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The impact of the war on industrial sectors in Ukraine

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The impact of the war on industrial sectors in Ukraine

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Abstract: This study provides an in-depth analysis of Ukraine's industrial performance at the 2-digit ISIC level, focusing on the economic impact of the war on industries. It uses trade, investment, and production data from 2020-2022 to assess the damage caused by the war, with a particular emphasis on the year 2022. It also explores regional vulnerabilities to industrial losses, adding a nuanced regional dimension to the discussion. The analysis encompasses the impact on the volume of industrial products sold, the overall production indices, and the estimates of value-added losses. Additionally, this study scrutinizes the repercussions on trade, regional exports, imports, and investment destinations while exploring business expectations and the factors influencing investment decisions in the current and upcoming years.

JEL codes: F01; F13; H12

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Summary of findings

On production and the volume of industrial products sold

1. The war has led to a decrease in the volume of industrial products sold in 15 out of 24 two-digit industries, with the most significant decline observed in the tobacco industry (53%), followed by machinery and equipment, n.e.c. (38%), other non-metallic mineral products (34%), basic metals (29%), and printing and reproduction of recorded media (29%).
2. All two-digit manufacturing industries experienced a decline in production, with basic metals, coke, and refined petroleum, as well as non-metallic materials, seeing a reduction of over 60% in 2022 compared to the 2019-2021 average.
3. Frontline regions, such as Zaporizhzhia, Donetsk, Kharkiv, and the City of Kyiv, suffered the most in terms of value-added loss. Donetsk incurred the highest damage and loss, necessitating an estimated \$10.5 billion in support.

On Trade

1. Ukraine's aggregate exports and imports in goods declined by 18.8% and 13.3%, respectively, in 2022 compared to the average of 2019-2021. However, exports to the European Union (EU) increased by 30%, while non-EU exports decreased by 51%. Ukraine's imports from the EU increased by 1%, while imports from the non-EU decreased by 24%.
2. Regionally, exports from frontline regions fell by 58% in 2022 compared to the average exports of 2019-2021. The largest declines in exports were observed in Donetsk (95%), Luhansk (94%), and Kherson (82%). Backline regions experienced an increase in exports of 21%.
3. In many frontline regions, a few sectors account for most of the region's exports. For instance, basic and fabricated metals accounted for 89% of Donetsk's total exports in 2021. These sectors experienced a fall in exports of 99%.
4. In the Kharkiv region, food and beverage exports declined by 51%, while machinery exports declined by 58% in 2022. These sectors accounted for 34% and 22% of total region exports, respectively.

On investment destination

1. In 2022, the distribution of investment was similar to previous years, with 48% for replacement, 21% for extension, and 19% for rationalization.
2. There was no substantial difference regarding industrial investment destinations between the pre- and during-war periods.

On business expectations

3. In the second quarter of 2022, businesses in Ukraine's manufacturing sector were more pessimistic, as indicated by the highest score on a scale measuring the difference between positive and negative responses.

On factors that influence investment

4. More than 90% of business expectations and investment survey respondents identified demand and finance as the major factors influencing investment decisions in the current year. However, their importance has declined over time.

1. Introduction

The war in Ukraine has had dramatic impacts on industrial production and the country's economy. The significant drop in most economic indicators calls for monumental challenges for policymakers to generate resilience and mitigate the adverse impacts. Despite the great attention of the media, current studies and policy debate have not focused in detail on the economic impact on Ukraine and even less on the consequences for the national industrial system. A significant strand of studies zooms in on the consequences of war at the global level. Liadze et al. (2023) analyze the economic costs of the Russia – Ukraine war on the global economy using the model NIESR. The war represents a massive cost, equivalent to 1% of global GDP in 2022, whereas GDP in ‘Developing Europe,’ mainly in Ukraine, is estimated to shrink by 30%. Ferriani and Gazzani (2023) analyze the impact of the war in Ukraine on the financial performance of European firms, and they find that energy-intensive enterprises are the most penalized via the increase in energy prices channel. Almazán-Gómez et al. (2023) studied the impact of the war on European regions and found a 1.7% drop in GDP. Only a segment of papers analyzes the impact of the war in Ukraine itself (World Bank 2023, 2024) and has a privileged focus on the Ukraine industrial system (Marin and Paglialonga 2024). The present study fills the gap by using national and international data to study the impact of the war on Ukraine's manufacturing sector.

2. Data and methodology

The primary data sources for this analysis are the Ukrainian Statistical Office and the World Integrated Trade Solution (WITS)¹. The Ukrainian data provides information on the volume of industrial products sold by sector and the value added by region and industry. Additionally, data for the business expectations and investment survey, which offers insights into the expectations of industrial enterprises regarding their business activities, is obtained from the Ukrainian statistics authority.

WITS and Ukrainian statistics are the primary data sources for trade analysis. WITS data categorized according to ISIC Rev3 and HS2022 is used to analyze Ukraine's imports and exports with the EU and the rest of the world. Data from the Ukrainian statistics authority is for the regional dimension of trade analysis.

¹ UNIDO data is shown in the Appendix for the index of industrial production.

To add a nuanced regional dimension to the discussion, information on industries is combined with data on the exposure of each region to different industrial sectors. This helps to understand how the war has affected different regions of the country and identify the most important sectors of each region. Based on World Bank (2023), regions are divided into four categories:

- Frontline regions (areas temporarily not under government control and/ or areas of active war): Donetsk, Kharkiv, Kherson, Luhansk, Mykolaiv and Zaporizhzhia;
- Support regions (regions providing logistics for defense and humanitarian cargo): Dnipropetrovsk, Kirovograd, Odesa, Poltava and Vinnytsia;
- Backline regions (regions protecting export/ import logistics hubs and evacuated enterprises): Ivano-Frankivsk, Khmelnytskyi, Lviv, Rivne, Ternopil and Volyn
- Regions no longer under the temporary military control of the Russian Federation (areas recovering from sustained damage): Kyiv, Sumy and Zhytomyr.

In the result and discussion, the analysis of the regional dimension is based on this classification.

The study is based on a five-stage methodology over a time horizon up to 2022².

Stage I – Production discusses the impact of the war on production through three different indicators and analysis: i) The volume of industrial products sold, which can be seen as an impact on manufacturing turnover rather than production impact or as a trade indicator when the focus is on products sold outside the country, ii) the indices of the industrial output of the manufacturing sector, and iii) the war's impact on value added.

Stage II – Trade assesses the effects of the conflict on trade and compares Ukrainian trade with EU and non-EU countries through international data.

Stage III – Damage succinctly presents the World Bank's (2023) estimate of the war's impact that can be used as a useful reference study.

Stage IV – Business and investment expectations focuses on business and investment expectations as part of the sentiment and perceptions of firms.

Stage V – Employment impact assesses the impact of the war on employment.

² Some information also covers 2023, but the main focus when the study was conducted was 2022.

3. Results and discussion

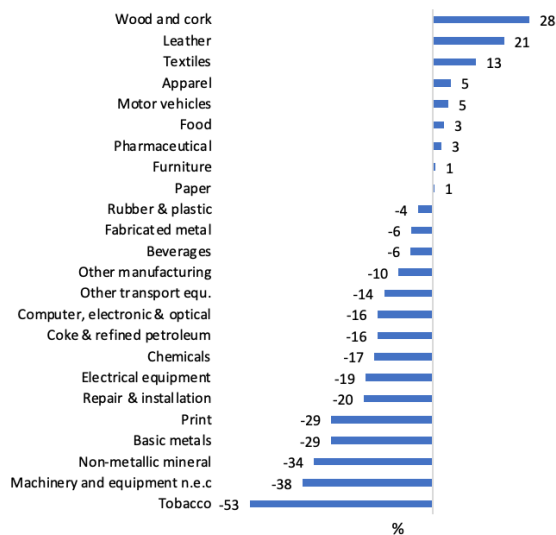
Stage I – Production

Volume of industrial production sold

In 2022, a decrease in the volume of industrial products sold was observed in 15 out of 24 two-digit industries compared to the average of 2019-2021. Despite the overall decline, some sectors registered growth. **Figure 1A** reports the change in the volume of industrial products sold in 2022 relative to the average of 2019-2021, while **Figure 1B** reports the same for industrial products sold outside the country.³

Figure 1: Ukraine’s percentage change in volume of industrial products sold in 2022 relative to the average of 2019-2021

A: Volume of industrial products sold



B: Volume of industrial products sold outside the country



Data source: State Statistics Service of Ukraine [1].

³ Results concerning Figure 1 are produced by using the ISIC rev. 4 classification and data from the State Statistics Service of Ukraine. Results based on ISIC rev. 3 are included in Appendix B. For comparison, UNIDO data is shown in the Appendix .

The manufacture of tobacco products sector experienced the most significant decline, with a decrease of 53%. This was followed by the manufacture of machinery and equipment n.e.c. (38%), manufacture of other non-metallic mineral products (34%), manufacture of basic metals (29%), and printing and reproduction of recorded media (also 29%). The decline in the manufacturing of basic metals is particularly noteworthy, as this sector contributed 26.6% of the 2021 manufacturing output in the country.

On the other hand, the manufacture of food products sector, which contributes 28% of the manufacturing output, saw a 3% growth. The manufacture of furniture and manufacture of paper and paper products saw minimal growth, with only a 1% increase. However, the manufacture of wood and products of wood and cork sector showed substantial growth, with a 28% increase. This was followed by the manufacture of leather and related products (21%) and the manufacture of wearing apparel (13%).

In 2022, out of the 24 two-digit manufacturing sectors, only eight sectors saw an increase in the volume of products sold outside the country compared to the average of 2019-2021. The remaining 15 sectors experienced a decline in sales. The manufacture of wood and products of wood and cork sector saw the largest increase, with a growth rate of 39%. This was closely followed by the manufacture of motor vehicles, trailers, and semi-trailers sector with an increase of 21%. The manufacture of furniture and manufacture of basic pharmaceutical products and pharmaceutical preparations sectors also saw significant increases of 19% and 10%, respectively. On the other hand, the tobacco sector saw the largest decline, with a drop of 49%, followed by the Manufacture of machinery and equipment n.e.c. and printing and reproduction of recorded media sectors, each experiencing a 44% drop.

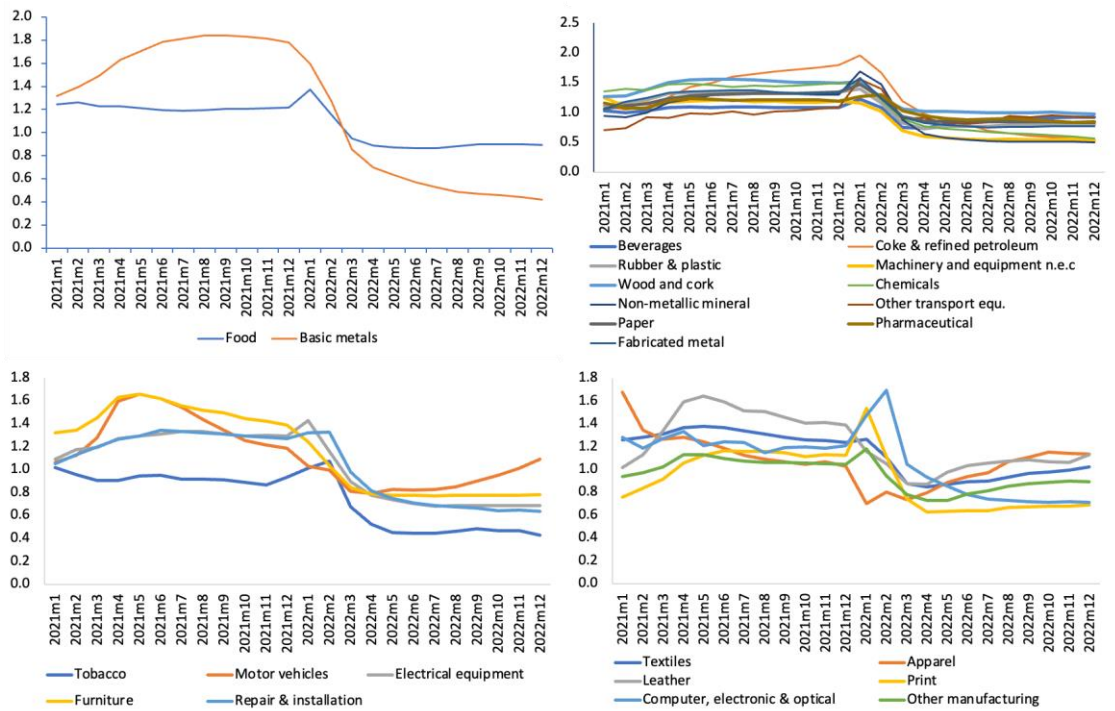
In general, the pattern of change in the volume of industrial products sold abroad by various sectors in 2022 relative to the average of 2019-2021 mirrors the overall pattern of change. Sectors operating at a large scale and dependent on continuous cycles, such as the manufacture of non-metallic mineral products and basic metals, as well as those with production concentrated in frontline regions (e.g., the tobacco industry centered around large plants owned by Phillip Morris in Kharkiv), experienced more substantial losses. Conversely, industries with more evenly distributed production across the country and those crucial for reconstruction and war efforts, like apparel, textiles, food, and wood, saw production increases.

Consultations with industry members revealed that the tobacco and food industries are relocating to safer backline regions, with plans to return to their original production areas after the conflict. However, returning to pre-war locations may be more challenging for industries heavily reliant on raw materials and logistics, such as wood, glass, mineral, and metal products. Given their

importance for post-conflict reconstruction, these sectors should be prioritized in policymaking. Furthermore, some sectors depended on the supply of Russian raw materials, and support is necessary for restructuring their supply chains. Incentives to encourage displaced industries and workers to return to their original manufacturing locations should also be considered to ensure regional equity after the conflict.⁴

Figure 2 depicts the monthly volume of industrial products sold in comparison to the corresponding month of the previous year, while Figure 3 provides a similar comparison for industrial products sold internationally. The sectors are categorized into four groups based on their contribution to the total volume of industrial products sold in the manufacturing sector in 2021.

Figure 2: Ukraine’s volume of industrial products sold over time using monthly data, 2021-2022

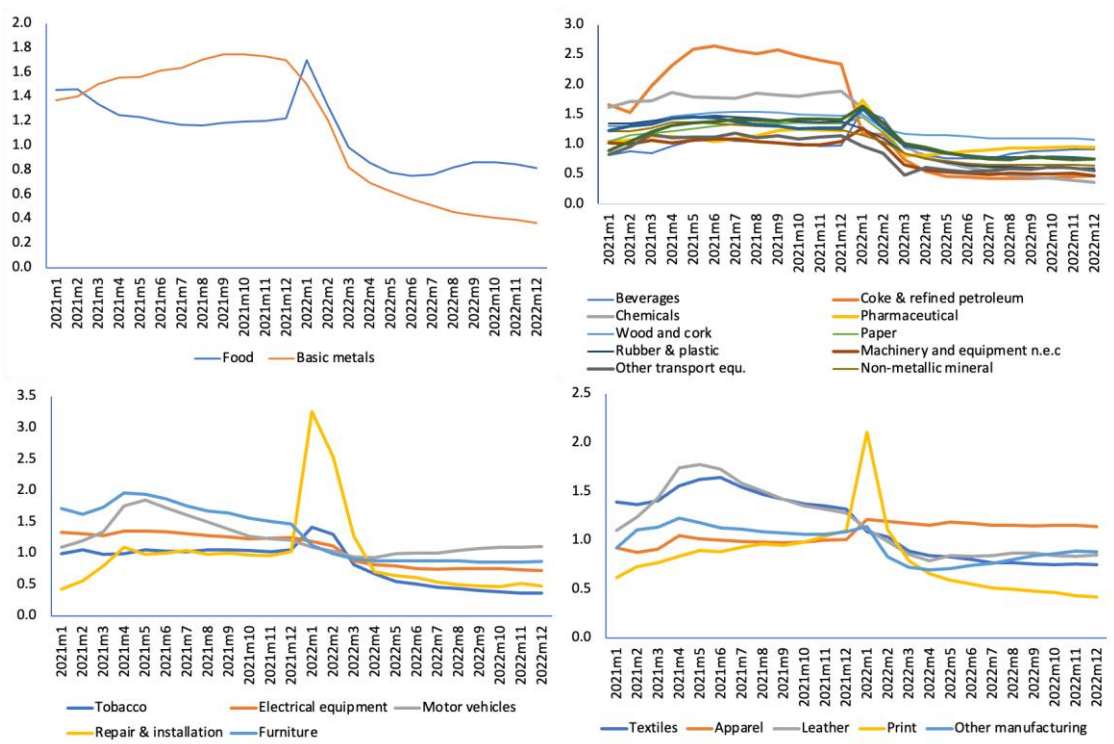


Note: This figure shows the volume of industrial products sold each month relative to the previous period in the same month. For example, it compares January 2022 to January 2021. A ratio greater than one indicates that more industrial output is sold in 2022 than in 2021, whereas a ratio below one indicates a decrease in industrial output sales in 2022 relative to 2021.

