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**CATEGORY OF REVEALED COMPARATIVE
ADVANTAGES AND EVALUATION
OF UKRAINE'S PROSPECTS
ON THE EUROPEAN MARKET**

Abstract

Measurement procedure of revealed comparative advantages for Ukraine's economy with the use of two trade classifications, namely Standard International Trade Classification (SITC) and Commodity Classification of Foreign Economic Activity of the Commonwealth of Independent States (TN ZED) is formed. The reporting procedure for the international trade on the basis of 3-digit approach to be applied in Ukraine is proposed, which was not employed before by Ukrainian statistical authorities. The advantage of this reporting procedure over the current one in Ukraine is explained.

We calculate the index of revealed comparative advantages (RCA index accordingly for Ukraine's sectors of economy in international trade with the EU and countries for the year 2001. This index shows that Ukraine has significant comparative advantages on the European market in following commodity divisions: ferrous metals, iron; ores, scoria, cinder; energy and electric power; textile clothing and textile accessory articles; aluminum and aluminum goods; grain, cereals; timber, woodwork and charcoal. Results of conducted research can serve to assess comparative advantages of Ukraine on the European market and determine Ukraine's prospective exports sectors.

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Key words:

autarky price, commodity classification of foreign economic activity of the Commonwealth of Independent States (TN ZED), commodity divisions (2-digit), commodity groups (3-digit), comparative advantage, Heckscher-Ohlin Theory, labor, new economy, RCA index, revealed comparative advantage (RCA), Standard International Trade Classification (SITC), the new trade theory.

In forming Ukraine's economy it is necessary to find out the prospect industries which can determine the exports structure of Ukraine in the future by the rule of comparative advantage.

One of the instruments to determine the country's potential comparative advantages in international trade is calculation of revealed comparative index (RCA index).

The concept of revealed comparative advantage is widely used in practice to determine country's weak and strong sectors of the export structure. Economist Liesner [1] was the first, who applied index of revealed comparative advantage in his research in 1958, but it was economist Balassa [2] who popularized it in 1965 and 1989. This index reveals the relationship of the export share (j) of a certain analyzed country (i) to the same exports share of a group of countries (ref) in the same industry.

$$B_j^i = \frac{X_j^i / X_n^i}{X_j^{Ref} / X_n^{Ref}}, \quad (1)$$

Where B_j^i is Balassa index; X_j^i is the export of industry (j) of country (i); X_n^i is the total export of country (i); X_j^{Ref} is the export of goods of industry (j) of other reference analyzed countries; X_n^{Ref} is the total export of other reference countries;

If $B_j^i > 1$, country (i) is said to have a comparative advantage in industry (j), since this industry is more important for country's (i) exports than for exports of the reference countries (ref).

The theory of international trade defines the category of comparative as «the ability to produce goods at lower cost, than the other goods, as compared to another country. In Ricardian model, this ability is measured through comparison of unit labor requirements, or more generally, it is of relative autarky prices»

[3]. Investigating issues of Ricardian theory of international trade, economist Maneschi points out that a country has a comparative advantage in manufacturing a given commodity when with higher productivity in comparison to other countries and other commodities [4]. In Heckscher–Ohlin Model a comparative advantage is measured by comparison of relative factor abundance (factor intensity) or relative factor prices of the countries [5]. The New Trade Theory considers additionally increasing returns to scale and transport (trade) expenses, which affect the value of comparative advantage and increase the international specialization of the countries [6]. The law of comparative advantage states that a country tends to export commodities which it can produce cheaper than other countries [4]. It shows which industries the country should specialize in and export.

The measurement of comparative advantage serves to characterize the country's international specialization. The international specialization reveals how the country allocates its resources in various industries and concentrates on producing and exporting some commodities while importing others.

In contrast to the category of comparative advantage which foresees a comparison between countries, the revealed comparative advantage is the indicator of export performance (trade performance) of an individual country and is determined for comparison of industries of the country within its exports structure [7]. The revealed comparative advantage characterizes present export-import structure revealed by the country within a certain period of time.

Empirical research in regards to determination of the specialization rate of industries and revealed comparative advantages of Ukraine's economy in Europe can be conducted using data on international trade by the commodity structure. Ukraine's State Committee of Statistics publishes annually the figures on commodity structure provided by Ukraine's State Customs Service, i.e. of country's separate commodity groups in export and import value, and their share in the total exports and imports in comparison to other countries from January till December [8].

