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EVALUATION OF EXPORT DIVERSIFICATION IN UKRAINE

ОЦІНЮВАННЯ ДИВЕРСИФІКАЦІЇ ЕКСПОРТУ В УКРАЇНІ

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The article looks into evolution of Ukrainian merchandise export through the lens of its diversification. Problems with export diversification in Ukraine are stipulated in key government strategic plans of economic development, so detailed examination of diversification processes becomes particularly important. Study applies advanced methodology to explore export diversification in Ukraine at extensive and intensive margins, as well as HS6-digit division of commodity groups to get the most accurate results. Export trends, geography and structural shifts are analyzed. Results of global recession of 2009 for structural changes in Ukraine's exports are defined. The main factors of Ukraine's export concentration are revealed. Challenges, posed by lack of exports diversification, for steady economic growth and development are emphasized. Key advantages and disadvantages of boosting export diversification through integration into global value chains are argued. Causes and consequences of geographical reorientation of Ukraine's export are analyzed. Efficiency of Ukraine's trade relations with China as a new biggest trade partner is estimated. Results of this study can be used in preparation of analytical materials on the development of Ukraine's export potential and international specialization, as well as in elaboration of new Export Strategy of Ukraine.

Keywords: diversification, concentration, merchandise trade, structural distortions, export basket, value added, commodities, manufactured goods, Ukraine.

У статті розглянуто розвиток диверсифікації товарного експорту України крізь призму його диверсифікації. Проблеми диверсифікації експорту постульовані в основних стратегічних планах уряду України з економічного розвитку, тому детальний розгляд процесів диверсифікації набуває особливої актуальності. У дослідженні застосовано сучасні методичні підходи до аналізу диверсифікації експорту в Україні за екстенсивному й інтенсивному вимірі, з використанням таких показників, як середній обсяг експортного кошика, індекс проникнення на зовнішні ринки, індекс Герфіндаля–Гіршмана, індекс Тейла, індекс Джині, а також шестизначний розподіл товарних груп за Гармонізованою системою кодування й опису товарів для отримання максимально точних результатів. Проаналізовано динаміку експорту, його географічні та структурні зрушення. Роз'яснено змішану техніко-економічну модель економіки України. Описано трирівневу модель міжнародної спеціалізації країни. Визначено результати світової фінансово-економічної кризи 2009 р. для структурних змін в експорті України. Виявлено основні чинники концентрації українського експорту. Оцінено подібність структури українського товарного експорту до світового, проведено відповідні міжнародні порівняння. Розраховано кореляцію між світовими цінами на сировинні товари та темпами зростання ВВП України. Наголошено на проблемах для сталого економічного розвитку, що пов'язані зі слабкою диверсифікацією експорту. Аргументовано ключові переваги та недоліки посилення диверсифікації експорту шляхом інтеграції в глобальні ланцюги доданої вартості. Проаналізовано причини та наслідки географічної переорієнтації експорту України. Оцінено ефективність торгових відносин України з Китаєм як новим найбільшим торговим партнером. Виявлено, що розширення економічних відносин з КНР посилює неефективну спеціалізацію української економіки. Результати дослідження можуть бути використані при підготовці інформаційно-аналітичних матеріалів щодо розвитку експортного потенціалу та міжнародної спеціалізації України, а також при розробці нової Експортної стратегії України.

Ключові слова: диверсифікація, концентрація, торгівля товарами, структурні диспропорції, експортний кошик, додана вартість, сировинні товари, товари переробної промисловості, Україна.

Introduction. Export is an important part of Ukrainian economy development, on the one hand, because of globalization, which strengthens ties between producers from different countries, and on the other hand, as a result of the adoption of a destructive economic model, which was formed on the ruins of the administrative-command Soviet economy and is based on the large rent-seeking businesses exporting mainly raw materials and low-tech products with significant dependence on the import of energy resources, equipment and consumer goods [1, p. 18]. In such a model, short-term goals objectively prevail, and this leads to a gradual degradation of the real sector of economy and a decrease in international competitiveness. This inevitably hinders foreign trade diversification. The problem with diversification is stressed in key government programs on development of export activities in Ukraine. For instance, in the Concept of creating a system of state export support in Ukraine, among the urgent problems that prevent the full use of the export potential, the low product and geographical diversification of exports is listed in the first place [2]. In the Export Strategy of Ukraine for 2017–2021, the strategic goal of trade development is creation of favorable conditions that stimulate trade and innovation for export diversification. Along with this, the Strategy admits that «existing entrepreneurship conditions don't stimulate Ukrainian companies to develop innovative activities and don't contribute to diversification of the economy. As a result, the structure of export basket consists of a small number of goods with a relatively low value added, and the available resources, highly qualified personnel in particular, are not used to their full extent» [3]. In this regard, it's topical to investigate main development stages and structural shifts of Ukrainian exports, and then trace their impact on export diversification.

Recent literature review. Problems of export diversification in Ukraine have been thoroughly investigated in publications of some scholars. It is worth highlighting the works of A. Zubritskiy [4], O. Havrylchenko [5], O. Shnyrkov et al. [6]. However, they tend to focus either on specific time periods (e.g. diversification shifts after launching EU–UA association agreement and losing Russian market) or technical issues (such as extensive and intensive margins of diversification) leaving key trends of Ukrainian export development out of consideration. This study attempts to apply diversification evaluation

to provide a holistic view of export evolution in Ukraine throughout the period of transition.