Data source: State Statistics Service of Ukraine [1].

⁴ 2023 State Strategy of Regional Development 2021 – 2027.

Figure 3: Ukraine’s volume of industrial products sold outside over time using monthly data, 2021-2022



Note: This figure shows the volume of industrial products sold each month relative to the previous period in the same month. For example, it compares January 2022 to January 2021. A ratio greater than one indicates more industrial output is sold in 2022 than in 2021, whereas a ratio below one indicates a decrease in industrial output sales in 2022 relative to 2021.

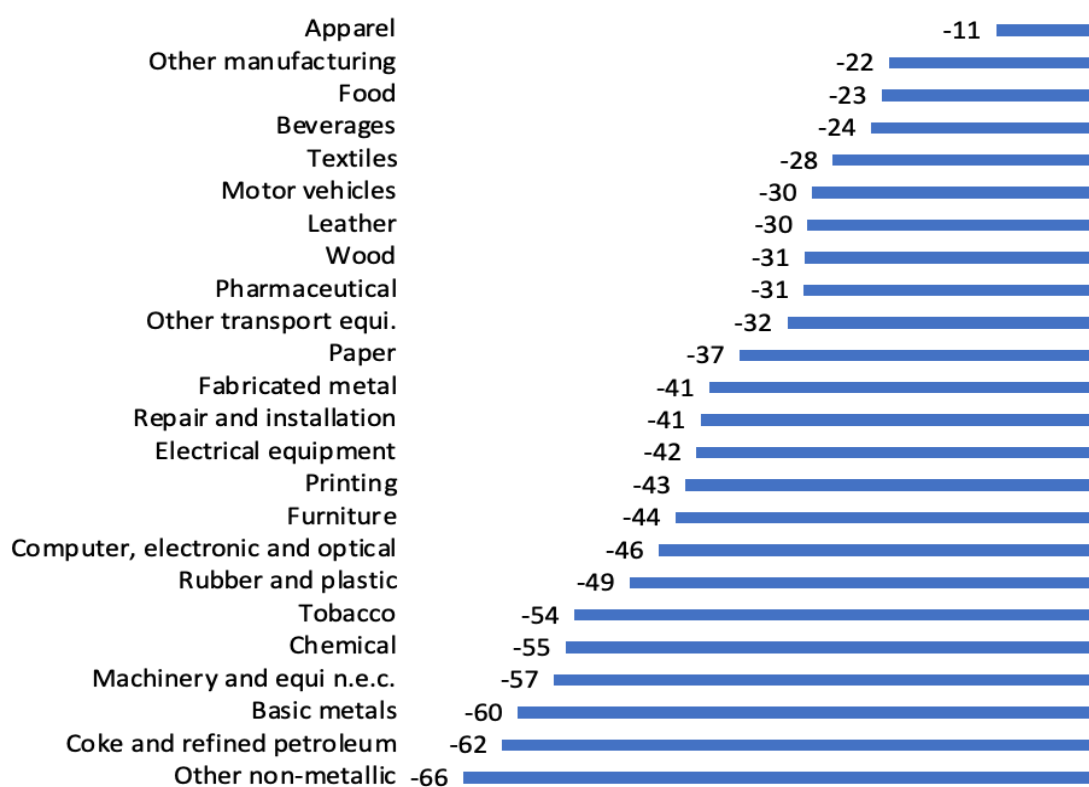
Data source: State Statistics Service of Ukraine [1].

The upper-left quadrant comprises the food and beverage sectors, which accounted for 28 percent and 23.7 percent of the total manufacturing output sold in 2021, respectively. The lower-left quadrant includes sectors contributing 2-6 percent to the volume of products sold. The upper-right quadrant encompasses sectors contributing 1-2 percent, and the lower-right quadrant comprises sectors contributing less than 1 percent to the volume of industrial products sold. In nearly all sectors, the volume of industrial products sold throughout 2022 was lower than in the corresponding months of 2021. Moreover, the extent of the decline in industrial products sold varies across different sectors.

Production and value-added losses

Evaluating the war’s impact on industry considers the changes in the volume of production sold and the actual state of the industrial output in Ukraine. The industrial production indices were used for this analysis, the results of which are presented in Figure 4.⁵ The data indicates a decline in the production of all two-digit manufacturing industries⁶. Specifically, the manufacturing of basic metals, coke, and refined petroleum, as well as the production of non-metallic materials, saw a significant reduction of more than 60% in 2022 compared to the average output from 2019 to 2021. Among the various manufacturing sectors, the manufacture of wearing apparel experienced the smallest decrease at 10.8%, followed by other manufacturing at 21.9%. The manufacturing of food products saw a decline of 22.7%.

Figure 4: Ukraine’s indices of industrial production in 2022 relative to the average value of 2019-2021



Data source: State Statistics Service of Ukraine [1].

⁵ Results concerning Figure 4 are produced by using the ISIC rev. 4 classification and data from the Ukraine Statistics Office. Results based on ISIC rev. 3 are included in Appendix C. For comparison, UNIDO data and UNComtrade/WITS (World Integrated Trade Solutions) data are shown in the Appendix.

⁶ The overall index of industrial production for the manufacturing sector is 59% when considering the industrial production over the period January – December 2022 compared to the same period in 2021. However, more recent data indicate a 108% recovery of industrial production over the period January – September 2023.

Without available value-added data for 2022 by region and industry, we conducted a preliminary analysis to gauge the war's impact. This involved using the growth rates in value added for each region and industry in 2021 to project the value added for 2022 if these regions and industries had experienced the same growth rates as in 2021. This projection yielded value-added figures by region and industry for 2022.⁷

Estimating the war's impact used the national-level industrial production losses by industries as a reference point for estimating losses at the regional level. For example, the manufacture of basic metals saw a 29% decline in industrial production at the national level. In 2021, the value-added growth rate for this industry in Donetsk was 14%. Based on the 2021 value-added, the projected value-added for 2022 would be the 2021 value plus 0.14 times the 2021 value. Given the 29% industry-wide decline in 2022, the same percentage fall for this industry in Donetsk in 2022 was assumed. The results are reported in Table 1 for regions and Tables 2-5 for regions and industries.

Table 1: Ukraine's regional value-added loss estimates

Region group	Regions	Estimated VA for 2022 (million UAH)	VA Loss in 2022 (million UAH)	Percentage Change
Backline regions	Ivano-Frankivsk	33,817	-5,875	-17
	Khmelnyskyi	49,228	-7,451	-15
	Lviv	159,038	-6,073	-4
	Rivne	44,153	-2,139	-5
	Ternopil	33,341	-4,393	-13
	Volyn	70,909	-1,655	-2
	Zakarpattia	16,698	-1,114	-7
Frontline regions	Donetsk	55,769	-10,466	-19
	Kharkiv	191,748	-15,246	-8
	Kherson	34,824	-642	-2
	Luhansk	8,289	-1,441	-17
	Mykolaiv	58,786	-7,851	-13
	Zaporizhzhia	305,926	-76,853	-25
Other regions	Cherkasy	90,646	-1,382	-2
	Chernihiv	17,460	-964	-6
	Chernivtsi	12,138	-1,002	-8

⁷ Initially, the growth rates for VA in 2019-2020 (g1) and 2020-2021 (g2) were computed. Subsequently, the average growth rate, denoted as g, is calculated using the formula: $g = (g1 + g2) / 2$. Following this, the VA for 2022 based on this average growth rate, expressed as: $VA_{2022} = VA_{2021} + (g * VA_{2021})$, was projected. Finally, the industry production (IP) loss in 2020 was utilized as a reference point to determine the VA loss in 2022, represented as $VA_{loss-2022} = VA_{2022} * IP_{loss}$.

Region group	Regions	Estimated VA for 2022 (million UAH)	VA Loss in 2022 (million UAH)	Percentage Change
Regained regions	City of Kyiv	643,522	-32,495	-5
	Kyiv	205,000	-17,007	-8
	Sumy	54,383	-5,919	-11
	Zhytomyr	43,715	-3,172	-7
Support regions	Dnipropetrovsk	656,613	-144,106	-22
	Kirovohrad	51,759	-2,759	-5
	Odesa	99,489	-13,016	-13
	Poltava	103,920	-7,943	-8
	Vinnytsia	100,494	-8,429	-8

Data source: State Statistics Service of Ukraine [2].

Table 2: Ukraine’s estimated loss in value added by *frontline* regions and industry

Frontline regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Donetsk	Chemicals and chemical products – 20	930	-17	-157
	Computer, electronic and optical products – 26	16	-16	-3
	Electrical equipment – 27	363	-20	-71
	Fabricated metal products, except machinery and equipment – 25	3,719	-6	-234
	Food products, beverages and tobacco products – 10, 11, 12	15,800	0	-25
	Machinery and equipment n.e.c. – 28	12,600	-38	-4,770
	Other non-metallic mineral products – 23	13,100	-34	-4,516
	Rubber and plastic products – 22	318	-4	-14
	Textiles, apparel, leather and related products – 13, 14, 15	1,184	12	139
	Other manufacturing, and repair and installation – 31, 32, 33	7,642	-11	-817
Kharkiv	Basic metal – 24	6,563	-30	-1,935
	Chemicals and chemical products – 20	7,079	-17	-1,199
	Computer, electronic and optical products – 26	5,118	-16	-819

Frontline regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Kharkiv (contd.)	Electrical equipment – 27	6,523	-20	-1,269
	Fabricated metal products, except machinery and equipment – 25	14,500	-6	-912
	Food products, beverages and tobacco products – 10, 11, 12	75,400	0	-117
	Machinery and equipment n.e.c. – 28	14,200	-38	-5,345
	Other non-metallic mineral products – 23	11,000	-34	-3,773
	Rubber and plastic products – 22	14,800	-4	-637
	Textiles, apparel, leather and related products – 13, 14, 15	6,871	12	808
	Transport equipment – 29, 30	5,340	-6	-336
	Wood and paper products and printing – 16, 17, 18	14,800	9	1,319
	Other manufacturing, and repair and installation – 31, 32, 33	9,649	-11	-1,031
Kherson	Electrical equipment – 27	730	-20	-142
	Food products, beverages and tobacco products – 10, 11, 12	25,500	0	-40

Frontline regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Kherson (contd.)	Machinery and equipment n.e.c. – 28	139	-38	-52
	Other non-metallic mineral products – 23	1,516	-34	-522
	Rubber and plastic products – 22	2,621	-4	-113
	Wood and paper products and printing – 16, 17, 18	3,505	9	313
	Other manufacturing, and repair and installation – 31, 32, 33	800	-11	-85
Luhansk	Basic metal – 24	285	-30	-84
	Chemicals and chemical products – 20	4,586	-17	-777
	Computer, electronic and optical products – 26	222	-16	-35
	Electrical equipment – 27	21	-20	-4
	Fabricated metal products, except machinery and equipment – 25	244	-6	-15
	Machinery and equipment n.e.c. – 28	487	-38	-184
	Other non-metallic mineral products – 23	429	-34	-148
	Rubber and plastic products – 22	267	-4	-11
	Transport equipment – 29, 30	90	-6	-6

Frontline regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Luhansk (contd.)	Other manufacturing, and repair and installation – 31, 32, 33	1,659	-11	-177
Mykolaiv	Basic metal – 24	17,800	-30	-5,250
	Chemicals and chemical products – 20	185	-17	-31
	Computer, electronic and optical products – 26	252	-16	-40
	Electrical equipment – 27	203	-20	-40
	Food products, beverages and tobacco products – 10, 11, 12	28,000	0	-44
	Machinery and equipment n.e.c. – 28	5,082	-38	-1,918
	Other non-metallic mineral products – 23	920	-34	-317
	Rubber and plastic products – 22	557	-4	-24
	Textiles, apparel, leather and related products – 13, 14, 15	1,029	12	121
	Transport equipment – 29, 30	478	-6	-30
	Wood and paper products and printing – 16, 17, 18	897	9	80
	Other manufacturing, and repair and installation – 31, 32, 33	3,352	-11	-358

Frontline regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Zaporizhzhia	Basic metal – 24	222,000	-30	-65,400
	Basic pharmaceutical products and pharmaceutical preparations – 21	502	3	13
	Electrical equipment – 27	18,500	-20	-3,590
	Fabricated metal products, except machinery and equipment – 25	8,493	-6	-535
	Food products, beverages and tobacco products – 10, 11, 12	21,900	0	-34
	Machinery and equipment n.e.c. – 28	7,205	-38	-2,719
	Other non-metallic mineral products – 23	10,400	-34	-3,598
	Rubber and plastic products – 22	4,045	-4	-174
	Textiles, apparel, leather and related products – 13, 14, 15	1,249	12	147
	Wood and paper products and printing – 16, 17, 18	1,688	9	151
	Other manufacturing, and repair and installation – 31, 32, 33	9,978	-11	-1,066

Data source: State Statistics Service of Ukraine [2].

