

## Article

# Estimation of Ukraine's losses from the military aggression of the Russian Federation : a macroeconomic dimension

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JEL: C13, C53, E20, H56

**ESTIMATION OF UKRAINE'S LOSSES FROM THE MILITARY  
AGGRESSION OF THE RUSSIAN FEDERATION:  
A MACROECONOMIC DIMENSION**

*At the end of March 2022, researchers of the State Institution "Institute for Economics and Forecasting, National Academy of Sciences of Ukraine" estimated the potential losses of Ukraine's national economy from the military invasion of the aggressor country. The results obtained are not final, as they only account the situation in the first month of the war. At the same time, they are quite informative in terms of presenting Ukraine's losses and the corresponding challenges this country is facing both in terms of consolidating available resources to protect state sovereignty and in terms of post-war economic reconstruction. The results obtained in the study have been sent to the central government. The paper is published in the journal without some information, which is removed for security reasons.*

Quantitative estimates of Ukraine's GDP decline as a result of the war unleashed by the Russian Federation are rather tentative due to the lengthening of the acute phase of hostilities, the daily increase in losses of Ukraine's production and infrastructure capacity and the lack of serious signs of not only completion, but even suspension of the Russian military intervention.

At the same time, a *direct* decline in Ukraine's GDP is caused by

- the destruction of production capacity, housing stock, as well as non-residential, transport and social infrastructure;
- the restriction of the use of the national land fund due to its partial occupation, as well as damage caused by mines, shelling and pollution of Ukrainian territories;
- a reduction in the workforce engaged in efficient production;
- a decrease in consumer spending by the population;
- a reorientation of public expenditure in favor of areas not directly related to GDP production;
- higher inflation, debt, and currency depreciation;
- direct and associated investment losses;
- higher energy prices;
- decrease in the quality of human capital due to psychological trauma and risk of loss of life.

Ukraine's direct and indirect losses will also be determined by *global* factors, such as a slowdown of the global economy due to the disruption of established supply chains, rising commodity and energy prices, in particular the rise in overall international risks, the increase in global confrontation and defense costs.

***In line with these threats, international organizations and expert groups made these estimates for Ukraine's economic downturn in 2022.***

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The IMF in its March report "Ukraine: Request for Purchase under Rapid Financing Instrument and Cancellation of Stand-by Arrangement-Press Release" forecasts that Ukraine's real GDP will fall by 10%<sup>1</sup> in 2022. But such a reduction would be possible with a rapid end to the war and substantial financial donor support. In other circumstances, the annual reduction could be much higher, in the range of 25-35% (taking into account data on the reduction of real GDP during similar military conflicts in Iraq, Lebanon, Syria, and Yemen).

According to the same IMF report, Ukraine's budget deficit will increase by 3% of GDP in 2022. The recession is expected to cause tax revenues to fall by around 4 per cent of GDP compared with 2021. With such an increase in the budget deficit, and taking into account the financial support already provided by the IMF (USD 4.5bn), there remains a need to finance the budget deficit of USD 7.4bn (4% of GDP). The budget deficit financing requirement of USD 7.4 billion (4 per cent of GDP) remains unchanged<sup>2</sup>.

According to Ukraine's alternate director at the IMF, Ukraine's annual losses could be as much as 35%<sup>3</sup>.

Since the start of the military invasion of Ukraine, international rating agencies downgraded Ukraine's sovereign ratings significantly, such as:

- Fitch Ratings (25 February 2022) - to speculative, from 'B' to 'CCC'<sup>4</sup>, which worsens the investment grade of government bonds<sup>5</sup>;
- Standard & Poor's (25 February 2022) to 'B' to 'B-';
- Moody's (4 March 2022) - from 'B3' to 'Caa2', citing that Ukraine's existing financial 'buffers' and expected international financial assistance are not sufficient to fully offset the liquidity risks associated with Ukraine's war-time debt needs<sup>6</sup>.

Mentioned facts do not only make more difficult for Ukraine to access international capital markets, but also increase its economic losses due to a significant deterioration of the business environment and corresponding capital flight. However, leading business groups give the following estimates of the possible decline in Ukraine's GDP in 2022:

- Raiffeisen Research: – (-15) %;

<sup>1</sup> Ukraine: Request for Purchase under the Rapid Financing Instrument and Cancellation of Stand-by Arrangement-Press Release; Staff Report; and Statement by the Executive Director for Ukraine (2022, March). IMF Country Report No. 22/74. <https://doi.org/10.5089/9798400204852.002>. Taking into account the lack of projected growth, Ukraine's GDP loss would be 13.5 per cent.

<sup>2</sup> Ibid. P. 6-7.

<sup>3</sup> The fall - by 35%. Rashkovan on how the Ukrainian economy can hold up in times of war – HB interview (2022, 20 March). Retrieved from <https://biz.nv.ua/economics/chto-proishodit-s-ukrainskoy-ekonomikoy-vo-vremya-voyny-intervyu-nv-50226235.html>

<sup>4</sup> The highest – AAA, the lowest – D.

<sup>5</sup> Fitch Ratings. Retrieved from <https://www.fitchratings.com/entity/ukraine-80442268#ratings>

<sup>6</sup> Moody's downgrades Ukraine's ratings to Caa2 from B3, ratings remain on review for downgrade (2022, 4 March). Retrieved from [https://www.moody's.com/research/Moodys-downgrades-Ukraines-ratings-to-Caa2-from-B3-ratings-remain--PR\\_463451](https://www.moody's.com/research/Moodys-downgrades-Ukraines-ratings-to-Caa2-from-B3-ratings-remain--PR_463451)



- Citigroup: – (-32) %;
- Oxford Economics: (-34,2) %;
- Moody's Analytics: (-43) %;
- S&P Global Mkt International: (-43,1) %;
- Economic Intelligence Unit: (-46,5) %.

***National estimates of Ukraine's economic losses due to the foreign intervention are also threatening***

For example, the Ukrainian Finance Minister estimates that the ten regions where the fighting is taking place account for half of Ukraine's GDP production, resulting in losses of between 33 and 50 per cent<sup>7</sup>. Ukrainian Prime Minister Dmytro Shmygal estimates that the war in Ukraine caused immediate direct losses of more than \$500 billion<sup>8</sup>.

The first official results of the transfer of Ukraine's economy to a war footing and estimates of its losses are not expected until April. The Ukrainian Ministry of Economy estimates the respective losses in two components: total GDP losses and infrastructure losses. According to the Ministry of Economy of Ukraine, as of 13 March 2022, losses from the destruction of part of the national infrastructure amounted to 119 billion dollars<sup>9</sup>.

The KSE Institute estimates Ukraine's infrastructure losses as of 17 March 2022 at USD 62.6 billion. At least 411 educational institutions, 36 healthcare institutions, 1,600 residential buildings, 26 factories and warehouses, 15 airports, six thermal power plants and hydroelectric power stations, 15,000 km of roads, 350 bridges and bridge crossings were destroyed or seized by the enemy<sup>10</sup>.

Ukrainian Legal Advisory Group (ULAG) estimates that 5,000 buildings were destroyed during the 26 days of war in Ukraine, including 4,431 residential buildings, 548 educational institutions, 135 medical facilities and eight cultural and arts institutions<sup>11</sup>.

Estimates of the drop in foreign currency revenues from the stoppage of exports of agricultural and steel products are as much as 80%. In these circumstances,

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<sup>7</sup> Ukrainian Finance Minister Serhiy Marchenko interviewed by Forbes (2022, March 14). Retrieved from [https://mof.gov.ua/uk/news/interviu\\_ministra\\_finansiv\\_sergiia\\_marchenka\\_vidanniu\\_forbes\\_14032022-3361](https://mof.gov.ua/uk/news/interviu_ministra_finansiv_sergiia_marchenka_vidanniu_forbes_14032022-3361)

<sup>8</sup> Losses for Ukraine due to Russian invasion exceed \$500bn – Schmyhal (2022, March 16). Retrieved from <https://interfax.com.ua/news/economic/814088.html>

<sup>9</sup> Ministry of Economy says when Ukraine's GDP loss due to war will be calculated (2022, March 14). Retrieved from [https://economy.24tv.ua/minekonomiki-povidomili-koli-pochnut-pidrahovuvati-vtrati-vvp\\_n1904648](https://economy.24tv.ua/minekonomiki-povidomili-koli-pochnut-pidrahovuvati-vtrati-vvp_n1904648)

<sup>10</sup> Ukraine destroys \$8.3bn worth of infrastructure in a week – KSE (2022, March 17).

Retrieved from [https://lb.ua/economics/2022/03/17/509961\\_tizhden\\_ukraini\\_zruynovano.html](https://lb.ua/economics/2022/03/17/509961_tizhden_ukraini_zruynovano.html)

<sup>11</sup> Ukraine assessed the scale of the war's devastation (2022, March 22). Retrieved from <https://korrespondent.net/ukraine/4459467-v-ukrayne-otsenyly-masshtaby-razrushenyi-ot-voiny>



Ukraine's international reserves are largely supported by active foreign aid receipts: its volume in the four weeks of war amounted to around USD 4 billion<sup>12</sup>.

