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THE UNITED KINGDOM – UKRAINE MERCHANDISE TRADE: RESILIENCE AND FACTORS

ТОРГІВЕЛЬНІ ВІДНОСИНИ МІЖ ВЕЛИКОБРИТАНІЄЮ ТА УКРАЇНОЮ: СТІЙКІСТЬ ТА ЧИННИКИ РОЗВИТКУ

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Abstract. *The paper analyses the latest trends in the development of Ukrainian-British economic cooperation, examines the institutionalization process of economic liberalization, and assesses the dynamics of Ukraine's and the United Kingdom's export-import activities. The authors note that a key issue remains the low diversification of Ukraine's exports to the United Kingdom, with a predominance of low value-added goods. In contrast, imports are dominated by high value-added products. Identifying the factors driving the development of mutual trade creates a foundation for determining the most promising directions for deepening trade relations between the two countries under current conditions. Ukraine supplies mainly food to the UK to import mostly machinery and vehicles from there. The analysis of the dynamics and structure of mutual trade in goods between Ukraine and the United Kingdom over the past 30 years indicates a significant unrealized potential for further development. The UK used more diverse modes of transports for its*

exports than Ukraine. Except for the pandemic crisis, the bilateral trade was vulnerable under the recent global or idiosyncratic crises. The product groups were clustered according to their trade resilience. Time series regression analysis demonstrated that in trade with the UK Ukrainian exports depend on Ukraine's general export competitiveness worldwide with more sector-specific factors (trade regulation in the UK for iron exports and possibly taxation in Ukraine for food exports). The Ukrainian imports are influenced by its GDP cycle, demand for foreign goods in general, the bilateral real exchange rate and possibly trade regulation in Ukraine and the bilateral banking links. Asymmetry in the importance of real exchange rate and business cycle for the bilateral trade depending on its direction and country is noted.

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Key words: *foreign trade, trade partners, United Kingdom, Ukraine, trade liberalization, Russia-Ukraine war, commodity markets, free trade area, logistics.*

JEL classification: F14, F15, F51, C4, L9, L92.

Анотація. *У статті аналізуються новітні тенденції розвитку українсько-британського економічного співробітництва, розглядається процес інституціоналізації економічної лібералізації та оцінюється динаміка експортно-імпортної України та Великої Британії. Автори зазначають, що ключовою проблемою залишається низька диверсифікація експорту України до Великої Британії, де переважають товари з низькою доданою вартістю. Натомість імпорт складається переважно з продукції з високою доданою вартістю. Визначення факторів, що впливають на розвиток взаємної торгівлі, створює основу для з'ясування найбільш перспективних напрямів поглиблення торговельних відносин між двома країнами в сучасних умовах. Україна постачає до Великої Британії переважно продовольчі товари, тоді як імпортує звідти здебільшого машини та транспортні засоби. Аналіз динаміки та структури взаємної торгівлі товарами між Україною та Великою Британією за останні 30 років свідчить про значний нереалізований потенціал подальшого розвитку. Велика Британія використовувала більш різноманітні види транспорту для своїх експортних операцій, ніж Україна. За винятком пандемічної кризи, двостороння торгівля була вразливою до останніх глобальних або ідіосинкратичних криз. Групи товарів були кластеризовані відповідно до їх стійкості у торгівлі. Регресійний аналіз часових рядів показав, що в торгівлі з Великою Британією український експорт залежить від загальної експортної конкурентоспроможності України у світі, а також від більш специфічних галузевих факторів (наприклад, регулювання торгівлі у Великій Британії щодо експорту заліза та, ймовірно, оподаткування в Україні для експорту продовольчих товарів). Імпорт України визначається її економічним циклом, попитом на іноземні товари загалом, двостороннім реальним обмінним курсом і, можливо, торговельним регулюванням в Україні, а також станом банківських зв'язків між двома країнами. Відзначено асиметрію у значенні реального обмінного курсу та економічного циклу для двосторонньої торгівлі залежно від її напрямку та країни.*

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Ключові слова: *зовнішня торгівля, торговельні партнери, Великобританія, Україна, лібералізація торгівлі, російсько-українська війна, товарні ринки, зона вільної торгівлі, логістика.*

Introduction. Today, geopolitical changes are becoming the main challenges to the stability of national and global economies. Russian military aggression negatively affected economic global growth and global commodity markets *[Mahlstein* et. al., *2022; Fang & Shao, 2022; Aizenman et.al., 2023]*. Ukraine and the United Kingdom have a long history of trade and investment relations and are important partners. Ukrainian-British diplomatic relations were established in January 1992. Since the beginning of Russia's aggression against Ukraine in 2014, the United Kingdom has actively supported Ukraine. In this context, official London has implemented a series of sanctions and restrictive measures against Russia in both unilateral and multilateral formats.

The United Kingdom supported the signing of the Deep and Comprehensive Free Trade Agreement between the EU and Ukraine, which came into force in 2017 after its provisional application in 2016. After Brexit, the United Kingdom concluded a number of agreements with Ukraine that comprehensively cover issues in the fields of political, economic, and security cooperation.

The post-Brexit period marked a new stage in the development of Ukrainian-British relations. The United Kingdom concluded several agreements with Ukraine, covering political, economic, and security cooperation, namely the Political Cooperation, Free Trade, and Strategic Partnership Agreement (2020, with amendments) and the Security Cooperation Agreement (2024). In September 2024, amendments to the **Agreement on Political Cooperation, Free Trade, and Strategic Partnership** between Ukraine and the United Kingdom of Great Britain and Northern Ireland came into force. According to these amendments, all import duties and tariff quotas in bilateral trade are to be eliminated during five years (until **March 31, 2029**), while for certain goods, tariff elimination is planned during two years – until **March 31, 2026.** As is well known, free trade agreements have a positive impact on a country's investment attractiveness and can facilitate the inflow of foreign investments, both from the partner country and from third countries *[Brülhart & Torstensson, 2001; Rodríguez-Pose, 2013; Monastiriotis et al., 2017; Kawai & Naknoi, 2015]*.