Table 3: Ukraine’s estimated loss in value added by regained regions and by industry

Region		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
City of Kyiv	Basic metal – 24	12,400	-30	-3,657
	Basic pharmaceutical products and pharmaceutical preparations – 21	35,300	3	920
	Chemicals and chemical products – 20	16,000	-17	-2,717
	Coke and refined petroleum products – 19	2,060	-16	-331
	Computer, electronic and optical products – 26	10,200	-16	-1,628
	Electrical equipment – 27	15,200	-20	-2,955
	Fabricated metal products, except machinery and equipment – 25	23,800	-6	-1,500
	Food products, beverages and tobacco products – 10, 11, 12	379,000	0	-589
	Machinery and equipment n.e.c. – 28	17,900	-38	-6,758
	Other non-metallic mineral products – 23	35,900	-34	-12,400
	Rubber and plastic products – 22	18,100	-4	-780
	Textiles, apparel, leather and related products – 13, 14, 15	9,205	12	1,082
Transport equipment – 29, 30	9,039	-6	-569	

Region		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
City of Kyiv (contd.)	Wood and paper products and printing – 16, 17, 18	29,000	9	2,591
	Other manufacturing, and repair and installation – 31, 32, 33	30,500	-11	-3,255
Kyiv	Basic metal – 24	5,735	-30	-1,691
	Chemicals and chemical products – 20	21,500	-17	-3,637
	Computer, electronic and optical products – 26	959	-16	-153
	Electrical equipment – 27	2,626	-20	-511
	Fabricated metal products, except machinery and equipment – 25	11,900	-6	-749
	Food products, beverages and tobacco products – 10, 11, 12	58,500	0	-91
	Machinery and equipment n.e.c. – 28	7,197	-38	-2,716
	Other non-metallic mineral products – 23	24,400	-34	-8,391
	Rubber and plastic products – 22	20,800	-4	-892
	Textiles, apparel, leather and related products – 13, 14, 15	11,300	12	1,333
	Transport equipment – 29, 30	10,800	-6	-681
	Wood and paper products and printing – 16, 17, 18	22,000	9	1,958
Other manufacturing, and repair and installation – 31, 32, 33	7,362	-11	-787	

Region		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Sumy	Chemicals and chemical products – 20	5,362	-17	-908
	Computer, electronic and optical products – 26	116	-16	-19
	Electrical equipment – 27	126	-20	-24
	Food products, beverages and tobacco products – 10, 11, 12	20,900	0	-32
	Machinery and equipment n.e.c. – 28	11,600	-38	-4,359
	Other non-metallic mineral products – 23	2,185	-34	-753
	Rubber and plastic products – 22	5,792	-4	-249
	Textiles, apparel, leather and related products – 13, 14, 15	3,343	12	393
	Transport equipment – 29, 30	1,090	-6	-69
	Wood and paper products and printing – 16, 17, 18	2,652	9	237
	Other manufacturing, and repair and installation – 31, 32, 33	1,270	-11	-136
Zhytomyr	Electrical equipment – 27	185	-20	-36
	Food products, beverages and tobacco products – 10, 11, 12	16,000	0	-25
	Machinery and equipment n.e.c. – 28	2,075	-38	-783
	Other non-metallic mineral products – 23	9,624	-34	-3,314
	Rubber and plastic products – 22	1,516	-4	-65

Region		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Zhytomyr (contd.)	Textiles, apparel, leather and related products – 13, 14, 15	2,363	12	278
	Wood and paper products and printing – 16, 17, 18	10,500	9	933
	Other manufacturing, and repair and installation – 31, 32, 33	1,496	-11	-160

Data source: State Statistics Service of Ukraine [2].

Table 4: Ukraine’s estimated loss in value added by support regions

Support regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Dnipropetrovsk	Basic metal – 24	419,000	-30	-124,000
	Coke and refined petroleum products – 19	9,162	-16	-1,473
	Computer, electronic and optical products – 26	484	-16	-77
	Electrical equipment – 27	3,618	-20	-704
	Fabricated metal products, except machinery and equipment – 25	20,900	-6	-1,318
	Food products, beverages and tobacco products – 10, 11, 12	89,100	0	-138
	Machinery and equipment n.e.c. – 28	13,100	-38	-4,937
	Other non-metallic mineral products – 23	24,600	-34	-8,464
	Rubber and plastic products – 22	21,100	-4	-905
	Textiles, apparel, leather and related products – 13, 14, 15	4,493	12	528
	Transport equipment – 29, 30	11,700	-6	-733
	Wood and paper products and printing – 16, 17, 18	10,100	9	897
	Other manufacturing, and repair and installation – 31, 32, 33	29,100	-11	-3,107

Support regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Kirovohrad	Basic metal – 24	353	-30	-104
	Chemicals and chemical products – 20	1,230	-17	-208
	Fabricated metal products, except machinery and equipment – 25	1,011	-6	-64
	Food products, beverages and tobacco products – 10, 11, 12	39,300	0	-61
	Machinery and equipment n.e.c. – 28	4,711	-38	-1,778
	Other non-metallic mineral products – 23	1,470	-34	-506
	Rubber and plastic products – 22	183	-4	-8
	Textiles, apparel, leather and related products – 13, 14, 15	579	12	68
	Wood and paper products and printing – 16, 17, 18	1,110	9	99
	Other manufacturing, and repair and installation – 31, 32, 33	1,847	-11	-197
Odesa	Basic metal – 24	1,057	-30	-312
	Computer, electronic and optical products – 26	1,833	-16	-293
	Electrical equipment – 27	4,598	-20	-895
	Fabricated metal products, except machinery and equipment – 25	10,300	-6	-652
	Food products, beverages and tobacco products – 10, 11, 12	37,400	0	-58

Support regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Odesa (contd.)	Other non-metallic mineral products – 23	26,500	-34	-9,141
	Rubber and plastic products – 22	3,861	-4	-166
	Textiles, apparel, leather and related products – 13, 14, 15	1,796	12	211
	Transport equipment – 29, 30	522	-6	-33
	Wood and paper products and printing – 16, 17, 18	2,474	9	221
	Other manufacturing, and repair and installation – 31, 32, 33	5,578	-11	-596
Poltava	Basic metal – 24	837	-30	-247
	Chemicals and chemical products – 20	13,900	-17	-2,356
	Computer, electronic and optical products – 26	458	-16	-73
	Electrical equipment – 27	469	-20	-91
	Fabricated metal products, except machinery and equipment – 25	4,104	-6	-259
	Food products, beverages and tobacco products – 10, 11, 12	56,700	0	-88
	Machinery and equipment n.e.c. – 28	8,590	-38	-3,241
	Other non-metallic mineral products – 23	3,303	-34	-1,137
	Rubber and plastic products – 22	1,660	-4	-71

Support regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Poltava (contd.)	Textiles, apparel, leather and related products – 13, 14, 15	1,892	12	222
	Transport equipment – 29, 30	3,680	-6	-232
	Wood and paper products and printing – 16, 17, 18	2,654	9	237
	Other manufacturing, and repair and installation – 31, 32, 33	5,680	-11	-607
Vinnitsia	Basic metal – 24	1,290	-30	-381
	Chemicals and chemical products – 20	2,603	-17	-441
	Electrical equipment – 27	689	-20	-134
	Fabricated metal products, except machinery and equipment – 25	3,211	-6	-202
	Food products, beverages and tobacco products – 10, 11, 12	54,900	0	-85
	Machinery and equipment n.e.c. – 28	3,286	-38	-1,240
	Other non-metallic mineral products – 23	19,000	-34	-6,528
	Rubber and plastic products – 22	2,662	-4	-114
	Textiles, apparel, leather and related products – 13, 14, 15	647	12	76
Wood and paper products and printing – 16, 17, 18	9,821	9	876	

Support regions		Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Vinnytsia (contd.)	Other manufacturing, and repair and installation – 31, 32, 33	2,386	-11	-255

Data source: State Statistics Service of Ukraine [2].

Table 5: Ukraine’s estimated loss in value added by backline regions and by industry

Backline regions	ISIC2 sector	Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Ivano-Frankivsk	Computer, electronic and optical products – 26	186	-16	-30
	Food products, beverages and tobacco products – 10, 11, 12	5,360	0	-8
	Machinery and equipment n.e.c. – 28	284	-38	-107
	Other non-metallic mineral products – 23	17,800	-34	-6,128
	Rubber and plastic products – 22	761	-4	-33
	Textiles, apparel, leather and related products – 13, 14, 15	601	12	71
	Wood and paper products and printing – 16, 17, 18	6,647	9	593
	Other manufacturing, and repair and installation – 31, 32, 33	2,182	-11	-233
Khmelnyskyi	Chemicals and chemical products – 20	3,804	-17	-644
	Electrical equipment – 27	2,185	-20	-425
	Food products, beverages and tobacco products – 10, 11, 12	11,600	0	-18
	Machinery and equipment n.e.c. – 28	1,524	-38	-575
	Other non-metallic mineral products – 23	17,200	-34	-5,911
	Rubber and plastic products – 22	4,898	-4	-211

Backline regions	ISIC2 sector	Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Khmelnytskyi (contd.)	Textiles, apparel, leather and related products – 13, 14, 15	3,769	12	443
	Wood and paper products and printing – 16, 17, 18	1,777	9	158
	Other manufacturing, and repair and installation – 31, 32, 33	2,516	-11	-269
Lviv	Basic metal – 24	7,168	-30	-2,114
	Computer, electronic and optical products – 26	605	-16	-97
	Electrical equipment – 27	1,381	-20	-269
	Fabricated metal products, except machinery and equipment – 25	8,286	-6	-522
	Food products, beverages and tobacco products – 10, 11, 12	59,700	0	-93
	Machinery and equipment n.e.c. – 28	2,610	-38	-985
	Other non-metallic mineral products – 23	8,616	-34	-2,967
	Rubber and plastic products – 22	6,773	-4	-291
	Textiles, apparel, leather and related products – 13, 14, 15	8,652	12	1,017
	Transport equipment – 29, 30	13,800	-6	-871
	Wood and paper products and printing – 16, 17, 18	28,300	9	2,522

Backline regions	ISIC2 sector	Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Lviv (contd.)	Other manufacturing, and repair and installation – 31, 32, 33	13,100	-11	-1,404
Rivne	Chemicals and chemical products – 20	4,239	-17	-718
	Food products, beverages and tobacco products – 10, 11, 12	11,100	0	-17
	Machinery and equipment n.e.c. – 28	1,139	-38	-430
	Other non-metallic mineral products – 23	6,070	-34	-2,090
	Rubber and plastic products – 22	1,435	-4	-62
	Textiles, apparel, leather and related products – 13, 14, 15	888	12	104
	Wood and paper products and printing – 16, 17, 18	16,000	9	1,425
	Other manufacturing, and repair and installation – 31, 32, 33	3,295	-11	-352
Ternopil	Basic metal – 24	3,196	-30	-943
	Fabricated metal products, except machinery and equipment – 25	2,534	-6	-160
	Food products, beverages and tobacco products – 10, 11, 12	10,800	0	-17
	Machinery and equipment n.e.c. – 28	205	-38	-77
	Other non-metallic mineral products – 23	9,190	-34	-3,164

Backline regions	ISIC2 sector	Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Ternopil (contd.)	Rubber and plastic products – 22	3,857	-4	-166
	Textiles, apparel, leather and related products – 13, 14, 15	779	12	92
	Wood and paper products and printing – 16, 17, 18	1,738	9	155
	Other manufacturing, and repair and installation – 31, 32, 33	1,061	-11	-113
	Fabricated metal products, except machinery and equipment – 25	808	-6	-51
Volyn	Food products, beverages and tobacco products – 10, 11, 12	20,000	0	-31
	Other non-metallic mineral products – 23	7,009	-34	-2,413
	Rubber and plastic products – 22	3,795	-4	-163
	Textiles, apparel, leather and related products – 13, 14, 15	1,537	12	181
	Transport equipment – 29, 30	2,789	-6	-175
	Wood and paper products and printing – 16, 17, 18	24,300	9	2,171
	Other manufacturing, and repair and installation – 31, 32, 33	10,300	-11	-1,104

Backline regions	ISIC2 sector	Estimated VA for 2022 (million UAH)	Industrial Production Loss (%)	VA Loss in 2022 (million UAH)
Zakarpattia	Electrical equipment – 27	3,275	-20	-637
	Food products, beverages and tobacco products – 10, 11, 12	2,307	0	-4
	Other non-metallic mineral products – 23	2,526	-34	-870
	Rubber and plastic products – 22	409	-4	-18
	Textiles, apparel, leather and related products – 13, 14, 15	2,014	12	237
	Wood and paper products and printing – 16, 17, 18	4,264	9	380
	Other manufacturing, and repair and installation – 31, 32, 33	1,903	-11	-203

Data source: State Statistics Service of Ukraine [2].

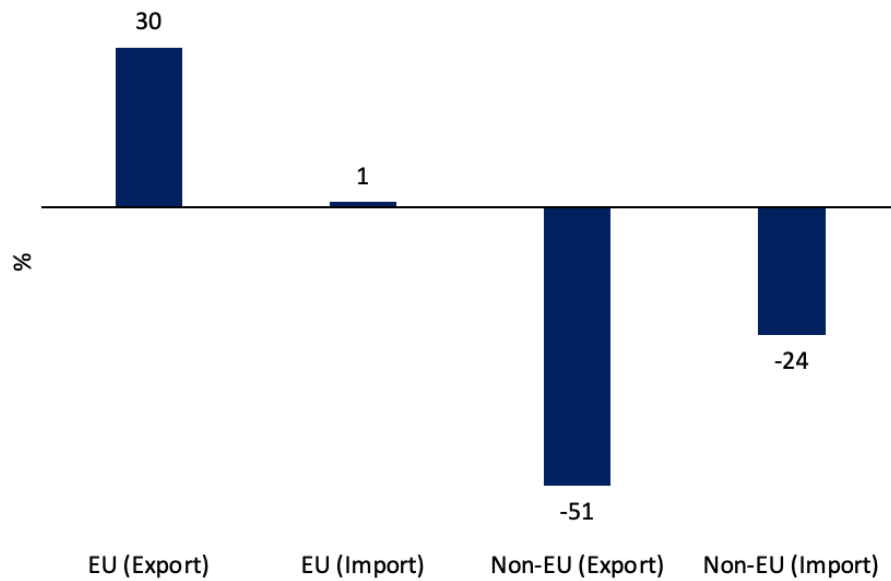
Stage II – Trade

Ukraine's aggregate exports in goods declined by 18.8%, from \$54.7 billion in 2022 to \$44.4 billion, compared to the average of 2019-2021. During the same period, Ukraine's imports declined by 13.3%, from \$61 billion in 2022 to \$52.8 billion, compared to the average of 2019-2021. The tobacco industry recorded a substantial decline of 67.8%, while the printing sector showed a significant decrease of 59.9%. Furthermore, the coke and refined petroleum sectors experienced a drop of 57.9%, and the other transport equipment saw a decline of 56.3% in their exports during 2022 relative to the average exports of 2019-2021. From 2019 to 2021, the food and beverage manufacturing sector contributed 28.2% to Ukraine's exports. However, in 2022, this sector saw a modest decrease of 0.78% in its export volume compared to the average export values from 2019 to 2021. Conversely, the basic metal manufacturing sector, which accounted for 30.5% of Ukraine's exports in 2019-2021, experienced a significant contraction of 49.7% in its exports in 2022. On the other hand, the wood and cork manufacturing, manufacturing of office, and accounting sectors registered an increase of 27% in their exports during 2022.

However, a different picture emerges when examining Ukraine's exports by EU and non-EU countries (Figure 5). While its exports to the EU increased by 30%, non-EU exports decreased by 51%. Ukraine's imports from the EU increased by 1%, while imports from non-EU countries fell by 24%.

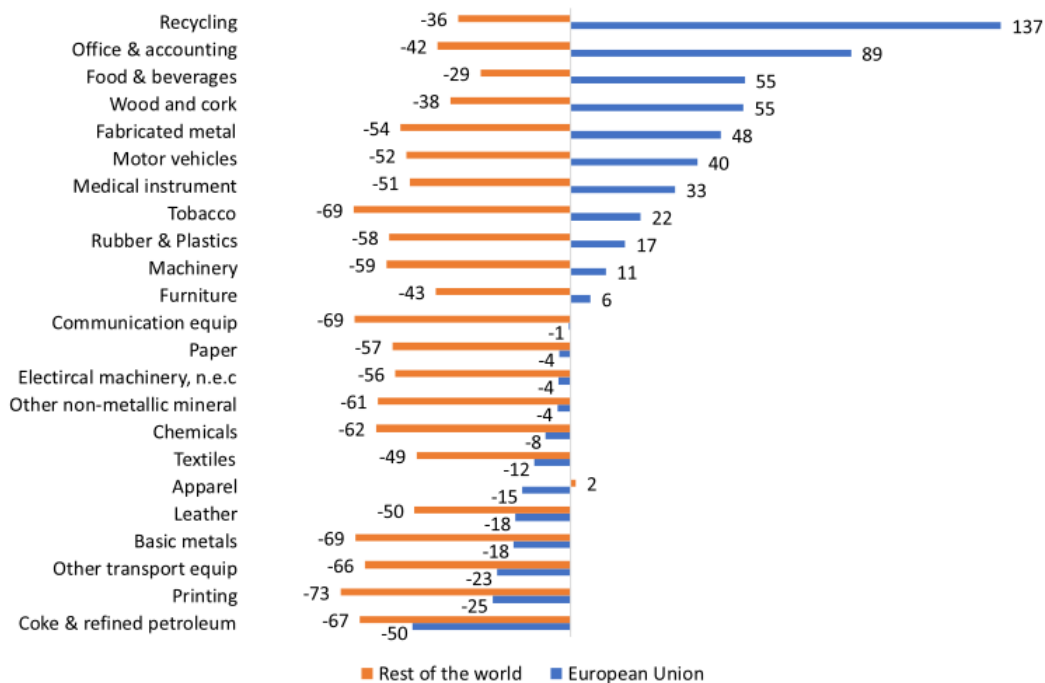
Similar results were found when examining two-digit manufacturing industries (Figure 6 and Figure 7). Ukraine's exports to the EU have performed much better than its exports to the rest of the world in 2022, relative to the averages of the previous three years. Except for the apparel sector, all 22 two-digit manufacturing exports from Ukraine to the rest of the world declined in 2022, while 11 sectors registered higher export growth to the EU. The manufacturing of food and beverages, which accounts for a significant share of Ukraine's exports, recorded a 55% export growth to the EU in 2022. The same is true for imports. Although imports from the EU and the rest of the world to Ukraine fell in 2022, the decline from the EU was smaller.