Ukraine's economy shrank by almost 50% in March, according to estimates by the National Bank of Ukraine. Electricity consumption in the last two weeks is around 60% of pre-war levels, the MMC's workload (metal and mining companies) is 50% - they are now mainly working to meet Ukraine's demand, including military-related needs. According to business blitz surveys, about 30% of the companies stopped operations completely, while 45% reduced output. The NBU estimates losses of these companies at 40-50%, noting, however, that the data cannot be extrapolated to the whole country, as the economy in the western regions is functioning more or less normally<sup>13</sup>.

Estimates of the 50% loss of national GDP production correlate tightly with the results of the population survey on current employment. Indeed, according to the Rating sociological group, 53% of those surveyed who were working before the war were not employed<sup>14</sup> as of 19 March 2022.

The European Business Association reports that about 56% of its member companies were not operating as of 5 March 2022<sup>15</sup>.

***Estimation of economic losses during hostilities in the post-Soviet republics***

**Georgia's economic losses** from the eight-day military conflict with Russia in 2008, which caused limited damage to Georgian infrastructure, are estimated at about \$2 billion<sup>16</sup>. The global financial and economic crisis that began shortly after the end of hostilities in Georgia makes it difficult to calculate more precisely. The country's GDP fell by 3.7% in 2009<sup>17</sup>. The decline in Georgia's GDP per capita, on the other hand, reached 15.7%<sup>18</sup>.

<sup>12</sup> Ukraine managed to raise about \$4 billion from international partners in a month - Presidential Office (2022, March 25). Retrieved from <https://www.ukrinform.ua/rubric-economy/3439184-za-misyats-ukrajini-vdalosya-zaluchiti-blizko-4-milyardiv-vid-mijnarodnih-partneriv-op.html>

<sup>13</sup> Forbes interview with NBU deputy governor Serhii Nikolaichuk on adapting the economy to martial law and the "Marshall Plan" for Ukraine (2022, March 18). Retrieved from <https://forbes.ua/inside/ekonomika-zvikaie-do-voennogo-chasu-zastupnik-golovi-nbu-sergiy-nikolaychuk-pro-padinnya-vvp-dopomogu-partneriv-ta-ukrainskiy-plan-marshalla-18032022-4800>

<sup>14</sup> 53% of Ukrainians who worked before the war are out of work now – survey (2022, March 23). Retrieved from <https://suspilne.media/220819-53-ukrainciv-aki-mali-robotu-dovijni-nini-ne-pracuut-opituvanna/>

<sup>15</sup> A third of Ukraine's economy is dysfunctional – Marchenko (2022, March 19). Retrieved from <https://www.epravda.com.ua/news/2022/03/19/684338/>

<sup>16</sup> Economic consequences of the Georgian-Russian conflict / Vienna Institute for International economic studies. Retrieved from <https://wiiw.ac.at/press-release-economic-consequences-of-the-georgian-russian-conflict-english-pnd-19.pdf>

<sup>17</sup> World Bank national accounts data. Retrieved from <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=GE>

<sup>18</sup> How military conflicts affect the economy (2017, June 30). *Mind.ua*. Retrieved from <https://mind.ua/openmind/20173685-yak-vijskovi-konflikti-vplivayut-na-ekonomiku>



**Ukraine's GDP declined** during the first active phase of the Russian-Ukrainian war (March 2014 - February 2015) was as follows: 10.1% in 2014 and 9.8% in 2015<sup>19</sup>.

**Armenia's GDP** declined by 7.4% in 2020, driven by both the six-week military conflict with Azerbaijan and the unfolding of the COVID-19 crisis.

*The estimates of Ukraine's economic losses as calculated by the Institute for Economics and Forecasting of the National Academy of Sciences of Ukraine*

**Estimates based on extrapolation of conditions and casualties observed in Ukraine during the first active phase of the Russian-Ukrainian war (March 2014 - February 2015).**

According to these calculations, the fall in real GDP in 2022 could be 45%, that of gross fixed capital formation - more than 80% and that of industrial output - 52% (Table 1).

*Table 1*

**Estimates of the dynamics of Ukraine's main macroeconomic indicators in 2022-2023**

Indicator	2021	2022	2023
Gross Domestic Product, %	3.0	-45.0	-6.5
Final consumption expenditure, %	7.1	-36.0	-4.6
Gross fixed capital formation, %	7.2	-80.5	-15.8
Industrial output, %	1.1	-52.0	-8.7
Consumer price index, annual average	9.4	30.7	19.5
Money supply, M <sup>2</sup> , December to December of the previous year	12.0	20.5	15.5
Consolidated state budget balance, % of GDP	-3.7	-9.4	-7.5
Exports of goods, USD billion	63.1	33.7	35.5
Imports of goods, USD billion	69.8	53.4	54.5
Trade balance, USD billion	-6.7	-19.7	-19.0
Current account balance, USD billion	-2.1	-11.5	-10.5
Forex reserves, USD billion	29.4	24.5	25.7

Source: The estimations of State Institution "Institute for Economics and Forecasting, NAS of Ukraine".

***Estimates based on scenario calculations of electricity consumption reductions***

The high correlation between electricity consumption and Ukraine's real GDP was used to estimate its possible changes in 2022 according to two scenarios: a 35% and a 50% fall in electricity consumption (Table 2).

The results indicate that Ukraine's GDP may fall this year:

- according to the first scenario: by 17.9–22.4%;
- according to the second scenario: by 25.6–33.1%.

<sup>19</sup> World Bank national accounts data. Retrieved from <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=UA>

Table 2

Forecast estimates of Ukraine's GDP dynamics in 2022 with an expected decrease in final energy consumption, % annual

Macroeconomic scenarios	Reduction of final energy consumption, %	Ukraine's GDP decline, %
First	-35,0	17,9-22,4
Second	-50,0	25,6-33,1

Source: The estimations of State Institution "Institute for Economics and Forecasting, NAS of Ukraine".

*Estimates based on the "territorial exclusion" of part of Ukrainian regions from the normal process of economic reproduction*

Taking into account the unevenness of hostilities in the country, it is assumed that 14 oblasts remain "conditionally unaffected". At the same time, 10 oblasts (Donetsk, Zhytomyr, Zaporizhzhya, Kyiv, Luhansk, Mykolaiv, Sumy, Kharkiv, Kherson, Chernihiv ones) and the city of Kyiv are considered to be removed from the normal process of economic reproduction. As a result, the territory of the country is represented by two types of regions, namely, those where the production of GDP:

- remains "conditionally unchanged";
- is not carried out due to hostilities.

The schematic nature of this distribution is conditional, but a more detailed classification of the "territorial exclusion" of Ukrainian regions from the production process is simply not yet possible.

The application of the above approach shows that economic losses of Ukraine in annual terms can be as follows:

- in GDP production: (-46) %;
- in export revenues: (-48) %;
- in capital investment: (-45) %.

*Estimates based on calculations of output reductions by sector: industry, agriculture, exports*

Ukraine's possible GDP dynamics are estimated according to two scenarios of declining activity in industry, agriculture, and export activities. According to the worst-case scenario (Scenario 2), the country's GDP could decline by 31% in 2022 (Table 3).

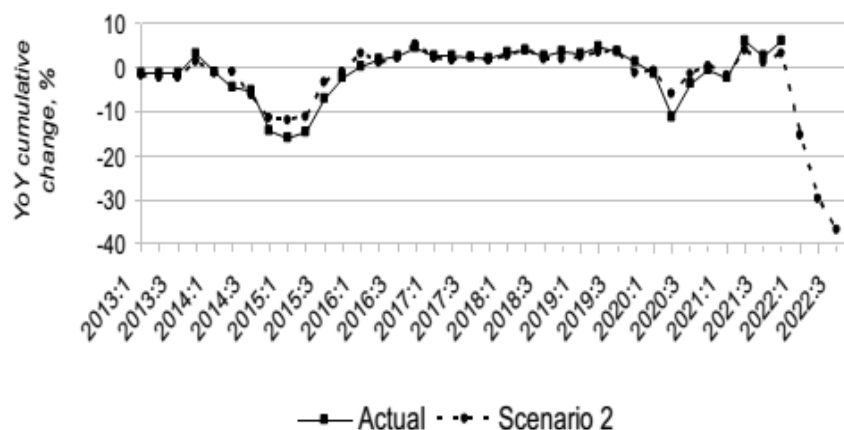
Table 3

Scenario forecast of Ukraine's GDP decline in 2022 due to reduced activity in industry, agriculture, and export activities, % in annual terms

Indicator	Scenario 1	Scenario 2
Industry	-45	-52
Agriculture	-30	-45
Export	-48	-52
<b>GDP</b>	<b>-26</b>	<b>-31</b>

Source: The estimations of State Institution "Institute for Economics and Forecasting, NAS of Ukraine".

A graphical representation of the actual and projected GDP dynamics of Ukraine under Scenario 2 is shown in Figure 1.



**Figure 1. Actual and projected GDP dynamics of Ukraine in 2013-2022**  
(quarterly report, Scenario 2)

Source: The estimations of State Institution "Institute for Economics and Forecasting, NAS of Ukraine".