Whereas statistic institutions of the EU and acceding countries use in their statistical reporting the Standard International Trade Classification (SITC), Ukrainian State Committee of Statistics uses Commodity Classification of Foreign Economic Activity (TN ZED), which was adopted by the regulatory bodies of the Commonwealth of Independent States on January 1, 1992. The use of different commodity classifications and approaches to statistical reporting does not allow for exports in international economy and European integration to correlate correctly the export structure of Ukraine with export structures of the EU member states and applicant states. Ukraine, which expressed its willingness to integrate into the EU, has to bring in line with international standards its statistical reporting system in regards of commodity classification. It has to reject the Commodity Classification TN ZED practiced only in the Commonwealth of Independent States or use it exclusively within the CIS.

It is worth to note, that statistic institutions of the EU and the acceding states publish 3-digit data of SITC, which reflect sufficiently high level of commodity disaggregation. Ukraine's State Committee of Statistics publishes, however, data not on 3-digit commodity groups, but on 2-digit commodity divisions. The latter is a relatively lower level of commodity disaggregation.

The higher is the disaggregating level of available published data, the easier to cluster the commodity groups for research of phenomena in the context of international specialization. For instance, in statistical reports published by the EU in section 7 «Machinery and transport equipment» there are separate data for commodity groups: 751 – «office machines», 752 – «automatic data processing equipment», 759 – «parts for office machines», 761 – «television receivers, etc.», 762 – «radio-broadcast receivers», 763 – «sound recorders, phonographs», 764 – «telecommunication equipment and parts», etc. For economists it is easy to attribute these commodity groups to the cluster «Computers, Telecommunication, Microelectronics». Such available published information on above-listed commodity groups in the export-import structure can be useful to determine the level of New Economy development of a country in comparison with other countries.

On the basis of data published by Ukraine's State Committee of Statistics it is impossible to draw such comparison. The Committee confines itself to publishing data on the commodity division 85 «Electric machines, equipment and their parts; sound recording and reproduction equipment; television reproduction and television sound equipment, their parts and accessories» as a whole (see section XVI «Machines, equipment and mechanisms (electric and mechanic) of TN ZED). However, in the commodity division 85 there are over 40 commodity groups which differ from each other by the purpose in modern economic system characterized by transition from the traditional (weighted) economy to the New Economy (weightless economy).

For example, one can see how significantly groups 8525 «radio- and television equipment», 8542 «electronics, microcircuitry and microassembly» differ from the group 8514 «industrial and electric furnaces and chambers». Such commodity groups as 8470 «Calculators, hand-held computers, bookkeeping machines», 8471 «computing machines and their units; magnetic and optical devices, which read information» belong to the commodity division 84 «boilers, machines, apparatus; their parts».

Different approaches to classification of commodity groups and the lack of appropriate statistical data does not allow us to correlate Ukrainian exports by commodity groups with the exports of the EU member states and applicant states, and hence, apply standard Balassa index. Therefore, we propose to use in this case the index of revealed comparative advantage which was developed by *Centre d'études prospectives et d'informations internationales*¹ and is used by ITC's Market Analysis Section, UNCTAD/ WTO [9]:

¹ Centre d'études prospectives et d'informations internationales, Paris (France).

$$RCA^t = \frac{1000}{(X_i^t + M_i^t)} \times \left[(X_{ij}^t - M_{ij}^t) - (X_i^t - M_i^t) \times \frac{(X_{ij}^t + M_{ij}^t)}{(X_i^t + M_i^t)} \right], \quad (2)$$

where X_{ij}^t – export of goods of industry (j) of country (i) to the group of other reference countries; M_{ij}^t – import of goods of industry (j) of country (i) from the group of other reference countries; X_i^t – total exports of country (i) to the group of other reference countries; M_i^t – total imports of country (i) from the group of other reference countries; t – period of time.

The presented computational procedure enables us to show a country's revealed comparative advantage relative to the group of other reference countries both for one year and for a few years. If we analyze a period of the same years, we can examine a revealed comparative advantage in dynamics or find its weighted average value for a certain period of time.

