sugar products and honey	0.63	0.6	0.92	-0.06	0.38	0.45	0.45	0.96
07 - Coffee, tea, cocoa, spices and their products	-0.43	-0.47	-0.69	-0.51	0.54	0.55	0.57	0.67
08 - Animal feed (except cereals in grain)	-0.42	-0.02	0.39	0.59	0.55	0.98	0.75	0.62
09 - Miscellaneous food products and their products	-0.32	-0.19	-0.13	0.08	0.65	0.81	0.92	0.95
Average values	-0.13	0.07	0.16	-0.14	0.54	0.60	0.60	0.71

*Source: RZS * In 2005, SITC, rev 3.*

Analysis of intra-industry trade (GL) and comparative advantage (RCA) at the sector level shows:

Intra-industry trade (GL)

• Intra-industry trade in sectors (presence of exports and imports): live animals GL^{2024} 0.98, while $GL^{2005, 2008}$ were 0.42 and 0.7; dairy products and eggs GL^{2024} 0.96, while $GL^{2005, 2008}$ were 0.72 and 0.71; sugar and sugar products GL^{2024} 0.96, while $GL^{2005, 2008}$ were 0.45; vegetables and fruit GL^{2024} 0.81, while $GL^{2005, 2008}$ were 0.82 and 0.57; animal feed GL^{2024} 0.62, while $GL^{2005, 2008}$ were 0.98 and 0.75; miscellaneous food products GL^{2024} 0.95, while $GL^{2005, 2008}$ were 0.81 and 0.92; coffee, tea, cocoa, spices GL^{2024} 0.6, while $GL^{2005, 2008}$ were 0.55 and 0.57;

• Inter-industry exchange is in sections (presence of export or import): fish and processed products GL^{2024} 0.18, while $GL^{2005, 2008}$ were 0.13 and 0.14; cereals and products GL^{2024} 0.48, while $GL^{2005, 2008}$ were 0.4 and 0.24; meat and processed meat GL^{2024} 0.46, while $GL^{2005, 2008}$ were 0.71 and 0.98.

Comparative analysis of specialization in intra-industrial trade shows an increase compared to 2005 in the following sections: Live animals; Dairy products and bird eggs; Sugar, sugar products and honey; Coffee, tea, cocoa, spices and products thereof; Animal feed (except grains); Miscellaneous food products and processed meats.

Comparative advantage index (RCA)

• The section with the highest RCA index shows that a surplus is achieved in foreign trade and is present in the section cereals and cereal products RCA^{2024} 0.86; animal feed 0.59 and vegetables and fruit 0.29.

• The SITC sections that show a pronounced negative comparative advantage and realize a deficit are Fish, crustaceans, molluscs and their products RCA^{2024} -1.71.

Five sections have a negative comparative advantage (Meat and meat products; Dairy products and bird eggs; Fish, crustaceans, molluscs and their products; Sugar, sugar products and honey; Coffee, tea, cocoa, spices and their products), which indicates a deficit in foreign trade in these products.

Table 3. Rank of export of agricultural and food products of the first 20 by commodity groups from Serbia in 2005, 2015 and 2024 ($ thousand)

	2005			2015			2024	
Product group	EXP.	IMP.	Product group	EXP.	IMP.	Product group	EXP.	IMP.
Sugar, molasses and honey	168,9	29	058 - Fruit preparations and products (except juices)	404,975	37,747	058 - Fruit preparations and products (except juices)	566,256	114,158
Fruit and products (except juices)	148,3	9,8	044 - Corn, in grains	389,278	19,534	044 - Corn, in grains	482,130	77,646