Figure 5: Ukraine's change in aggregate goods export and import in 2022 relative to the average of 2019-2021



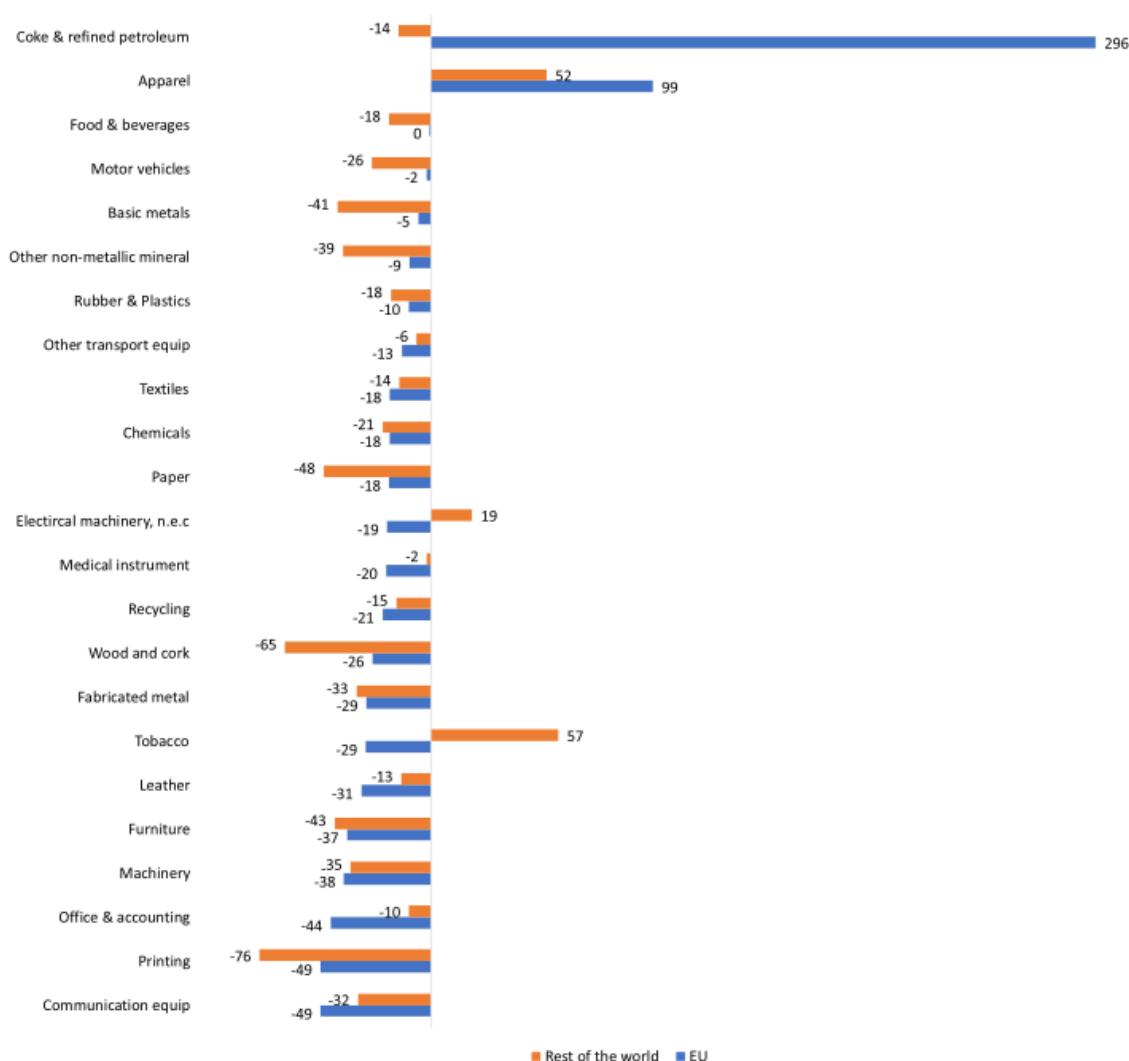
Data source: World Integrated Trade Solution, World Bank.

Figure 6: Ukraine's percentage change in goods export in 2022 relative to the average of 2019-2021 by sector and the European Union (EU) and the Rest of the World



Data source: World Integrated Trade Solution, World Bank.

Figure 7: Ukraine's percentage change in goods import in 2022 relative to the average of 2019-2021 by sector and the European Union (EU) and the Rest of the World



Data source: World Integrated Trade Solution, World Bank.

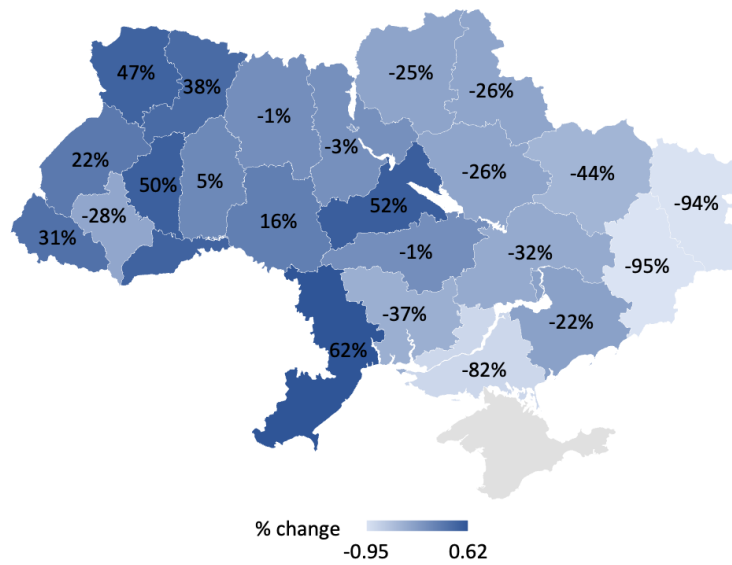
Table 6 and Figure 8 provide an overview of the export performance of Ukrainian regions in 2022 compared to the three-year average from 2019 to 2021. The data reveals a significant regional disparity. The backline regions' exports outperformed the other regions significantly. Except for Ivano-Frankivsk, all backline regions experienced an uptick in their exports in 2022, resulting in an overall increase of 21% in their export volumes. Conversely, all the frontline regions experienced the most significant decline, with their aggregate exports decreasing by 58% in 2022 relative to the average of 2019-2021.

Table 6: Ukraine's exports and percentage change in goods exports in 2022 relative to the average of 2019-2021 by region

Region group	Region	2019-2021		
		Average (Million US\$)	2022 (million US\$)	Percentage Change
Backline regions	Ivano-Frankivsk	945	685	-28
	Khmelnyskyi	741	780	5
	Lviv	2,486	3,025	22
	Rivne	538	744	38
	Ternopil	520	780	50
	Volyn	723	1,066	47
	Zakarpattia	1,508	1,970	31
	Sub-total	7,461	9,050	21
Frontline regions	Donetsk	5,201	284	-95
	Kharkiv	1,563	880	-44
	Kherson	321	57	-82
	Luhansk	150	9	-94
	Mykolayiv	2,619	1,643	-37
	Zaporizhzhia	3,582	2,809	-22
	Sub-total	13,436	5,681	-58
Other regions	Cherkasy	853	1,294	52
	Chernihiv	963	717	-25
	Chernivtsi	197	287	46
	Sub-total	2,012	2,298	14
Regained regions	Kyiv	2,156	2,096	-3
	Kyiv city	13,417	10,464	-22
	Sumy	973	724	-26
	Zhytomyr	724	718	-1
	Sub-total	17,269	14,001	-19
Support regions	Dnipropetrovsk	9,221	6,251	-32
	Kirovohrad	880	873	-1
	Odesa	1,481	2,400	62
	Poltava	2,536	1,867	-26
	Vinnysya	1,381	1,600	16
	Sub-total	15,499	12,992	-16

Data source: State Statistics Service of Ukraine [1].

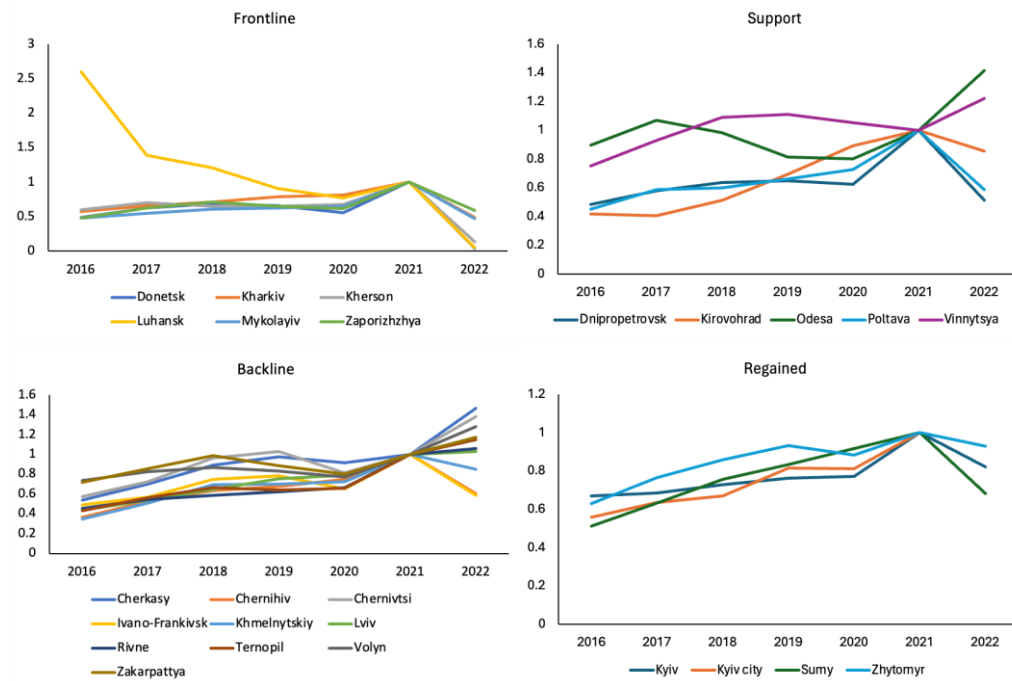
Figure 8: Regional percentage change in goods exports in 2022 relative to the average between 2019-2021



Note: The boundaries, names and designations on this map do not imply UNIDO's official endorsement or acceptance.
 Data source: State Statistics Service of Ukraine [1].

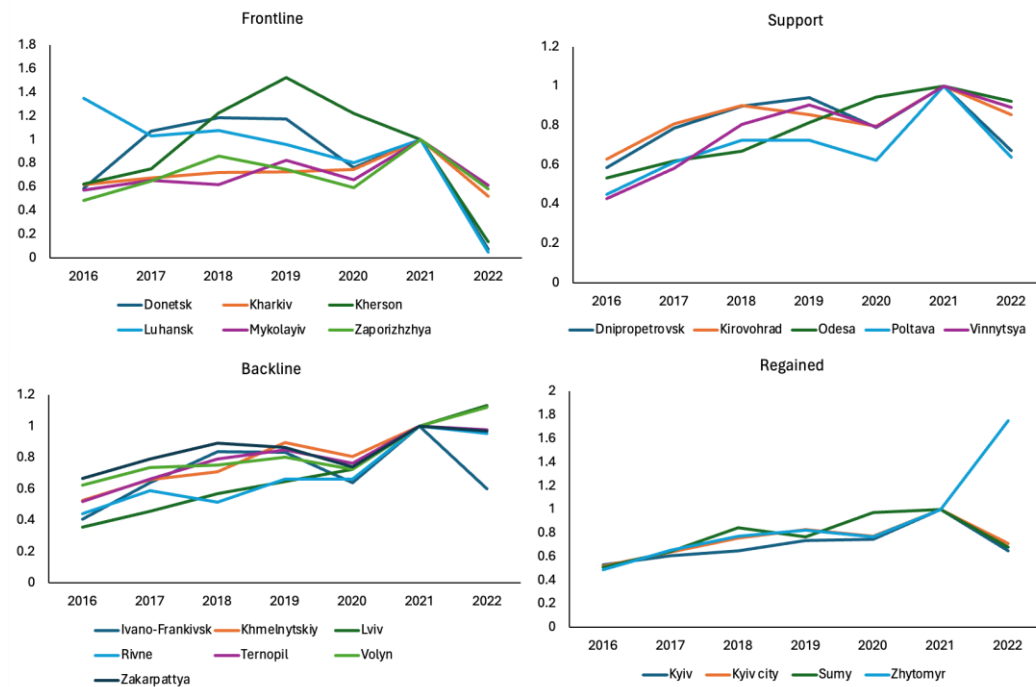
Figure 9 and Figure 10 display the aggregate export and import of Ukrainian regions for that year, respectively, with the 2021 export normalized to one. Regions are categorized into four groups based on the World Bank Classification: frontline, support, backline, and regained regions.

Figure 9: Ukraine's regional exports, 2016-2022



Data source: State Statistics Service of Ukraine [1].

Figure 10: Ukraine's regional imports, 2016-2022



Data source: State Statistics Service of Ukraine [1].

Exports from all frontline regions in Ukraine saw a significant decrease in 2022 compared to 2021. Overall, exports from the frontline areas fell by 67.7% in 2022, while imports decreased by 58%. The regions with the largest declines in exports in 2022 were Donetsk (96%), Luhansk (95%), and Kherson (86%). Other frontline regions such as Mykolayiv (52%), Kharkiv (51%), and Zaporizhzhia (41%) also experienced significant declines in exports.

The data for support regions in Ukraine shows mixed results for exports and imports in 2022 compared to 2021. Overall, exports from support regions fell by 32.9% in 2022, while imports decreased by 26.2%. However, some regions, such as Odesa (41%) and Vinnytsya (22%), showed an increase in exports. In contrast, all support regions experienced a decline in imports.

Regained regions saw a 29% decrease in aggregate exports and a 28.2% decrease in aggregate imports in 2022 relative to 2021. In contrast, backline regions saw a 1.5% increase in aggregate exports and a 4% increase in aggregate imports.

In examining Ukraine's regional industry trade, Table 7 presents the top three export sectors for each frontline region in Ukraine and each industry's share in the region's aggregate exports. This share is calculated using the average export of the industry from 2019-2021. All remaining sectors are grouped under the "Others" category.