The purpose of the article is to define key trends of export development in Ukraine through evaluation of its diversification.

The main results of the research. In 1995–2021, Ukraine observed a general trend towards an increase in the value of merchandise exports, which was interrupted during crises of 1997–1999, 2009, 2013–2016, and 2020. Value of merchandise export reached the highest level – 68.7 billion US dollars – in 2012, however, the volume index peaked in 2008 when it was 207.2 per cent of the 2000 level. That year Ukraine also gained its largest share in the world market – 0.415 per cent. During 2000–2021, the value index of Ukrainian export of goods increased by more than 4.5 times, and volume index by 1.2 times. Global exports are also characterized by an outpacing growth in value over physical volumes, but the gap in dynamics is much smaller: value of world exports grew by 2.7 times, volume – by 1.7 times. Thus, the favorable price environment of foreign markets played a much greater role in the export growth for Ukraine than for most other countries. The share of Ukraine in the world market reduced to 0.305 per cent in 2021. The level of openness of the Ukrainian economy grew until 2004, when the ratio of merchandise export to GDP reached 48.6 per cent (taking into account the export of services, this ratio was 60.3 per cent), and then gradually decreased. In 2020, the ratio of goods exports to GDP was 31.6 per cent (goods and services – 39.0 per cent), which, however, significantly exceeds the world average of 29.5 per cent for goods and services revealing significant openness of the Ukrainian economy, and hence the great influence of the external sector on dynamics of its growth (table 1).

As for the structure of export flows, it was formed under a mixed technical and economic model of the Ukrainian economy, within which a number of industries that significantly differ in levels of international competitiveness were represented on foreign markets [8, p. 18]:

– the first group includes industries characterized by low competitiveness and outdated technologies, such as automotive, railway transport, various machinery and appliances, chemical products). Production and export potential of these industries collapsed partly as a result of global recession in 2009, and then as a result of the closure of the Russian market, starting in 2014;

Table 1

Indicators of merchandise exports development in Ukraine in 1995–2021

	Million US dollars	Annual growth rate, %	Value index (Index base – the year 2000)	Volume index (Index base – the year 2000)	% of world exports	% of GDP
1995	13 317,1	27,4	90,1	–	0,254	26,4
1996	14 400,2	9,7	98,8	–	0,266	31,2
1997	14 217,5	-1,2	97,7	–	0,254	27,4
1998	12 637,4	-11,2	86,7	–	0,229	29,1
1999	11 581,6	-8,3	79,5	–	0,202	35,4
2000	14 572,6	25,8	100,0	100,0	0,226	45,0
2001	16 264,7	11,6	111,6	115,1	0,263	41,4
2002	17 927,4	10,4	123,2	126,4	0,276	40,8
2003	23 066,8	28,5	158,3	146,6	0,304	44,4
2004	32 666,1	41,6	224,2	172,2	0,354	48,6
2005	34 228,0	4,8	234,9	159,9	0,326	38,4
2006	38 367,6	12,1	263,3	166,9	0,316	34,3
2007	49 294,4	28,5	338,3	187,7	0,352	33,1
2008	66 952,3	35,8	459,5	207,2	0,415	35,6
2009	39 695,6	-40,6	273,0	168,2	0,317	32,7
2010	51 430,3	29,4	353,3	172,8	0,336	37,8
2011	68 393,0	33,0	469,8	182,9	0,373	41,9
2012	68 694,5	0,1	470,3	186,7	0,370	39,1
2013	63 320,5	-6,1	441,5	173,5	0,339	34,5
2014	53 913,3	-16,2	369,9	153,3	0,284	40,4
2015	38 127,0	-29,3	261,6	131,8	0,230	41,9
2016	36 361,0	-4,6	249,5	130,6	0,227	38,9
2017	43 428,4	19,0	296,9	134,1	0,244	38,7
2018	47 334,7	9,4	324,8	131,3	0,242	36,2
2019	50 051,9	5,7	343,5	138,7	0,263	32,5
2020	49 230,8	-1,7	337,6	130,3	0,279	31,6
2021	65 870,3	38,4	452,0	120,6	0,305	32,9

Source: compiled by the author based on [7]

– the second group consists of industries with a preserved potential of high-tech exports including aerospace, inorganic chemical products, telecommunications equipment, arms and ammunition, plastics and rubber, etc. These industries have been reducing production gradually moving from the export of consumer goods to supply of intermediates;

– however, the third group prevails, which is formed by extractive industries and producers of primary processed goods, such as iron concentrates and ores, ferrous metals, cereals, sunflower oil.