Table 4

**Current estimates of Ukraine's losses in 2022 from the war unleashed by Russia**

Source	Nominal estimate Production/infras tructure capacity, USD billion	Relative estimate, % GDP*		
		Production/infras tructure capacity	GDP production	Total
IMF <sup>20</sup>			10-35	
Ministry of Economy of Ukraine <sup>21</sup>	120.0	60		
Ministry of Finance of Ukraine <sup>22</sup>			33-50	

<sup>20</sup> Down 35%. Rashkovan on how the Ukrainian economy can survive the war – interview NV. Retrieved from <https://biz.nv.ua/economics/chto-proishodit-s-ukrainskoy-ekonomikoy-vo-vremya-voyny-intervyu-nv-50226235.html>; Ukraine: Request for Purchase under the Rapid Financing Instrument and Cancellation of Stand-by Arrangement-Press Release; Staff Report; and Statement by the Executive Director for Ukraine (2022, March). IMF Country Report No. 22/74. Retrieved from <https://www.imf.org/en/Publications/CR/Issues/2022/03/10/Ukraine-Request-for-Purchase-under-the-Rapid-Financing-Instrument-and-Cancellation-of-Stand-514148>

<sup>21</sup> Ministry of Finance of Ukraine (2022, March 14). Ukraine's GDP losses from war to be counted in April - Ministry of Economy. Retrieved from <https://minfin.com.ua/ua/2022/03/14/82151235/>

<sup>22</sup> Minister of Finance of Ukraine Serhii Marchenko interviewed by Forbes (2022, March 14). Retrieved from <https://www.kmu.gov.ua/news/intervyu-ministra-finansiv-sergiya-marchenka-vidannyu-forbes-14032022>



Table 4 (continued)

Cabinet of Ministers of Ukraine <sup>23</sup>	500.0	250		
National Bank of Ukraine <sup>24</sup>			50	
KSE <sup>25</sup>	62.6	31		
Raiffeisen Research			15	
Citigroup			32	
Oxford Economics			34.2	
Moody's Analytics			43	
S&P Global Mkt Int.			43.1	
Economic Intel. Unit			46.5	
SI "Institute for Economics and Forecasting, NAS of Ukraine"			<b>33.7-38.8</b>	
- extrapolation			45	
- electricity consumption			17.9-33.1	
- regional breakdown			46	
- sectoral approach			26-31	
<b>Average</b>	<b>227.5</b>	<b>113.7</b>	<b>34-38.8</b>	<b>148-152</b>

\* In relation to Ukraine's GDP in 2021 (\$5459.574 billion, or \$200.2 billion), the current level is set at UAH 27.27 per US dollar as of 31.12.2021).

Source: The estimations of State Institution "Institute for Economics and Forecasting, NAS of Ukraine".

### Consequences of losses for industries

The Russian Federation caused extremely significant damage to industry and directly to private investors by destroying a number of large operating Ukrainian enterprises, some of which are owned by non-residents. It should be noted that most of the affected enterprises did not produce any military or dual-use goods. According to our estimates, the irreversible loss of industrial potential is as high as

<sup>23</sup> Losses for Ukraine due to Russian invasion exceed \$500bn - Shmyhal (2022, March 16). Retrieved from <https://interfax.com.ua/news/economic/814088.html>

<sup>24</sup> Forbes interviews NBU deputy governor Serhii Nikolaichuk on adapting the economy to martial law and the "Marshall Plan" for Ukraine (2022, March 18). Retrieved from <https://forbes.ua/inside/ekonomika-zvikaie-do-voennogo-chasu-zastupnik-golovi-nbu-sergiy-nikolaychuk-pro-padinnya-vvp-dopomogu-partneriv-ta-ukrainskiy-plan-marshalla-18032022-4800>

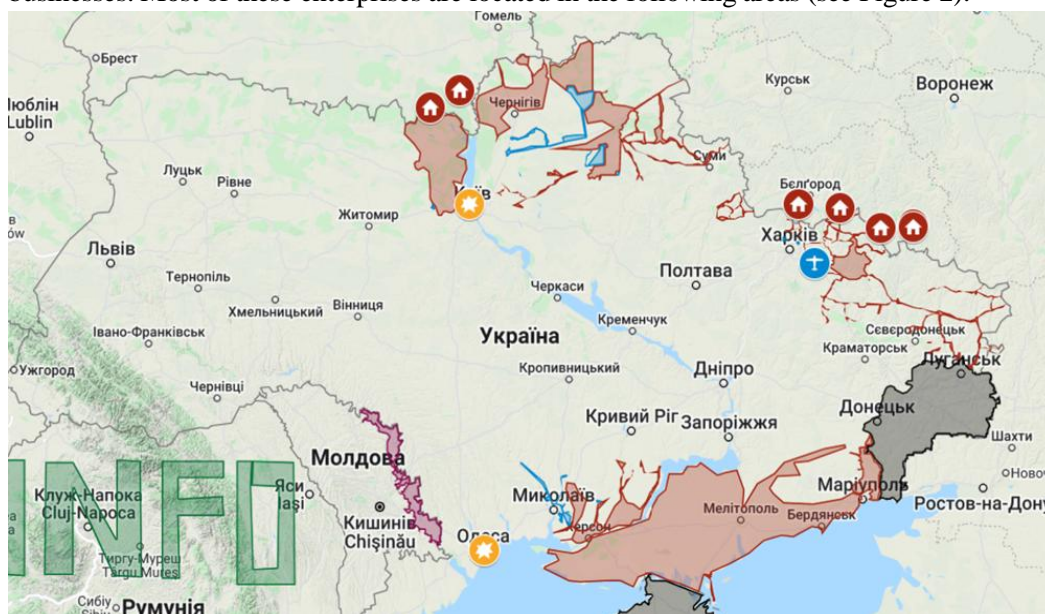
<sup>25</sup> Ukraine destroys \$8.3bn worth of infrastructure in a week, - KSE (2022, March 17). Retrieved from [https://lb.ua/economics/2022/03/17/509961\\_tizhden\\_ukraini\\_zruynovano.html](https://lb.ua/economics/2022/03/17/509961_tizhden_ukraini_zruynovano.html)

30%. A significant number of enterprises, which account for about a third of industrial potential, reduced their operations due to the loss or complication of access to raw materials and markets, as well as the forced migration of industrial production staff.

According to preliminary data from professional analytical agencies, in the first three weeks of the full-scale Russian invasion, between 60 and 80 per cent of the country's businesses were suspended.

As of 21.03.2022, an estimated 85,500 square kilometers of hazardous areas contaminated by explosive devices need to be rehabilitated in Ukraine (according to the Association of Sappers in Ukraine and Mine Action Operator Demining Solutions)<sup>26</sup>.

Military events, the destruction of infrastructure, the production base of many industrial enterprises in areas of active fighting, and the departure of specialists of enterprises outside the territory of production sites as of 21 March 2022 led to the shutdown of many industrial enterprises - both large and small and medium-sized businesses. Most of these enterprises are located in the following areas (see Figure 2):



**Figure 2. The map of hostilities and occupation on the territory of Ukraine as of 21.03.2022**

Source: Interactive map of hostilities in Ukraine. *ICTV Facts*. Retrieved from <https://fakty.com.ua/ua/ukraine/20220321-vijska-rf-proryvayutsya-z-pivnochi-shodu-ta-pivdnya-karta-vtorgnennya-v-ukrayinu/>

In other words, predominantly industrially developed regions of Ukraine (Kharkiv, Donetsk, Luhansk, Zaporizhzhia, Sumy, Kyiv and Chernihiv regions)

<sup>26</sup> Retrieved from

[https://galinfo.com.ua/news/v\\_asotsiatsii\\_saperiv\\_povidomyly\\_yaku\\_ploshchu\\_ukrainskyh\\_ze\\_mel\\_dovedetsya\\_rozminovuvaty\\_pislya\\_rashystiv\\_382815.html?fbclid=IwAR16BhqS9frJ2RybaUVhcww\\_Gn2FxP0RCbVp\\_pKh8S9XXlyx5Yb4p-WKVns](https://galinfo.com.ua/news/v_asotsiatsii_saperiv_povidomyly_yaku_ploshchu_ukrainskyh_ze_mel_dovedetsya_rozminovuvaty_pislya_rashystiv_382815.html?fbclid=IwAR16BhqS9frJ2RybaUVhcww_Gn2FxP0RCbVp_pKh8S9XXlyx5Yb4p-WKVns)

suffered the most damage and destruction, and in addition, the newly temporarily occupied territories (Kherson region) cannot establish the standard operation of industrial enterprises.

As of 23.03.2022, about 50 enterprises were relocated from the affected regions thanks to the Program of the Cabinet of Ministers and the Ministry of Economy of Ukraine for Temporary Relocation of Enterprises<sup>27</sup>.

However, not all production facilities may be subject to relocation, especially those in heavy industries.

Thus, it can be assumed that the estimated losses from the shutdown of industrial plants in regions with active military operations could amount to up to 10% of GDP (measured in 2019), or \$15 billion. The total losses in 2022 would be about 50% of GDP.