On the basis of the CIS – Commodity Classification of Foreign Activity TN ZED, we conducted some empirical research of the Ukraine's export-import structure by commodity divisions for the year 2001 pertinent to the EU and member states and 14 European acceding countries². Results of the RCA index calculation are presented in Table 1.

Table 1

Ukraine's revealed comparative advantages and disadvantages in international trade with the EU and the acceding states for the year 2001

Ranked commodity divisions	Commodity division	Exports, in thousand US\$ (FOB prices)	Imports, in thousand US\$ (CIF prices)	RCA (Revealed comparative advantage index)
72	Ferrous metals, iron	963346,44	83310,85	77,85
26	Ores, scoria, cinders	637433,1	8231,81	56,4
27	Energy materials; petroleum and products of petroleum refining, bituminous substances; lignite waxes	771746,24	160008	52,65

² For calculation of RCA index for export sectors of Ukraine's economy we include in the common group of reference countries the countries of the EU and the following 14 countries-candidates for the entry into the EU: Hungary, Poland, Czech Republic, Slovenia, Slovakia, Estonia, Latvia, Lithuania, Romania, Bulgaria, Yugoslavia, Bosnia and Herzegovina, Croatia, and Macedonia. Cyprus and Malta are not considered.

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62	Textile clothes and complementary parts, excluding knit-work	338135,4	16140,06	28,69
76	Aluminum and aluminum goods	234774,3	68607,53	13,94
10	Grain, cereals	148631,7	10934,62	12,21
44	Wood & woodwork, charcoal	191276,4	51436,29	11,82
12	Seeds and fruits of oil plants; other seeds; fruits and corn; industrial crops and herbs; straw, silage and forage.	117816,4	13115,68	9,22
82	Tools; knives, blades, cutters, cutlery, flatware produced of non-precious metals; parts of these goods produced of non-precious metals	117898,6	20646,63	8,44
31	Fertilizers	91947,76	499,7	8,21
28	Products of inorganic chemistry; inorganic or organic compounds of precious metals and rare-earth metals, radioactive elements and isotopes	109539,2	23019,22	7,44
35	Albumens, modified starches, glues and ferments	99488,97	18063,66	7,05
86	Railway or tramway locomotives, railway vehicles and vehicles for analogous tracks and their parts; track equipment and equipment for tram-and railway systems; their units and details; mechanic and electro mechanic signaling equipment	106559,9	31423,75	6,3
4	Milk and milk products, bird's eggs, honey, food products of animal origin	68886,2	9878,85	5,16
89	Floating transport and other floating facilities	57973,07	1583,16	5,04
41	Hides, untanned leather (excluding genuine furs), tanned leather	90451,09	30883,82	4,91
81	Other non-precious metals, cermet; goods produced of them	51199,99	1624,98	4,43
74	Copper and copper goods	82529,3	31961,55	4,08
64	Footwear, leggings and analogous goods, their parts	57959,52	12519,06	3,9
61	Knitted clothing and complementary knitted clothing parts	61584,9	20255,29	3,42
29	Organic chemical compounds	126918,4	80906,91	2,97
88	Aircraft, space vehicles; their parts	20042,21	1073,82	1,69
25	Salt, brimstone; soils and stones, plaster materials, lime and cement	65025,53	41496,25	1,52
7	Vegetables, plants, roots and edible roots,	17036,08	3529,56	1,16
97	Art and collecting articles, antiques	11301,02	109,62	1,00
95	Toys, games, entertainment & sport articles; their parts and fixings	22729,4	8311,49	0,86
42	Leather goods; harness leather outfit, harness; travel accessories, handbags and analogous goods, goods produced of animal guts (excluding catgut produced	9026,93	3820,9	0,41

