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UKRAINE–EU TRADE UNDER GLOBAL FLUCTUATIONS

The practical value of this research lies in highlighting trends in trade relations between Ukraine and the European Union, particularly in the context of geopolitical conflicts and the implementation of European integration principles in the Ukrainian economy. The dynamism of changes in the economy and politics has led to the emergence of new challenges facing Ukraine's international trade, necessitating further research. The research is based on the hypothesis that, in the context of geopolitical changes and globalization, Ukraine's trade in goods with EU countries is undergoing structural changes, which, in turn, affects the state of the country's economic stability and international partnerships. It is necessary to develop an econometric model that reflects the impact of logistics efficiency and the regulatory environment on the state of international trade. To achieve this goal, the methods of theoretical generalization, analysis, and synthesis were used. The results of research by leading scholars are considered to identify the main challenges that accompany the process of EU-Ukraine integration in the field of trade and the complicated, unstable conditions of international cooperation. The research applies statistical analysis of trade flows, structural diagnostics of export and import composition, and a multifactor econometric model incorporating GDP, logistics performance, and economic freedom indices. The model's adequacy is confirmed through regression diagnostics and statistical tests. The analysis reveals a reorientation of Ukrainian exports toward agricultural and food products, a decline in metallurgical exports, and growing technological

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ТОРГІВЛЯ МІЖ УКРАЇНОЮ ТА ЄС В УМОВАХ ГЛОБАЛЬНИХ КОЛИВАНЬ

Практичне значення цього дослідження полягає у висвітленні тенденцій торговельних відносин між Україною та Європейським Союзом в контексті геополітичних конфліктів та процесу впровадження принципів європейської інтеграції в українську економіку. Динамічність змін в економіці та політиці зумовлює появу нових викликів для міжнародної торгівлі України та потребує подальших досліджень. Дослідження ґрунтується на гіпотезі, що в умовах геополітичних змін та глобалізації торгівля України товарами з країнами ЄС зазнає структурних трансформацій, що, у свою чергу, впливає на стан економічної стабільності країни та міжнародного партнерства. Необхідно розробити економетричну модель, яка відображатиме вплив ефективності логістики та регуляторного середовища на стан міжнародної торгівлі. Для досягнення цієї мети використано методи теоретичного узагальнення, аналізу та синтезу. Враховано результати досліджень провідних науковців для визначення основних викликів, що супроводжують процес інтеграції України до ЄС у сфері торгівлі та складні, нестабільні умови міжнародного співробітництва. У дослідженні застосовано статистичний аналіз торговельних потоків, структурну діагностику складу експорту та імпорту, а також багатофакторну економетричну модель, що включає ВВП, індекс ефективності логістики та індекс економічної свободи. Адекватність моделі підтверджено за допомогою регресійної діагностики та статистичних тестів. Аналіз виявив переорієнтацію українського експорту на аграрну та харчову продукцію, зниження експорту

and energy dependence in imports. The econometric model demonstrates high explanatory power (R^2 = 0.979), confirming the significance of institutional and logistical factors. Comparative advantage calculations identify priority export sectors and underrepresented product groups with development potential. Ukraine's trade with the EU is undergoing structural diversification, driven by geopolitical shocks and regulatory shifts. To strengthen resilience and deepen integration, Ukraine must enhance logistics, support priority sectors, and adapt trade policy to reflect national interests within the framework of the Association Agreement.

Keywords: trade in goods, European integration, stability of the economy, export, import, benefits, and challenges, development, global fluctuations, logistics, geopolitics.

металургійної продукції та зростання технологічної й енергетичної залежності імпорту. Економетрична модель демонструє високу пояснювальну здатність (R^2 = 0,979), що підтверджує значущість інституційних та логістичних чинників. Розрахунки порівняльних переваг визначають пріоритетні експортні сектори та недопредставлені групи товарів із потенціалом розвитку. Торгівля України з ЄС зазнає структурної диверсифікації, зумовленої геополітичними шоками та регуляторними змінами. Для зміцнення стійкості та поглиблення інтеграції Україна має вдосконалити логістику, підтримати пріоритетні сектори та адаптувати торговельну політику до національних інтересів у рамках Угоди про асоціацію.

Ключові слова: торгівля товарами, європейська інтеграція, стабільність економіки, експорт, імпорт, переваги та виклики, розвиток, глобальні коливання, логістика, геополітика.

JEL Classification: F17, F20, E69.

Introduction

Global fluctuations in the world economy caused by the COVID-19 pandemic, the energy crisis, russia's full-scale aggression against Ukraine, and structural changes in global supply chains have significantly affected the dynamics of foreign trade. For Ukraine, which is integrating into the European economic space, trade with the European Union (EU) has become a determining factor in economic stability. Assessments by leading international organisations show that the trajectory of global trade remains unstable, and risks are increasing due to tariff conflicts and regulatory changes that directly affect trade flows, prices, and logistics. In particular, in 2025, the WTO recorded a sharp deterioration in forecasts for trade dynamics amid escalating trade barriers, while the IMF emphasizes 'fragile stability' with significant risks from politics and geopolitics (World Trade Organization, 2025, April; Poidevin & Blenkinsop, 2025, April 16; International Monetary Fund, 2025).