Russia's military aggression continues to inflict devastating losses on ordinary citizens and the national economy. Significant infrastructure destruction and a severe electricity shortage negatively impact Ukraine's economic growth rates, including its external economic activities' dynamics and structure. According to the National Bank of Ukraine, GDP growth is expected to reach **3.6% in 2025,** which is lower than the previously forecasted **4.2%** *[National bank of Ukraine, 2024]*. According to World Bank research, Ukraine will require at least **$486 billion** over the next decade for repairs and reconstruction. The largest estimated needs are in **housing (17%), transport (15%), commerce and industry (14%)**, **agriculture (12%)**, **energy (10%), social protection and livelihoods (9%),** and **explosive hazard management** *[World Bank, 2023]*.

As a global financial services hub, the UK could play a key role in financing Ukraine's reconstruction both during and after the war. In **October 2024**, the **United Kingdom** exported **£76.9 million** worth of goods to Ukraine and imported **£47.8 million,** resulting in a **positive trade balance of £29 million**. Between **October 2023 and October 2024,** UK exports to Ukraine grew by **£24.9 million (47.8%)**, rising from **£52 million to £76.9 million**, while imports increased by **£18.7 million (64.2%),** from **£29.1 million to £47.8 million** *[The Observatory of Economic Complexity, 2024]*.

Analysis of recent research and publications.

The trade and economic relations between Ukraine and the United Kingdom have been the focus of extensive research by numerous Ukrainian scholars. Maiko V. *[1998]* studied the issues of economic cooperation between Ukraine and the United Kingdom through the lens of investment cooperation and trade relations during the 1990s.

The works of Hrubinko *[2005; 2022]* highlight the historical aspects and geopolitical factors that influenced the development of Ukrainian-British diplomatic relations. The author examines the state of investment and scientific cooperation, provides a general overview of military-political contacts, and analyses specific projects of British technical assistance during the period of 1991–2004.

Makarchuk & Shuba *[2020]* examined international trade in goods and services between the UK and Ukraine. The authors emphasize the potential for growth in Ukrainian agri-food exports to the UK market following Brexit, given the country's significant reliance on agricultural raw material imports from global markets. Furthermore, the United Kingdom remains one of Ukraine's key trade partners in the services sector, with notable growth in IT service exports.

The study of bilateral economic relations between Ukraine and the United Kingdom in the context of Russia's military aggression remains a highly relevant task today. In particular, Lanoszka et al. *[2022]* emphasize that the strategic partnership between the UK and Ukraine has only deepened following Russia's aggression against Ukraine. The UK has progressively increased its financial, humanitarian, and military support for Ukraine. Analyzing trade relations, the authors stress that the UK is one of the few countries that maintains almost parity in trade in goods and services with Ukraine. Shyrokyi & Havrylenko *[2022]* analyse the prospects for expanding Ukrainian exports in light of the UK's decision, at the onset of Russia's war against Ukraine, to suspend import duties on all Ukrainian-origin goods. This measure was implemented under the Agreement on Political Cooperation, Free Trade, and Strategic Partnership between Ukraine and the United Kingdom of Great Britain and Northern Ireland. The loss of a significant part of Ukraine's industrial and agricultural potential will have a substantial impact on the volume of Ukrainian exports of these goods.

According to Kukharyk & Skorokhod *[2023]*, the United Kingdom's decision to liberalize access for Ukrainian goods to the British market will support national producers and exporters in the challenging conditions of martial law and contribute to the prospects for export growth in the post-war period. Dukhnytskyi *[2023]* examine the dynamics of foreign trade in agricultural and food products between Ukraine and the United Kingdom, including the relationship between the development of mutual trade and the liberalisation of its conditions. The author emphasizes that Ukraine needs to diversify its supply range, focusing on final agriculture products and value-added raw materials. In this context it is necessary to note that Ukraine is one of the world's leading producers and exporters of many food commodities, particularly wheat, corn, and oilseeds. Therefore, global food supply chains have faced significant disruptions due to Russia's war against Ukraine.

In the context of Russian military aggression, understanding the efficiency of international logistics is crucial for increasing the export volume of Ukrainian products and in this context it is necessary to understand the interaction between national and international logistics corridors to implement a real and effective trade and transport facilitation policy not only in the short term but also for the future. Analysing the paths and challenges of Ukraine's European integration aspirations, Shnyrkov & Chugaiev *[2023]* note that the development of Ukraine's foreign trade largely depends on the degree of reconstruction of the country's destroyed export structure and the construction of a new logistics structure with the ability to export key products, such as raw materials, and agriculture. By retaining at least some access to the Black Sea, Ukraine should remain integrated into the global economy.

The purpose of the article is to analyse the trends in Ukraine's trade relations with the United Kingdom during 2001-2024 with special focus on the consequences of Russia's military aggression against Ukraine.

Trends in the bilateral trade. The trade relations between Ukraine and the United Kingdom since the 1990s have shown a dynamic growth trend due to various factors, which were only interrupted in 2015 and 2022 following the Russian occupation of part of Ukraine's territory and the onset of full-scale aggression (see Table 1). The relatively rapid recovery of bilateral export-import operations in the following years indicates the resilience, first and foremost, of Ukraine's national economy in the context of military conflict.

Table 1. Trade in goods between Ukraine and the United Kingdom ($ million, current prices)

	2001	2005	2010	2013	2014	2015	2020	2021	2022	2023	2024
Total	688	929	1258	1562	1224	944	1395	2028	1096	1450	1481
Exports	360	375	522	614	614	374	685	1060	513	359	466
Imports	328	554	736	948	610	570	710	968	583	1091	1015
Balance	+32	-179	-214	-334	+4	-196	- 25	+92	-70	-732	-549

Source: compiled by the authors based on data from Observatory of Economic Complexity *[2024]* and State Statistics Service of Ukraine *[2024]* without considering temporarily occupied territories, parts of the anti-terrorist operation zone, and areas where hostilities are (or were) taking place.

Bilateral trade regulation framework. For the purpose of analysing the impact of various factors on mutual trade, it is important to examine the process of trade liberalization between the two countries, as the removal of border customs barriers directly strengthens the influence of other factors on the development of its dynamics and structure.