	from the real silk)			
8	Eatable fruits and nuts; dried lemons or orange peels, melon rinds.	13908,14	8610,37	0,35
5	Other products of animal origin	3445,39	248,05	0,28
20	Products of processed vegetables, fruits or other parts of plants	15777,39	11917,17	0,18
65	Headgear and their parts	998,04	462,06	0,04
17	Sugar and sugar confectionary	6828,43	5513,03	0,04
14	Plant materials for production of wicker-work; other plant products	166,82	0,15	0,01
46	Straw articles & wicker work	0,94	33,72	-0,003
67	Finished fluff and feather and goods produced of them; artificial flowers, goods produced of human hair	34,89	75,76	-0,005
92	Musical instruments; parts and accessories for them	168,15	357,16	-0,02
50	Silk	0	329,8	-0,03
66	Umbrellas, sunshades, walking sticks, knouts, whips and their parts	0	351,44	-0,04
91	Clocks, watches and parts for them	0,65	419,76	-0,04
73	Ferrous metal fabrics	109980,7	95250,38	-0,05
80	Tin & fabricated tin products	5,03	489,27	-0,05
36	Powder and explosives; pyrotechnic substances, matches, pyrophorus alloys, ignitable substances	940,35	1535,1	-0,08
45	Cork and cork goods	143,15	2711,9	-0,27
19	Finished grain products; flour, starch and dairy products; floury confectionery	2109,01	4712,54	-0,3
53	Other plant textile fibers; spun cotton and spun cotton cloth	2210,44	4970,13	-0,32
23	Food industry remains and wastes; finished fodder for animals	22955,77	22931,58	-0,33
78	Lead & fabricated lead products	818,02	3845,26	-0,33
99	Other products	81900,45	74477,76	-0,4
79	Zinc & fabricated zinc products	361,43	4787,2	-0,47
22	Strong and soft drinks, vinegar	8949,06	12545,96	-0,5
75	Nickel & fabricated nickel products	1051,65	5869,63	-0,52
57	Carpets and other textile floorings	25,11	5694,59	-0,59
1	Livestock & living animals	163,72	6313,26	-0,64
6	Natural plants, flowers and products of flower-growing	27,42	6121,07	-0,64
13	Gums, pitches and other moistures and extracts of plants	672,86	6974,62	-0,67
43	Fur and imitation fur & products produced of them	7053,83	12614,23	-0,68
47	Wood-pulp, pulp cellulose materials; paper or cardboard produced of reprocessed wastepaper	145,12	7051,42	-0,72
37	Photographic or cinematographic products	136,99	8380,83	-0,86
3	Fish, crawfish, crabs, lobster, mollusks,	5716,98	14825,81	-1,03

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	shellfish and other aquatic invertebrate animals			
15	Vegetable fats and oils, seed-oils, adipose and animal oils; products of their splitting, finished food products	38558,87	43625,79	-1,08
59	Proofed, coated, bonded textile materials; technical articles produced of textile materials	9476,8	18892,06	-1,12
11	Products of flour-and-cereals industry; molt; starch; inulin; wheat gluten	2167,42	12923,01	-1,15
70	Glass & glassware	19256,75	28714,19	-1,26
63	Other finished textile goods; complete sets and bed-clothes; rags	17835,81	28075,79	-1,32
9	Coffee, tee, maté and spicery	362,45	14478,24	-1,47
58	Special stuffs; stuffs with machine-sewn nap; laces; gobelins; decorating materials; embroidery	79,29	15940,57	-1,65
18	Cocoa & cocoa products	1613,78	17323,3	-1,66
2	Meat & variety meat	40,25	17833,66	-1,85
56	Cotton wool, felt and non-woven fabrics; special yarn; twines, cords, ropes and products produced of them	11086,55	27590,6	-1,88
16	Finished food goods produced of meat, fish, crawfish, crabs, lobster, mollusks, shellfish and other aquatic invertebrate animals	378,3	18555,38	-1,9
68	Products made of stone, plaster cast, cement, asbestos, mica	10159,34	27282,53	-1,93
96	Different finished products	229,17	18788,65	-1,94
49	Printed products, periodicals and other products of printed industry; manuscripts and typescripts and plans	684,7	21590,69	-2,19
60	Stockinet	16,29	22322,27	-2,32
34	Soap; organic surface-active materials, detergents, creams, artificial wax, finished wax, cleaning and polishing mixtures, candles and analog	1023,6	24614,32	-2,47
83	Other goods produced of non-precious metals	1414,91	26641,63	-2,65
24	Tobacco & industrial tobacco substitutes	812,92	32967,21	-3,36
94	Furniture, medico-surgical furniture, beddings (mattresses, cushions, etc.) and furnishings; analogous products	21046,56	54203,6	-3,76
52	Cotton	836,95	45552,4	-4,67
21	Different food products	1770,53	46763,78	-4,71
51	Wool, thick and thin hair of animals; yarn and materials produced of horsehair	5006,82	51652,02	-4,93
40	Caoutchouc and rubber; products of them	15714,6	60983,9	-4,94
69	Ceramic products	5584,83	52339,32	-4,95
54	Synthetic and artificial threads	15437,16	62871,1	-5,17