Table 7: Ukraine's *frontline* regional trade by sector, 2021-2022

Region	Industry	2019-2021		Share of the sector	Change between 2021
		average (thousands USD)	2022 (thousands USD)		
Donetsk	Basic + fabricated metals	4,306,055	17,371	89	-100
	Machinery & equip.e.c.+ office + electrical, n.e.c.	285,227	5,293	6	-98
	Food & beverages	112,778	31,356	2	-72
	Others	126,009	181,197	3	44
Kharkiv	Food & beverages	420,496	206,118	36	-51
	Machinery & equip.e.c.+ office + electrical, n.e.c.	270,735	112,782	23	-58
	Basic + fabricated metals	81,088	53,206	7	-34
	Others	403,093	197,993	34	-51
Kherson	Food & beverages	91,067	20,884	44	-77
	Basic + fabricated metals	41,991	4,133	20	-90
	Motor vehicles + Other transport equ	22,097	293	11	-99
	Others	53,965	5,515	26	-90
Luhansk	Paper	45,811	1	33	-100
	Chemicals	34,592	162	25	-100
	Textiles	13,929	-	10	-100
	Others	46,436	1,561	33	-97
Mykolaiv	Chemicals	543,356	132,173	57	-76
	Food & beverages	283,819	404,040	30	42
	Machinery & equip.e.c.+ office + electrical, n.e.c.	82,880	35,291	9	-57
	Others	45,287	22,737	5	-50
Zaporizhzhia	Basic + fabricated metals	2,062,686	2,101,902	67	2
	Machinery & equip.e.c.+ office + electrical, n.e.c.	480,567	222,783	16	-54
	Food & beverages	312,375	124,351	10	-60
	Others	209,630	116,008	7	-45

Data source: State Statistics Service of Ukraine [3-8].

A few sectors dominate the region's aggregate exports in many frontline regions. For instance, manufacture of basic metals and manufacture of fabricated metal products accounted for 89% of Donetsk's total exports in 2019- 2021. However, in 2022, exports of these sectors declined by 99.6% relative to the average of 2019-2021. In the Kharkiv region, food and beverage exports, which accounted for 36% of the region's exports, were reduced by 51%. In contrast, exports of basic metals and fabricated metals, which accounted for 7% of the region's exports, declined by 34%.

The production losses in both basic and fabricated metals are of particular concern for several reasons. Firstly, these sectors were internationally competitive before the war. Secondly, there was a growing external demand for these sectors, and Ukraine's exports in these areas rose. This presented significant potential for employment opportunities. Moreover, the production in these sectors is geographically concentrated, primarily due to their high dependence on logistics and the supply of commodity inputs. Similar arguments apply to motor vehicles and other transport equipment, as well as textiles, despite these sectors not having the same level of geographic concentration and Ukraine not demonstrating strong specialization in them.

Table 8 displays the primary export sector for each non-frontline region in Ukraine and the share of that sector in the region's total exports in the average of 2019-2021. The remaining sectors are again grouped under the "Others" category. For example, the primary export sector for the support region Dnipropetrovsk is basic metals and the manufacturing of fabricated metals, which account for 74% of the region's total exports. In the Dnipropetrovsk region, exports of basic metals and fabricated metals declined by 33% in 2022 relative to the average of 2019-2021. Odesa, a region in Ukraine, registered an increase in exports of food products and beverages in 2022 relative to average of 2019-2021. This sector accounts for 53% of the region's exports.

Backline regions of Ukraine, such as Khmelnytskyi, Lviv, and Rivne, have seen increased exports from specific sectors, notably Food and Machinery. These sectors are less geographically concentrated compared to industries like metal production. Importantly, consultations with members of industrial organizations have revealed that some multinational food producers successfully relocated production plants to safer backline regions. In contrast, plants in frontline regions that managed to resume production operate at significantly reduced capacity levels, typically below 30%.

Table 8: Non-frontline regional trade, by sector, 2021-2022

Group	Region	Industry	2021 (thousands USD)	2022 (thousands USD)	Share of the sector	Change
Support regions	Dnipropetrovska	Basic + fabricated metals	4,328,214	2,891,309	74	-33
		Others	1,493,411	1,098,841	26	-26
	Kirovograd	Food & beverages	428,126	425,786	78	-1
		Others	121,210	84,105	22	-31
	Odesa	Food & beverages	407,668	624,827	53	53
		Others	354,999	322,007	47	-9
	Poltava	Food & beverages	285,212	243,793	46	-15
		Others	333,962	171,049	54	-49
	Vinnytsia	Food & beverages	494,104	508,147	61	3
		Others	311,080	264,514	39	-15
Back-line regions	Ivano-Frankivsk	Rubber & plastics	258,389	91,302	32	-65
		Others	550,152	429,988	68	-22
	Khmelnysky	Food & beverages	68,416	102,888	23	50
		Others	227,120	239,765	77	6
	Lviv	Machinery & equipin..+ office + electrical	522,154	587,385	25	12
		Others	1,537,018	2,075,506	75	35

Group	Region	Industry	2021 (thousands USD)	2022 (thousands USD)	Share of the sector	Change	
Back-line regions (contd.)	Rivne	Other non-metallic mineral	60,998	63,863	27	5	
		Others	166,093	264,979	73	60	
	Ternopil	Machinery & equip...+ office + electrical	207,612	173,331	60	-17	
		Others	135,866	238,156	40	75	
	Transcarpathian	Machinery & equip...+ office + electrical	911,751	978,176	64	7	
		Others	514,831	551,579	36	7	
	Volyn	Machinery & equip...+ office + electrical	262,229	219,989	43	-16	
		Others	353,954	547,353	57	55	
Re-gained regions	Kyiv	Food & beverages	347,357	374,573	31	8	
		Others	756,871	613,904	69	-19	
	Sumy	Food & beverages	208,348	93,149	35	-55	
		Others	384,787	290,594	65	-24	
	Zhytomyr	Machinery & equip...+ office + electrical	168,148	151,231	31	-10	
		Others	368,085	362,401	69	-2	
	Other regions	Cherkasy	Food & beverages	283,868	380,475	64	34
			Others	159,817	179,663	36	12
Chernihiv		Food & beverages	120,176	175,849	31	46	
		Others	265,833	169,253	69	-36	
Chernivtsi		Machinery & equip...+ office + electrical	50,881	47,197	31	-7	
		Others	114,466	134,961	69	18	

Data source: State Statistics Service of Ukraine [3-8].

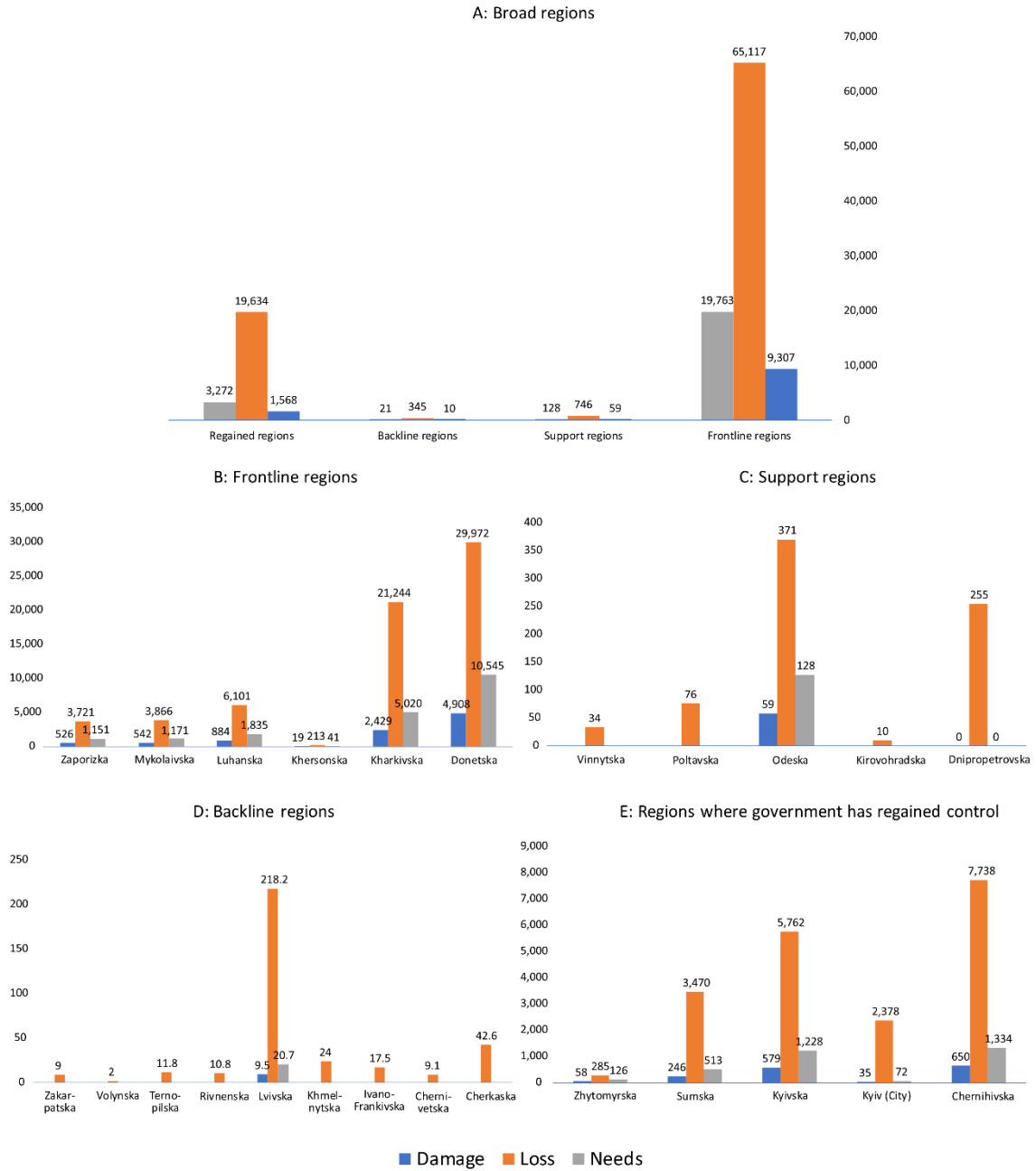
Stage III – Damage

The analysis is supplemented by estimates from the World Bank (2023). Error! Reference source not found. shows the damage, loss, and needs by region (in US\$ million) for Ukraine’s commerce and industry sectors. These estimates, derived from the World Bank report (2023), encompass the manufacturing sector and commerce.

Regions are categorized into four groups: frontline, support, backline, and regained regions. As of February 24, 2023, the total damage to industry and commerce facilities is estimated at US\$10.9 billion for a one-year period since the onset of the war. The total losses across commerce and industry amount to US\$85.8 billion, estimated over 30 months, which includes a one-year period from the start of the war and an additional 18 months accounting for continued losses.

Figure 11 A illustrates the overall impact of the war on Ukraine’s commerce and industry sectors by broad regions. It reveals that frontline regions bore the brunt of the impact, followed by regions that are no longer under the temporary military control of the Russian Federation—Figure 11 B-E details the impact of the war on regions, classified by their status. Among the frontline regions, Donetsk suffered the most in terms of damage and loss and, consequently, has the greatest need for support, followed by Kharkiv. Donetsk incurred US\$4.9 billion in damage and US\$29.9 billion in loss and, therefore, requires US\$10.5 billion in support.

Figure 11: Ukraine’s damage, loss, and needs by region (US\$ million)



Data source: World Bank (2023).

Stage IV – Business and investment expectations

In this subsection, we analyze the business expectations in Ukraine’s manufacturing sector and how they have evolved over 2022 and 2021. The Ukraine State Statistics Service (UkrStat) provides information about the expectations of industrial enterprises regarding their business activity development. This information, collected quarterly, covers more than 14 dimensions, including the assessment of industrial production, demand, export orders, and expectations of changes in industrial production, competitive positions on domestic, the EU, and non-EU markets (refer to the Appendix A for the list of measures).

For each measure, businesses are asked to assess whether their situation has improved (increased), remained the same, or worsened (decreased) or whether they have no opinion over the past three months. The balance is the difference between the percentage of businesses that reported improvement and the percentage that reported worsening. A negative balance indicates that more firms reported a worsening situation than an improvement over the past three months.

To capture the aggregate trend for expectations of industrial enterprises regarding their business activity development, we scored each measure. For each quarter and each measure, a score of 1 is given if the balance is negative and a score of 0 if it is positive. We then sum up the scores for all measures to create an index that ranges from zero to 14. A score of 14 indicates that the industry has negative balances for all measures, while a score of 0 indicates that all balances are positive. For instance, if we consider the “Assessment of industrial production over the past three months” for the manufacturing of food products sector, for the first quarter of 2022, 11% reported an increase, and 63% reported a decrease, resulting in a -53% balance. As the balance is negative, we scored it one per our approach.

Table 8 reports the results of the scorecard approach. The score is highest in the second quarter of 2022, indicating that businesses were more pessimistic in that quarter. This is likely due to the ongoing war in Ukraine, which has negatively impacted the economy. The score is lowest in the first quarter of 2023, which may be attributed to businesses having some time to adjust to the war and starting to see some signs of recovery.

Table 8: Ukraine's aggregate score of business expectation over quarters, 2022-2023

Sector	2022				2023
	Q1	Q2	Q3	Q4	Q1
Food	10	12	8	9	10
Beverages	9	6	10	9	4
Tobacco	8	10	6	7	6
Textiles	11	10	9	7	5
Apparel	9	8	4	9	6
Leather	8	11	4	6	5
Wood	8	10	10	12	8
Printing	10	11	7	6	4
Coke and refined petroleum	8	11	9	8	10
Chemical	11	12	11	12	10
Pharmaceutical	8	10	11	7	9
Rubber and plastic	10	12	8	11	10
Other non-metallic	9	10	7	10	9
Basic metals	9	12	12	12	8
Fabricated metal	9	12	11	11	10
Computer, electronic and optical	9	12	12	10	12
Electrical equipment	11	12	10	11	12
Machinery and equi n.e.c.	9	12	11	11	11
Motor vehicles	8	11	10	10	8
Other transport equipment	9	11	9	8	7
Furniture	10	12	8	8	10
Other manufacturing	9	11	9	12	8
Repair and installation	9	10	11	12	11
Average	9.1	10.8	8.9	9.4	8.4

Notes: This table reports the scores index. A score of one is assigned if the balance is negative, and zero is assigned if it is positive. The scores for all measures are summed up to create an index that ranges from zero to 14. A score of 14 indicates that the industry has negative balances for all measures, while zero indicates that all balances are positive. The data described in this figure as Q1 – Q4 in 2022 and 2023 refers to an assessment of the business situation over each past quarter.