2005			2015			2024		
Product group	EXP.	IMP.	Product group	EXP.	IMP.	Product group	EXP.	IMP.
Corn, in grains	103,3	2,1	057 - Fruit, fresh or dried	203,937	151,788	081 - Animal feed (except cereals in grains)	397,276	179,917
Cereal products, flour	48,8	32,8	098 - Edible products and products, nec	117,701	134,593	098 - Edible products and preparations, nec	384,959	327,592
Edible products and products	37,8	87,6	081 - Animal feed	109,897	65,356	057 - Fruit, fresh or dried	293,545	309,559
Vegetables, fresh, frozen, processed	35,2	31,4	048 - Cereal products, flour, starch	108,272	55,456	048 - Cereal products, flour, starch	275,709	245,205
Chocolate and other food products containing cocoa	34,5	35,4	061 - Sugar, molasses and honey	105,693	21,974	041 - Wheat and groats, in grains	256,071	2,057
Fruit and vegetable juices	32	12,4	041 - Wheat and groats, in grains	85,048	666	073 - Chocolate and other food products with cocoa, nn	201,381	173,840
Vegetables, processed	26	15,2	054 - Vegetables, fresh, frozen or processed	77,114	64,964	022 - Milk and products, except butter or cheese	149,763	107,658
Fruit, fresh or dried	20,3	90,4	001 - Live animals	58,623	31,392	056 - Vegetables, roots and tubers, processed, nn	145,221	123,899
Wheat and groats, in grain	20	0,1	073 - Chocolate and other food products containing cocoa	50,157	52,288	054 - Vegetables, fresh, frozen or processed	108,067	213,259
Meat, canned products	18,7	8,2	022 - Milk and products, except butter or cheese	46,036	30,978	061 - Sugar, molasses and honey	75,879	45,954
Animal feed (except cereals in grain)	18,5	49	017 - Meat and edible offal, preserved	45,955	35,192	017 - Meat and edible offal, canned, nn	63,933	81,103
Other meat and edible offal, fresh, frozen	9,8	0	012 - Other meat and edible offal, fresh, frozen	42,996	53,341	046 - Flour, groats and meal, of wheat	59,241	4,976
Groats, wheat flour	7,9	0,1	056 - Vegetables, roots and tubers, processed	42,642	35,153	024 - Cheese and cottage cheese	51,639	84,036

	2005			2015			2024	
Product group	**EXP.**	**IMP.**	**Product group**	**EXP.**	**IMP.**	**Product group**	**EXP.**	**IMP.**
Milk and products except butter	7,5	8,6	046 - Flour, groats and meal, of wheat	39,427	2,427	059 - Fruit and vegetable juices, non-farmed, alcohol-free	49,577	25,357
Cheese and cottage cheese	2,5	2	059 - Fruit and vegetable juices, non-farmed, alcohol-free	34,975	13,003	071 - Coffee and coffee substitutes	45,909	208,711
Live animals	2,4	8,3	024 - Cheese and cottage cheese	34,923	11,314	001 - Live animals, other than animals of section 03	44,108	42,147
Groats, flour from other cereals	2,3	0,1	071 - Coffee and coffee substitutes	17,691	112,295	012 - Other meat and edible meat offal, fresh, frozen	27,767	206,377
			043 - Barley, whole grain	9,658	743	043 - Barley, in grain	17,964	2,908

Source: Authors' calculations and RZS, * In 2005, SITC, rev 3.

Analysis of foreign trade turnover in 2024 shows an increase compared to 2005. The largest increase is present in the following commodity groups: Prepared fruit and products (except juices), where an increase in exports of $417.956 million and an increase in imports of $104.358 million was achieved; Corn, in grain, where an increase in exports of $378.830 million and an increase in imports of $75.546 million was achieved; Animal feed (except grain cereals) with an increase in exports of $378.776 million and Edible products and processed foods, with an increase in exports of $347.159 million compared to 2005.

Comparative advantages and the index of intraindustrial exchange of agricultural-food products

The analysis of comparative advantages in foreign trade exchange is devoted to dynamic analysis (RCA index) at the level of commodity groups (aggregation level 3 digits SITC, rev.4). This gives an assessment of the export potential of products of agricultural origin.

Commodity groups can be classified according to the level of comparative advantage indicators (RCA, Balassa index), by classifying products with:

• product groups with an RCA index value of 0 to 1.00 are classified as satisfactory advantages,

• product groups with an RCA index value of 1.00 to 2.00 are classified as having significant advantages and

• commodity groups with an RCA index over 2.00 are classified as having exceptional comparative advantages.

Table 4. Ranking of commodity groups of agricultural and food products of Serbia according to the RCA index of comparative advantage in 2024

Commodity groups	2005*	2008	2015	2024
Exceptional comparative advantag				
041 - Wheat and groats, in grain	0.55	1.62	3.63	3.61
Significant comparative advantages				
046 - Flour, groats and meal, of wheat	1.82	1.77	2.09	1.85
047 - Groats and meal of other cereals	-1.12	2.50	2.56	1.44
044 - Maize, in grain	2.66	1.50	2.24	1.37
043 - Barley, in grain	-0.39	-0.68	1.92	1.36
058 - Fruit preparations and products (except juices)	1.07	1.09	1.78	1.20
Satisfactory comparative advantages				
081 - Animal feed (except cereals in grain)	1.06	0.07	0.39	0.59
059 - Fruit and vegetable juices, non-farmed, alcohol-free	0.04	0.44	0.74	0.50
061 - Sugar, molasses and honey	1.14	0.86	1.18	0.37
075 - Spices	-0.87	0.51	0.35	0.37
022 - Milk and products, except butter or cheese	1.20	0.43	0.30	0.25
098 - Edible products and preparations, nec	-0.54	-0.01	-0.10	0.12
056 - Vegetables, roots and tubers, processed, nec	-0.53	0.17	0.14	0.12
073 - Chocolate and other food products containing cocoa, nec	1.76	0.39	-0.03	0.11
048 - Cereal products, flour, starch	0.19	0.44	0.50	0.09
001 - Live animals, except animals of division 03	-	0.87	0.47	0.03

Source: Authors' calculations and RZS

* In 2005, SITC, rev 3.