32	Tanning and dyeing extracts; tanning and its derivatives	17016,75	72468,04	-6,02
98	Goods purchased in ports	2113,98	64753,4	-6,56
55	Chemical staple fibers	2918,15	81736,95	-8,26
33	Essential oils and resinoids; perfumes, toiletry, cosmetic (makeup) preparation	3281,35	83217,58	-8,38
90	Optical equipment and instruments; equipment and instruments for photographing, cinematography, control, measurement; precision measuring instruments, medico-surgical instruments; their parts and fixings	18873,64	119276,7	-10,74
38	Other products of chemical industry (including graphite, activated charcoal, compounds, turpentine, insecticides, fungicides, herbicides for agriculture, chemicals for metal etching, antiknock additives, antioxidants, industrial fatty acids and spirits, catalysts)	13538,58	132845,5	-12,63
48	Paper & cardboard; products produced of paper stock, paper or cardboard	55120,02	265393,1	-22,71
30	Pharmaceutical products	3618,83	254515,8	-26,2
39	Polymeric materials, plastics and products produced of them	33315,86	303569,7	-28,64
87	Automobiles, tractors, bicycles and other land-based vehicles; their parts and fixings	12392,41	295369,8	-29,67
85	Electrical machines, electrical equipment and their parts; sound recorders and reproducers	170999,2	434129,38	-29,88
84	Piles, boilers, machines, devices; their parts (including nuclear reactors, steam-boilers, central heating boilers, gas generators, internal-combustion engines, water turbines, pumps, air-conditioners, refrigerators, freezer compartments and freezing rooms, dish-washing machines, goods weighing instruments, lifting jacks, elevators, hoisting cranes, agricultural machines, harvesters, printing equipment, textile industry equipment, lathes, benches, presses, calculators, bookkeeping machines, cash registers, electronic processing machines and their electronic units, machines for street & road works, etc.	419621,87	787644,28	-44,39
71	Pearls, precious and semiprecious stones and metals, costume jewelry, coins	-	-	-
77	Articles reserved for the future	-	-	-
93	Weapons, ammunition; their parts and fixings	-	-	-

According to the RCA figures in above, Ukraine in the year 2001 revealed essential comparative advantages in international trade with the EU acceding states in commodity divisions 72, 26, 27, 62, 76, 10, and 44. The negative RCA indexes show country's disadvantages in the export sectors. Ukraine's essential disadvantages are in commodity divisions 84, 85, 87, 39, 30, 48, and 90. For the most part, commodity divisions with enough low positive or negative RCA index are not determinant in the country's international trade.

Interesting results were received in commodity divisions 73, 23, and 99. In spite of the fact, that these commodity divisions by their commodity flows value are determinant in international trade with the EU acceding states, they are characterized by low negative RCA index. Ukraine attained a positive balance in these commodity divisions but at the same time did not revealed comparative advantages.

It should also be noted that the commodity division with high technologies 88 «aircraft, space vehicles; their parts» took only 22nd position among commodity divisions with comparative advantages (RCA index 1,69). These commodities were exported mainly to Macedonia, Great Britain, Estonia, and Germany.

As for commodity division 10 «Grain-crops, cereals», Ukraine is able to increase its comparative advantage in the future. Climatic factor becomes essential for these commodities. Because of the flash floods in Central and Eastern Europe in 2002, Ukraine seems to increase its exports of grain-crops and cereals to these countries and Germany. The main risk however is introduction of non-tariff barriers on the part of the EU, e.g. in the form of strengthening quality control of products.

As for commodity division 27 «Energy materials; petroleum and products of petroleum refining, bituminous substances; lignite waxes» it is safe to say that Ukraine revealed comparative advantage mainly due to commodity groups 2710 «Petroleum oils and oils obtained from bituminous minerals, etc.» (leading markets – Italy, Yugoslavia, Romania), 2711 «Natural gas in gaseous state» (leading markets – Poland, Hungary) and 2716 «Electrical energy» (leading markets – Poland, Hungary, Slovakia, Bulgaria).