As a result of the oversaturation of the world market of iron and steel after the global

recession in 2009 and the partial destruction of the metallurgical facilities in the temporarily occupied territories of Ukraine, the share of base metals in Ukrainian exports decreased from 42.2 per cent in 2007 to 23.5 per cent in 2021. The lack of prospects for metallurgical exports contributed to investments into agriculture and rapid increase in the exports of cereals (the share of which in total exports increased from 1.6 to 18.1 per cent during 2007–2021) and sunflower oil (increased from 3.5 to 10.3 per cent). Iron ore mining companies, which faced a drop in demand for their products from domestic manufacturers, also began to increase export supplies. Exports of iron concentrates and ores

gained particular momentum during the global crisis of 2020, when China, as one of the few economies in the world that did not experience a recession, significantly increased iron ores import for its rapidly growing production needs. Share of iron ores and concentrates in Ukraine's exports in 2021 reached 10.5 per cent, while in 2007 it did not exceed 2.2 per cent.

Obviously, structural shifts in Ukraine's exports weaken its position on the global market. The three-level model of international specialization reveals this trend. These levels are:

- lower level (market of agricultural goods and extractive industries products);
- medium level (market of low-tech and semi-finished goods, production of which is characterized by high labor intensity);
- upper level (market of high-tech products) [9, p. 276].

Ukraine reduced its presence on the global market within the upper and middle levels and expanded specialization at the lower level, increasing risks and threats to economic stability because of inefficient export structure (table 2).

The share of manufactured goods in Ukraine's exports grew from 66.3 to 73.5 per cent during 1995–2007 due to the low-skill goods – pig iron, rods and bars, pipes, profiles and other semi-

finished steel products, railway freight cars. However, by 2021, the share of manufactured goods decreased to 43.2 per cent. Exports of high-tech goods demonstrated the biggest decline, its share decreased from 14.6 to 5.4 per cent, primarily as a result of reduced supplies of various chemicals and inorganic fertilizers. Share of agricultural and food products in Ukraine's exports decreased from 16.1 to 7.8 per cent during 1995–2007, but then has been steadily increasing and reached 26.8 per cent in 2021, primarily thanks to exports of maize, wheat, food residues and wastes. The increase in the share of non-edible raw materials in exports during 2007–2021 from 7.1 to 17.4 per cent occurred mainly due to the supply of iron ores and concentrates, rapeseed, wood-in-the-rough, etc. The increase in share of labor-intensive goods in exports up to 6.4 per cent in 2021 took place mainly due to supplies of wood products (plywood, carpentry, packing cases, fiberboard, sheets for veneering), furniture, ceramic building materials, textiles and apparel.

Despite above mentioned negative structural trends, Ukrainian exports of goods diversified at the extensive margin (table 3).

During 1997–2018, number of products in Ukraine's export basket increased by 8.0 per

Table 2

**Structure of Ukrainian exports by main product groups
and degree of manufacturing in 1995–2021, %**

SITC codes	Product groups	1995	1999	2003	2007	2011	2015	2019	2021
0–1	Food and live animals; beverages and tobacco	16,1	9,9	8,1	7,8	11,8	25,6	26,7	26,8
2	Crude materials, inedible, except fuels	9,1	11,7	7,8	7,1	11,1	14,6	16,2	17,4
3	Mineral fuels, lubricants and related materials	4,3	6,1	11,9	5,3	8,3	1,3	1,7	1,1
4	Animal and vegetable oils, fats and waxes	1,3	1,0	2,4	3,5	4,8	8,6	8,8	10,4
5–8	Manufactured goods, including:	66,3	64,0	66,9	73,5	62,6	48,9	45,9	43,2
TDRB	labor-intensive and resource-intensive manufactures	5,6	7,3	7,2	6,4	5,1	6,7	6,7	6,4
TDRC	low-skill and technology-intensive manufactures	33,0	36,3	37,1	44,0	36,8	24,3	24,6	22,7
TDRD	medium-skill and technology-intensive manufactures	13,1	9,3	10,7	12,0	10,7	10,8	9,4	8,6
TDRE	high-skill and technology-intensive manufactures	14,6	11,1	11,9	11,1	10,0	7,1	5,2	5,4
9	Commodities and transactions, n.e.s.	2,9	7,3	2,9	2,8	1,4	1,0	0,7	1,1

Source: compiled by the author based on [7]

Table 3

Diversification of Ukrainian exports at the extensive margin in 1997–2018

Indicators	1997	2000	2003	2006	2009	2012	2015	2018
Number of exported HS6-digit products	3430	3473	3537	3670	3816	3683	3621	3706
Average volume of export basket	149	189	229	277	315	340	347	406
Number of trade partners	144	162	171	174	185	185	185	193
Index of export market penetration (IEMP), %	3,63	4,56	5,41	6,48	6,75	7,14	7,27	8,34

Source: compiled by the author based on [10; 11]

cent from 3.4 to 3.7 thousand. Ukraine ranked 46th according to this indicator, behind the US, Canada, Japan, South Korea, Turkey, Singapore, Vietnam, Thailand, Australia, New Zealand, Russia, Belarus and most European countries, except Ireland, Estonia, Norway, North Macedonia, Bosnia and Herzegovina. Most of the world's biggest economies, with the exception of Poland and India, showed a slight decrease in the total number of products in export basket during this period. Therefore, against the background of global trends, the dynamics of the expansion of Ukrainian exports nomenclature was positive, albeit trivial.