Cooperation with the European Union, which has been Ukraine's main trading partner since 2014, is of particular importance for Ukraine. The Deep and Comprehensive Free Trade Area (DCFTA) has provided the legal and institutional framework for the growth of bilateral trade flows, but global crises have posed new challenges:

- disruptions in logistics and transport, due to the blocking of traditional routes and the need to develop alternative routes (Solidarity Routes through the EU);
- growing trade policy uncertainty (TPU), which reduces investment activity and makes it difficult for Ukrainian companies to enter new markets;
- increased regulatory pressure due to global and regional changes, including new requirements for product quality and environmental standards;

• structural changes in supply and demand, which have resulted in a reorientation of Ukrainian exports from the CIS and Asian markets to the EU.

Thus, the problem lies in the need for a scientifically sound assessment of how global fluctuations transform the intensity and structure of Ukraine's trade with the EU, which sectors are most vulnerable, and which ones are gaining new opportunities. Solving this problem is critical for shaping Ukraine's economic integration strategy into the European market and adapting national trade policy to new realities.

Both foreign and domestic scholars have paid attention to the study of the transformation of international trade and its sensitivity to global fluctuations. At the same time, the growing turbulence of the global socio-economic environment is creating new challenges that require in-depth study (Poidevin & Blenkinsop, 2025).

Thus, Prokop (2024) emphasizes that the war started by russia has become a key factor in the destruction of established logistical links between Ukraine and the EU. The author analyses changes in the product mix of Ukrainian exports and outlines the main trends in trade between Ukraine and the EU during the war.

An article by a group of authors (Lyzun et al., 2024) highlights the uneven concentration of Ukrainian exports to EU countries and describes the main barriers hindering the development of trade relations in the context of growing security risks.

Polish researchers Darvas and Martins (2022) emphasize that the war against Ukraine has overlapped with the post-pandemic recovery of the global economy, exacerbating inflationary pressures. They conclude that although Ukraine's share in world trade remains relatively small, the sanctions pressure on russia weakens its production potential and thus changes Ukraine's foreign trade position.

A group of Asian authors (Cui et al., 2022) considers war as a factor that increases the risk of disruption to global supply chains. The researchers emphasize the vulnerability of international energy flows, although their findings have broader implications for understanding the relationship between geopolitical conflicts and the global economy. A similar line of research is being pursued by a group of researchers (Zhang et al., 2024) who analyze the impact of war on international energy trade, emphasizing the need for diversification of export strategies and flexible mechanisms for adapting to geopolitical shocks.

The work of Galetska et al. (2022), which traces the evolution and variations of the gravity model of international trade, deserves special attention in the domestic scientific tradition. The authors conclude that it needs to be further adapted to consider new global factors, which is consistent with the need to develop improved econometric approaches to analysing foreign trade relations between Ukraine and the EU.

Hanna Duginets interprets crises in international trade as systemic and cyclical phenomena triggered by global shocks – financial, energy-related, pandemic, or military. They destabilize production and trade chains, intensify

protectionist tendencies, and expose the vulnerability of economies. At the same time, crises act as catalysts for structural change, stimulating adaptation and the search for new formats of integration and cooperation (Duginets, 2022).

The study by Zhabynets, "Factors of Global Changes in International Trade and the Military Aggression of russia: Impact on the Development of Export Activities of Ukraine's Regions" (2022) analyzes how global economic transformations and russian aggression affect the exports of Ukrainian regions. The research reveals that these factors generate significant challenges requiring adaptation of regional export activities, particularly through market reorientation, product diversification, and the search for new logistical routes.

Thus, existing studies form a broad scientific base, but there is a shortage of works that combine the analysis of global shocks and the specifics of Ukrainian-European trade through an improved econometric model. This determines the niche for the novelty of this article.

The research hypothesis is that Ukraine's trade with the EU in 2014–2024, under the influence of global fluctuations (COVID-19, war, sanctions, and logistical shocks), underwent structural changes and asymmetry, and the use of an improved econometric model allows for a quantitative assessment of the impact of these factors on export and import volumes.

The aim of the research is to comprehensively analyze the dynamics and structure of Ukraine's trade with the European Union in 2014–2024 in the context of global economic fluctuations, as well as to identify key challenges and opportunities for Ukraine's further integration into the EU internal market.

The research methodology includes analysis of export, import, balance, and trade turnover dynamics, econometric modelling using an improved econometric model, and justification of Ukraine-EU trade flows through the identification of comparative advantages.

The following tasks are aimed at achieving the aim of the article, sequentially implemented in four sections of the main part of the article: the first is to investigate the dynamics of exports, imports and trade balance between Ukraine and the EU in 2014–2024; the second is to identify the main structural shifts in bilateral trade and identify the most sensitive sectors; the third is to develop and build an improved econometric model (a new part of the study) that integrates classical trade determinants with indicators of uncertainty and logistical shocks, and apply it to quantify the consequences for 2014–2024; the fourth is to identify a list of key challenges between Ukraine and the EU, taking into account the current state of world trade.

1. Analysis of trade trends between Ukraine and the EU

Trade relations with European Union member states play a prominent role in international cooperation. Relations with the EU are of particular importance for Ukraine in determining its prospects and reserves for

increasing the level of international trade contacts and the competitiveness of the domestic economy in the global market. Research into the problems of integration, the structure of integration processes, and the prospects for the development of the domestic economy in the context of strengthening foreign economic ties is the subject of study by domestic and foreign experts.

Data for 2014–2024 (*Table 1*) show significant dynamics in bilateral trade between Ukraine and the European Union.