Because of the hostilities in the regions of Ukraine, a rough estimate of companies of all activities, in particular those that stopped or may stop their operation in the near future is presented in Table 5.

*Table 5*

**Indicative estimate of the number of industrial companies that suspended or may suspend their activities in areas of active fighting or occupation in 2022**

	The number of companies, units				
	All activities	Including			
		extractive industry	processing industry	food processing	Engineering
<b>Ukraine</b>	<b>373822</b>	<b>1660</b>	<b>115133</b>	<b>16222</b>	<b>7409</b>
Donetsk region	9473	121	3283	559	207
Zaporizhzhia region	15368	26	5003	697	629
Kyiv region	20320	64	7037	894	414
Luhansk region	3408	30	1147	210	59
Mykolaiv region	11482	35	2424	500	196
Sumy region	6096	16	2646	368	159
Kharkiv region	25144	55	11505	1351	1082
Kherson region	8116	21	1996	354	159
Chernihiv region	6524	17	2557	306	112
Kyiv	101252	277	14746	1563	1472
<b>Total by region</b>	<b>207183</b>	<b>662</b>	<b>52344</b>	<b>6802</b>	<b>4489</b>
<b>The share of the overall Ukrainian indicator, %</b>	<b>55</b>	<b>40</b>	<b>45</b>	<b>42</b>	<b>60</b>

*Source:* the calculations by employees of State Institution "Institute for Economics and Forecasting, NAS of Ukraine" based on the State Statistics Service figures for 2020.

<sup>27</sup> Retrieved from <https://www.kmu.gov.ua/news/uryad-zabezpechuye-masovij-pereyizd-pidpriemstv-na-bezpechnu-teritoriyu-dlya-zberezheniya-promislovogo-potencialu-ukrayini>; <https://suspilne.media/220783-na-vinniccinu-pereihali-ponad-50-pidpriemstv-iz-regioniv-ukraini-de-trivaut-bojovi-dii-so-vidomo/>

### *The areas of industrial recovery during wartime*

- the relocation of enterprises and their staff;
- resumption of supply chains and production if it is possible;
- attracting assistance from international partners;
- negotiations with foreign countries, in particular EU countries, the USA and Canada regarding possible procurement of certain goods from Ukraine that can be exported abroad - both by governments and businesses;
- the determination of a list of industries (and companies) that will need a government order to provide Ukraine with essentials, including import substitution;
- the development of a programme to stimulate production in Ukraine with the definition of clear mechanisms for obtaining a state order and marketing products.

### **Synopsis: Sources of financing for Ukraine's economic recovery**

#### **Additional information: Sources of financing for Ukraine's economic recovery<sup>28</sup>**

The European Bank for Reconstruction and Development (EBRD) adopted the "War in Ukraine - EBRD Resilience Package" - to support Ukraine's substantial recovery, amounting to €2 billion. It includes an immediate "Resilience and Livelihoods" program that includes areas such as energy security, nuclear safety, municipal services, trade finance support and SMEs in Ukraine and neighboring affected countries. If conditions permit, the EBRD would be prepared to participate in a recovery program in Ukraine aimed at restoring livelihoods and businesses, rebuilding vital infrastructure and supporting access to services.

The European Investment Bank, together with the European Commission, prepared a €2 billion emergency solidarity package for Ukraine, including €668 million in immediate liquidity assistance to the Ukrainian authorities. As part of the package, the EIB is also accelerating additional commitments for infrastructure projects worth €1.3 billion.

The CEB (Council of Europe Development Bank) provided grants to Ukraine's neighboring countries to cover urgent refugee needs, including transportation and orientation. The CEB is also willing to provide flexible short-term loans to meet the significant financial needs of neighboring and other countries hosting significant refugee flows, while maintaining a focus on the social sector.

On 9 March 2022 the IMF provided \$1.4 billion in emergency financing through the Rapid Financing Instrument (RFI) for Ukraine. The principle of the financing mechanisms was changed from "reform" to "crisis management".

The World Bank Group mobilized \$952 million, including budget support to help the government deliver critical services to the Ukrainian population and \$350 million was disbursed. This funding is part of a \$3 billion support package planned for Ukraine in the coming months. A MDTF (multi-donor trust fund) was also established as one of the fastest, most targeted and reliable mechanisms to facilitate the channeling of grant resources to Ukraine from donors. As of 17 March 2022,

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<sup>28</sup> Retrieved from <https://www.imf.org/en/News/Articles/2022/03/17/pr2280-joint-statement-heads-ifis-programs-ukraine-neighboring-countries>

the contributions amounted to \$145 million. The World Bank Group is also working on assistance options for neighboring countries, including refugee support, and will continue funding in support of the private sector.

Internal sources of industrial recovery in Ukraine that do not involve budget funding should also be noted. Ukrainian businesses are already consolidating in order to lay the groundwork for post-war recovery. For example, an initiative of the Association of Industrial Automation Enterprises is aimed at so-called cluster mobilization - the creation of a nationwide cluster association, Ukrainian Cluster Alliance (UCA), which aims to establish cooperation in the supply of raw materials and components to keep manufacturing and engineering companies running; outsourcing and remote working and cooperation in international EU Clusters Support Ukraine Forum projects are possible<sup>29</sup>.

#### **Assessing the scale of losses and prospects for agricultural production in Ukraine under war conditions**

The agricultural sector in Ukraine accounts for almost half of the country's foreign exchange earnings and about 10% of its GDP<sup>30</sup>. The impact of military aggression on the agricultural sector is very significant, complex, and poorly predictable due to the dynamic development of the situation, the presence of significant unpredictable risks and uncertainties, direct and indirect factors, delayed impact, etc.

The above estimates of the baseline scenario for assessing the impact of Russian military aggression in Ukraine on the latter's agricultural activities in 2022 are based on the assumption that during the spring sowing campaign the status quo in control of territories as of 22-23 March, be maintained, as was the case, or sowing activities will be hampered by significant risks in the liberated territories (so, according to the Association of Sappers of Ukraine, as of 21 March, an estimated 82.5 thousand square kilometers of Ukraine were in need of demining<sup>31</sup>, while the General Staff of the Armed Forces of Ukraine estimates that demining of the territories will require at least \$250 billion<sup>32</sup>).

Uncertainties also exist as to whether production processes during the growing season and harvesting in Ukrainian-controlled areas will be adequately secured and appropriate logistics for the entire production process and the post-harvest period will be ensured.

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<sup>29</sup> Retrieved from <https://www.facebook.com/groups/appau>

<sup>30</sup> Ukraine will be provided with bread – The Minister (2022, March 17). *Radio Svoboda*. Retrieved from <https://www.radiosvoboda.org/a/news-hlib-ukrayina-ministr/31758176.html>

<sup>31</sup> How much of Ukraine's territory is in need of demining - an assessment by the Association of Sappers. *Slovo i Dilo*.

Retrieved from <https://www.slovoidilo.ua/2022/03/22/novyna/bezpeka/skilky-terytoriyi-ukrayiny-potrebuye-rozminuvannya-oczinka-asocziacziyi-saperiv>

<sup>32</sup> The Ukrainian Armed Forces estimated the cost of demining Ukraine. Retrieved from <https://www.slovoidilo.ua/2022/03/23/novyna/bezpeka/zsu-oczynyly-vytraty-rozminuvannya-ukrayiny-sotni-milyardiv-dolariv>

Due to active hostilities, partial control by invaders of certain Ukrainian territories, highways and other logistic routes etc., the highest current risks for the agricultural sector are observed in the following regions: Mykolaiv, Kherson, Zaporizhzhia, Donetsk, Luhansk, Kharkiv, Sumy, Chernihiv, Kyiv, Zhytomyr oblasts', but high current or deferred risks also persist in other regions.

Significant areas of the southern regions specializing in grain production are in the epicenter of active military operations, where it is physically impossible to harvest. However, in relatively calm regions (Poltava, Dnipropetrovsk, Kirovohrad, Cherkasy, and other oblasts'), problems arise for the operation of large agricultural holdings due to the breakdown of logistics chains - for example, their warehouses of protection products, seeds and fertilizers may be located near Kyiv, or in other places that cannot be reached due to fighting or ruined infrastructure. The possibility of buying protection products, seeds and fertilizers from Poland is being discussed, but this does not solve the issue of logistics of resources within the country. The closure of Ukrainian ports on the Black and Azov seas threatens Ukrainian agrarian imports, the sea route is now closed and this in turn increases the logistical burden of any supplies by land<sup>33</sup>.

In wartime, logistics and trade must adapt not only to disruption in all supply chains, fuel shortages, but also to curfews.

Based on official statistical information, consideration of event probabilities, potential risks and uncertainties, expert assumptions and empirical data, calculations were made for a possible reduction in agricultural production (due to military activities on large territories of Ukraine) in monetary terms, in physical terms, with special attention to certain crops important from the point of view of food security and in the context of individual sectors of agricultural production: agricultural enterprises (legal entities) and household farms.