At the same time, the average volume of Ukraine's export basket increased from 149 to 406 products, which is primarily due to a significant expansion of the range of supplies to the EU and EFTA, the USA, Turkey, Azerbaijan, Armenia, Georgia, and Moldova. For instance, in 1997–2018, Ukraine expanded exports nomenclature to Italy from 321 to 1,031 products, Germany – from 841 to 1,949, Georgia – from 343 to 1,815, Turkey – from 313 to 1,127, Poland – from 771 to 1,995, Great Britain – from 215 to 1,086 products, etc. The expansion of the range of exported products during the analyzed period took place with all trading partners, except for Russia (the number of exported products decreased from 2,529 to 2,085). In 2018, Ukraine supplied the largest number of products to Moldova, Russia, Poland, Germany, Belarus and Georgia. On the other hand, the range of export supplies to Africa, Asia, Latin America and Oceania still remains narrow. Ukraine's exports to China consist of 734 products, Singapore – of 385, South Korea – of 374, Japan – of 360, Egypt – of 303. Ukraine exported less than 300 HS6-digit products to other geographically remote countries in 2018.

Diversification of Ukraine's exports at the extensive margin is mainly a result of entering new

markets with traditional goods. This is evidenced by the increase in the number of trading partners from 144 to 193 countries during 1997–2018 and the increase in the index of foreign market penetration from 3.63 to 8.34 per cent. In 2018, Ukraine ranked 45th according to the IEMP and slightly exceeded the world average level. It should be noted that in terms of the number of HS6-digit exported products the world leader (the USA with 4529 products) exceeds Ukraine's level by 22.2 per cent only, while in terms of the average volume of export basket and IEMP, the excess reaches 5,6 times. Therefore, the main potential for extensive diversification of Ukrainian exports lies in expansion into new markets, while the space for adding new products to the existing export basket is quite limited, although not fully used.

The key challenge for Ukraine remains to diversify exports at the intensive margin in order to overcome structural distortions in trade. The first approximation to the assessment of Ukrainian exports concentration level indicates disturbing trends, as the share of the top 10 HS6-digit products in export during 1996–2008 increased from 22.8 to 30.5 per cent, and reached 46.2 per cent in 2020. Thus, about half of Ukraine's merchandise exports are concentrated on several raw materials and semi-finished products (Table 4).

In 1996, the top 10 products in Ukraine's exports included food products (sugar) and meat of bovine animals, products of the chemical (urea, ethyl alcohol) and petrochemical (benzene) industries, as well as iron and steel articles (pipes, rods and bars). In 2008, top positions were taken by semi-finished products of non-alloy steel along with cereals (wheat, barley) and sunflower oil. But in 2020, the leading positions were taken by cereals (maize, wheat), vegetable oils, oilseeds (rapeseed), along with iron ores, semi-finished products of non-alloy steel and pig

Table 4

Share of the top 10 commodity groups in Ukrainian exports in 1996, 2008 and 2020

1996		2008		2020	
Commodity groups (HS6)	%	Commodity groups (HS6)	%	Commodity groups (HS6)	%
170199 – Sugar	4,13	720712 – Semi-finished products of non-alloy steel ($\omega < 0,25\%$)	4,70	100590 – Maze	9,89
310210 – Urea	2,87	720711 – Semi-finished products of non-alloy steel ($\omega < 0,25\%$)	4,22	151211 – Sunflower oil, crude	9,56
722820 – Bars and rods of silico-manganese steel	2,37	720720 – Semi-finished products of non-alloy steel ($\omega > 0,25\%$)	3,82	100199 – Wheat, other than durum	7,30
720711 – Semi-finished products of non-alloy steel ($\omega < 0,25\%$)	2,27	271019 – Not light oils and preparations	3,33	260111 – Iron ores and concentrates; non-agglomerated	5,17
220710 – Ethyl alcohol	2,04	720851 – Iron or non-alloy steel, flat-rolled	3,09	260112 – Iron ores and concentrates; agglomerated	3,45
721331 – Bars and rods of non-alloy steel, hot-rolled	2,04	721420 – Bars and rods of non-alloy steel, n.e.s.	2,69	854430 – Ignition wiring sets and other wiring sets of a kind used in vehicles	2,52
271000 – Benzene	1,96	100199 – Wheat, other than durum	2,39	720712 – Semi-finished products of non-alloy steel ($\omega < 0,25\%$)	2,45
730511 – Line pipes for oil or gas pipelines	1,81	151211 – Sunflower oil, crude	2,12	120510 – Rape or colza seeds	2,01
260111 – Iron ores and concentrates; non-agglomerated	1,69	100390 – Barley	2,10	720711 – Semi-finished products of non-alloy steel ($\omega < 0,25\%$)	1,96
020210 – Meat of bovine animals	1,81	310210 – Urea	2,00	720110 – Pig iron in blocks or other primary forms	1,87
Top 10 together	22,84	Top 10 together	30,45	Top 10 together	46,18

Source: compiled by the author based on [12]

iron in primary forms. If in 1996 the share of the largest commodity group in exports was 4.1 per cent, and in 2008 – 4.7 per cent, then it reached almost 9.9 per cent in 2020. Shares of the following commodity groups grew even faster. The share of the first five commodity groups in exports increased from 13.7 per cent in 1996 to 19.2 per cent in 2008 and to 35.4 per cent in 2020. Despite some changes in the arrangement and the appearance of new types of goods in top 10 list, all of these products (except wiring sets, which will be discussed further) belong to agricultural or mineral raw materials and primary processed goods that are characterized by high price volatility on global markets. The growth

of the share of such products in exports, given significant openness of the national economy, increases vulnerability to commodity markets, makes economic development unsteady and fragile.