Table 1

Data on Ukraine's foreign trade in goods and services with the European Union in 2014–2024, USD billion

Year	Exports from Ukraine to the EU	Imports from the EU to Ukraine	Balance	Foreign trade turnover
2014	20	24	–4	44
2015	15	18	–3	33
2016	16	19	–3	35
2017	20	23	–3	43
2018	23	27	–4	50
2019	24	29	–5	53
2020	22	27	–5	49
2021	30	32	–2	62
2022	29	31	–2	60
2023	26	34	–8	60
2024	26	45	–19	71

Source: State Statistics Service of Ukraine (n. d.).

In 2014–2015, Ukraine's exports to the EU amounted to approximately USD 15–20 billion, while imports exceeded USD 18–24 billion, resulting in a negative balance for Ukraine. The period 2016–2018 was characterized by a gradual increase in exports to USD 23 billion in 2018, with imports growing in parallel (USD 27 billion in 2018).

The years 2019–2020 were marked by a decline in exports to USD 22 billion in 2020, which can be explained by the consequences of the COVID-19 pandemic and disruptions in global supply chains.

2021 saw a recovery, with exports reaching USD 30 billion and trade turnover growing to USD 62 billion, demonstrating the economy's rapid response to post-pandemic recovery.

In 2022, despite the outbreak of full-scale war, exports to the EU grew to USD 29 billion, reflecting a reorientation of trade flows towards EU markets and the use of alternative logistics routes.

2023–2024 are characterised by stabilization of exports (USD 25–28 billion) and a sharp increase in imports to USD 45 billion in 2024, resulting in a record negative balance (USD 19 billion).

Throughout the period, the balance remained negative for Ukraine, but there were periods of deficit reduction, particularly in 2022 (USD -5 billion),

thanks to the reorientation of exports and temporary EU trade liberalisation. The deepest deficit was recorded in 2024, indicating increased import dependence and the intensification of programmes to restore and purchase critically important products.

Tables 2 and 3 show the commodity structure of foreign trade with EU countries for goods with a share of more than 5%.

Table 2

Commodity structure of Ukraine's exports to the EU with a share of more than 5% in 2014–2024, %

Title by Ukrainian Classification of Commodities in Foreign Trade	2014	2016	2018	2020	2022	2024
Plant products	22.5	24.8	26.3	28.1	29.5	27.3
cereals	10.2	11.5	13.4	14.1	16.7	15.8
oil seeds and fruits	7.3	8.1	8.7	9.2	10.1	9.7
Animal or plant fats and oils	9.5	10.4	11.8	12.7	14.2	13.6
Finished food industry products	6.8	7.2	7.6	7.9	8.4	8
Mineral products	6.2	5.9	6.3	7.1	7.8	8.2
Base metals and preparations thereof	15.1	14.6	13.9	12.2	11.3	11.6
Machines, equipment, and mechanisms, electric and technical equipment	8.0	8.4	9.1	9.6	10.0	10.2

Source: State Statistics Service of Ukraine (n. d.).

Table 2 shows that plant products consistently maintain their leading position in the export structure. Its share peaked in 2022 (29.5%), which is associated with a sharp increase in exports of grains and oilseeds after the blockade of Black Sea ports and the active use of alternative logistics routes (rail corridors, Danube ports). From 2014 to 2022, grain crops almost doubled their share (from 10.2% to 16.7%), but in 2024, the figure declined slightly (15.8%) due to export difficulties and competition from other suppliers. Fats and oils (mainly sunflower oil) showed growth throughout the period and peaked in 2022 (14.2%). This indicates Ukraine's transformation into a key exporter of edible oils in the world. Metallurgy (base metals) had a significant share in 2014 (15.1%) but gradually declined due to the destruction of industrial capacity in the combat zone, logistical difficulties, and a structural shift towards agricultural products.

Machinery, equipment, and electrical engineering grew from 8% in 2014 to 10.2% in 2024. This is due to the integration of Ukrainian enterprises into EU production chains (in particular, the automotive industry, cable harnesses, and electrical components). Mineral products and prepared food products maintain a secondary but stable share in exports (6–8%), reflecting the gradual diversification of exports.

Table 3

Commodity structure of imports from the EU to Ukraine with goods whose share is more than 5% in the period 2014–2024, %

Title by Ukrainian Classification of Commodities in Foreign Trade	2014	2016	2018	2020	2022	2024
Finished food industry products	6.2	6.5	6.9	7.2	7.5	7.0
Mineral products	15.5	14.8	16.2	17.0	18.1	17.4
mineral fuel, petroleum, and petroleum distillation products	14.9	14.2	15.8	16.4	17.6	17.1
Products of chemical and allied industries	11.8	12.3	12.9	13.1	13.5	13.7
Polymeric materials, plastics, and articles made from them	5.3	5.4	5.7	5.8	6.0	5.6
Machines, equipment, and mechanisms, electric and technical equipment	14.2	14.6	15.1	15.4	15.6	15.2
Ground, air, and water transport facilities	10.5	10.7	11.0	11.4	11.6	11.1

Source: State Statistics Service of Ukraine (n. d.).