The United Kingdom was a member state of the EU for a long time, so the institutional foundations of trade between the two countries were formed at the level of the Union as a whole. In the Partnership and Cooperation Agreement between Ukraine and the European Communities and their Member States (1994), the parties granted each other the most-favoured-nation treatment in trade according to paragraph 1 of Article 1 of GATT. It is important to note that even then, the participants of the Agreement undertook to consider, in particular, after Ukraine's further progress in economic reforms, the addition of relevant sections of this Agreement with the aim of creating a free trade area between them.

On September 16, 2014, the Verkhovna Rada of Ukraine and the European Parliament simultaneously ratified the Association Agreement between Ukraine and the EU, which came into full force on September 1, 2017. The Association Agreement between Ukraine and the EU established a free trade area and, in the field of tariff regulation of trade in goods, provided for:

- the abolition of import duties on 97% and 96.3% of tariff lines, respectively;
- an asymmetric nature of tariff liberalization in terms of timelines and depth (the EU has shorter transitional periods, and Ukraine does not fully abolish duties for a number of tariff positions);
- the transitional period lasts 10 years;
- the EU retains a significant volume of tariff quotas (13.7% of tariff lines for agriculture, the food industry, and related sectors);
- the average import duty rates decrease for Ukraine from 4.95% to 0.32%, and for the EU from 7.6% to 0.05%.

The significant growth of trade between Ukraine and the United Kingdom following the liberalization of the trade regime after 2014 was hindered by the Russian occupation of part of Ukraine's territory and the removal of a significant part of the country's economic potential from Ukraine's regulatory space. Thus, this led to the forced disintegration of this territory from the EU's free trade regime as a whole and from individual member states, including the United Kingdom.

After the United Kingdom's exit from the European Union, an Agreement on Political Cooperation, Free Trade, and Strategic Partnership between Ukraine and the United Kingdom of Great Britain and Northern Ireland was signed in 2020, which entered into force on January 1, 2021. The Agreement establishes a free trade regime, general principles and rules for the abolition of customs duties, fees, and other payments in the trade of goods, the application of non-tariff measures, special provisions for goods, as well as a schedule and conditions for tariff liberalization by the parties in the trade of goods. However, exceptions to the free trade regime were maintained, which largely coincided with the exceptions in the Ukraine-EU Association Agreement. Moreover, zero tariff quotas were established by the British side, in addition to those provided under the Association Agreement). The number of tariff quotas opened for Ukraine is 36 (+4 additional), and for the United Kingdom, it is 3 (+2 additional) (see Table 2). Ukrainian exports – including, barley,

honey, tinned tomatoes and poultry – were previously subject to tariffs averaging about 22 per cent *[The Independent, 2022]*.

Table 2. Number of non-liberalized tariff lines for exports to the United Kingdom and Ukraine

	United Kingdom			Ukraine	
Year	Tariff	Entry price	Tariff quota	Tariff	Tariff quota
2021	163	27	364	603	73
2023	0	27	364	262	73
2026	0	27	362	242	73

Source: Ministry of Economy of Ukraine *[2020]*.

After the start of Russia's full-scale aggression, the United Kingdom was the first country to abolish tariffs on all trade with Ukraine in May 2022, in accordance with the Free Trade Agreement between the UK and Ukraine, which remained in effect until March 2024. Following this decision, similar initiatives were supported by the EU and other partners of Ukraine. The UK also suspended for 9 months the restrictive measures on hot-rolled steel products exported from Ukraine. This period could be extended up to 21 months upon an additional recommendation from the UK Trade Remedies Agency.

In 2024, changes to the Agreement provided for further liberalization of mutual trade. By 2029, all import duties and tariff quotas in bilateral trade will be abolished, except for two product categories – eggs and poultry meat products. Duty-free trade for these products will continue for another 2 years, until April 1, 2026. These changes will certainly stimulate the exchange of goods between the two countries.

UK-Ukraine 100 year partnership declaration, singed in January 2025, envisages further mutual market access through raising awareness and utilisation of the UK-Ukraine Free Trade Agreement, accelerating and broadening the scope of elimination of customs duties on trade, and improving ease of doing business. It will be done through insurance mechanisms, removing trade barriers, de-regulation, rolling guidance, targeted reforms and concerted private sector engagement *[UK-Ukraine 100 year partnership declaration, 2025]*.

Throughout the period of developing mutual trade, the trade in goods was of greater importance for Ukraine (for instance, the United Kingdom ranked 14th in Ukraine's trade volume in 2024) *[State Statistics Service of Ukraine, 2024]*, than for the United Kingdom (Ukraine ranked only 76th among the UK's trade partners in 2023-2024) *[Office for National Statistics, 2024]*. The share of mutual trade in the total external trade turnover of the partners in recent years has accounted for only 0.1-0.2% for the UK and 1-2% for Ukraine. However, in the context of intensifying global competition, such positions are important, especially for certain commodity groups in mutual trade.

An important role in the development of mutual trade between Ukraine and the United Kingdom will be played by the Digital Trade Agreement (2023), as part of the Agreement on Political Cooperation, Free Trade, and Strategic Partnership. This agreement, in particular, aims to reduce administrative costs in trade through the use of digital products, electronic signatures, contracts, and invoices in mutual trade.

The commodity structure of mutual trade is primarily intersectoral, with UK exports to Ukraine dominated by goods with higher added value, while the commodity structure of Ukrainian exports to the UK is dominated by raw materials and products with minimal added value. However, in recent years, the share of finished products in Ukraine's export structure has been steadily increasing (insulated wire, electric heaters, gas turbines, air pumps) (see Tables 3 and 4) *[The Observatory of Economic Complexity, 2024]*.