The analysis of the comparative advantage of exports of commodity groups showed the following results:

The following commodity groups have an exceptional comparative advantage (the highest coefficient): wheat and oat bran, in grain (RCA[2024] =3.61);

The following commodity groups have significant comparative advantages: Flour, groats and semolina, from wheat (RCA[2024]=1.85), Groats and flour from other cereals (RCA[2024]=1.44), Corn, in grain (RCA[2024]=1.37), Barley, in grain (RCA[2024]=1.36), Prepared fruit and products (except juices) (RCA[2024]=1.20).

The following commodity groups have satisfactory comparative advantages: Animal feed (except cereals) (RCA^{2024}=0.59), Fruit and vegetable juices, non-farmed, alcohol-free (RCA^{2024}=0.50), Sugar, molasses and honey (RCA^{2024}=0.37), Spices (RCA^{2024}=0.37), Milk and products, except butter or cheese (RCA^{2024}=0.25), Edible products and processed foods, n.a. (RCA^{2024}=0.12), Vegetables, roots and tubers, processed, n.a. (RCA^{2024}=0.12), Chocolate and other food products. with cocoa,nn (RCA^{2024}=0.11), Cereal products, flour, starch (RCA^{2024}=0.09), Live animals, except animals from section 03 (RCA^{2024}=0.03).

The research found the largest increase in the RCA index in the following commodity groups: Barley, in grain: From RCA^{2005} from -0.39 in 2005 to RCA^{2024} 1.36, which represents an increase of +1.75; Edible products and processed products RCA^{2005} -0.54 to RCA^{2024}0.12 in 2024, which is an increase of 0.66 index points; Spices: RCA^{2005} from -0.87 to RCA^{2024} 0.37, which is an increase of 1.24 points.

The biggest reduction is present in the product groups: Chocolate and other food products with cocoa, not mentioned): With RCA^{2005} of 1.76, the value of the index was reduced to 0.11 in 2024; for Milk and products, except butter or cheese, the index value was reduced from RCA^{2005} 1.20 to 0.25 in 2024, which is a decrease of 0.95 index points. In the commodity group Sugar, molasses and honey, there is a decrease from With RCA^{2005} 1.14 to 0.37 in 2024, which is a decrease of 0.77. In the commodity group Maize, in grains we have a significant decrease in the value of the index from With RCA^{2005} 2.66 to 1.37 in 2024 (a decrease of 1.29).

Table 5. Values of the intra-industrial trade coefficient (GL) of commodity groups of the SITC Rev.3.

Inter or intra -industry trade	2005	2008	2015	2024
Inter-industry trade				
062 - Sugar products	0.13	0.79	0.86	0.45
071 - Coffee and coffee substitutes	0.19	0.06	0.27	0.36
058 - Fruit preparations and products (except juices)	0.65	0.17	0.17	0.34
043 - Barley, in grains	0.00	0.37	0.14	0.28
044 - Maize, in grains	0.57	0.07	0.10	0.28
034 - Fish, fresh, chilled or frozen	0.04	0.04	0.13	0.26
035 - Fish, dried, salted, in brine, smoked	0.04	0.04	0.87	0.26
047 - Groats and meal of other cereals	0.03	0.01	0.06	0.26
012 - Other meat and edible offal, fresh, frozen	0.75	0.91	0.89	0.24
046 - Flour, groats and meal, of wheat	0.27	0.04	0.12	0.15
072 - Cocoa	0.05	0.05	0.25	0.14
042 - Rice	0.43	0.07	0.11	0.12
016 - Meat and edible offal, salted, dried	0.57	0.60	0.54	0.10
037 - Fish, crustaceans, molluscs, etc., preserved	0.01	0.36	0.14	0.09
036 - Crustaceans and invertebrates	0.00	0.00	0.08	0.03
041 - Wheat and groats, in grain	0.07	0.06	0.02	0.02