In 2020, 67.7 per cent of metal ores mined in Ukraine, 69.9 per cent of produced iron, steel and ferroalloys, and 76.8 per cent of produced sunflower oil were sold on foreign markets. In the 2019/2020 marketing year, the wheat harvest in Ukraine amounted to 28.2 million tons, of which 20.5 million tons (72.3 per cent) were exported; the corn harvest amounted to 35.2 million tons, of which 30.3 million tons (86.1 per cent) were exported. With such a high

export orientation of key domestic producers, dynamics of Ukraine's GDP is largely determined by conjuncture abroad. It should be noted that although key Ukrainian exports, in contrast to classical monoculture economies, are dispersed among several types of raw materials and primary processed goods, the dynamics of world prices for these goods in periods of global crises is largely synchronized. As a rule, during a crisis, the prices of all types of raw materials and semi-finished products decrease rapidly, and then rise just as rapidly during post-crisis recovery. Therefore, a relatively higher level of export diversification doesn't protect Ukraine's economy from excessive vulnerability to external destabilizers [13, p. 19], since the decrease in the share of base metals and products thereof in domestic exports during 2008–2020 occurred at the expense of products with similar pricing principles.

Figure 1 visualizes correlation between average dynamics of world prices for minerals, ores and metals, and growth rates of Ukrainian GDP in 2008–2020. It reaches the level of 0,775. Previous scientific research in this area for the period 2006–2016 also confirms stable causality between export prices fluctuation and the dynamics of Ukraine's GDP [14, p. 49–50].

Separate attention should be paid to wiring sets (HS 8544 30) in the list of top-10 commodity groups in Ukrainian exports in 2020. This export developed thanks to outsourcing by European

and Japanese automobile companies of some production functions to Ukraine in order to further supply intermediate products to the EU countries. During 2004–2020, the export of wire sets from Ukraine to the EU increased from 5.0 to 49.1 thousand tons (from 105.0 million to 1.23 billion US dollars in value). The importance of this export in trade relations of Ukraine with the EU is difficult to overestimate: the share of product group HS 8544 30 alone in the total export of goods from Ukraine to the EU reached 6.6 per cent in 2020.

As of the end of 2020, 12 factories were operating in Ukraine that produced electrical wiring, circuit harnesses, cables and other sets of wires for the needs of automotive companies in EU countries. All factories belong to five MNCs: along with European corporations ("Nexans", "Leoni"), there are also Japanese companies ("Fujikura", "Yazaki") and a joint Japanese-German concern ("Sumitomo Electric Bordnetze"). However, all these MNCs built their value chains in a way where final assembly of automobiles take place in EU countries. According to the State Statistics Service of Ukraine, in 2019, 50.3 thousand tons of wire sets for vehicles were produced in Ukraine, of which 45.4 thousand tons (90.3 per cent) were produced from customer-furnished raw materials. Germany, Poland, Romania, the Czech Republic, Hungary, Slovakia are the main destination countries for Ukrainian exports

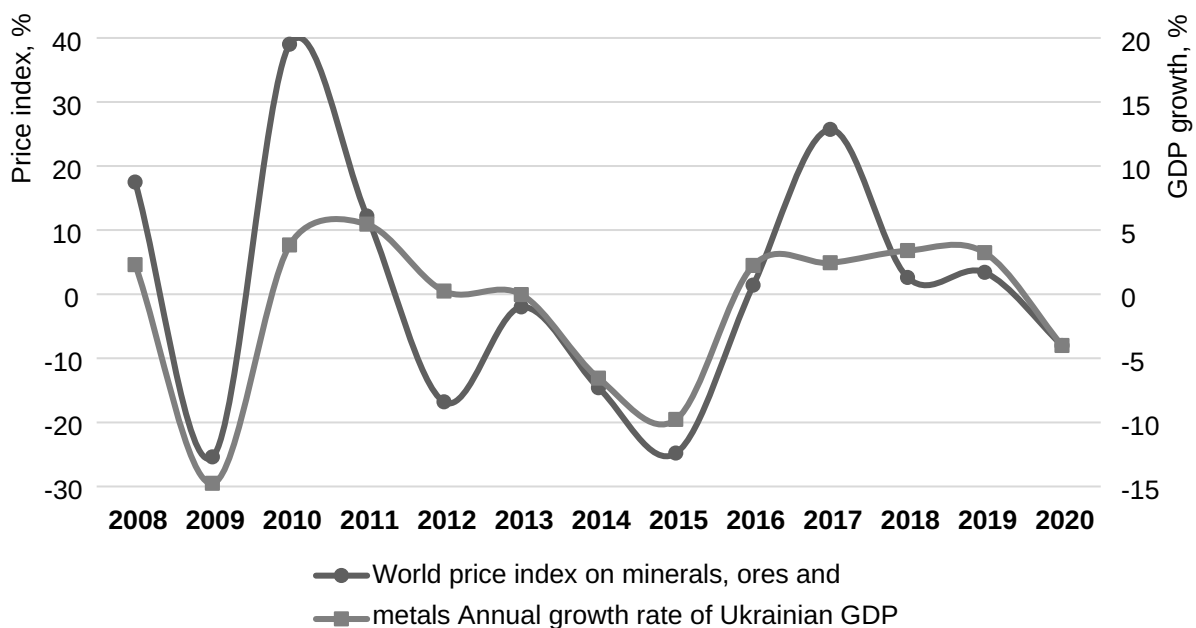


Figure 1. Correlation between prices for minerals, ores & metals and growth rates of Ukraine's GDP in 2008–2020