An analysis of *Table 3* clearly shows the following:

- Machinery and equipment continue to play a leading role in the import structure (≈15%). This indicates Ukraine's active integration into EU production chains and its dependence on technological imports (equipment for industry, energy, and IT).
- Mineral products remain consistently high (15–18%), mainly due to imports of petroleum products and gas. The peak was in 2022 (18.1%) due to the reorientation of supplies from russia and Belarus to EU markets.
- Chemical products (12–14%) include pharmaceuticals, fertilisers, and organic chemicals. The growth reflects increased demand for medical supplies (COVID-19 pandemic) and fertilisers during the war.
- Polymers and plastics consistently account for 5–6% of imports. They are critical for packaging, the light industry, and construction.
- Transport vehicles (≈11%) are showing growth, which is explained by an increase in imports of passenger cars (in particular, used cars from the EU after the liberalisation of customs rules in 2022), as well as equipment for infrastructure restoration.
- Ready-made food products have a moderate but stable share (6–7%), reflecting the high demand for ready-made European food products in Ukraine.

Thus, Ukraine's imports from the EU are characterised by technological and energy dependence: the key items are machinery, petroleum products, and chemical products. This creates risks during periods of global price fluctuations and at the same time stimulates the development of import substitution programmes.

2. Econometric factor model of international trade

A study of the works of foreign and domestic scientists on the gravitational model of international trade has revealed their great diversity. Over time and with changing economic conditions, the forms of this model have also changed. Galetska et al. (2022) provide a detailed review of the development of scientific thought on econometric modeling of the dependence of international trade volume on various factors. Thus, in the work of Tinbergen (1962), the model included only three factor variables. His follower, Linneman (1966), expanded the list of factors to seven. In recent studies, Ukrainian scientists (Sholom & Kazakova, 2019) proposed using logarithmic dependencies of exports, considering institutional changes.

Having examined several studies (Linneman, 1966; Nasodyuk, 2012; Handley & Nuno, 2015; Galetska et al., 2022) and rating systems for assessing the position of countries in the world, we will analyze the relationship between the volume of international trade and key indicators by constructing an econometric model.

As of 2025, Ukraine's main trading partners remain China, Poland, Germany, Turkey, and the United States. Among them, Germany demonstrates logistics performance indicators that are closest to the average European level, according to the Logistics Performance Index (LPI). Therefore, the parameters characteristic of Germany – as a representative model of the European logistics system – were used for constructing the econometric function.

Let us examine trade activity (Y – the volume of foreign trade turnover between the EU and Ukraine) to formalize the factors influencing it. The influencing factors include (*Table 4*):

Table 4

Input data for the multivariate model

Year	The volume of foreign trade turnover between the EU and Ukraine	Ukraine's gross domestic product, in USD billion	The gross domestic product of the European Union countries, in USD billion	Ukraine's logistics performance index points *	Germany's logistics performance index points, *	Ukraine's economic freedom index points	Germany's economic freedom index points
2014	44	131.8	15800	2.98	4.12	49.3	73.4
2015	33	90.6	13700	2.82	4.18	46.9	73.8
2016	35	93.3	14000	2.74	4.23	46.8	74.4
2017	43	112.2	14900	2.81	4.2	48.1	73.8
2018	50	130.8	16100	2.83	4.2	51.9	74.2
2019	53	153.8	15800	2.82	4.21	52.3	73.5
2020	49	155.6	15500	2.81	4.2	54.9	73.5
2021	62	199.8	17500	2.8	4.18	56.2	72.5
2022	60	162.0	17000	2.8	4.14	54.1	76.1
2023	60	181.2	18600	2.7	4.1	49	73.7
2024	71	190.7	19400	2.7	4.1	49	72.1

**Data not available in reports was calculated based on trend forecasts*

Source: The Heritage Foundation (2025, February); World Trade Organization (2025, April).

X_1 – Ukraine's gross domestic product, USD billion;

X_2 – the gross domestic product of the European Union countries, USD billion;

X_3 – Ukraine's logistics performance index points;

X_4 – Germany's logistics performance index points

X_5 – Ukraine's economic freedom index points

X_6 – Germany's economic freedom index points.

Let's use the extended power function of the form:

$$Y = a_0 \cdot X_1^{a1} \cdot X_2^{a2} \cdot X_3^{a3} \cdot X_4^{a4} \cdot X_5^{a5} \cdot X_6^{a6} \quad , \qquad (1)$$

Let us bring the function to a linear form using logarithms and obtain a function of the form:

$$lnY = \ln A + \alpha \cdot lnX_1 + \beta \cdot lnX_2 + \gamma \cdot lnX_3 + \delta \cdot lnX_4 + \theta \cdot lnX_5 + \vartheta \cdot lnX_6 \quad . \qquad (2)$$

Let's build a multifactorial exponential model using Excel functions (*Figure 1*):

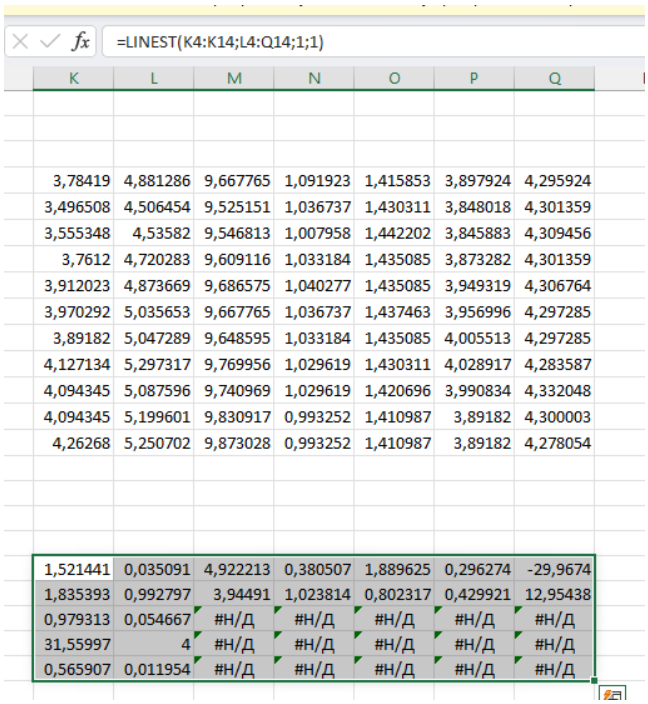

Figure 1. Calculation of the parameters of the functional dependence of the volume of foreign trade turnover using the power model

Source: calculated by the author.

