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Analysis and assessment of economic losses during the Russian-Ukrainian war

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Abstract. The relevance of the article is stipulated by the need to study the issues of Ukraine's economic losses as a result of russia's aggression with a view to further developing recommendations for Ukraine's post-war recovery.

The article analyses the main indicators which, in the authors' opinion, are crucial for determining the country's economic losses in the long-term perspective. In particular, the first significant indicator that can describe economic losses is the loss of territory. The loss of territory as a result of hostilities and its occupation has an immediate and long-term impact on the country's economy, as it reduces its potential for development and wealth creation. Another indicator that is closely related to the loss of territory is human losses. This can occur due to death, injury or migration of the population. The negative demographic situation affects the labour market, as there is a lack of personnel, in particular for the security and defence forces, and thus our resilience to the enemy is weakened; and the budget structure, which will change, as it will be necessary to increase expenditures for the older population's maintenance, etc. This is important when determining the country’s GDP, as this indicator shows the market value of all final goods and services produced in a year in all economy’s sectors in the state’s territory for consumption, export and accumulation. In

other words, GDP is largely determined by the country's population and land area. To provide a more comprehensive picture of Ukraine's economy and its losses, the article presents the dynamics of Ukraine's public debt compared to GDP.

The identified trends have made it possible to identify three sharp deterioration waves in the economic situation in Ukraine over the past ten years, which are associated with both a decrease in Ukraine's population and loss of territory, as well as a reduction in GDP. The first period was in 2014, and is associated with the occupation of Crimea and certain areas of Donetsk and Luhansk regions. The second period (2020) is the COVID-19 pandemic result. The third period (2022) is mainly caused by russia's full-scale invasion of Ukraine.

Areas for further research could include formalising the relationship between GDP and the country's population and the area of lost territory, as well as developing recommendations for improving the economic situation in Ukraine during the reconstruction period after the cessation of hostilities.

Keywords: national debt, demography, economic losses, GDP, loss of territory, population.

Introduction

The economic losses of a country as a result of war can be described by various indicators that cover a wide range of economic aspects. In particular, such indicators include: the growth or decline in gross domestic product (hereinafter - GDP), which will be determined by the intensity of production, investment and consumption; budget deficit, which may occur due to increased defence spending and reduced tax revenues; inflation, which may be significant due to higher prices for goods and services due to reduced supply and disruption of logistics chains; unemployment, which may increase due to the destruction of enterprises, loss of jobs and evacuation of the population; the volume of direct foreign investments which may decrease due to the increasing risks and uncertainty; trade balance which may worsen due to the decreasing export and increasing import of necessary goods (for example military materials and supplies); external debt which may increase due to the necessity to involve financial resources to cover the budgets` deficiency and defence financing; infrastructure damages which may be considerable due to the destruction of transport, energetic and municipal infrastructure, what requires significant spends for reconstruction; economic structure which may change if the reorientation of manufacture and economic activity happens for war-time needs that may lead to the degradation of civil economy sectors, etc.

It should be noted that, according to the authors, the main factors that affect the economic losses of a country are human losses that can occur due to death, injury or migration of the population, as well as the loss of territory as a result of hostilities.

Therefore, in order to assess economic losses, the authors believe that a detailed study of such factors as the number of people, the area of lost territories and GDP is necessary, which will allow to assess the overall impact of the war on the country's economy.

The current situation in the world prompted the study of determining losses problems in Ukraine. In general, quite a few publications have been devoted to this issue. In particular, since 2022, the analytical team of the Kyiv School of Economics has been periodically assessing the damage to Ukraine's economy caused by the destruction resulting from russia's armed aggression against Ukraine. This assessment is carried out within the framework of the National Council for the Recovery of Ukraine from the Consequences of Armed Aggression jointly with the Ministry of Community Development, Territories and Infrastructure, the Ministry of Economy, the Ministry of Health of Ukraine, under the coordination of the Ministry for the Reintegration of the Temporarily Occupied Territories of Ukraine and in cooperation with other relevant ministries and the National Bank of Ukraine (Damage to Ukraine's infrastructure as of 2022, 2022; Damage to the infrastructure of Ukraine as of 2023, 2023; Damage to the infrastructure of Ukraine as of 2024, 2024; Report on

direct infrastructure damage, indirect economic losses from the destruction caused by russia's military aggression against Ukraine, and a preliminary assessment of Ukraine's needs for financing the recovery, 2022; Report on direct losses of infrastructure from destruction as a result of russia's military aggression against Ukraine as of 1 September 2022, 2022; Report on direct losses of infrastructure from destruction as a result of russia's military aggression against Ukraine for the year since the beginning of the full-scale invasion, 2023; Report on direct infrastructure damage and indirect economic losses from destruction as a result of russia's military aggression against Ukraine as of June 2023, 2023; Report on direct infrastructure losses from destruction as a result of russia's military aggression against Ukraine as of the beginning of 2024, 2024). The assessment is based on the World Bank's methodology, which provides for the determination of direct damages - a cost estimate of the damage caused to Ukraine's physical infrastructure as a result of armed aggression (complete or partial destruction), as well as indirect damages – a cost estimate of changes in economic flows as a result of armed aggression, namely: loss of income in various sectors of the economy, additional costs associated with the war, and future losses incurred by the economy as a result of the war.