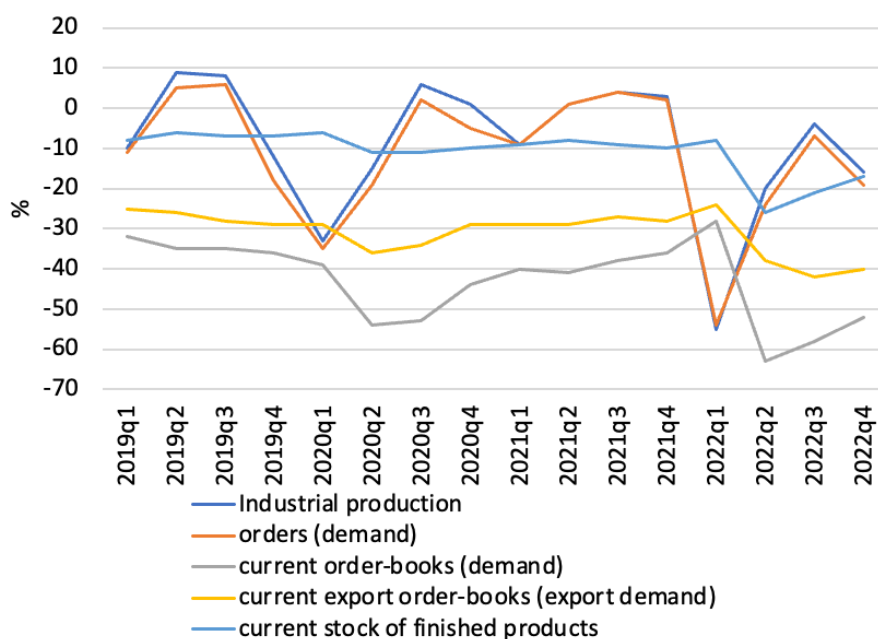
Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Conversations with members of Ukrainian industrial organizations and company managers have unveiled that restricted access to bank credit and reliance on internal funds were among the challenges faced by industrial companies for growth and development, including the modernization of production, in the period leading up to the war. To alleviate financial constraints experienced by manufacturing companies, preferential lending for producers and grants are recommended (World Bank 2023). Additionally, there is a call for the restoration of the Ministry of Industrial Policy (which was merged with the Ministry of Economy in 2014) and regional bodies for industrial policy, ensuring effective coordination with other state entities. In this regard, the "Law of Ukraine on State Support of Investment Projects with Significant Investments"⁸ is a positive stride, offering support and incentives for projects involving substantial capital investments.

Figure 12 shows business expectations across different measures for the manufacturing sector. The figure shows structural breaks in most of the measures in 2022 following the armed conflict. These results suggest businesses are becoming more cautious about investing in the current economic environment.

Figure 12: Ukraine's business expectations, 2019-2022

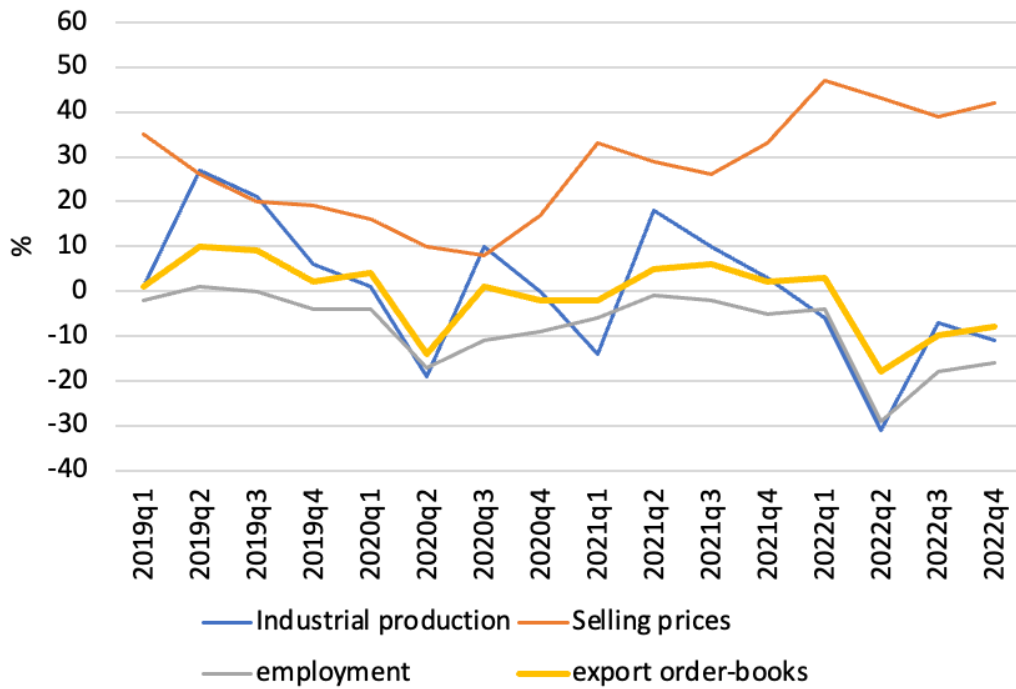
A: Assessment of the business situation over the past three months in the manufacturing sector



Note: The data described in this figure refers to an assessment of the business situation over the past three months. The values represent the balance between the share of firms reporting an increase and a decrease in each indicator.

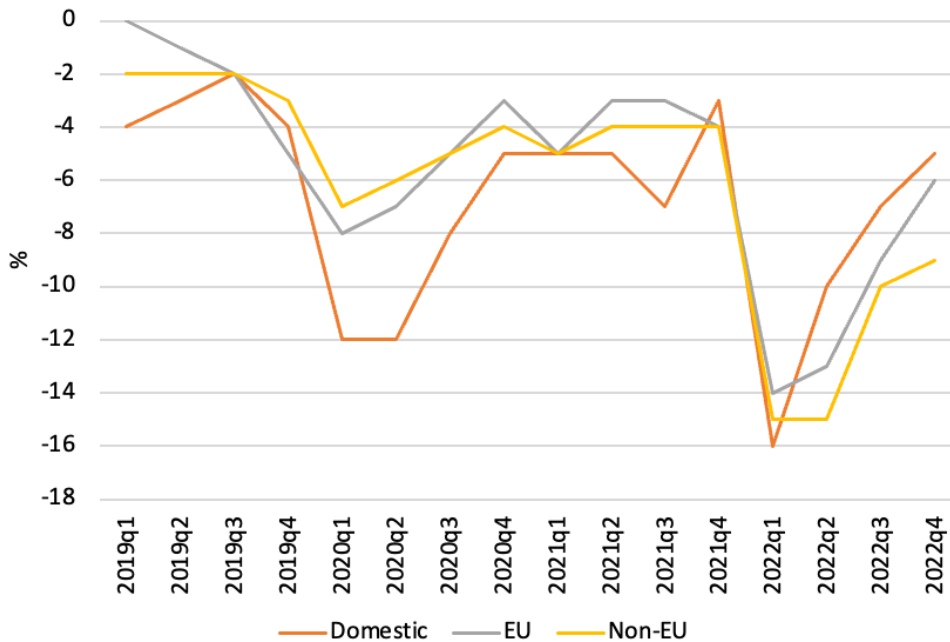
⁸ <https://zakon.rada.gov.ua/laws/show/1116-20#Text>.

B: Expected changes over the following quarter in the manufacturing sector



Note: The data described in this figure refers to an assessment of the business situation over the following quarter. The values represent the balance between the share of firms reporting a positive or negative expectation of each indicator.

C: Assessment of the competitive position of manufacturing enterprises



Note: The data described in this figure refers to an assessment of the business situation for the past quarter. The figure reports the data about quarter X as information concerning the quarter X-1. The values represent the balance between the share of firms reporting a positive or negative expectation of the indicator.

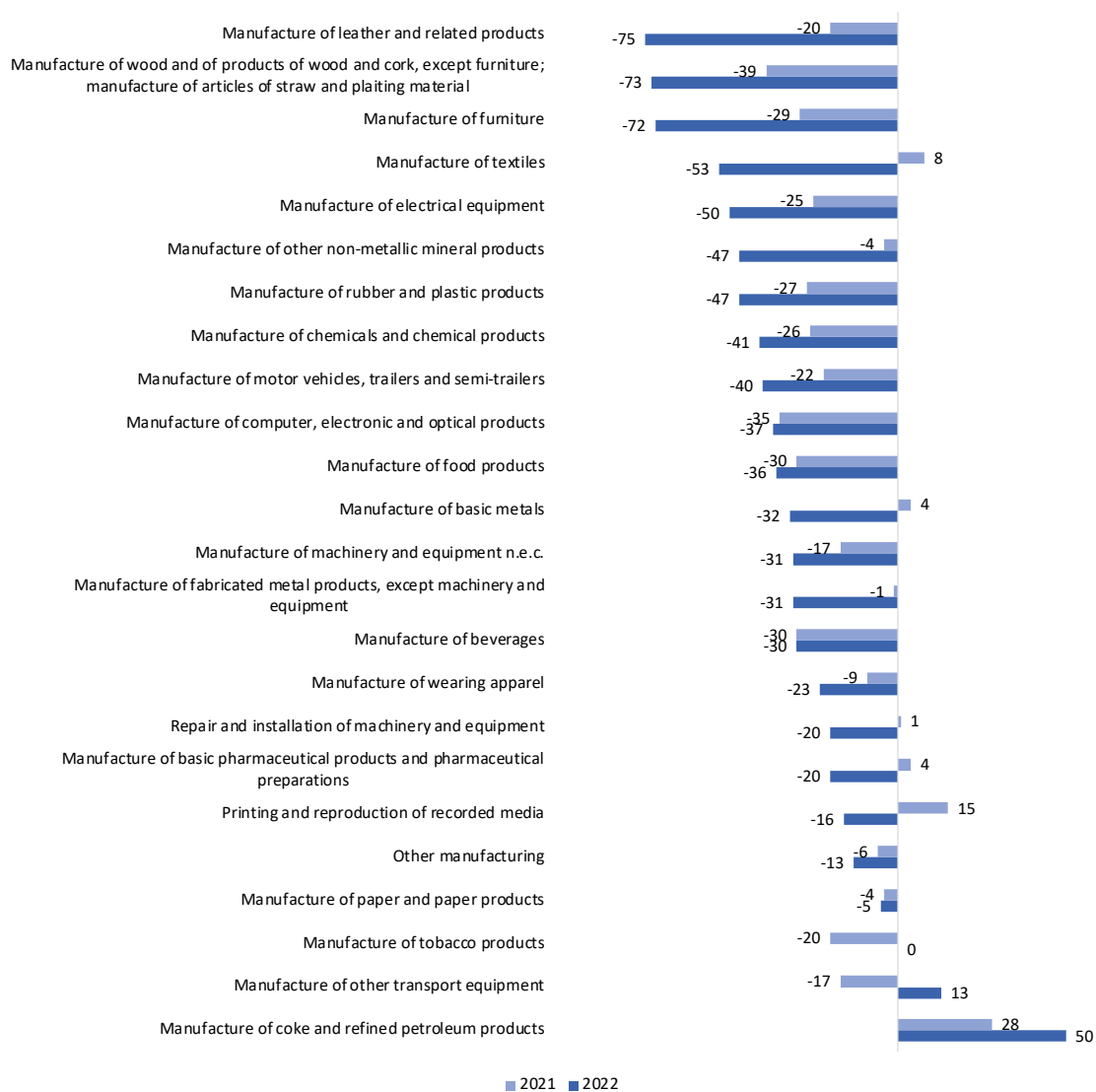
Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Expected changes in investment in the manufacturing

The biannual survey conducted in April and October asks respondents to rate the expected changes in investment in their industry in the current year compared to the previous year. Figure 13 compares the 2022 surveys with the results of the 2021 surveys. Panel A presents the results of the April surveys, and Panel B displays the results of the October surveys. The figure illustrates the expected % change of investments over the time horizon April 2021 vs April 2022 and October 2021 vs October 2022. The data was collected in April 2021, April 2022, October 2021, and October 2022.

Figure 13: Ukraine's expected changes in investment in manufacturing over the period 2021-2022, %

A: April 2021 vs April 2022



B: October 2021 vs October 2022



Note: The figure illustrates the expected % change of investments over the time horizon April 2021 vs April 2022 and October 2021 vs October 2022. The data was collected in April 2021, April 2022, October 2021, and October 2022.

Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

For both survey rounds in 2022, most manufacturing industries expected the changes in investment in the industry in the current year to be significantly smaller than in the previous year. For instance, in the October survey, respondents in the manufacture of basic pharmaceutical products and pharmaceutical preparations expected investments to be 50% smaller than in the previous year, while the expectation was positive in the same period for 2021. The beverages sector and the rubber and plastic sector followed this trend.

Destination of investment in manufacturing

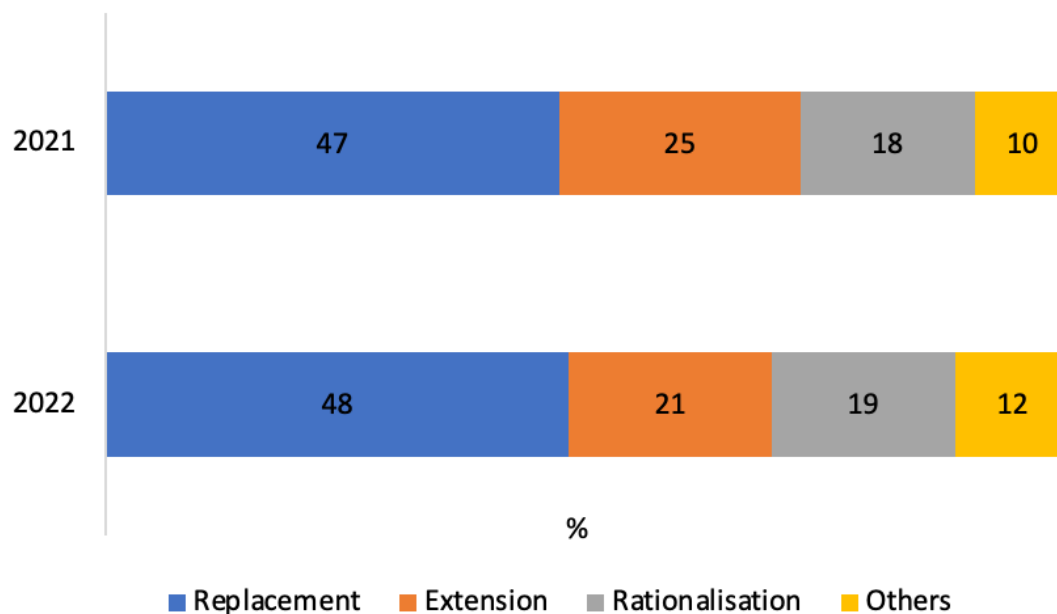
An October survey inquired about businesses' investment destinations in the manufacturing sector for the current and upcoming year. The responses were categorized as investment in replacement (new equipment or facilities to replace existing ones that are worn out or obsolete), extension (investment in new equipment or facilities to expand the capacity of existing operations), rationalization (investment in new equipment or facilities to improve the efficiency of existing operations), and others.

Figure 14 illustrates the destination of investment in the manufacturing sector for 2021 and 2022. Panel A reports for the current year, while Panel B shows the following year. In 2020, the expectation for 2021 was that 46% of the investment in the manufacturing sector was for replacing old equipment, 24% was for expanding production capacity, and 19% was for making other changes to improve efficiency. In 2021, the expectation for 2022 was similar, with 44% for replacement, 26% for extension, and 20% for rationalization (Panel B). In 2022 (Panel A), the distribution across investment types is confirmed with 48% replacement, 21% extension, 19% rationalization and 12% others⁹. This suggests no substantial difference between the pre- and during-war periods in terms of the destination of investment in the industry for the current year or the following year. The most common destination for investment is replacement, followed by extension. Rationalization and other investments are less common.