Table 3. Main goods exported from the United Kingdom to Ukraine (%%)

2001	2005	2010	2015	2020	2022
Broadcasting equipment - 13.1 Activated carbon – 4.58 Razor blades – 2.74 Packed medicaments – 2.64	Cars – 7.28 Used clothing – 3.9 Packed medicaments – 3.08 Photographic films – 2.87	Cars – 15.8 Packed medicaments – 7.12 Used clothing – 6.25 Compasses – 1.93	Packed medicaments – 13.8 Cars – 7.22 Petroleum gas – 18.6 Used Clothing – 5.53	Cars – 15.9 Packed medicaments – 9.14 Petroleum gas – 10.6 Large construction vehicles – 4.59	Cars – 11.6 Packed medicaments – 6.9 Used clothing – 7.74 Petroleum gas - 5 Pesticides – 4.48

Source: compiled by the authors based on data from The Observatory of Economic Complexity *[2024]*.

Table 4. Main goods exported from Ukraine to the United Kingdom (%%)

2001	2005	2010	2015	2020	2022
Refined petroleum – 33.7 Industrial printers – 28.7 Non-knit women's suits – 4.61 Semi-finished iron – 3.57	Seeds oils – 22 Semi-Finished iron – 12.9 Refined petroleum – 10.2 Non-knit women's suits – 5.71	Semi-finished iron – 2.,5 Ferroalloys – 4.92 Seeds oils – 14 Aluminium oxide - 12	Semi-finished iron – 16.5 Seeds oils 16.5 Corn – 8 insolated Wire – 6.22	Corn – 15.9 Rapeseed – 15.9 Seed oils – 14,5 Insolated wire – 9.84	Rapeseed – 13 Corn – 7.9 Seed oils – 11.4 Insolated wire – 12.3 Electric heaters – 4.14 Gas turbines – 2.15 Air pumps - 1.38

Source: compiled by the authors based on data from *[The Observatory of Economic Complexity, 2024]*.

In 2022, the UK had a large net trade with Ukraine in the exports of Chemical Products ($120 million), Transportation ($119 million), and Machines ($108 million). In 2017, Ukraine had a large net trade with the UK in the exports of Vegetable Products ($128 million), Machines ($116 million), and Animal and Vegetable Bi-Products ($60.6 million).

In 2023 Ukrainian main exports to the UK included: food (49%), machinery and transport equipment (17%), iron and steel (10%). The UK exports to Ukraine were mostly machinery and transport equipment (44%), chemical products (19%), beverages and tobacco (10%), textile fibres, yarn, fabrics and clothing (7%), 8% were high-tech products *[UNCTAD, 2024a]*.

As for the pre-war logistical structure of the bilateral trade (table 5), in 2021 most of the Ukrainian exports to the UK were transported by sea transport (the cheapest one). That's why, blocking of seaports in 2022 at the beginning of the war had a substantial negative effect on the bilateral exports (decrease 2 times). This corresponds to the fact that 56% of the exports in 2023 were primary commodities and resource based manufactures *[UNCTAD, 2024a]*.

The UK exports to Ukraine relied both on road and sea transport as the main modes. The road transport was the cheapest in this case, but the price of transportation varied a lot in various years (e.g. railway transport was the cheapest mode in 2020).

Table 5. Transport costs and structure of the bilateral trade between Ukraine and the United Kingdom by mode of transport, 2021

	Ukrainian exports to the UK			The UK exports to Ukraine		
	Transport cost intensity in US$ per ton-km	Value, $ million	%	Transport cost intensity in US$ per ton-km	Value, $ million	%
All modes	0.012	1007	100.0	0.021	983	100.0
Air	0.360	13	1.3	0.0409	109	11.0
Sea	0.011	812	80.7	0.054	418	42.5
Railway	0.017	23	2.3	0.063	176	17.9
Road	0.066	92	9.2	0.003*	361	36.7
Other modes		89	8.8		111	11.3
Multimodal adjustment		-23	-2.3		-191	-19.4

Source: UNCTAD *[2024b]*.
Note: * 0.012 in 2020.

According to International Trade Centre (2025), actual exports of machinery from Ukraine to the UK are 42% of their potential (unrealized potential is estimated to be $81 million), ferrous metals 50% (+$34 million), wheat 9% (+$46 million), mineral resources 1% (+$37 million), vegetal residues and animal feed 33% (+$33 million), processed meat 11% (+$28 million) etc. On the contrary, exports of maize, sunflower and rapeseed are above their potential.

Actual exports of machinery from the UK to Ukraine are 52% of their potential (unrealized potential is $79 million), motor vehicles and parts 75% (+$61 million), pharmaceutical components 54% (+$50 million), chemicals 56% ($47 million), alcoholic beverages 48% (+$39 million), optical products, watches and medical instruments 39% (+$37 million), plastic and rubber 38% (+$29 million) etc. Exports of some specialized vehicles (such as tractors, excavators), diagnostic and laboratory reagents, used textile and textile articles are above their potential level *[International Trade Centre, 2025]*.

Thus, the analysis of the dynamics and structure of mutual trade in goods between Ukraine and the United Kingdom over the past 30 years indicates a significant unrealized potential for further development. Identifying the factors driving the development of mutual trade creates a foundation for determining the most promising directions for deepening trade relations between the two countries under current conditions.

Resilience and vulnerability of the bilateral trade under crises. At the next stage changes in % in bilateral trade in goods (large products groups) during the four crisis events were calculated to assess vulnerability under various circumstances *[UNCTAD, 2024a]*. The first crisis (2009 relatively 2008) was a regular cyclical economic crisis which put half of the countries into recession and was a demand driven event. The second crisis (2015 relatively 2013) was idiosyncratic to Ukraine under hybrid war and was demand driven and partially supply-driven (in South East of the country). The third crisis (2020 relatively 2019) was a unique event in modern history since it was caused by the COVID-19 pandemic and the associated lockdown measures affecting both demand and supply. The fourth crisis (2022 relatively 2021) was rather idiosyncratic for Ukraine under large-scale Russia-Ukraine war which caused mostly supply shock. The demand shock was partially smoothed thanks to international aid. Several product groups were considered:

- Total – total all products;
- Food – food, basic (SITC 0 + 22 + 4);
- Bev – beverages and tobacco (SITC 1);
- Agro – agricultural raw materials (SITC 2 less 22, 27 and 28);
- Ore – ores and metals (SITC 27 + 28 + 68);
- Fuel – fuels (SITC 3);

- Manuf – manufactured goods (SITC 5 to 8 less 667 and 68);
- Chem – chemical products (SITC 5);
- Mach – machinery and transport equipment (SITC 7);
- Iron – iron and steel (SITC 67);
- Textile – textile fibres, yarn, fabrics and clothing (SITC 26 + 65 + 84).