In addition, the Government of Ukraine, together with the World Bank, conducted a number of damage assessments and reconstruction needs in Ukraine due to russian aggression and presented their vision of losses and their cost estimates (Ukraine First Rapid Damage and Needs Assessment (RDNA1), 2022; Ukraine Second Rapid Damage and Needs Assessment (RDNA2), 2023; Ukraine Third Rapid Damage and Needs Assessment (RDNA3), 2024).

It should be noted that in 2022, the Cabinet of Ministers of Ukraine adopted Resolution

No. 326 of 20.03.2022 "On Approval of the Procedure for Determining Damage and Losses Caused to Ukraine as a Result of the Armed Aggression of the russian federation" (Resolution of the Cabinet of Ministers of Ukraine of 20.03.2022. № 326, 2022), and the Ministry of Economy of Ukraine, accordingly, developed a methodology for determining economic losses related to human losses, including Indirect economic losses associated with a decrease in population and a corresponding decrease in the country's economic indicators caused to Ukraine as a result of the armed aggression of the russian federation (Order of the Ministry of Economy of Ukraine of 02.11.2022. № 4363, 2022). These regulations are designed to determine damage and losses in monetary terms and establish general approaches to assessing economic losses related to human losses, including indirect economic losses associated with a decrease in population and a corresponding decrease in the country's economic performance caused to Ukraine as a result of the armed aggression of the russian federation.

In addition to reports, studies, and regulations at the state level, there are many other publications devoted to the analysis of the country's losses during the hostilities (Nykoliuk, Pyvovar, Nazarkina, Stolnikovych, Bohonos, 2023; Semenenko, Chernyshova, Taran, Kaplia, Musiienko, VPoberezhets, 2022; Khomutenko, Khomutenko, 2023; Bohdan, 2024; Marko, Chernyshova, 2019). However, the study of Ukraine's economic losses in terms of the relationship between human losses, losses of the country's territory and its GDP is not fully disclosed and needs to be clarified.

Thus, the purpose of this study is to examine Ukraine's economic losses in terms of the interconnection of human losses, losses of the country's territory and GDP.

Methodological Framework

The proposed study is based on empirical research methods, such as comparison, analysis, synthesis, induction and deduction. An economic and statistical analysis of the demographic situation in Ukraine, its territory and key economic indicators is carried out: GDP and national debt. The author constructed a series of dynamics of these indicators and identified the main trends in their change, which made it possible to comprehensively study the change in Ukraine's economic losses and draw appropriate conclusions about the current situation in the country. To illustrate the results, the author

uses the graphical method and builds relevant diagrams and graphs.

Results and Discussions

It is clear that the loss of territories has a significant impact on the state's economy, since the loss of territory means: loss of natural resources, namely access to minerals, forests, water resources and other natural resources that could bring economic benefits; loss of agricultural land, which can reduce the production of food and other agricultural products; loss of infrastructure (infrastructure facilities), namely, roads, bridges, power plants, water pipes, etc., which are important for economic activity; loss of production facilities, namely, plants, factories and other production facilities located on the lost territory; loss of housing stock, namely residential buildings and other real estate, which affects the real estate market and living conditions of the population; loss of businesses and enterprises, namely the loss of small, medium and large businesses that operated in the occupied territory, which leads to a decrease in tax revenues and overall economic activity; loss of tourism (tourist sites and territories), which leads to a decrease in tourism revenues; loss of markets and logistics routes, which requires reconfiguring economic ties and logistics routes due to the loss of territories, which may lead to additional costs. Thus, the loss of territory has an immediate and long-term impact on a country's economy, reducing its potential for development and wealth creation.

The total area of Ukraine's territory is 603,628 km², i.e. 5.7% of Europe and 0.44% of the world (Website of the State Service of Ukraine for Geodesy, Cartography and Cadastre). In terms of this indicator, it is the largest country located entirely in Europe and the second largest among the continent's countries after the russian federation. The territory of Ukraine stretches from west to east for 1316 km and from north to south for 893 km. Table 1 shows Ukraine's territory and population by region as of 2001 (Website of the State Statistics Service of Ukraine. Population). This year was chosen because it was the year of the All-Ukrainian Population Census. It was carried out in accordance with the resolution of the United Nations Economic and Social Council of 19.07.1995 on the conduct of national population censuses by UN member states in the period 1995-2004. It was the first national census since the previous one was conducted in 1989, on the eve of Ukraine's independence.