Source: compiled by the author based on [15, p. 22]

under HS 8544 30 commodity group. The positive aspects of such a production model include attraction of investments in the national economy (FDI in wire sets production in Ukraine exceeded 200 million US dollars), creation of new jobs, which deters labor emigration, and stable inflows of foreign currency overreaching 1 billion US dollars annually, which positively affects trade balance. Ukraine took advantage of preserved production potential (some wire production factories were opened on the basis of existing capacities), a favorable geographical location in close proximity to destination markets, as well as the liberalization of access to the EU market (5 out of 12 operating wire production factories were opened shortly after the entry into force of the EU–UA Agreement on the Deep and Comprehensive Free Trade Area) [16, p. 128].

However, some challenges and threats can be outlined as well. First, Ukraine found itself locked in a supply chain where production is heavily dependent on customer-furnished raw materials and markets are clearly defined by a narrow circle of counterparties at the following stages of production process. Second, Ukraine took up the stage of production that requires manual and therefore relatively cheap labor, while automated production processes are located in countries with a higher level of development. In fact, this production and export do not reflect the potential of domestic engineering, as they remain under the full control of subsidiaries of car manufacturers from EU countries and Japan. This is the result of the MNC's strategy of outsourcing one of the simplest functions in the motor vehicle manufacturing (which has not yet been automated) in order to take advantage of cheap labor.

Establishing the production and export of wiring sets for motor vehicles in Ukraine, with all its advantages and disadvantages, serves as a vivid illustration of integration into global

value chains as a strategy for diversification of economy and foreign trade, which was successfully implemented by the post-socialist countries of Central and Eastern Europe.

To evaluate Ukraine's exports diversification, it is worth analyzing its dynamics using Herfindahl-Hirschman, Theil and Gini indices (table 5).

Dynamics of all these indices proves concentration of Ukraine's merchandise export in 1997–2018. The Herfindahl-Hirschman index (aka concentration index) increased from 0.082 to 0.141 over the period, which still corresponds to a high level of diversification, but is approaching the threshold of 0.15 that indicates an average level. A slight decrease in export concentration index was detected only in 2006. Previous studies that calculated this indicator for 2004–2012 also revealed its slight decrease in 2009 compared to the previous year [4, p. 30]. The highest growth rates of the concentration index were recorded in 2015 compared to 2012 (an increase from 0.107 to 0.136).

Level of export diversification has decreased due to loss of access to Russian market since 2014, which until then remained key market for most Ukrainian exporters of machinery, electrical appliances, and vehicles. During 2012–2018, Ukraine's machinery exports (HS 84–89) decreased by 59.0 per cent, and share of machinery in total merchandise exports decreased from 18.9 to 11.2 per cent. Share of chemical products in total exports also decreased from 7.4 to 4.0 per cent. Development of production and export potential in the furniture and woodworking industries (their share in exports in 2012–2018 increased from 2.2 to 4.5 per cent) and manufacturing of animal products (increased from 1.4 to 2.6 per cent) did not cover the losses from reduction in the supply of machinery and chemical products. It led to the increase of structural distortions reflected in table 2.

Table 5

Diversification of Ukrainian exports at the intensive margin in 1997–2018

Indicators	1997	2000	2003	2006	2009	2012	2015	2018
Herfindahl – Hirschman index	0,082	0,089	0,099	0,097	0,099	0,107	0,136	0,141
Theil index, including:	2,552	2,695	2,735	2,766	2,851	2,952	3,196	3,294
between group component	0,376	0,431	0,442	0,492	0,477	0,506	0,535	0,558
within group component	2,176	2,264	2,293	2,274	2,374	2,446	2,661	2,736
Gini index	0,918	0,930	0,930	0,930	0,933	0,940	0,944	0,948

Source: compiled by the author based on [17]

During 1997–2018, the Theil index increased from 2.55 to 3.29 reflecting gradual increase of Ukraine's exports concentration from a relatively small to the world average level. Decomposition of Theil index showed predominance of the within-group over between group component¹. Between-group component of index increased from 0.376 to 0.558. A decrease in level of between-group concentration was recorded in 2009, when it decreased to 0.447 compared to 0.492 in 2006. Obviously, with the drop in raw materials prices in 2009, their share in the value of Ukrainian exports decreased compared to goods of a higher degree of processing, which to some extent balanced the overall structure of exports and led to its diversification during the crisis, at least at the between-group level.