Ukrainian metallurgy industry experiences difficulties. Nearly 50% of steel is produced by means of open-hearth furnace – Western Europe renounced this mode of steel production way back in the eighties of the last century. The fixed capital stock is aging, the steel production remains very power-consuming. The competitiveness of metallurgical goods on the European market is explained by scale economies and price conjuncture on the world steel markets. From the middle of 2003, it is forecast that the world economy will grow and there are grounds for hope that Ukraine's exports of ferrous metals to the EU and, therefore, its comparative advantage in this sector will increase. It should not be ruled out that Ukraine can reveal comparative advantage in the commodity division 73 «Ferrous metal fabrics». The main risk is the increase in the number of anti-dumping measures on the part of the EU in this industry.

We also calculated separately Ukraine's revealed comparative advantages for the year 2001 concerning only the EU member states. Ukraine revealed quite

essential comparative advantages in trade with the EU in the commodity divisions 72 (RCA 36,93), 26 (RCA 29,48), 62 (RCA 27,42), 27 (RCA 26, 51), and 10 (RCA 9, 71). Ukraine's most essential disadvantages are in the commodity divisions 84 (RCA – 48,16), 85 (RCA – 28,10), 87 (RCA – 24, 34), 39 (RCA – 19,58), 30 (RCA – 17,58), 48 (RCA – 15,62), 38 (RCA – 11,32), and 90 (RCA – 10,04).

Comparing these data with those given in the above table in the commodity divisions 62 and 10, we can see that Ukraine and the EU have relatively similar RCA indexes. However, the revealed comparative advantages are noticeably less in the commodity divisions 72, 26 and 27. Ukraine's revealed comparative advantage in the commodity division 76 «Aluminum and aluminum goods» is less more than twice. It means that competitive positions of Ukraine in these commodity divisions in Europe are determined also largely by the trade with the acceding countries.

In international trade with the EU Ukraine revealed comparative disadvantage (RCA – 1,39) in the commodity division 82 «Tools; knives, blades, cutters, cutlery, flatware produced of non-precious metals; parts of these goods produced of non-precious metals», while in trade with the candidate countries Ukraine revealed significant comparative advantage (RCA 8,44. See in Table).

Revealed comparative advantages and disadvantages of Ukraine were obtained in international trade with the EU and candidate countries and refer solely to the year 2001. Ukraine's export-import structure will undergo changes depending on integration processes in the countries which will enter the EU, and in Ukraine as well. Enlargement of the EU to the East, internal reforms in Ukraine's economy, and the rate of business activity will also affect the structure. If business activity increases and Ukraine is still open to the West, we can expect fast development of infrastructure in our country, i.e. construction of transport networks, growth of goods traffic, and hence increase in domestic consumption of petroleum and mineral oils which will decrease Ukraine's comparative advantages in many commodity groups of the commodity division 27, and increase its comparative disadvantage in the commodity division 87.

The German consulting group on issues of economic reforms with Ukrainian government notes «...the ability of agricultural and food production expansion and diversification, and the quality standards compliance can be realized only if Ukraine continues to open its markets for imports of material and technical resources and also new technologies» [10]. If we assume such scenario for Ukraine, it is expected, therefore, in the short run period the increase of Ukraine's comparative disadvantages in such commodity divisions as 84, 85, 1, 38, 90 and weakening of comparative advantages in divisions 31 and 12. For the output expansion of traditional and new for Ukraine types of production, which can be in demand in Europe on a large scale, Ukraine needs certain types of seeds, pedigree livestock, freezing and refrigerating equipment, transportation facilities, electronic measuring equipment, and agricultural machinery.

From the obtained results we can draw a conclusion that Ukraine reveals to date on the European market comparative advantages mainly in traditional basic industries, in which production is characterized by average-low and low technologies

(see a jointly developed by OECD and EUROSTAT taxonomy of industries by different technological intensity [11]). The acceding countries hold a highly important place in Ukraine's international trade within Europe as a whole. The trade with the applicant countries strengthens Ukraine's comparative advantages. The formation of comparative advantage is a dynamic process. Therefore, Ukraine's revealed comparative advantages can change with time depending on how Ukraine integrates into Europe, how fast it will be able to accumulate physical and R&D capital and use external and internal technological potential.

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