Table 6 shows that the bilateral trade was stable only during the pandemic crisis, while both Ukrainian and British exports substantially decreased during the other three crises. But there were asymmetries in vulnerabilities of exports in various products on Ukrainian and British side. The most vulnerable bilateral Ukrainian exports were exports of fuels, ores, iron, steel and other metals with high traditional dependency on business cycles. The most vulnerable bilateral British exports were exports of machinery, transport equipment and agricultural raw materials. Contrasting low vulnerability of Ukrainian machinery exports and high sensitivity of British machinery exports can be possibly explained by shift of the demand during the crises to cheaper products from developing economies. The same regularity may be relevant for food, beverages and agricultural raw materials.

Table 6. Changes in the UK – Ukraine bilateral trade under crises, %

Direction of trade	UA-UK exports					UK-UA exports				
Years	2009/ 2008	2015/ 2013	2020/ 2019	2022/ 2021	Geometric mean	2009/ 2008	2015/ 2013	2020/ 2019	2022/ 2021	Geometric mean
Total	-46	-33	6	-58	-36	-53	-50	4	-29	-35
Food	-3	-22	36	-60	-20	-21	-68	6	-34	-35
Bev	0	1	66	147	43	-42	-38	5	-24	-27
Agro	8	-9	-47	-60	-32	-10	-95	98	-16	-48
Ore	67	-81	-82	-75	-66	-13	-61	-15	44	-20
Fuel	-88	-75	-60	-81	-78	-59	1662	4	-43	44
Manuf	-70	-15	-15	-56	-44	-55	-57	0	-34	-40
Chem	-73	-54	8	-61	-52	-13	-46	0	-39	-27
Mach	-1	-12	52	-11	4	-72	-67	5	-36	-50
Iron	-83	-12	-42	-87	-67	-15	-42	6	14	-12
Textile	-32	-14	-39	-34	-30	-9	-78	54	-9	-27

This data was used for K-means cluster analysis to create 6 clusters of relatively homogeneous patterns of reaction of exports from the UK to Ukraine (UK-UA) and Ukraine to UK (UA-UK) to the shocks (table 7). According to results of cluster analysis in table D, Ukrainian exports of beverages (the only member of cluster 3) and British exports fuels (cluster 1) can be treated as outliers as there were extremely large positive trends in them during one of the crises. In both cases this can be explained by the base effect as originally their shares in the bilateral trade were small.

Most Ukrainian export product groups and British total, manufactures and machine exports (cluster 6) followed a pattern when there were substantial drop in them during 3 crises and a milder dynamics under pandemic crisis. Several types of British exports (cluster 4) suffered the most in 2015 with milder drop in 2009 and 2022 and on average had stable value during the pandemic crisis. Cluster 2 exports were characterized by increase during the pandemic crisis contrasting with a drop during 2015 or 2022. Ukrainian commodity exports within cluster 5 were vulnerable to all the crises except for the crisis in 2008-2009.

Table 7. Cluster analysis results

No of cluster	Cluster members	Mean values			
		2009/2008	2015/2013	2020/2019	2022/2021
1	UK-UA: Fuels	-59	1662	4	-43
2	UA-UK: Food, Mach UK-UA: Agro, Textile	-6	-52	60	-24
3	UA-UK: Bev	0	1	66	147
4	UK-UA: Food, Bev, Ore, Chem, Iron	-21	-51	0	-8
5	UA-UK: Agro, Ore	37	-45	-65	-67
6	UA-UK: Total, Fuel, Manuf, Chem, Iron, Textile UK-UA: Total, Manuf, Mach	-64	-42	-15	-53

Factors of the bilateral trade. The annual data for analysis of the factors of the bilateral trade in goods is for 1996-2023. Unfortunately, the available detailed time series for the services bilateral trade data are much shorter. Therefore merchandise trade was considered only at this stage.

We analyse several dependent variables, which are indicators of bilateral trade in all or main traded products (e.g. in 2023 the 3 relevant products constituted 75% of the bilateral export of Ukraine to the UK and 78% of the bilateral imports):

- UAExpUK – growth of Ukrainian exports to the UK, total all products, % (relatively preceding year);
- UAExpUKFood – growth of Ukrainian exports to the UK, all food items (SITC 0 + 1 + 22 + 4), %;
- UAExpUKMach – growth of Ukrainian exports to the UK, machinery and transport equipment (SITC 7), %;
- UAExpUKIron – growth of Ukrainian exports to the UK, iron and steel (SITC 67), %;
- UAImpUK – growth of Ukrainian imports from the UK, total all products, %;
- UAImpUKFood – growth of Ukrainian imports from the UK, total all products, All food items (SITC 0 + 1 + 22 + 4), %;
- UAImpUKChem – growth of Ukrainian imports from the UK, chemical products (SITC 5), %;
- UAImpUKMach – growth of Ukrainian imports from the UK, machinery and transport equipment (SITC 7), %.

The independent variables include trade with the entire world to consider overall export competitiveness of a country and overall demand in a country for imported goods (same product group as in a dependent variable):

- UAExpW – growth of Ukrainian exports to the world, %;
- UAImpW – growth of Ukrainian imports from the world, %;
- UKExpW – growth of exports of the UK to the world, %;
- UKImpW – growth of imports of the UK from the world, % *[UNCTAD, 2024a]*.