The within-group component of Theil index increased from 2.176 to 2,736 in 1997–2018, reflecting the growth of Ukrainian exports concentration on individual products within aggregated groups. For example, if in 1997 the top five products in group "Base metals and products thereof" accounted for 30.6 per cent of exports for this group, then the share of top five reached 42.9 per cent in 2018. Similarly, the share of the top five products in group "Products of vegetable origin, fats and oils" increased from 68.0 to 83.8 per cent.

The Gini index for Ukrainian exports increased from 0.918 to 0.948 during the analyzed period. In 2000–2009, the Gini index was at the level of 0.930–0.933, which indicates the constant predominance of the same commodity groups

in exports in this period. The further increase of this indicator took place as commodities from the group of base metals gave way to cereals, sunflower oil and iron ores in the top of exports list.

Ukraine's diversification index (reflects similarity between country's export structure and the global one) increased from 0.571 to 0.694 in 1995–2020 (table 6).

In 2019, according to the SITC classification, the share of iron and steel in Ukraine's exports exceeded the share of these products in world exports by 20.3 percentage points, the share of cereals and products thereof – by 16.4 percentage points, vegetable oils – by 8.4 percentage points, iron ores and concentrates – by 7.6 percentage points. At the same time, the share of machinery was lower by 25.2 percentage points, chemical products – by 8.2 percentage points, pharmaceuticals – by 3.1 percentage points. In 1995, such significant disparity was observed only for iron and steel (26.2 percentage points higher) and machinery (the Ukrainian share was lower than world's average by 23.7 percentage points). For the rest of product groups, difference in shares in exports did not exceed 4.9 percentage points.

International comparisons based on diversification index show accelerated rate of deepening of structural deformations in Ukrainian exports compared to most other countries. In 1995–2020, higher growth rates of export diversification index than in Ukraine were observed in Mongolia, Azerbaijan, Switzerland, Hong Kong, Chad,

Table 6

Export diversification index of Ukraine and other countries in 1995–2020

Countries	1995	1999	2003	2007	2011	2015	2019	2020
Ukraine	0,571	0,609	0,570	0,589	0,573	0,683	0,683	0,694
Moldova	0,712	0,714	0,736	0,671	0,643	0,723	0,724	0,690
Georgia	0,645	0,688	0,775	0,721	0,705	0,644	0,683	0,657
Latvia	0,623	0,647	0,634	0,430	0,436	0,422	0,467	0,457
India	0,581	0,600	0,555	0,535	0,492	0,434	0,437	0,445
Turkey	0,633	0,576	0,542	0,464	0,482	0,434	0,409	0,441
Poland	0,490	0,406	0,460	0,422	0,418	0,374	0,409	0,407
China	0,478	0,460	0,470	0,453	0,463	0,421	0,396	0,383
USA	0,271	0,257	0,257	0,268	0,255	0,246	0,227	0,232

Source: compiled by the author based on [7]

¹ To evaluate the intergroup component of the Theil index, HS6-digit commodity groups were aggregated into following sections: 01–05 "Live animals, products of animal origin"; 06–15 "Products of vegetable origin, fats and oils"; 16–24 "Food-stuffs"; 25–27 "Mineral products"; 28–40 "Products of the chemical and allied industries"; 41–49 "Wood & wood products"; 50–67 "Textiles"; 68–71 "Non-metallic mineral products"; 72–83 "Base metals and products from them"; 84–85 "Machines, equipment and mechanisms"; 86–89 "Transportation"; 90–99 "Miscellaneous".

Ireland, Argentina, Iraq, Australia, Armenia, Equatorial Guinea, Bhutan, Nepal and a number of island states. On the other hand, Turkey experienced the world's fastest rate of decline in this indicator – from 0.633 to 0.441. Latvia, Poland, Tunisia, India, China and other countries have also made significant progress in bringing their export structure closer to the global one. The lowest levels of export diversification index as of 2020 were in the US (0.232), Germany (0.295), the Netherlands (0.316), the United Kingdom (0.328), and France (0.330). Out of 120 studied countries, Ukraine moved from 48th to 75th place according to the export diversification index during 1995–2019. It can be concluded that Ukraine developed international specialization in goods with narrow niches on the world market (trade in vegetable oils makes up only 0.38 per cent of global merchandise trade, cereals – 0.93 per cent, iron ores – 1.76 per cent, ferrous metals – 2.31 per cent).

Finally, let's delve into geographical dimension of export diversification in Ukraine (table 7).

In 1996–2020, the share of the top 10 countries of Ukraine's export destination decreased from 68.33 to 53.35%, reflecting gradual geographical diversification of exports. The decrease in the share of key trading partner (which was Russia until 2018) from 38.5 to 5.5 per cent was particularly noticeable. In 2019, Poland took place of Ukraine's leading export market with a share of 6,6 per cent, and since 2020, China became the largest trade partner of Ukraine with a share of 14.3 per cent. Turkey, Germany, India, the Netherlands, and Egypt also became important

markets to which Ukraine increased its exports. Instead, the share of exports to Belarus, the US, Italy, Kazakhstan, and Hungary decreased. The fundamental shifts in geographical structure of Ukrainian export occurred due to European integration: the granting by the European Union of autonomous trade preferences for Ukraine from April 23, 2014 and the entry into force of EU–UA Agreement on a Deep and Comprehensive Free Trade Area since 2016. Trade liberalization with the EU, along with a trade war with Russia, prompted competitive Ukrainian manufacturers to reorient themselves to EU market. During 2013–2018, the share of EU countries in Ukrainian exports increased from 26.5 to 42.6 per cent. In 2020, this share decreased to 37.8 per cent due to the crisis caused by COVID-19 pandemic. Instead, the share of the CIS countries in Ukraine's exports decreased from 34.2 to 11.4 per cent.