Main results:

**1. Reduction of production in value terms - a regional analysis.** The share of Ukraine's 10 regions with active military actions in total agricultural output is 40.9%, including 43.3% in crop production and 30.3% in livestock production (Table 6). According to preliminary data, in 2021 total agricultural output (in constant prices of 2016) amounted to 700.1 billion UAH<sup>34</sup>. The inability to physically carry out sowing in the regions specified in Table 6 will reduce gross agricultural output in value terms by 286.6 billion UAH and will amount to 413.5 billion UAH.

<sup>33</sup> Fuel, food, ports: the economy's three pain points. *BBC news*. Retrieved from <https://www.bbc.com/ukrainian/features-60680634>

<sup>34</sup> State Statistics Service of Ukraine (2022). Agricultural output in constant prices 2016 for 2021. Kyiv. P. 6.

Table 6

The share of regions with active hostilities in agricultural production

	Ukrainian regions	The region's share of agricultural output, %	Including		Sown areas of winter crops for the 2022 harvest, thousand hectares
			crop production	livestock farming	
	<i>Ukraine</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>9093,1</i>
1	Donetsk oblast	3.0	2.9	3.2	436,0
2	Zhytomyr oblast	4.2	4.3	3.8	188,2
3	Zaporizhzhia oblast	3.9	4.4	1.9	858,0
4	Kyiv oblast	5.7	5.2	7.7	255,6
5	Luhansk oblast	1.8	2	0.7	339,6
6	Mykolaiv oblast	4.0	4.5	1.8	748,2
7	Sumy oblast	4.1	4.4	2.7	207,6
8	Kharkiv oblast	5.2	5.6	3.6	609,9
9	Kherson oblast	4.3	4.8	2.2	668,2
10	Chernihiv oblast	4.7	5.2	2.7	216,5
<b>Total of above regions</b>		<b>40,9</b>	<b>43.3</b>	<b>30.3</b>	<b>4527.8</b>

In the optimistic scenario, some of the affected regions may sow partially: western and southern Zhytomyr region, part of Zaporizhzhia, Kyiv and Mykolaiv regions, while Chernihiv and Sumy regions may also be included. This will improve the forecast for the sowing campaign by 5-6% and potentially the value of agricultural output in 2022 could be estimated at 455-460 billion UAH (at constant 2016 prices).

**2. Reduced production by type of crop.** Due to the specialization of certain regions, the reduction in crop production will be uneven across individual crops. Production of cereals and legumes will drop by 44.6% to 46.8 million tonnes, down from 84.6 million tonnes in 2021 (Figure 3).

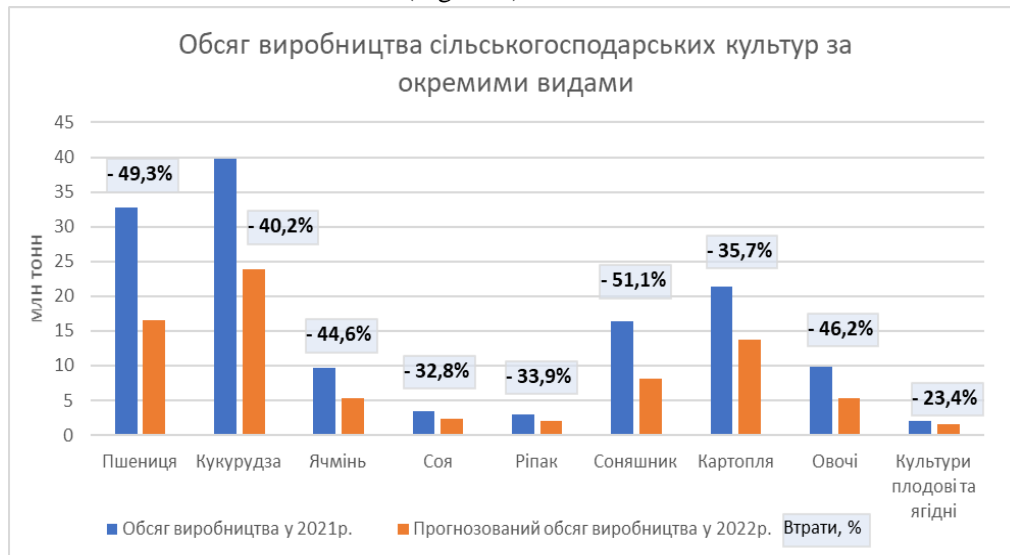


Figure 3. Forecast estimates of crop production volumes

Source: State Statistics Service of Ukraine (2022). Output, yield and harvested area of agricultural crops by type in 2021. Kyiv.



The biggest losses in wheat (-49.3%) and sunflower production (-51.1%) will result in a decrease in the output of these crops to 16.6 million tonnes and 8.0 million tonnes respectively. Vegetable production will decrease by 46.2% to 5.3 million tonnes, and potato production by 35.7% to 13.7 million tonnes. Production of fruit and berry crops will decrease by 23.4% to 1.6 million tonnes.

Such losses are expected solely due to the reduction of cultivated areas at the expense of the regions where active combat operations are taking place. Additional factors in the reduction of agricultural production could be: limited possibility to purchase mineral fertilizers (a significant part of them were purchased in Russia and Belarus), and plant protection products and a significant rise in the price of fuel and lubricants.

In 2021, 9.1 million hectares of agricultural land were sown for winter crops for grain and green fodder<sup>35</sup>. Almost half of the area is in the temporarily occupied and/or territories where active hostilities are taking place. Consequently, the output of winter crops and green fodder will decrease by 49.8%. A significant reduction in fodder will have a negative impact on the livestock industry in "calmer" regions and it will lead to an even greater drop in livestock production.

In 2021, 28387.5 thousand hectares of lands were sown with agricultural crops in Ukraine<sup>36</sup>. Of them, 15943.9 thousand hectares were cereals and leguminous crops, 9106.6 thousand hectares were industrial crops, and the rest were other crops (Table 7). Specific weight of winter crops in the structure of cereals and legumes was over 50%, including winter wheat - 43.3% (spring wheat - 1.2%), winter barley - 7.1%, and winter rye - 1.1%. In the group of industrial crops, winter rapeseed accounted for 10.7% of the cropping pattern.

Table 7

**Area under crops in farms of all categories in 2021, thousand hectares**

<b>Crops</b>	<i>thousand hectares</i>
<b>Cereals and leguminous crops</b>	15943.9
Winter wheat	6907.5
Spring wheat	192.1
corn for grain	5474.8
Winter barley	1137.5
Spring barley	1337
Winter rye	174.2
Spring rye	1.1
<b>Other cereals and legumes</b>	719.7
<b>Industrial crops</b>	9106.6
Sunflower	6509.7

<sup>35</sup> Winter crop areas sown for the 2022 harvest by region (2022). Retrieved from <http://www.ukrstat.gov.ua/>

<sup>36</sup> All categories of farms are taken into account.



Table 7 (continued)

Winter rapeseed	975.9
colza (spring rapeseed)	33.6
Soya	1280.3
sugar beet	226.6
<b>Other technical crops</b>	80.5
<b>Other crops</b>	3337
<b>Total</b>	<b>28387.5</b>

Source: Sown area of agricultural crops by type in 2021 / State Statistics Service of Ukraine.

Retrieved

from

[http://www.ukrstat.gov.ua/operativ/operativ2021/sg/ppsgk/ppsgk\\_2021.xlsx](http://www.ukrstat.gov.ua/operativ/operativ2021/sg/ppsgk/ppsgk_2021.xlsx)

In 2022, compared to 2021, the area of winter cereals planted decreased slightly; 6538.4 thousand hectares of wheat, 108.5 thousand hectares of rye and 969.0 thousand hectares of barley were planted. Sown winter rapeseed increased to 1413.500 hectares.

Figure 4 shows that there could be a significant reduction in crop production in 2022 due to the high risk of fieldwork in the areas bordering the aggressor country and where active hostilities are taking place. Consequently, this could lead to a reduction in the output of a number of important food crops. Access to land is limited in nine regions with 14.2 million hectares of arable land, or almost half of the country's total (32.5 million hectares). Farming in large parts of these areas now appears to be dangerous for human life.