The result of the calculation is:

A´= –29.968, α=0.296; β=1.889; γ=0.381, δ=4.922, θ=0.035, υ=1.521.

The logarithmic model looks like this:

$$lnY = 0.296lnX_1 + 1.889lnX_2 + 0.381lnX_3 + 4.992lnX_4 + \\ +0.035lnX_5 + 1.521lnX_6 - 29.967 + \varepsilon \quad , (3)$$

where: ε is the random error.

r model has the form:

$$Y_{calc} = (\exp(-29.967)) \cdot X_1^{0.296} \cdot X_2^{1.889} \cdot X_3^{0.381} \cdot X_4^{4.992} \cdot X_5^{0.035} \cdot X_6^{1.521} + \varepsilon$$

$$Y_{calc} = 0{,}0000001 \cdot X_1^{0.296} \cdot X_2^{1.889} \cdot X_3^{0.381} \cdot X_4^{4.992} \cdot X_5^{0.035} \cdot X_6^{1.521} \quad . (4)$$

The coefficient of determination is 0.979, which confirms the relationship between the variables. There is little dispersion of residuals in the statistical information in the power model, so we conclude that the power form of dependence better describes the relationship between the variables.

Verification of the model for reliability using the F-criterion showed that the model is reliable (Fcalc = 31.56 > Ftab = 4.76 at a significance level of α = 0.05).

Analysis of the parameters of the regression dependence shows that all factors influence the volume of foreign trade turnover between Ukraine and EU countries.

To test the significance of the correlation coefficient R, we calculate the Student's t-test:

$$t_\alpha = \frac{R\sqrt{(n-m)}}{\sqrt{1-R^2}} = \frac{\sqrt{0{,}979^2(10-6)}}{\sqrt{(1-0.979^2)}} = 9.652. \quad (5)$$

Using statistical tables with a significance level of α=0.05 and 6 degrees of freedom, we select ttab = 1.895. Since t > t_{tab}, we can conclude that the correlation coefficient is significant and the constructed model is adequate.

Let us check the model for adequacy by analyzing the direction and magnitude of deviations of the resulting feature according to actual and calculated values (*Table 5*).

Table 5

Determining the accuracy of the constructed model by calculating the sign and magnitude of deviations between the dependent variable calculated using the model and the actual values

Y	Y`	e = Y`– Y
44	46.47	2.47
33	33.61	0.61
35	37.50	2.50
43	42.94	–0.06
50	52.73	2.73
53	53.19	0.19
49	50.89	1.89
62	65.91	3.91
60	60.13	0.13
60	65.74	5.74

Source: calculated by the author.

The model is constructed correctly. The model can be used both for researching partial factors of influence and for forecasting.

The model is adequate, as confirmed by calculations. In addition to traditional gross domestic product (GDP) indicators, this model integrates additional variables that reflect the impact of contemporary economic and institutional factors. In particular, the following were used:

Logistics Performance Index (LPI): This indicator helped to assess the quality and reliability of transport infrastructure and services. Its analysis confirmed that improving logistics links is critical to reducing trade costs and accelerating export flows.

Economic Freedom Index: the use of this index made it possible to quantitatively assess the impact of the regulatory environment, property rights protection, and market openness on trade volumes. The study showed that economic liberalization is a significant stimulus for trade growth.

In the future, by studying the factors that influence the formation of the factor characteristics of this model, it will be possible to develop action programs that will contribute to the "improvement" of individual components, resulting in a multiplier effect of increased international trade.

3. Ukraine – EU trade trends

To determine priority commodity groups for trade with the EU, relative comparative advantages in the structure of exports and imports by commodity groups were calculated using the formula

$$KP_{ij} = \ln\left[\frac{\frac{Ex_{ij}}{Im_{ij}}}{\frac{Ex_i}{Im_i}}\right], \quad (6)$$

where KP_{ij} is the indicator of comparative advantage of the i-th country for the j-th product;

Ex_i, Im_i are exports and imports of the i-th country;

Ex_{ij} and Im_{ij} are exports and imports of the j-th product of the i-th country.

If KPij>0, then for the jth product, this means that the ith country has a comparative advantage in exports to other countries. If KPij<0, then this means that it is not advisable to export this product to Ukraine.

Calculations of the comparative advantages of product groups of Ukraine in 2019–2024 showed that in Ukraine, among the 96 product groups listed in the nomenclature, only 28 have comparative advantages and only they are advisable to sell on the world market. As of 2024, this is only 15 positions. The results are summarized in *Table 6*.