Inter or intra -industry trade	2005	2008	2015	2024
Inter and intra-industrial trade				
025 - Birds' eggs and egg yolks, fresh, dried (whites)	0.70	0.80	0.86	0.57
045 - Cereals, in grain, other	0.00	0.91	0.86	0.50
Intra-industrial trade				
001 - Live animals, except animals of section 03	0.45	0.26	0.70	0.98
074 - Tea and mate	0.03	0.86	0.77	0.98
057 - Fruit, fresh or dried	0.45	0.70	0.85	0.97
048 - Cereal preparations, flour, starch	0.14	0.55	0.68	0.94
073 - Chocolate and other food products with cocoa, nn	0.03	0.60	0.98	0.93
056 - Vegetables, roots and tubers, processed, nn	0.64	0.82	0.90	0.92
098 - Edible products and preparations, nn	0.10	0.99	0.93	0.92
017 - Meat and edible offal, canned, nn	0.32	0.62	0.87	0.88
022 - Milk and products, except butter or cheese	0.63	0.56	0.80	0.84
024 - Cheese and cottage cheese	0.70	0.51	0.49	0.76
075 - Spices	0.23	0.49	0.77	0.76
061 - Sugar, molasses and honey	0.95	0.26	0.34	0.75
023 - Butter and other milk fats (milk spreads)	0.11	0.79	0.73	0.69
059 - Fruit and vegetable juices, non-farmed, alcohol-free	0.15	0.55	0.54	0.68
054 - Vegetables, fresh, frozen or processed	0.78	0.86	0.91	0.67
011 - Beef, fresh, chilled or frozen	0.00	0.02	0.96	0.65
091 - Margarine and other edible fats	0.15	0.87	0.73	0.63
081 - Animal feed (except cereals in grain)	0.23	0.93	0.75	0.62

Source: Authors' calculations and RZS

In the commodity groups that have an inter-industry character of exchange, in the analyzed period the greatest increase in the Grubel-Lloyd (GL) index was recorded for: Fish, dried, salted, in brine, smoked. The value of the GL index increased from 0.04 in 2005 to 0.26 in 2024, although in 2015 it had a distinctly intra-industry character. In other commodity groups, such as: Coffee and coffee substitutes (increase from 0.19 to 0.36); Barley, in grain (increase from 0.00 to 0.28); Flour and flour from other cereals (increase from 0.03 to 0.26) led to an increase in the GL index. In essence, most commodity groups have fluctuations in the value of the GL index, but the inter-industry character of the exchange remains present throughout the analyzed period, and there is no significant transition to the intra-industry character of the exchange.

In the commodity groups of intra-industrial nature of exchange, the largest increase in the GL index is present in: Tea and mate; Live animals, except animals from section 03; Cereal products, flour, starch; Chocolate and other food products with cocoa,nn; Edible products and processed products,nn and Fruit, fresh or dried. The largest decrease in the GL index is present in: Sugar, molasses and honey; Vegetables, fresh, frozen

or processed; Butter and other milk fats (dairy spreads); Margarine and other edible fats. It is important to emphasize that most other commodity groups have achieved a noticeable increase in the GL index. In some groups, we have a moderate increase in the GL index (e.g. cheese and cottage cheese, milk and products other than butter and cheese, canned meat).

Conclusion

In the view of the findings, the 2024 research into the comparative advantage of Serbia's exported commodity groups paints a picture of its international trade position. The data emphatically highlights an exceptional Revealed Comparative Advantage (RCA) in wheat, underscoring Serbia's strong competitive edge in this primary agricultural product. Furthermore, the research identifies a significant RCA in several other key agricultural outputs, including flour, groats, corn, barley, and processed fruit, suggesting a broader strength in the agricultural and food processing sectors.

Interestingly, the dynamics of comparative advantage are not static. The study reveals that barley and spices experienced the largest increase in their comparative advantage during 2024, indicating a growing international competitiveness. Conversely, chocolate and dairy products witnessed the largest decrease in their comparative advantage, suggesting potential challenges or shifts in their global market position.

Delving deeper into the nature of trade, the analysis of inter-industry exchange indicates that for the majority of commodity groups, trade continues to be predominantly characterized by the exchange of goods between different industries. Notably, the Grubel-Lloyd (GL) index showed the greatest increase for fish (dried, salted, smoked), potentially signifying a shift towards more intra-industry trade within this specific sector.

Conversely, the analysis of intra-industry exchange reveals a significant increase in the GL index for tea, live animals, cereal products, and chocolate. This suggests a growing trend of Serbia both importing and exporting similar types of goods within these categories, possibly reflecting product differentiation, specialization within sub-sectors, or the influence of global value chains.

In conclusion, the 2024 research underscores Serbia's strong agricultural export base, particularly in wheat, while also highlighting evolving competitive dynamics and shifts in the nature of its international trade across various commodity groups. The increasing intra-industry trade in certain sectors suggests a more complex and potentially more integrated role for Serbia in the global economy.

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Conflict of interests

The authors declare no conflict of interest.

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