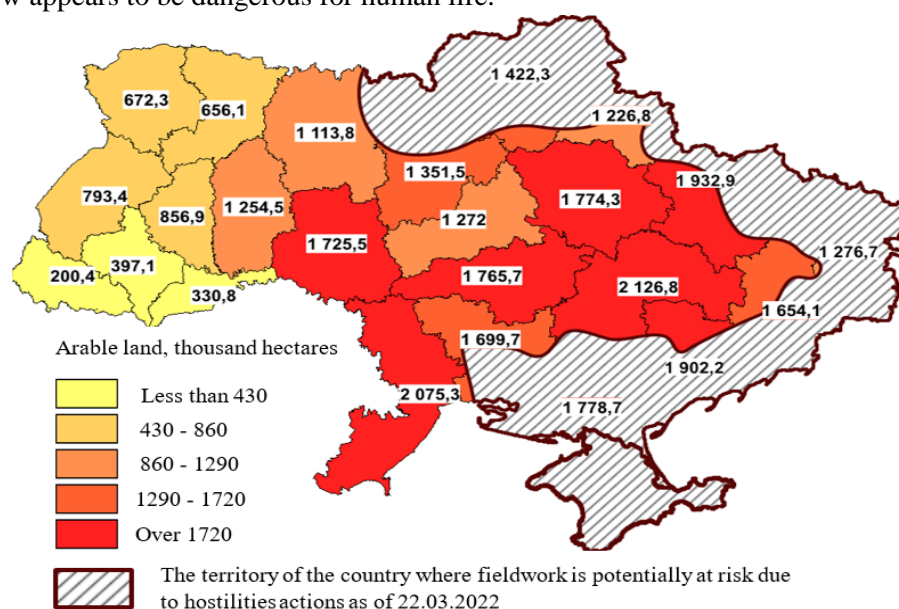


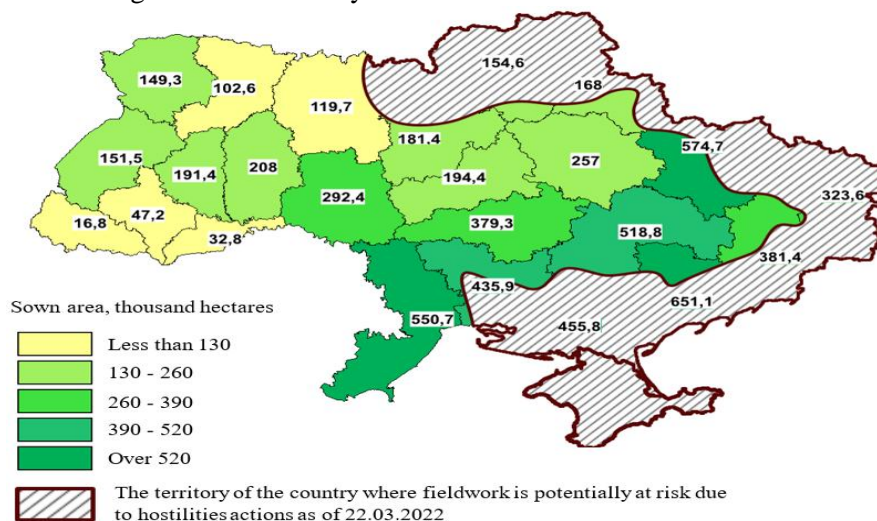
Figure 4. Arable land area by region, 2022

Source: State Statistics Service of Ukraine (2019). Ukrainian agriculture in 2018. Kyiv.

Retrieved from [http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/2019/zb/09/Zb\\_sg\\_2018%20.pdf](http://www.ukrstat.gov.ua/druk/publicat/kat_u/2019/zb/09/Zb_sg_2018%20.pdf)

Winter wheat and maize. Wheat and maize are strategically important crops for Ukraine's and global food security. Leading grain market analysts estimate that wheat and maize are crucial food commodities because they supply 27% of total calorie intake, or in other words, 27% of all food on Earth<sup>37</sup>.

Today in Ukraine half of the sown area of winter wheat (3324.5 thousand hectares) for the 2022 harvest is in the high risk zone, and a significant part of this area remains without the possibility of proper further cultivation at all (Fig. 5). In 2021, a high percentage of the area sown to this crop was concentrated in all of the warring regions (50.1%). Considering the fact that spring wheat has a small share in the cropping structure, the problem arises of compensating for the lost yield in the long term by sowing it in remote regions, because wheat plays a key role in Ukraine's and global food security.

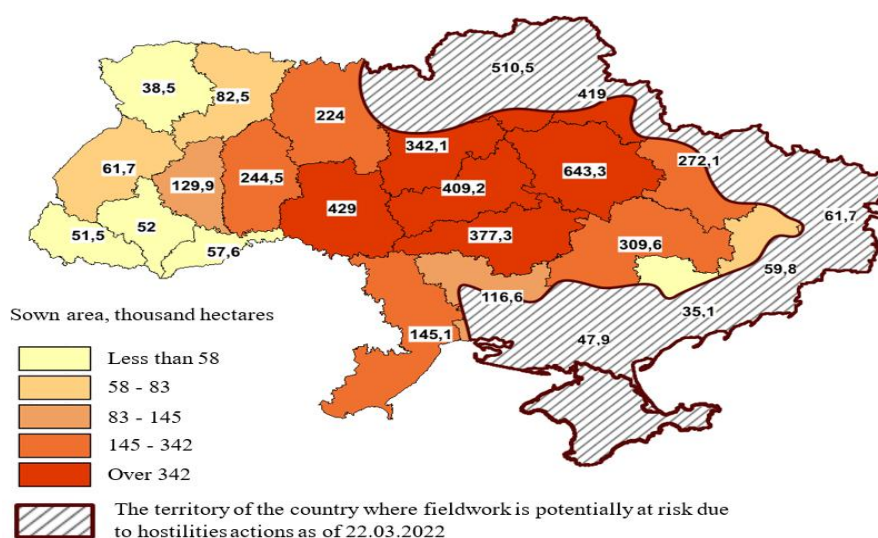


**Figure 5. Sown area of winter wheat for the 2022 harvest, thousand hectares**

Source: State Statistics Service of Ukraine. Sown area of winter crops for the 2022 harvest Retrieved from [http://www.ukrstat.gov.ua/operativ/operativ2022/sg/ppko/ppokpu\\_22\\_reg.xls](http://www.ukrstat.gov.ua/operativ/operativ2022/sg/ppko/ppokpu_22_reg.xls)

Another strategically important crop in terms of food security in Ukraine and the world is maize. The area under maize cultivation for grain in the last five years in Ukraine amounted to about 5200 thousand hectares (Fig. 6). The main part of cultivated areas is concentrated in the central and northern regions. This means that, compared to wheat, the likely losses in gross yields here will be smaller. In four regions with high risk for agricultural activity as a result of hostilities (Chernihiv, Sumy, Kharkiv and Mykolaiv regions) total area of maize sown is 1522.7 thousand hectares, or 30% of total production area of this crop.

<sup>37</sup> Andrii Yarmak: Global food security ruined by Russia's invasion of Ukraine could still kill hundreds of millions of people around the world (2022, March 22). Retrieved from [https://east-fruit.com/en/news/global-food-security-destroyed-by-russian-invasion-in-ukraine-could-kill-hundreds-of-millions-globally/?fbclid=IwAR2L\\_ikBxUfMQqKsIAngf9R7EytsKP\\_8a5o8ut0lRQ5hxxzAOwtEo5LHwQrY](https://east-fruit.com/en/news/global-food-security-destroyed-by-russian-invasion-in-ukraine-could-kill-hundreds-of-millions-globally/?fbclid=IwAR2L_ikBxUfMQqKsIAngf9R7EytsKP_8a5o8ut0lRQ5hxxzAOwtEo5LHwQrY)



**Figure. 6. Sown area of maize for grain, thousand hectares**

Source: State Statistics Service of Ukraine. Sown area of agricultural crops by their type in 2017-2021. Retrieved from <http://www.ukrstat.gov.ua>

Table 8 shows the projected estimates of possible gross harvest of wheat and maize in 2022 under war conditions. In total, losses in the gross harvest of wheat and maize could be about 8610.6 thousand tonnes (31.5%) and 7574.7 thousand tonnes (22.8%), respectively. Donetsk, Zaporizhzhia, Luhansk, Sumy, Kherson and Chernihiv regions will experience the greatest decline in crop output.

Table 8

**Forecast estimate of the gross harvest of wheat and maize in 2022, thousand hectares**

Region	Agricultural crops, thousand tones			
	Peaceful time		Military actions	
	Wheat	Maize	Wheat	Maize
AR Crimea	-	-	-	-
Vinnitsia	1686.1	3279.4	1686.1	3279.4
Volyn	708.9	320.6	708.9	320.6
Dnipropetrovsk	1935.1	1233.3	1935.1	1233.3
Donetsk	1290.4	204.8	129	20.5
Zhytomyr	664.1	1646.1	531.3	1316.9
Transcarpathian	87.0	258.0	87	258
Zaporizhzhia	2184.2	177.5	436.8	35.5
Ivano-Frankivsk	281.7	377.1	281.7	377.1
Kyiv	895.9	2419.4	716.7	1935.5
Kirovograd	1288.7	1921.7	1288.7	1921.7
Luhansk	959.3	205.0	95.9	20.5
Lviv	807.9	460.4	807.9	460.4
Mykolaiv	1510.5	475.4	1057.4	332.8
Odesa	2071.5	607.9	2071.5	607.9

*Table 8 (continued)*

Poltava	1066.0	4025.8	1066	4025.8
Rivne	494.4	607.0	494.4	607
Sumy	941.1	3090.8	94.1	309.1
Ternopil	1099.6	1132.0	1099.6	1132
Kharkiv	2374.7	1353.8	1187.4	676.9
Kherson	1696.5	378.5	169.7	37.9
Khmelnyskyi	1286.6	2200.5	1286.6	2200.5
Cherkasy	970.7	2677.0	970.7	2677
Chernivtsi	183.3	361.8	183.3	361.8
Chernihiv	853.7	3878.3	341.5	1551.3
<b>Ukraine</b>	<b>27337.8</b>	<b>33291.9</b>	<b>18727.3</b>	<b>25699.4</b>

Source: State Statistics Service of Ukraine (2017-2020). Agriculture of Ukraine in 2018. Kyiv. Retrieved from