Table 6

Priority commodity groups of Ukrainian exports for sale on the EU market 2021–2025

Code and name of the commodity item	CPij	Code and name of the commodity item	CPij
Currently sold on the EU market and has high advantages			
10 cereals	4.28	12 seeds and fruits of oil plants	1.66
26 ores, slag, and ash	2.93	23 residues and waste from the food industry	1.58
15 Fats and oils of animal or vegetable origin	2.73	44 wood and wood products	1.51
72 ferrous metals	2.17		
Currently, they are poorly represented on the EU market but have significant advantages and development prospects.			
14 plant materials for making wickerwork	2.45	86 railway locomotives	0.81
43 natural and artificial fur	2.04	28 inorganic chemistry products	0.81
89 vessels	1.79	25 salt; sulfur; earth and stones	0.61
78 lead and articles thereof	1.47	94 furniture	0.56
02 meat and edible offal	1.35	49 printed products	0.49
XV. Base metals and articles thereof	1.27	17 sugar and sugar confectionery	0.33
11 products of the flour and cereal industry	0.89	19 prepared grain products	0.33
Currently sold on the EU market, but has no advantages			
73 ferrous metal products	0.11	74 copper and articles thereof	0.09
46 straw products	0.09	04 milk and dairy products, poultry eggs; natural honey	–0.04

Note: Italic highlights what was traded in 2021 but not in 2024.

Source: calculated by the author.

The calculations in the table show that the highest comparative advantage ratio in 2025 will be observed in the following commodity groups: cereals (4.38), ore, slag and ash (3.03), animal or vegetable fats and oils (2.83), plant materials for making wickerwork (2.55), natural and artificial fur (2.14), products of vegetable origin (2.05), wood and wood products, etc.

Ukrainian exports to the EU are concentrated in the agro-industrial sector, food products, metallurgy, and wood. Imports are mainly represented by machinery, equipment, transport vehicles, pharmaceuticals, and chemical products. This confirms the asymmetry of trade: Ukraine exports raw materials and semi-finished products, while importing high-tech products.

The 2020 pandemic led to a drop in exports and a temporary decline in trade turnover.

The start of full-scale war in 2022 caused a rapid reorientation of exports to the EU and a partial reduction in the balance deficit. The period 2023–2024 is characterised by an increase in imports due to purchases of critically important goods, the restoration of logistics, and aid programmes.

The analysis shows that Ukraine's trade with the EU remains stable but asymmetrical. Global shocks (COVID-19, war, and sanctions) have radically affected the structure and volume of trade, highlighting the need to adapt the Ukrainian economy and strengthen integration into the European market.

4. Key challenges in trade between Ukraine and the EU

In June 2022, the EU took an unprecedented step, completely lifting restrictions on Ukrainian goods to support the Ukrainian economy during a large-scale war. At the same time, Ukraine stopped importing goods produced in aggressor countries and increased imports from the EU. Of all Ukrainian industries, agriculture benefited the most. Already in June 2022, exports in the 'Food and live animals' category were 14.7% higher than in June 2021; subsequently, the growth rate of exports in this category continued to increase. This confirms the general understanding that Ukraine has a comparative advantage in the agricultural and food sectors in terms of European markets. At the same time, it is impossible to clearly identify the reason for the decline in industrial goods exports. Most industrial enterprises are located in eastern and south-eastern Ukraine, territories that are under occupation or have been most affected by the russian invasion. Azovstal alone produced about 4.3 million tonnes of steel in 2021, which is more than 10% of Germany's total steel production for the same period. Therefore, the Ukrainian industry has suffered from the war, not from competition with European producers.

Until 2022, significant restrictions on imports of Ukrainian agricultural products protected EU farmers from competition. The removal of administrative barriers clearly demonstrated the competitiveness of the Ukrainian agricultural sector. The European Union remains Ukraine's main trading partner, as evidenced by official data from the State Statistics Service: in 2024, 59% of all Ukrainian exports went to the EU market. However, the growth rate of exports to the EU slowed down somewhat compared to 2022, when the war and logistical restrictions made the EU virtually the only option for Ukrainian exporters. The slowdown in export growth is linked to the restoration of maritime logistics, which has allowed some businesses to return to alternative supply routes.

In April 2023, Poland and Hungary announced a ban on imports of Ukrainian grain and several other agricultural products. In May, the European Commission agreed to this ban until 5 June as an exception. However, on 6 June, an EU decree came into force allowing restrictions on imports of four Ukrainian goods (wheat, corn, rapeseed, and sunflower seeds) if imports of these goods destabilise domestic markets (no restrictions were imposed on transit shipments). Accordingly, the embargo was imposed in five countries (including Bulgaria, Romania, and Slovakia) until 15 September 2023. The main reason for trade protectionism was protests by

farmers (particularly in Poland). It is believed that the increase in imports of Ukrainian grain crops undermines market stability and lowers prices. In total, Poland imported 2.5 million tonnes of Ukrainian grain in 2022 (while, according to preliminary estimates, the Polish grain harvest amounted to 26.6 million tonnes), meaning that supply increased by less than 10%.

Given russia's blockade of Black Sea ports, restrictions on land exports could prove costly for the Ukrainian economy in a state of war. On the other hand, the position of Ukraine's neighbours that have imposed an embargo is not unanimous.

For the import of certain agricultural products from Ukraine under the agreement with the EU, which will be in force from 6 June 2025 until the end of the year, temporary tariff quotas have been established, in particular for wheat, corn, poultry meat, and other goods. There is also a temporary suspension of import prices for fruit and vegetables.