Business cycle and price competitiveness factors include ($_{t-1}$ index is added if an indicator is with 1 year lag):

- GDPUK – GDP growth in the UK, % (GDP is used to consider business cycles; it is an alternative way to consider growth of export capacities and demand);
- GDPUA – GDP growth in Ukraine, %;

- RER – growth of real exchange rate of hryvnia to the pound (calculated based on official exchange rates, LCU per US$, and inflation, consumer prices), % (when GDP deflator based real exchange rate was tested as alternative, correlation analysis showed no significant difference in the effect; and the data to calculate unit labour cost based real exchange rate was missing for Ukraine; therefore only consumer prices based real exchange rate was left);
- RIR – real interest rate in Ukraine, % (it shows costs of borrowing money for domestic financing for purchases of imported goods and for developing export capacities) *[World Bank, 2024]*.

Economic freedom factors are (besides trade freedom, only dimensions with relatively large variance are included; additional 1 year lag is envisaged considering publication lag, e.g. score for 2024 is based on the data between the 2nd half of 2022 and 1st half of 2023):

- EFUK – change in overall economic freedom index in the UK, pp (i.e. change in 0-100 scale score);
- EFUA – change in overall economic freedom index in Ukraine, pp;
- TrFUK – change in trade freedom index in the UK, pp (considers trade-weighted average tariff rate and qualitative evaluation of nontariff barriers);
- TrFUA – change in trade freedom index in Ukraine, pp;
- TxUA – change in tax dimension of freedom index in Ukraine, pp (considers top marginal tax rate on individual income, top marginal tax rate on corporate income, and the total tax burden as a percentage of GDP);
- MFUA – change in monetary freedom index in Ukraine, pp (considers weighted average rate of inflation for the most recent three years and a qualitative judgement about the extent of government manipulation of prices through direct controls or subsidies) *[Heritage Foundation, 2023]*.

Bilateral financial relations factors include (unfortunately, the detailed FDI times series are too short to be included in the analysis here):

- BL – change in cross-border total liabilities of the UK banks vis-a-vis residents of Ukraine, pp GNI (i.e. calculated as change in % GNI);
- BC – change in cross-border total claims of the UK banks vis-a-vis residents of Ukraine, pp GNI (the liabilities and the claims are correlated strongly enough to each other, therefore they can be treated as a single factor) *[Bank for International Settlements*, 2024; *World Bank, 2024]*.

Correlation analysis is done with Pearson correlation coefficients, but robustness check with Spearman correlation is carried out for indicators with outliers leading to substantial deviation from normal distribution (there was an abnormally high increase in Ukrainian exports of food, machinery and iron in 2003, 2001 and 2008 respectively). Within regression analysis OLS method is used for unweighted cases and then robustness is checked by using weighted cases, where more recent years receive higher weight (e.g., 1997 is assigned weight 7 and 2023 – weight 33).

Correlation analysis (see table 8) shows that Ukrainian exports to the UK (all products) may depend on its *exporting capacities* (or its global exporting competitiveness). In particular, the effect is present for machinery and iron (the latter shows a very strong Spearman correlation 0.83), although the positive effect for food exports is insignificant under annual data analysis. But an alternative explanation of positive association with GDP may be a reverse causality: under open economy of Ukraine exports may be a GDP growth driver. In such a case a confounding variable (such as global commodity prices increase) may affect both exports to the UK and worldwide, with the latter leading to GDP growth.

Table 8. Correlation Analysis of the bilateral trade between Ukraine and the UK and its factors

	UAExpUK	UAExpUKFood	UAExpUKMach	UAExpUKIron	UAImpUK	UAImpUKFood	UAImpUKChem	UAImpUKMach
UAExpW	0.47**	0.05/0.30	0.16/0.39**	0.64**/0.83**				
UAImpW					0.77**	0.61**	0.80**	0.85**
UKExpW					0.40**	0.31	0.27	0.26
UKImpW	-0.02	0.37*/0.01	-0.17/-0.29	0.44**/0.65**				
GDPUK	0.10	0.07/0.05	0.03/-0.09	0.12/0.21	0.16	-0.06	0.14	0.19
GDPUA	0.45**	0.24/0.16	0.19/0.21	0.37*/0.50**	0.58**	0.62**	0.64**	0.64**
RER	0.38**	-0.10/0.02	0.28/0.31	0.37*/0.24	0.40**	0.41**	0.52**	0.50**
RIR	0.16	0.14/0.07	0.23/-0.11	-0.25/-0.16	-0.13	-0.20	0.08	-0.15
EFUK	0.25	-0.03/0.08	0.07/-0.14	-0.01/-0.15	-0.03	-0.08	0.19	-0.04
EFUA	0.09	0.17/0.12	0.02/0.08	0.11/0.32	0.14	-0.08	0.27	-0.02
TrFUK	-0.13	0.19/-0.12	0.01/0.18	-0.16/-0.19	0.22	-0.08	-0.10	0.19
TrFUA	0.00	-0.03/-0.11	-0.01/0.09	0.22/0.08	0.33*	0.04	0.25	0.25
TxUA	0.05	0.09/0.44**	0.01/-0.09	-0.22/-0.01	0.09	-0.10	0.37*	0.04
MFUA	-0.08	0.00/0.06	-0.07/-0.01	-0.00/0.06	-0.15	-0.24	-0.19	-0.33
BL	-0.13	0.04/-0.04	-0.00/-0.21	-0.26/0.07	-0.13	-0.24	0.01	-0.20
BC	-0.29	0.02/-0.03	0.01/-0.08	-0.44**/-0.06	-0.14	-0.29	0.12	-0.13
$GDPUK_{t-1}$	-0.20	-0.03/-0.25	0.13/-0.40**	-0.26/-0.17	-0.17	-0.24	-0.20	-0.21
$GDPUA_{t-1}$	0.22	0.17/0.31	0.15/0.29	0.08/-0.06	-0.02	0.07	0.03	-0.09
RER_{t-1}	-0.07	-0.05/0.01	0.01/-0.02	-0.16/-0.24	-0.06	-0.06	0.17	0.06
RIR_{t-1}	0.20	0.26/0.20	0.09/0.02	-0.05/0.10	-0.04	-0.25	-0.07	-0.16
$EFUK_{t-1}$	0.23	0.19/0.28	0.18/0.34*	-0.04/-0.03	-0.04	-0.06	-0.18	-0.12
$EFUA_{t-1}$	0.19	0.00/0.17	0.32*/0.05	-0.21/-0.15	-0.21	-0.16	0.13	-0.28
$TrFUK_{t-1}$	0.23	0.18/-0.05	-0.03/-0.06	0.70**/0.44**	0.42**	0.50**	0.25	0.48**
$TrFUA_{t-1}$	0.35*	0.01/0.17	0.61**/0.08	0.10/0.31	0.11	0.18	0.45**	0.13
$TxUA_{t-1}$	-0.25	0.09/0.10	-0.09/-0.12	-0.41**/-0.12	-0.02	0.01	-0.25	0.00
$MFUA_{t-1}$	0.22	-0.16/0.02	0.39**/-0.02	-0.09/-0.06	-0.04	-0.07	0.21	-0.07
BL_{t-1}	-0.02	0.28/0.02	0.01/0.01	0.08/0.01	0.47**	0.24	0.26	0.45**
BC_{t-1}	0.28	0.08/0.30	-0.01/0.05	0.31/0.05	0.42**	0.32	0.33*	0.47**