[http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/2019/zb/09/Zb\\_sg\\_2018%20.pdf](http://www.ukrstat.gov.ua/druk/publicat/kat_u/2019/zb/09/Zb_sg_2018%20.pdf); State Statistics Service of Ukraine. The volume of production, yield and harvested area of agricultural crops by type as of 01 December 2021. Retrieved from [http://www.ukrstat.gov.ua/operativ/operativ2021/sg/ovuzpsg/ovuzpsg\\_1221.xls](http://www.ukrstat.gov.ua/operativ/operativ2021/sg/ovuzpsg/ovuzpsg_1221.xls)

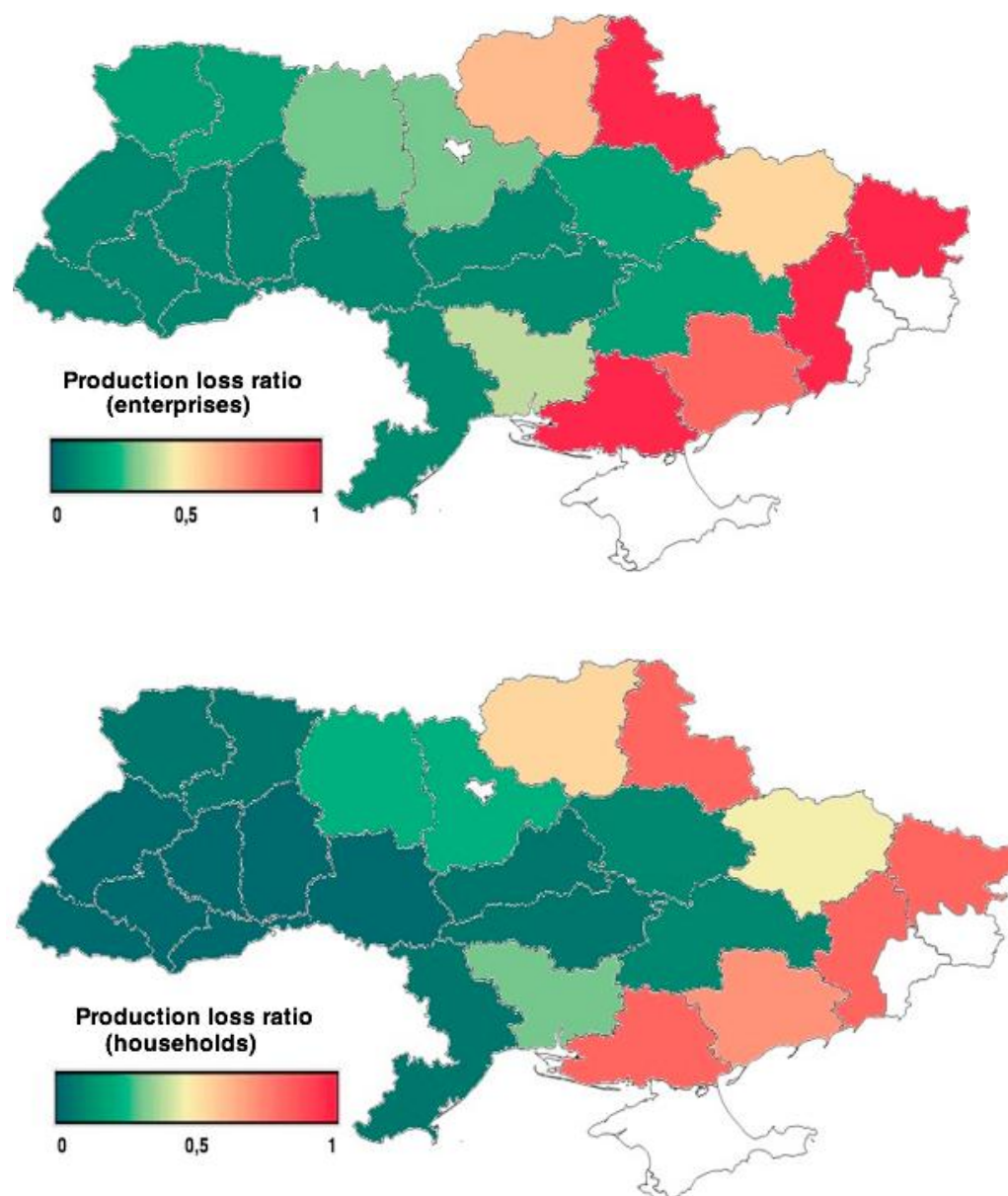
Agricultural work can be seriously hampered by shortages and increasing costs of inputs (fuel, lubricants, mineral fertilizers, seeds), as well as by risks and hazards to human life. Therefore, the cropping pattern should be reviewed and the focus should be on the cultivation of the food group crops, as these crops are the basis of Ukraine's food security.

#### **4. Sectoral loss estimation: agricultural companies (legal entities) and households.**

Military actions will affect the volume of agricultural production in agricultural enterprises and household farms in different ways. The share of market production differs considerably between different categories of agricultural producers, with different integration into resource and marketing markets. Whereas the provision of production processes in enterprises at all stages is largely dependent on their access to material and technical resources and marketing channels, household farms are largely self-sufficient and rely to a greater extent on their own resources. Therefore, the decline in production on household farms in rural areas, from which they were not completely displaced as a result of military actions, will not be as pronounced as on enterprises, but production volumes will be lower than in previous periods due to population out-migration<sup>38</sup> and other factors. In addition, the share of output consumed by households themselves will increase.

Estimates of possible output of agricultural products by individual sectors - agricultural companies and households - are based on estimates of the level of probable losses due to the exclusion of productive forces of individual regions where military actions take place (Fig. 7).

<sup>38</sup> The estimates of production losses and output by households need to be adjusted taking into account the fact that a large proportion of the population was displaced from areas that are under full or partial control of the Russian Armed Forces.



**Figure 7. Estimated level of output losses in agriculture by categories of producers**

Estimates of possible losses will be refined by taking into account additional factors that may subsequently affect yields and output - the ability to carry out necessary agro-technological operations, cultivate crops, apply fertilizers, export harvested products, etc. Significant uncertainties in the influence of these factors result in wide forecast intervals of possible production losses and agricultural output.



The total output losses expected in 2022 in the ten regions most affected by the war will be from 17.5 to 20.7 million tonnes of grains and legumes, from 380 to 540 thousand tonnes of sugar beets, from 3.8 to 4.5 million tonnes of sunflower seeds, from 2 to 2.7 million tonnes of potatoes, from 2.1 to 2.6 million tonnes of vegetables and from 116 to 150 thousand tonnes of fruits and berries (see Table 9 and Table 10).

Table 9

**Probable ranges of output losses by agricultural enterprises, thousand tonnes**

Agricultural crops	Grains and legumes	Sugar beet	Sunflower	Potato	Vegetables	Fruit and berries
Regions						
Donetsk	1240–1390		390–435		9.4–10.5	3.7–4.1
Zhytomyr	320–540	63–105	46–77	6.6–11	1.3–2.2	0.4–0.6
Zaporizhia	1680–1900		465–530	0.15–0.17	15.5–17.5	4.7–5.3
Kyiv	400–660	120–200	68–113	4.6–7.7	8.0–13.4	2.6–4.4
Luhansk	960–1070		480–540		0.17–0.19	
Mykolaiv	400–560		130–180	0.8–1.1	98–138	0.7–1
Sumy	3840–4290		730–816	4.8–5.4	1.7–1.9	0.8–0.9
Kharkiv	1660–2020	64–78	560–680	0.2–0.3	12.4–15.2	2.4–3
Kherson	1550–1730		29–32	19.8–22	490–550	16–18
Chernihiv	2870–3390	107–126	380–450	60–71	2.0–2.4	

Source: calculated on the basis of data of the State Statistics Service of Ukraine in terms of agricultural production (Statistical Yearbook of Ukraine for 2020. Retrieved from [http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/2021/zb/11/Yearbook\\_2020.pdf](http://www.ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/11/Yearbook_2020.pdf)) and online DeepState war maps.

Table 10

**Probable ranges of agricultural output losses by households, thousand tonnes**

Agricultural crops	Grains and legumes	Sugar beet	Sunflower	Potato	Vegetables	Fruit and berries
Regions						
Donetsk	400–450	8.3–9.4	85–96		173–196	6.2–7.1
Zhytomyr	19–56	1.1–3.3	1.9–5.6	86–260	20–60	2.1–6.2
Zaporizhia	470–550		134–155	115–133	152–175	24–28
Kyiv	17–51	0.8–2.4	0.2–0.7	76–228	26–77	2.9–8.7
Luhansk	186–211		83–94		111–126	
Mykolaiv	115–191		27–46	31–51	27–45	3.4–5.6
Sumy	230–261	7.1–8.1	15.7–17.8	670–760	152–173	11.9–13.4
Kharkiv	410–530	4.4–5.6	41–52	250–320	193–248	15.3–19.6
Kherson	680–770		147–166	192–218	555–629	19.5–22.1
Chernihiv	75–92	2.9–3.5	0.45–0.55	520–635	97–119	

Source: calculated on the basis of data of the State Statistics Service of Ukraine in terms of agricultural production (Statistical Yearbook of Ukraine for 2020. Retrieved from [http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/2021/zb/11/Yearbook\\_2020.pdf](http://www.ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/11/Yearbook_2020.pdf)) and online DeepState war maps.