During the war, the EU extended the trade liberalisation regime three times. Initially, it removed all duties and fees on Ukrainian products. Subsequently, the situation changed, and from 2024, tariff quotas were applied, which were corrective measures that directly affected Ukrainian-produced oats, eggs, sugar, and honey.

It is most likely that the EU's liberalisation measures for our food products will continue. At the same time, certain restrictions can be expected to be introduced.

The following main challenges in trade between Ukraine and the EU are highlighted:

War and high security measures. According to the World Bank, in 2022–2023, the damage to Ukraine's logistics infrastructure exceeded USD 40 billion, and the cost of cargo insurance increased 3–5 times. This significantly increases the cost of exports.

The problem of selective protectionism. In 2023, some EU countries (Poland, Hungary, Slovakia) imposed restrictions on imports of Ukrainian grain, affecting up to 20% of Ukrainian agricultural exports to the EU. This creates precedents for 'selective' protectionism.

Tariff and non-tariff restrictions. Despite the autonomous trade preferences, in 2023, more than 14% of Ukrainian exports faced technical barriers (certification, sanitary requirements).

Uncertainty about the future of autonomous trade preferences. EU preferences are valid until June 2025, but there are no guarantees that they will be automatically extended. This creates risks for exporters in the grain and metallurgy sectors, which account for over 40% of exports to the EU.

Logistical and administrative constraints. Due to the blockade of ports in 2022–2023, up to 65% of exports were redirected to land routes through Poland, Romania, and Slovakia. This led to infrastructure overload and a 30–50% increase in logistics costs.

Energy supply issues. In 2022–2023, attacks on energy infrastructure resulted in the loss of over 50% of generating capacity, limiting the operation of industrial enterprises and reducing export potential.

Labour shortage. According to IOM estimates, more than 5 million Ukrainians are abroad as refugees or temporarily displaced persons, creating a shortage of skilled labour in export-oriented sectors.

Structural constraints on the economy. Agricultural exports account for over 40% of trade with the EU, while high-value-added products account for less than 15%. This creates a risk of 'raw material dependency'.

Need for harmonisation of standards. According to the European Commission, about 25% of Ukrainian producers have not yet adapted their products to EU technical and sanitary requirements. This limits their access to the market even under the preferential regime.

Summarizing the challenges outlined above, it can be argued that trade between Ukraine and the EU is under significant pressure from both external factors (war, energy crisis, logistical barriers) and internal ones (structural imbalances, labor shortages). Taken together, these factors generate multi-dimensional risks that undermine the stability of export flows and complicate Ukraine's trajectory of institutional convergence with the European market.

The long-term sustainability of the EU's autonomous trade preferences remains uncertain, reflecting broader issues of institutional uncertainty and the political economy of integration. At the same time, Ukraine's persistent commodity dependence raises concerns regarding its ability to leverage comparative advantage beyond primary goods, thereby limiting prospects for deeper economic integration. Equally salient is the need to reconcile the trade-offs between EU member states' domestic market protection and the strategic imperative of supporting Ukrainian producers. Addressing these tensions requires innovative formats of dialogue, regulatory harmonization, and a rethinking of integration strategies within the framework of global trade governance.

Conclusions

The results of the modeling confirm the proposed hypothesis: in 2014–2024, Ukraine's trade with the EU underwent significant structural changes under the influence of global fluctuations. In particular, the COVID-19 pandemic led to a contraction of exports, the war and sanction regimes resulted in an asymmetric redistribution of trade flows, and logistical shocks caused a substantial increase in transportation costs. The application of the econometric model made it possible to quantitatively assess these factors, confirming their significant impact on the volumes of exports and imports.

An analysis of the dynamics of Ukraine's international trade with the European Union amid global fluctuations has revealed the multifaceted nature of its development. The research confirms that, despite numerous external challenges – from the COVID-19 pandemic to geopolitical shifts and full-scale invasion – there is a steady trend towards deeper integration of the Ukrainian economy into the EU market.

The main findings of the research indicate that the Association Agreement and DCFTA+ have been key instruments in stimulating export growth.

Ukrainian exports to the EU are concentrated in the agro-industrial sector, food products, and timber. Imports are mainly represented by machinery, equipment, transport vehicles, pharmaceuticals, and chemical products. This confirms the asymmetry of trade: Ukraine exports raw materials and semi-finished products while importing high-tech products.

The 2020 pandemic led to a drop in exports and a temporary decline in trade turnover. The start of full-scale war in 2022 prompted a rapid reorientation of exports towards the EU and a partial reduction in the balance of trade deficit. The period 2023–2024 is characterized by an increase in imports due to purchases of critically important goods, the restoration of logistics, and aid programs.

The analysis shows that Ukraine's trade with the EU remains stable but asymmetrical. Global shocks (COVID-19, war, restrictions) have radically affected the structure and volume of trade, highlighting the need to adapt the Ukrainian economy and strengthen integration into the European market. However, in the context of global turmoil, trade faces new challenges, including logistical obstacles, supply chain disruptions, and the need to reorient export flows. These factors require Ukraine to pursue further structural reforms, strengthening institutional capacity, developing transport infrastructure, and introducing innovative technologies. Future cooperation will require not only the removal of existing barriers, but also the formation of new partnership models that consider constantly changing global conditions.

A modified model has been developed and tested to assess and forecast trade flows. The relevance and convenience of this model lie in its ability to provide more accurate forecasts in conditions of high uncertainty. It allows for the rapid adaptation of parameters to analyze the impact of unpredictable events, such as pandemics or armed conflicts.