Notes: ** denotes significant correlations at p<0.05, * – marginally significant correlations at p<0.1. Since UAExpUKFood, UAExpUKMach andUAExpUKIron are not normally distributed, Spearman correlations are added after /.

Ukrainian exports of food and iron to the UK are *demand driven* (caused by larger propensity to buy foreign goods but not by business cycle). Insignificant correlation with economic growth in the UK may be potentially explained by two mutually offsetting effects. Under recession buyers tend to buy less, but they may tend to switch to cheaper goods like the ones originating in less developed economies. There is also non-robust negative Spearman correlation with lagged economic growth in the UK for the bilateral exports of machinery.

The bilateral *real exchange rate* of the hryvnia is positively associated with exports growth to the UK, which is contrary to the theory. A possible explanation may be a reverse effect: large income from exports may lead to appreciation of national currency especially under open economy like in Ukraine. Moreover sectoral exports (food and machinery) do not have significant correlation with it. Marginally significant positive Pearson correlation in case of iron exports does not pass robustness check with Spearman correlation.

Real interest rate affects neither the bilateral exports nor the bilateral imports, possibly considering lower financial sector development level in Ukraine and possibly low contribution of domestic bank lending to financing of international trade.

Except for taxation dimension, it takes some time lag (about a couple of years) for *economic freedom* indicators to affect exports of Ukraine to the UK. There is a marginally significant non-robust effect of overall freedom in the UK and Ukraine on exports of machinery. Trade freedom in the UK stimulates Ukrainian exports of iron, while trade freedom in Ukraine primarily stimulates its exports of machinery. The negative effect of low taxation burden on iron exports turns out to be non-robust, while its positive effect on exports of food is more justified. A positive effect of monetary freedom on machinery exports is not robust.

Change in intensity of *international banking relations* between Ukraine and the UK seems to have a neutral effect on their bilateral trade.

As for imports of Ukraine from the UK, neither business cycle in the UK nor trends in its exports worldwide (*supply factors*) affect it significantly, except for a minor positive effect (0.40) of the latter when all products are considered.

Instead, they are highly dependent on *demand* in Ukraine in general (GDP) and especially for foreign goods (imports from the entire world). Larger correlation with the latter may be explained by assumption that British goods take a more expensive and higher quality segment of the market. Under recession Ukrainian buyers not only decrease consumption, but also may switch to cheaper domestic or other foreign alternatives from developing economies.

Sensitivity to prices on British goods is also proved by positive correlation with the bilateral *real exchange rate* of the hryvnia to the pound. Appreciation of hryvnia under higher inflation in Ukraine than in the UK stimulates Ukrainian imports from the UK, while hryvnia's devaluation has an opposite effect. No lagged effect of the business cycle and price competitiveness indicators was registered.

Economic freedom factors affect the bilateral imports with a time lag of a couple of years (except for two marginally significant effects). Overall economic freedom has no effect. Trade freedom is more important for most of the products. But imports of chemical products depend significantly positively more on trade freedom and marginally on low taxation burden in Ukraine. Monetary freedom does not provide a significant effect.

Unlike for the bilateral exports, growing intensity of *international banking relations* (both claims and liabilities) between Ukraine and the UK positively affects the bilateral imports in general and in particular of machinery (other main sectoral imports are insignificantly positively correlated).

According to the regression analysis results (see table 9), Ukrainian exports to the UK positively depend on overall Ukrainian competitiveness globally. Ukrainian iron exports to the UK

even stronger depend on Ukrainian exports of iron worldwide, which may either reflect dependence on the global commodity market conditions (global demand) or export capacity building (supply factor). In alternative specifications the iron exports may depend on the UK iron imports (local demand) and economic growth in Ukraine (supply/global demand) or trade liberalization in the UK (regulation favouring larger propensity to imports). Ukrainian food exports to the UK marginally positively depend on easiness of taxation in Ukraine. No robust results were found for the factors of Ukrainian machinery exports to the UK. Unlike the bilateral iron exports (with coefficient of determination up to 0.65), food and machinery exports are much less predictable.

Table 9. Regression models for the Ukrainian exports to the UK

Y	UAExpUK	UAExpUKFood	UAExpUKIron	UAExpUKIron	UAExpUKIron
$\mathbf{b}_0$	6.65/4.51 (8.34)	9.14/8.99 (12.8)	13.64/16.25 (9.24)	9.57/9.21 (10.18)	16.96/16.41 (13.48)
$\mathbf{b}_{UAExpW}$	0.99/1.14 (0.37)**		1.86/1.72 (0.30)***		
$\mathbf{b}_{UKImpW}$				1.83/1.74 (0.48) ***	
$\mathbf{b}_{GDPUA}$				2.50/2.80 (1.31)*	
$\mathbf{b}_{TrFUKt-1}$					32.6/31.0 (13,5)**
$\mathbf{b}_{TxUA}$		5.73/5.33 (2.98)*			
$\mathbf{R^2}$	0.22** /0.38	0.14* /0.16	0.62*** /0.65	0.57*** /0.62	0.19** /0.20
N	27	26, excl. 2003	26, excl. 2008	26, excl. 2008	26, excl. 2008

Notes. The coefficients for unweighted and weighted cases are separated with a slash (/).The significance according to t-and F-test is mentioned for unweighted cases: *** at $p<0.01$, ** at $p<0.05$, * at $p<0.01$. Standard errors are in brackets. The last row contains the number of years and excluded outlier year, when it is relevant.