The biggest challenge in exports geography for Ukraine at the moment is the intensification of trade with China. In 2020, Ukraine's merchandise export to China increased by 98.0 per cent compared to the previous year, which largely compensated the reduction of trade with the vast majority of other countries, during pandemic. The boost in exports to the PRC in 2020 was primarily due to drastic increase in supplies of iron concentrates and ores, maize, sunflower oil, sunflower seed cake and ferrous metals. These product groups formed the basis of Ukraine's exports to China, however, in contrast to Ukraine's general trade structure, its top exporting commodity to China

Table 7

Share of the top 10 destination countries of Ukrainian exports in 1996, 2008 and 2020

1996		2008		2020	
Countries	%	Countries	%	Countries	%
Russia	38,56	Russia	23,50	China	14,33
China	5,33	Turkey	6,92	Poland	6,65
Belarus	5,01	Italy	4,35	Russia	5,50
Turkey	2,84	Poland	3,49	Turkey	4,95
Germany	2,73	Belarus	3,14	Germany	4,21
Hungary	2,58	USA	2,91	India	4,01
USA	2,57	Germany	2,74	Italy	3,92
Poland	2,52	Kazakhstan	2,74	Netherlands	3,66
Italy	2,40	Egypt	2,33	Egypt	3,29
Thailand	2,29	Hungary	2,04	Belarus	2,71
Top 10 together	68,33	Top 10 together	54,16	Top 10 together	53,35

Source: compiled by the author based on [18]

is iron concentrates and ores (35.2 per cent) with a value of 2.5 billion US dollars. In 2020, China accounted for 59.1 per cent of Ukraine's exports of iron concentrates and ores. Cereal exports of 1.85 billion US dollars accounted for 26.1 per cent of goods supplied by Ukraine to China in 2020. Ukraine exported 27.9 million tons of corn that year, of which 7.7 million tons (27.6 per cent) have been sold to China [12].

In 2018, the share of raw materials in the Ukraine's merchandise export to China reached 55.8 per cent, intermediate goods – 32.0 per cent, capital goods – 10.2 per cent, consumer goods – measly 2.0 per cent. In contrast, imports from China consisted of consumer goods for 30.4 per cent, capital goods for 46.5 per cent, intermediate goods for 21.6 per cent, and the share of raw materials in it was 1.1 per cent only. So, Ukraine's bilateral trade with China is characterized by a pronounced raw material orientation of exports with import dependence on goods with a high level of processing and value added. Given the fact that in 2020 the increase in Ukraine's exports to China occurred primarily at the expense of iron ores and cereals, it can be argued about further growth of structural distortions in bilateral trade. And taking into account the increase in the share of China in Ukraine's trade turnover, it should be emphasized that the expansion of economic relations with PRC strengthens the raw material character of Ukraine's specialization. This determines topicality of identifying and using new promising markets for further geographical diversification of Ukraine's merchandise exports.

Conclusions. There is a steady upward trend in Ukraine's export for the increase of basket volume and number of trade partners. At the same time, the level of export concentration rises as well. During 1995–2020, the share of manufactured goods in Ukraine's exports decreased from 66.3 to 40.8 per cent, mainly at the expense of medium- and high-tech goods. Traditional specialization in base metals and

obsolete machinery, which has been delivered mainly to Russia, was largely replaced by exports of cereals, oilseeds, sunflower oil, iron ores and concentrates. As a result, the share of top ten commodity groups in Ukraine's exports increased from 22.8 to 46.2 per cent, the concentration index increased from 0.082 to 0.141, which still corresponds to a relatively high level of export diversification, but shows clearly negative shifts in its structure. Although Ukrainian exports, in contrast to classical monoculture economies, are dispersed among several types of raw materials and semi-finished products, the dynamics of world prices for these commodities is usually volatile in same direction. That's why a lower level of Ukraine's exports concentration doesn't guarantee a higher level of economic resistance to external shocks. In combination with high export orientation of key producers, this determines excessive dependence of GDP growth on world commodity markets and apparently destructive influence of foreign trade on macroeconomic stability in times of global crises.

In geographical dimension, Ukraine has diversified its exports to some extent: Share of top 10 export markets decreased from 68.3 to 53.4 per cent, and share of potential markets covered by export increased from 3.6 to 8.3 per cent. Geographical concentration of Ukraine's exports has been reduced mainly thanks to dramatic drop in trade with Russia, the share of which decreased from 38.6 to 5.5 per cent, and the expansion of trade with the EU after the entry into force of the Agreement on a Deep and Comprehensive Free Trade Area. However, since 2019, there has been a sharp increase in trade with China, exports to which, although have mitigated the consequences of the global crisis caused by the COVID-19 pandemic, have exacerbated the challenges to economic security, since Ukraine's trade with China is characterized by the most pronounced raw material orientation of exports at predominant import of consumer goods.

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