Currently, trade between the EU and Ukraine faces several challenges and threats:

- war and high security measures;
- the problem of separate protectionism;
- tariff and non-tariff restrictions on exports of Ukrainian goods;
- uncertainty about the future of autonomous trade preferences;
- logistical and administrative restrictions;
- energy supply problems;
- labour shortages;
- structural constraints on the economy;
- the need to harmonize standards.

Ukraine has chosen the path of European integration, which requires substantial work, changes, and transformations in many aspects of public life. The main challenges today are inadequate efficiency of the management system in Ukraine, certain complications directly in the EU, russia's war against our country, and the ongoing COVID-19 pandemic. At the same time, the EU's support is felt during this difficult time for Ukrainians, as confirmed by the start of the procedure for obtaining EU candidate status.

For successful cooperation with the EU, Ukraine's priority areas for change should be:

- updating the Agreement with a view to liberalizing mutual trade;
- changes in product certification in accordance with EU legislation;
- creation of a common aviation area;
- deepening cooperation in science and technology;
- cooperation in the field of health and pharmacy;
- increasing business collaboration and ensuring employment.

A promising direction for further research within this topic is the in-depth substantiation of mechanisms for developing international trade between Ukraine and the European Union. Particular attention should be paid to addressing the structural asymmetry in trade and logistics relations, which has been exacerbated by the full-scale war. An important task also lies in shaping the institutional and infrastructural foundations that will facilitate Ukraine's integration into the European economic area and contribute to the mutual prosperity of both parties.

REFERENCES

Cui, L., Yue, S., Nghiem, X.-H., & Duan, M. (2023). Exploring the risk and economic vulnerability of global energy supply chain interruption in the context of the russo–Ukrainian war. *Resources Policy*, (83), 103373. https://doi.org/10.1016/j.resourpol.2023.103373

Darvas, Z. M., & Martins, C. (2022). *The impact of the Ukraine crisis on international trade* (Bruegel Working Paper No. 20/2022). Bruegel.

Duginets, Ganna (2020). Crises in the world economy and the bankruptcy: parity of the relationship. http://srd.pdaba.edu.ua:8080/bitstream/123456789/5313/1/Duginets.pdf

Galetska, T. I., Topishko, N. P., & Galetskyi, S. M. (2022). Gravitational model of international trade: Origins and contemporary approaches. *Scientific Notes of the National University "Ostrog Academy". Series "Economics", 27*(55), 96–103. https://journals.oa.edu.ua/Economy/article/view/3671

Handley, K., & Limão, N. (2015). Trade and investment under policy uncertainty: Theory and firm evidence. *American Economic Journal: Economic Policy, 7*(4), 189–222. https://doi.org/10.1257/pol.20140068

International Monetary Fund. (2025). *Global economy: Tenuous resilience amid persistent uncertainty*. https://www.imf.org/en/Publications/WEO/Issues/2025/07/29/world-economic-outlook-update-july-2025

Linnemann, H. (1966). *An econometric study of world trade flows*. North-Holland Publishing. https://www.scirp.org/reference/ReferencesPapers?ReferenceID=1348509

Lyzun, M., Vitálišová, K., & Borseková, K. (2024). Transformation of trade flows between the EU and Ukraine in the conditions of increasing security risks. *Journal of European Economy, 23*(2), 289–305. https://doi.org/10.35774/jee2024.02.289

Nasadyuk, I. B. (2012). Gravity model of international economic relations of Ukraine. *Herald of Socio-Economic Research*, (1), 94. http://vsed.oneu.edu.ua/files/full/1_44_2012/94-99.pdf

Poidevin, O., & Blenkinsop, P. (2025, April 16). *WTO slashes 2025 trade growth forecast, warns of deeper slump*. Reuters. https://www.reuters.com/markets/wto-slashes-2025-trade-growth-forecast-warns-deeper-slump-2025-04-16

Prokop, M. (2024). *The war in Ukraine is impacting EU trade: Perspectives of the EU's eastern neighbourhood*, 89–101.

Sholom, A. S., & Kazakova, N. A. (2019). Global institutionalization within the WTO as a factor in the growth of Ukraine's foreign trade. *Business Inform*, (4), 48–54. https://www.researchgate.net/publication/334320721_The_Global_Institutionalization_Within_the_Framework_of_WTO_As_a_Growth_Driver_of_Ukraine's_Foreign_Trade

State Statistics Service of Ukraine. (n. d.). *Foreign trade of Ukraine*. https://www.ukrstat.gov.ua

The Heritage Foundation. (2025, February). *Index of economic freedom*. https://www.heritage.org/index/pages/all-country-scores

Tinbergen, J. (1962). *Shaping the world economy: Suggestions for an international economic policy*. The Twentieth Century Fund.

World Trade Organization. (2025, April). *Global trade outlook and statistics*. https://www.wto.org/english/res_e/booksp_e/trade_outlook25_e.pdf

Zhabynets, O. (2022). Chynnyky hlobalnykh zmin u mizhnarodnii torhivli ta viiskova ahresiia rosii: vplyv na rozvytok eksportnoi diialnosti rehioniv Ukrainy [The global changes factors in international trade and russia's military aggression: impact on the development of export activities in Ukraine regions]. *Galician economic journal* (Tern.), 75(*2*), 82–91. https://galicianvisnyk.tntu.edu.ua/pdf/75/1067.pdf

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