The Ukrainian imports of the main products from the UK are usually predictable enough with the analysed factors (tables 10-11). For all the products, the bilateral Ukrainian imports depend on total import demand in Ukraine, especially when machinery is considered. In alternative specifications we further decompose the effect of import demand into the effect total local demand (GDP growth in Ukraine matters for all the three types of the products and especially for machinery, demand for which is more pro-cyclic as it is includes either durable consumer goods or investment goods) and factors affecting propensity to imports.

Table 10. Regression models for the Ukrainian imports from the UK (part1)

Y	UAImpUK	UAImpUK	UAImpUK	UAImpUK Food	UAImpUK Food
$\mathbf{b}_0$	3.21/2.87 (4.75)	8.91/9.87 5.36	7.08/8.45 (4.21)	5.72/9.81 (5.79)	8.69/12.06 (6.16)
$\mathbf{b}_{UAImpW}$	1.14/1.10 (0.19)***			0.52/0.53 (0.23)**	
$\mathbf{b}_{GDPUA}$		1.78/1.86 (0.68)**	1.58/1.75 (0.53)***	1.77/1.53 (0.78)**	
$\mathbf{b}_{RER}$			0.96/0.73 (0.35)**		1.03/0.95 (0.49)**
$\mathbf{b}_{TrFUKt-1}$					13.38/12.55 (4.90)**
$\mathbf{b}_{TrFUA}$		2.10/2.11 (1.10)*			
$\mathbf{b}_{BLt-1}$		5.16/4.21 (2.70)*			
$\mathbf{R^2}$	0.59*** /0.62	0.50*** /0.52	0.51*** /0.51	0.49*** /0.54	0.36*** /0.36
N	27	27	26, excl.2003	27	27

Table 10. Regression models for the Ukrainian imports from the UK (part2)

Y	UAImpUK Chem	UAImpUK Chem	UAImpUK Mach	UAImpUK Mach
$\mathbf{b}_0$	-0.21/-0.83 (3.01)	4.62/3.80 (3.04)	3.44/3.40 (4.66)	15.87/17.29 (5.86)**
$\mathbf{b}_{UAImpW}$	0.84/0.89 (0.14) ***		1.14/1.17 (0.14)***	
$\mathbf{b}_{GDPUA}$		1.35/1.44 (0.36)***		2.65/2.72 (0.72)***
$\mathbf{b}_{RER}$		0.57/0.50 (0.25)**		1.18/1.02 (0.48)**
$\mathbf{b}_{TrFUAt-1}$	1.04/0.63 (0.55)*	1.16/1.07 (0.58)*		
$\mathbf{b}_{TxFUA}$		1.38/1.25 (0.73)*		
$\mathbf{R^2}$	0.69*** /0.73	0.69*** /0.72	0.77***/ 0.76	0.52*** /0.54
N	27	26	27	27

Unlike for bilateral Ukrainian exports, price competitiveness of British goods (inverse to the real exchange rate of the hryvnia to the pound) stimulates Ukrainian bilateral imports from the UK especially for machinery and food, which is expected to have higher elasticity of demand to prices. This is not a typical regularity for food products as essential goods, but we may assume that British food and beverages products belong to a relatively more expensive segment than domestically produced ones in Ukraine.

Trade liberalization in the UK stimulates its exports of food to Ukraine, while trade and tax liberalization in Ukraine marginally positively affects the British exports of chemical products (as well as all products in total in case of trade regulation) to Ukraine. Bilateral banking relations have a marginally significant positive impact on Ukrainian imports from Britain, although the factor is not present in the sectoral models.

Conclusions

The process of trade liberalization between the United Kingdom and Ukraine mainly started in 2014 on multilateral basis, then deepened on bilateral basis in 2022 and directly strengthened the influence of other factors on the development of the trade dynamics and structure.

The bilateral trade between Ukraine and the UK is largely inter-industry: virtually a half of Ukrainian exports are food and almost a half of the UK exports are machinery or transport equipment. In pre-war logistics Ukraine relied mostly on the sea transport for its exports to the UK, which became vulnerable under the war. The UK exporting logistics was more diversified. There is still much potential for further development of the bilateral trade, especially in machinery, vehicles, chemical and some agrifood products.

The bilateral trade was subject to vulnerability under global (the great recession) or idiosyncratic (Russia-Ukraine hybrid and then full-scale war) crisis events leading to demand or supply shocks, but it was resilient enough under the pandemic crisis. Ukrainian commodity exports and the UK machinery (including transport equipment) vehicles were the most vulnerable under the crises. The relatively most resilient main export products in the short run were Ukrainian machinery and food, and the UK chemical products. In the middle run the UK exports turned out to be more resilient than Ukrainian ones and already had exceeded the pre-war level, which is natural under international aid to Ukraine.

Ukrainian exports to the UK depend on the overall growth of Ukrainian exports worldwide (denoting either national export competitiveness or world price effects). This effect is primarily attributable to iron exports together with the positive effect of large propensity to imports and trade freedom in the UK. The food exports might be stimulated by favourable taxation. Meanwhile, real devaluation of hryvnia cannot be an efficient instrument to stimulate Ukrainian sales in the UK. Ukrainian imports from the UK depend on business cycle in Ukraine (GDP growth and propensity to import), real exchange rate (price competitiveness) and possibly on trade freedom in Ukraine and the bilateral financial relations intensity. Trade freedom or taxation may be important for some sectoral imports (food and chemical products). Business cycle in the UK, real interest rate in Ukraine and general economic freedom in both countries seem to have an insignificant impact on the bilateral trade in both directions.

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