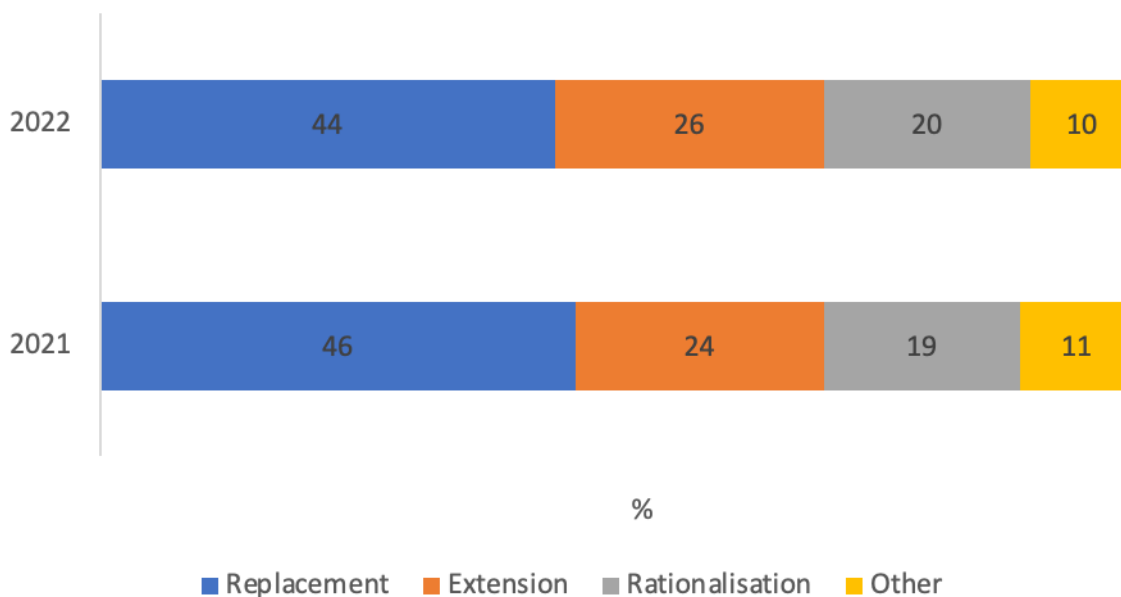
⁹ In 2023, in the manufacturing sector, the distribution of investments is similar with 44% replacement, 21% extension, 20% rationalization, and 15% other typologies of investment.

Figure 14: Ukraine's destination of investment in manufacturing in the current and next year (Aggregate), 2021-2022

A: Current year



B: The following year



Note: "Following year" refers to the expectations about 2022 with the data collected in 2021 and the expectations about 2021 with the data collected in 2020.

Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Table 9 presents the results by two-digit industry for 2022 and the expectations in 2021 concerning 2022. The findings are broadly consistent with the aggregated results, with replacement emerging as the most common form of investment across all industries except for tobacco and other transport equipment. However, there are some industry-specific variations. For instance, the manufacture of wearing apparel, other non-metallic, machinery and equipment, n.e.c., and repair and installation sectors have a higher proportion of investment in replacement than other industries. Conversely, computer, electronic and optical and chemical industries have a higher proportion of investment in rationalization. This indicates that investment strategies can vary significantly across different sectors.

Factors influencing investment in manufacturing

A subsequent survey inquired about the factors that influence investment in manufacturing for the current year and the upcoming year. Figure 15 presents the aggregate data for the manufacturing industry, while Figure 16 provides the data for two-digit industries. At an aggregate level in 2022, more than 90% of respondents indicated that demand and finance are the primary factors influencing investment decisions in the current year. Interestingly, there is little difference in the factors influencing investment decisions—such as demand, finance, technical factors, and others—before and after the war¹⁰.

¹⁰ In 2023, the updated data indicates a drop in the share of firms, flagging demand, financial resources, technical factors, and other factors as drivers affecting investments in manufacturing (45%, 64%, 36%, and 48%, respectively) as availability and cost of production inputs are becoming more important bottlenecks (UNIDO, 2024).

Table 9: Ukraine's destination of investment in manufacturing

Sector	Current year (2022)				Following year (2022)			
	Replacement	Extension	Rationalization	Other	Replacement	Extension	Rationalization	Other
Food	48	19	19	14	45	22	25	8
Beverages	60	10	14	16	42	22	24	12
Tobacco	κ/c	κ/c	κ/c	κ/c	23	47	13	17
Textiles	54	29	17	0	37	27	31	5
Apparel	72	17	11	0	61	25	11	3
Leather	66	7	27	0	47	22	31	0
Wood	38	30	24	8	48	13	27	12
Paper	59	24	13	4	40	31	20	9
Printing	κ/c	κ/c	κ/c	κ/c	43	27	23	7
Coke and refined petroleum	κ/c	κ/c	κ/c	κ/c	35	18	21	26
Chemical	34	20	28	18	40	26	20	14
Pharmaceutical	52	9	24	15	39	29	20	12
Rubber and plastic	40	30	13	17	46	30	17	7
Other non-metallic	45	16	24	15	53	17	14	16
Basic metals	40	24	18	18	35	30	18	17

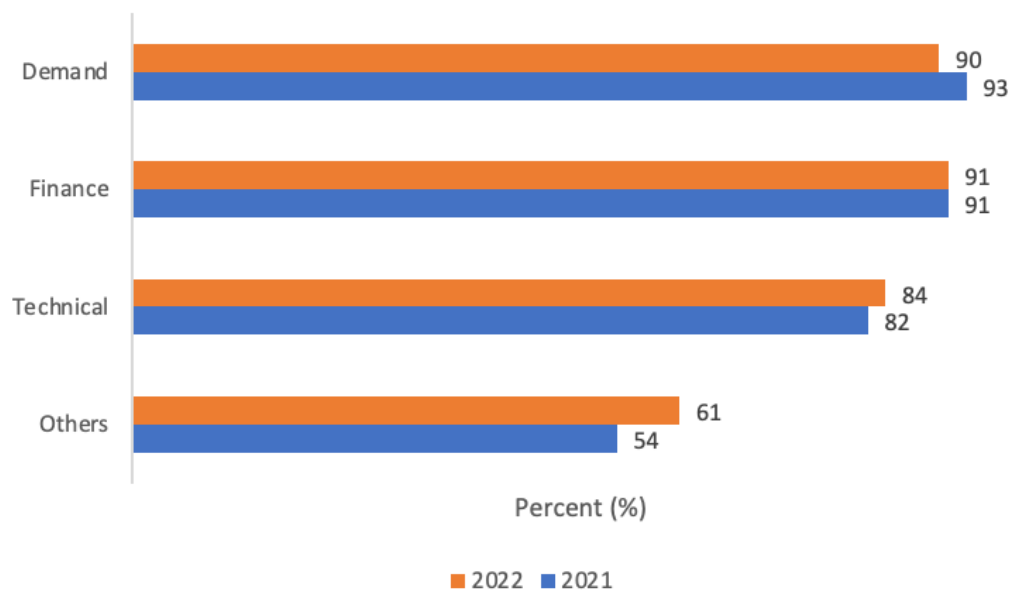
Sector	Current year (2022)				Following year (2022)			
	Replacement	Extension	Rationalization	Other	Replacement	Extension	Rationalization	Other
Fabricated metal	46	25	21	8	40	29	21	10
Computer, electronic and optical	37	16	34	13	45	35	15	5
Electrical equipment	43	24	21	12	39	23	24	14
Machinery and equipment n.e.c.	45	23	22	10	52	16	17	15
Other transport equipment	47	22	14	17	32	33	19	16
Furniture	48	22	21	9	44	33	13	10
Other manufacturing	34	29	25	12	45	29	19	7
Repair and installation	72	22	3	3	49	24	16	11

Note: k/c means the result is suppressed. The data represents the information collected from firms in 2022 about destinations of investment in manufacturing in 2022 (“Current year (2022)”) and the information collected in 2021 about expectations concerning destinations of investment in manufacturing in 2022 (“Following year (2022)”).

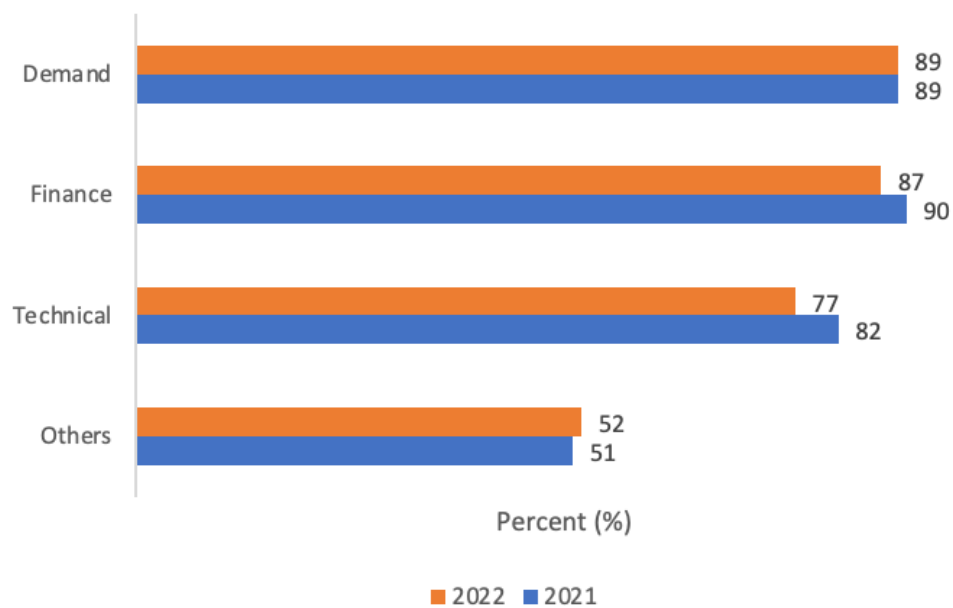
Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Figure 15: Ukraine's factors influencing investment in manufacturing in 2021 and 2022

A: Current year



B: The following year



Note: "Following year" refers to the expectations about 2022 with the data collected in 2021 and the expectations about 2021 with the data collected in 2020.

Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Table 10: Ukraine's factors influencing investment in manufacturing

Sector	Current year (2022)				Following year (2022)			
	Demand	Finance	Technical	Others	Demand	Finance	Technical	Others
Food	91	89	88	59	90	85	75	52
Beverages	95	95	89	74	85	93	74	48
Tobacco	κ/c	κ/c	κ/c	κ/c	100	100	80	80
Textiles	100	100	88	38	94	81	88	69
Apparel	81	94	75	56	95	95	74	74
Leather	75	75	100	75	50	67	67	67
Wood	90	90	85	60	95	84	95	63
Paper	85	92	77	69	94	88	69	56
Printing	κ/c	κ/c	κ/c	κ/c	94	94	69	44
Coke and refined petroleum	κ/c	κ/c	κ/c	κ/c	83	83	100	67
Chemical	82	86	77	68	95	88	74	45
Pharmaceutical	100	100	75	38	88	88	75	46
Rubber and plastic	89	89	89	58	87	85	78	43
Other non-metallic	90	100	85	70	87	85	74	56
Basic metals	95	95	80	45	88	91	72	44
Fabricated metal	92	92	85	73	86	85	80	51
Computer, electronic and optical	79	93	93	64	84	81	77	39
Electrical equipment	100	93	93	60	90	97	74	58
Machinery and equi n.e.c.	94	94	89	67	91	87	87	66
Motor vehicles	93	86	71	50	100	90	81	57
Other transport equi.	70	100	70	50	86	95	90	57
Furniture	80	100	90	60	79	83	83	46
Other manufacturing	88	81	75	69	100	84	72	56
Repair and installation	89	100	89	44	73	81	73	31

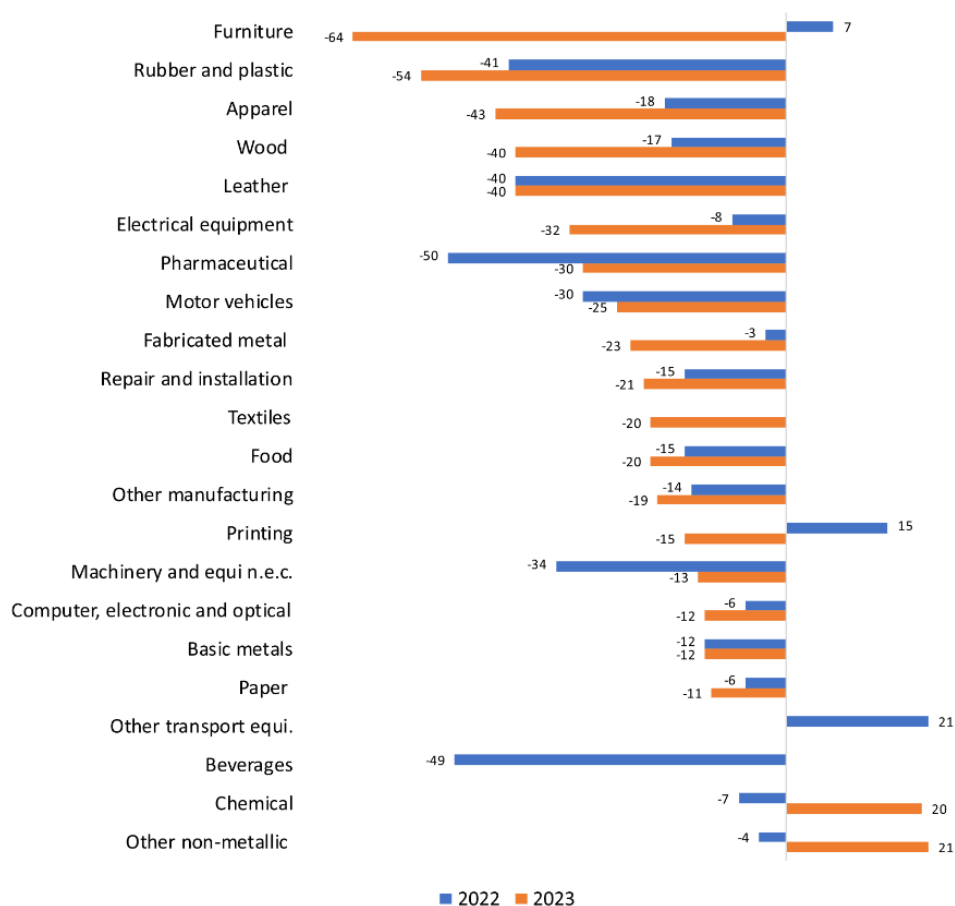
Note: κ/c means the result is suppressed. The data represents the information collected from firms in 2022 about factors affecting investments in 2022 ("Current year (2022)") and the information collected in 2021 about factors affecting investments in 2022 ("Following year (2022)").

Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Expected changes in investment in the manufacturing sector in 2022 over 2021 and 2023 over 2022

Figure 16 illustrates the anticipated changes in manufacturing investment in the upcoming year (bar 2023) compared to 2022 and the expected investment change perceived in 2022 compared to 2021 (bar 2022). Almost all sectors are expected to see negative changes in investment in 2023, with furniture (64%), rubber and plastics (54%), and apparel (43%), being the sectors with the highest anticipated negative changes. On an aggregate level, the manufacturing sector is expected to see a decrease in investment by 18% in 2023 compared to 2022.