The estimated output of agricultural products in enterprises and households is presented in Tables 11 and Table 12.

Table 11

**Expected output in agricultural enterprises (ranges), thousand tonnes**

Agricultural crops	Grains and legumes	Sugar beet	Sunflower	Potato	Vegetables	Fruit and berries
Regions						
Donetsk	70-220		20-70		0.6-1.7	0.2-0.6
Zhytomyr	1610-1830	310-360	230-260	33-37	6.5-7.3	1.8-2.0
Zaporizhia	340-560		90-160	0.03-0.05	3.1-5.2	0.9-1.6
Kyiv	1990-2250	600-680	340-380	23-26	40-46	13-15
Luhansk	60-170		30-85		0.01-0.03	
Mykolaiv	1040-1200		330-380	2-2.3	260-300	1.9-2.2
Sumy	230-680		40-130	0.3-0.9	0.1-0.3	0.05-0.14
Kharkiv	1700-2000	64-78	560-680	0.23-0.28	12.4-15.2	2.4-3
Kherson	90-270		1.7-5.1	1.1-3.5	30-85	0.9-2.8
Chernihiv	1830-2350	70-90	240-310	40-50	1.3-1.7	

Source: calculated on the basis of data of the State Statistics Service of Ukraine in terms of agricultural production (Statistical Yearbook of Ukraine for 2020. Retrieved from [http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/2021/zb/11/Yearbook\\_2020.pdf](http://www.ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/11/Yearbook_2020.pdf)) and online DeepState war maps.

Table 12

**The expected output of agricultural products in households (ranges), thousand tonnes**

Agricultural crops	Grains and legumes	Sugar beet	Sunflower	Potato	Vegetables	Fruit and berries
Regions						
Donetsk	80-130	1,7-2,8	17-28		35-58	1,2-2,1
Zhytomyr	320-360	19-21	32-36	1470-1640	335-375	35-39
Zaporizhia	180-260		52-72	44-62	58-82	9-13
Kyiv	290-320	13-15	3,8-4,3	1290-1440	440-490	50-55
Luhansk	37-62		17-28		22-37	
Mykolaiv	570-650		137-155	153-173	136-154	17-19
Sumy	46-77	1,4-2,4	3,1-5,2	130-220	30-50	2,4-4
Kharkiv	650-760	6,9-8,1	64-75	390-460	300-360	24-28
Kherson	135-225		29-49	38-64	110-185	3,9-6,5
Chernihiv	76-92	2,9-3,5	0,45-0,55	520-635	97-119	

Source: calculated on the basis of data of the State Statistics Service of Ukraine in terms of agricultural production (Statistical Yearbook of Ukraine for 2020. Retrieved from [http://www.ukrstat.gov.ua/druk/publicat/kat\\_u/2021/zb/11/Yearbook\\_2020.pdf](http://www.ukrstat.gov.ua/druk/publicat/kat_u/2021/zb/11/Yearbook_2020.pdf)) and online DeepState war maps.



The calculations made were based on the assumption that the structure of crop production will not change significantly. However, it is obvious that under current conditions there should be a reorientation to food crops at the expense of reducing the cultivated areas under industrial crops.

### **Assessing the impact of the Russian military invasion of Ukraine on trade (based on UNCTAD, OECD and USDA materials)**

#### ***UNCTAD (United Nations Conference on Trade and Development)***

On March 17, 2022, UNCTAD published a report on operational assessments of the impact of the war in Ukraine on global trade and development<sup>39</sup>. The report is currently closed, but its summary is available on the UNCTAD website<sup>40</sup>.

UNCTAD's rapid assessment of the impact of the war in Ukraine on trade and development notes a rapidly deteriorating global economic outlook, as evidenced by rising prices for food, fuel and fertilizers.

The report also points to increased financial instability, reduced investment in sustainable development, a complex reconfiguration of the global supply chain and rising trade costs.

The biggest impact of the war is on global food and fuel markets.

Ukraine and Russia are global players in agri-food markets, accounting for 53% of global trade in sunflower oil and seeds and 27% of wheat. According to UNCTAD calculations, on average more than 5% of the import basket of the world's poorest countries consists of products whose prices are likely to rise because of the war. For richer countries, the proportion is less than 1%.

Freight rates are also predicted to rise. Factors will include restrictive airspace measures, contractor uncertainty, and concerns about the safety of land trade routes through Russia and Ukraine. These two countries are a key geographic component of the Eurasian land bridge.

It is noted that in 2021, UNCTAD modeled the impact of freight rate increases during the pandemic and obtained a 1.5% increase in global consumer prices.

#### ***OECD (Organization for Economic Cooperation and Development)***

On March 22, 2022, the OECD published its internal report on the economic and social impact of the war in Ukraine<sup>41</sup>.

The main conclusions of this report on the economic consequences of the Russian military invasion of Ukraine are as follows.

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<sup>39</sup> The impact on trade and development of the war in Ukraine - UNCTAD rapid assessment (UNCTAD/OSG/INF/2022/1) (2022, March 16). Retrieved from <https://unctad.org/webflyer/impact-trade-and-development-war-ukraine>

<sup>40</sup> Ukraine war's impact on trade and development (2022, March 16). Retrieved from <https://unctad.org/news/ukraine-wars-impact-trade-and-development>

<sup>41</sup> OECD (2022). OECD Economic Outlook, Interim Report March 2022: Economic and Social Impacts and Policy Implications of the War in Ukraine. Paris: OECD Publishing. <https://doi.org/10.1787/4181d61b-en>



- Although Russia and Ukraine are relatively small economies in terms of output, they are major producers and exporters of key foods, minerals and energy. The war has caused economic and financial turmoil, especially in commodity markets as a result of rising oil, gas and wheat prices.

- The changes in the commodity and financial markets since the war began could, if the war continues, reduce global GDP growth by 1 percentage point during the first year of the war, accompanied by a deep recession in Russia, and raise global consumer price inflation by about 2.5 percentage points.

- The war highlighted the importance of minimizing dependence on Russia for key energy imports. To ensure energy security, OECD countries are advised to review the design of energy markets with a view to ensuring energy security and creating incentives for a green transition.

The technical appendix to the OECD report presents endogenous factors that were built into the simulation processes using the global macroeconomic model NiGEM. These are price shocks (the percentage difference in the average price of a selected commodity between February 24 and March 9 from the average price in January 2022), changes in commodity and financial markets, and the significant decline in domestic demand in Russia and Ukraine that occurred during the first two weeks after the Russian invasion.

The main values of endogenous factors are as follows:

- world oil prices rose by 33%; coal prices rose by 80%;
- gas prices rose by 85% in Europe, by 10% in North America and by 20% in the rest of the world;
- world metal prices rose by 11%, based on the volume-weighted average price change for copper, gold, zinc, iron ore, nickel, aluminum, palladium, and platinum;
- world food prices rose by an average of 6%, with wheat prices up 90% and corn prices up 40%;
- fertilizer prices were expected to rise by 30%.

At the same time, the potential scale of the likely impact on domestic demand in Ukraine and Russia is defined in the report as highly uncertain, but probably significant. Previous events in Russia, such as the 1998 financial crisis and the aftermath of the 2014 annexation of Crimea, were accompanied by significant declines in domestic demand of between 10-15%. But the intensified sanctions imposed after the invasion of Ukraine suggest that the downturn in Russia could be even greater than due to those past events.

In Ukraine, the scale of the losses caused by the war is likely to be even greater. Other military conflicts led to annual GDP declines of 25-40% in some countries, including Iraq, Syria, and Yemen.

Ukraine's demand is an endogenous factor in the model. Based on comparisons with similar situations, the model assumes a 40% decline in domestic demand in Ukraine and a 15% decline in Russia.

It is also assumed that all shocks will last at least one year.



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*USDA (U.S. Department of Agriculture)*

On March 9, 2022, USDA published its regular monthly forecast of global agricultural supply and demand, in which it provided preliminary estimates of the short-term impact of Russia's military invasion of Ukraine on global agricultural supply and demand. The report notes that Russia's military action in Ukraine significantly increased the uncertainty of supply and demand conditions in global agricultural markets.

The document contains a forecast of output, exports, imports and consumption of some of Ukraine's main agricultural exports in the 2021-2022 marketing year.

The USDA document reduced forecasts for exports of major export crops from Ukraine in the 2021-2022 marketing year:

- the projected wheat exports from Ukraine in the 2021-2022 marketing year will decrease by 4 million tonnes compared to the forecast made in February (before the war), and will amount to 20 million tonnes (down by 17%). The main reason is the disruption of exports from the Black Sea ports;
- the projected maize exports from Ukraine in the 2021-2022 marketing year will decrease by 6 million tonnes compared to the forecast made in February (before the war) and will amount to 27.5 million tonnes (decrease by 18%). The main reason is the disruption of exports from the Black Sea ports.

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