Figure 16: Expected changes (%) in Ukraine’s investment in manufacturing in the following year over the current year



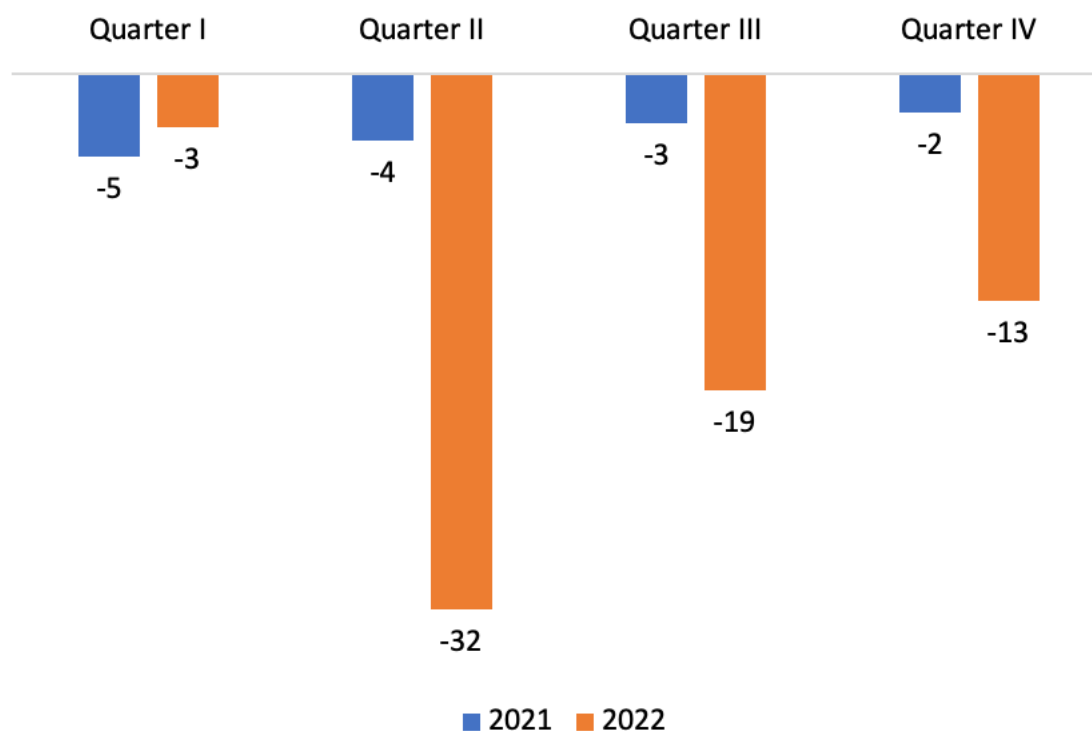
Note: The data described in this figure as 2023 and 2022 refers to the expectations of investment changes in 2023 with the data collected in 2022, and the expectations of investments change in 2022 over the previous year with data collected in 2022. The data of textiles (2022), other transport equipment (2023), beverages (2023), tobacco (2022 and 2023), and coke and refined petroleum (2022 and 2023) are not available.

Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

Stage V – Employment impact

Figure 17 shows the expected changes in employment at industrial enterprises over the next three months for 2021 and 2022. The second quarter of 2022 is expected to have the greatest negative change in employment, at 33%. This is followed by the third quarter (18%) and the fourth quarter (14%).¹¹

Figure 17: Ukraine's expected changes in industrial employment, 2021-2022



Note: The quarters in 2021 and 2022 data in this figure refers to expectations over each corresponding quarter in the same or following year. The values represent the expected change in total employment of industrial firms from the data submitted by industrial enterprises.

Data source: UNIDO elaboration, based on the State Statistics Service of Ukraine [1].

¹¹ In 2023, employment expectations are increasing.

4. Conclusions

With a great variety of approaches, indicators, sources of data and geographical dimension of the analysis, the study indicates great heterogeneity of the impacts across industrial sectors and oblasts. Despite this heterogeneity two points clearly emerge:

- 1) the loss for the Ukraine economy and industrial has been dramatic;
- 2) despite the losses Ukraine still preserves niches of resilience and a capability reservoir.

Whereas industrial policy traditionally focuses on unlocking potential of industrial sectors and remove bottlenecks to industrialization, in the Ukraine emergency situation, a great policy effort also needs to focus on mitigation measures to reduce damages and losses, while at the same time building the foundations for a green and prosperous recovery. The policy challenge is monumental, but industrial monitoring and analytics can play a vital role to support evidence based decisions.

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6. Appendix

Appendix A: List of measures

1	Assessment of industrial production over the past three months
2	Assessment of orders (demand) on industrial production over the past three months
3	Assessment of current order-books (demand) on the industrial production
4	Assessment of current export order-books (export demand) on the industrial production
6	Assessment of current stock of finished products in the industry
7	Expected changes in industrial production over the next three months
9	Expected changes in selling prices for the products of the industry over the next three months
10	Expected changes in employment at industrial enterprises over the next three months
11	Expected changes in export order-books (export demand) on the industrial production over the next three months
13	Assessment of production capacity of industrial enterprises, considering current order books and expected change in demand over the next three months
15	Assessment of the competitive position of industrial enterprises on the domestic market over the past three months
16	Assessment of the competitive position of industrial enterprises on the foreign markets inside the EU over the past three months
17	Assessment of the competitive position of industrial enterprises on foreign markets outside the EU over the past three months

Data source: State Statistics Services of Ukraine [1].

Appendix B: Exports losses with alternative statistics classifications and datasets

Figure 1, employing data about losses in industrial production from the Ukraine Statistics Office, is expressed with an ISIC rev. 4 classification. It is possible to transform ISIC rev. 4 data into ISIC rev. 3 by using the following concordance table (Table B1).

Only the ISIC rev. 4 sector 26 “Computer, electronic and optical products” cannot be decomposed into ISIC Rev. 3 sectors and must remain unchanged. Further information on the concordance table is available at the UNIDO source User’s Guide Statistical Data Portal. Losses of exports in 2022 and an average 2019 – 2021 according to an ISIC rev. 3 classification are then summarized (Figure B1). Sectors with the highest percentage losses are tobacco, machinery, printing, other transport equipment, and basic metals.

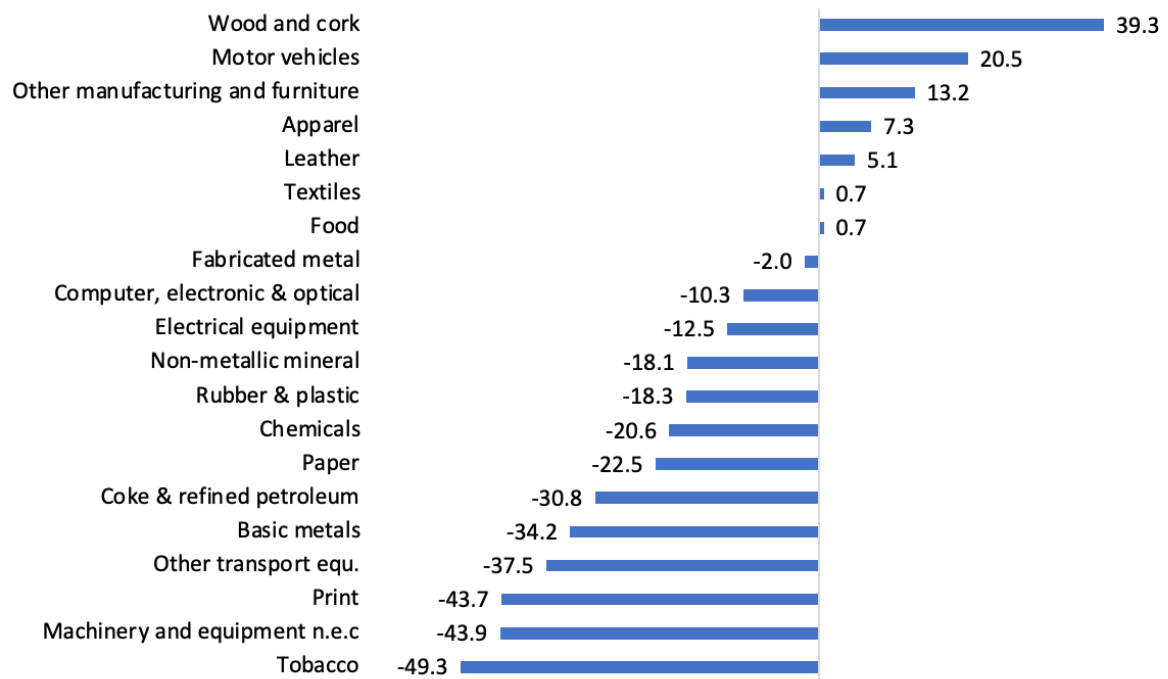
It is possible to compare data from the Ukraine Statistics Office with those from the UNComtrade/WITS (World Integrated Trade Solutions) dataset (ISIC Rev. 4 classification), summarized in Figure B2.

Table B1: ISIC rev. 3 and rev. 4 concordance table

ISIC rev. 3	ISIC rev. 4
15	10 + 11
16	12
17	13
18	14
19	15
20	16
21	17
22	18
23	19
24	20 + 21
25	22
26	23
27	24
28	25
30F (30+32+33)	26
31	27
29	28 + 33
34	29
35	30
36	31 + 32

Data source: UNIDO (2018).

Figure B1: Losses of exports 2022 vs average 2019 – 2021 (ISIC Rev. 3)



Data source: State Statistics Service of Ukraine [1].

Figure B2: Losses of exports 2022 and average 2019 – 2021 (ISIC Rev. 3)



Data source: UnComtrade/WITS (World Integrated Trade Solutions).

Appendix C: Industrial production losses with alternative statistics classifications and datasets

Figure 4, employing data about losses in industrial production from the Ukraine Statistics Office, is expressed with an ISIC rev. 4 classification. It is possible to transform ISIC rev. 4 data into ISIC rev. 3 by using the following concordance table (Table C1).

Only the ISIC rev. 4 sector 26 “Computer, electronic and optical products” cannot be decomposed into ISIC Rev. 3 sectors and must remain unchanged. Further information on the concordance table is available at the UNIDO source User’s Guide Statistical Data Portal.

Two indices of industrial production belonging to ISIC rev. 4 sectors are aggregated into a single ISIC rev. 3 index by using weights provided by the Ukraine Statistics Office that are used to calculate the Ukraine Industrial Production Index <https://ukrstat.gov.ua/>

Losses of the industrial production index in 2022 vs an average 2019 – 2021 according to an ISIC rev. 3 classification are then summarized in Figure C1. Non-metallic mineral products, coke, basic metals, tobacco and machinery, are sectors with the highest percentage losses.

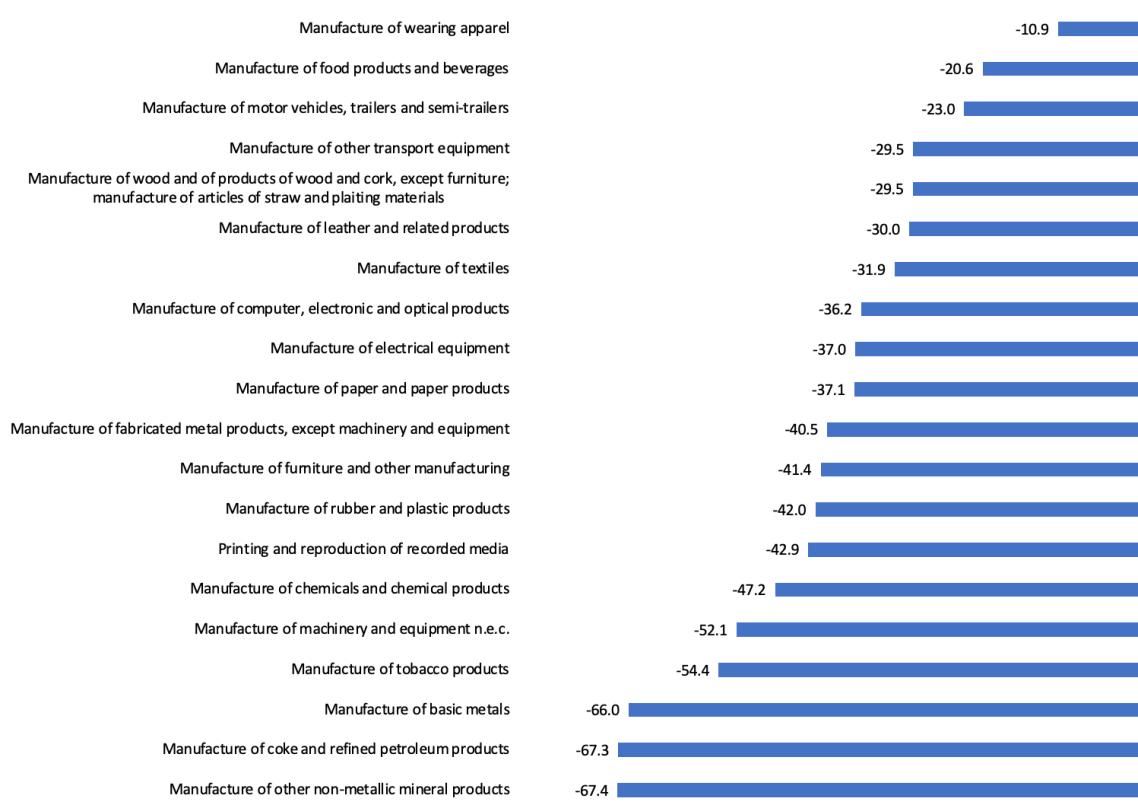
It is possible to compare data from the Ukraine Statistics Office with that from the UNIDO dataset <https://stat.unido.org/database/Quarterly%20IIP> (ISIC Rev. 4 classification), which can be summarized in Figure C2.

Table C1: ISIC rev. 3 and rev. 4 concordance table

ISIC rev. 3	ISIC rev. 4
15	10 + 11
16	12
17	13
18	14
19	15
20	16
21	17
22	18
23	19
24	20 + 21
25	22
26	23
27	24
28	25
30F (30+32+33)	26
31	27
29	28 + 33
34	29
35	30
36	31 + 32

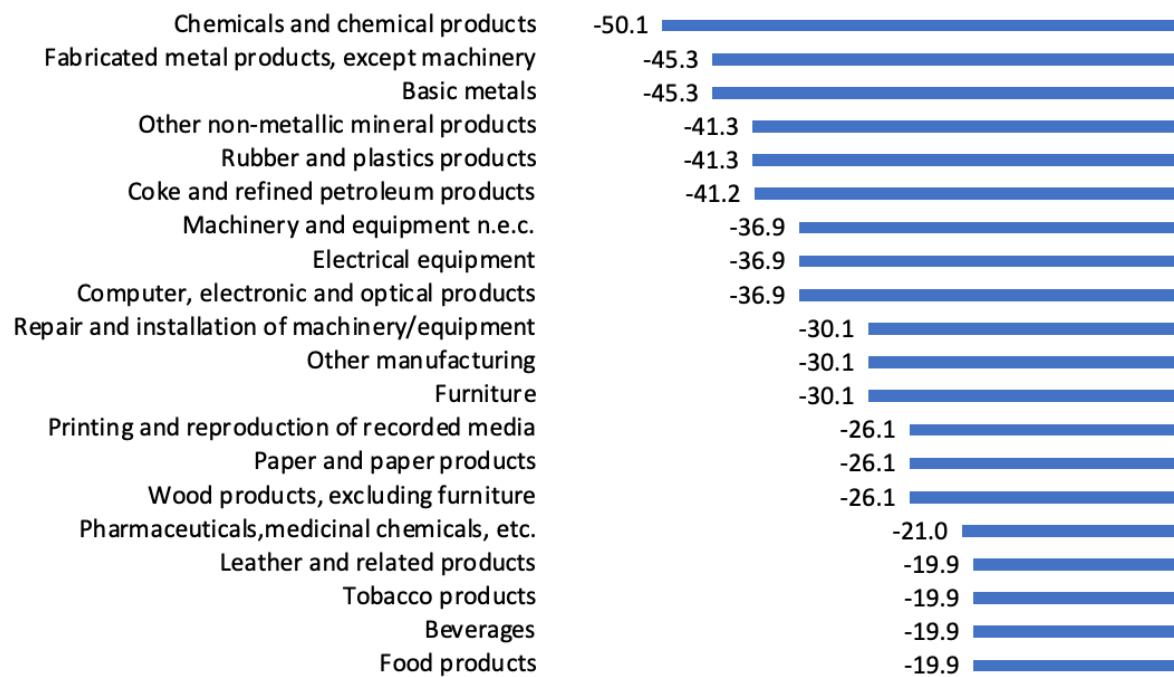
Data source: UNIDO (2018).

Figure C1: Losses of the index of industrial production 2022 vs average 2019 – 2021 (ISIC Rev. 3)



Data source: State Statistics Service of Ukraine [1].

Figure C2: Losses of the index of industrial production 2022 vs average 2019 – 2021 (ISIC Rev. 3)



Data source: UNIDO.



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