Thus, the total population of Ukraine, according to the All-Ukrainian Population Census, was 48 million 457 thousand people (Website of the State Statistics Service of Ukraine. Population). As can be seen from the table, Ukraine is characterised by a high population density, according to the All-Ukrainian Census, with a national average of 80 $^{people/km2}$. The lowest population density is in the north-west and south of the country, where it was less than 60 $^{people/km2}$. This figure is particularly low in Chernihiv region – 39 $^{people/km2}$. The eastern industrial regions are the most densely populated, with a population density of over 90 $^{people/km2}$, and in Donetsk region it reached 183 $^{people/km2}$. A decrease in population in 2001 compared to 1989 occurred in the vast majority of the country's regions, with the exception of Volyn, Zakarpattia, Rivne, and Kyiv, where this indicator remained almost at the level of 1989.

Unfortunately, since March 2014, certain parts of the territory of Ukraine have been occupied by the russian federation, namely: The Autonomous Republic of Crimea and Sevastopol and part of Kherson region (part of the Arabat Spit, the Ad Peninsula (Chaplynka district), Chonhar Peninsula (Henichesk district)). In April 2014, Ukraine's control temporarily ceased to extend to parts of Donetsk and Luhansk regions. After the full-scale russian invasion in February 2022, other territories were added to these areas, including parts of Kherson, Kharkiv, Zaporizhzhia, Mykolaiv, Dnipro, Sumy and Odesa regions.

By the end of autumn 2023, representatives of the Commander-in-Chief of the Armed Forces of Ukraine's Office released information that the aggressor state had occupied 109,000 ^{km2} of Ukraine's territory out of 603,600 ^{km2}, while the Armed Forces of Ukraine had liberated about 39,000 ^{km2} since the beginning of the full-scale invasion (Taranenko, 2023).

The dynamics of the loss of Ukrainian territory as a result of russia's occupation is shown in Table 2. Thus, five regions of Ukraine and the Autonomous Republic of Crimea are currently under partial occupation. In particular, Luhansk (26.3 thousand km^2, or 98% of the territory), Zaporizhzhia (19.6 thousand km^2, or 73%), Kherson (20.5 thousand km^2, or 72%), Donetsk (15.07 thousand km^2, or 57%), and Kharkiv (603 km^2, or 2%). russia also maintains full control over the Ukrainian peninsula of Crimea, which is 26.9 thousand km^2 of territory (Taranenko, 2023). We should also note the de-occupied territories that were occupied by russia at the beginning of the full-scale invasion and later returned by Ukrainian troops, namely 14 thousand km^2 - parts of Chernihiv and Sumy regions; 12 thousand km^2 - north and east of Kharkiv region; 7 thousand km^2 - north of Kyiv region; 6 thousand km^2 - parts of Mykolaiv region and the right-bank part of Kherson region. In total, 39 thousand km^2 have been cleared. The change in the territory of Ukraine occupied by russia since its independence is shown in Fig. 1.

Table 1. Ukraine`s territory and its population by regions

Region	Area		Population			
	year 1992 (km^2)	% of the total area	year 2001 (thousand people)	% of the total in 2001	year 1989 (thousand people)	2001 in % to 1989
Autonomous Republic of Crimea	26 081	4,32%	2033,7	4,20%	2063,6	99%
Vinnytsia oblast	26 513	4,39%	1772,4	3,66%	1932,6	92%
Volyn oblast	20 144	3,34%	1060,7	2,19%	1061,2	100%
Dnipropetrovsk oblast	31 974	5,30%	3567,6	7,36%	3881,2	92%
Donetsk oblast	26 517	4,39%	4841,1	9,99%	5332,4	91%
Zhytomyr oblast	29 832	4,94%	1389,5	2,87%	1545,4	90%
Zakarpattia oblast	12 777	2,12%	1258,3	2,60%	1252,3	100%
Zaporizhzhia oblast	27 180	4,50%	1929,2	3,98%	2081,8	93%
Ivano-Frankivsk oblast	13 928	2,31%	1409,8	2,91%	1423,5	99%
Kyiv oblast	28 131	4,66%	1827,9	3,77%	1940	94%
Kirovohrad oblast	24 588	4,07%	1133,1	2,34%	1239,4	91%
Luhansk oblast	26 684	4,42%	2546,2	5,25%	2862,7	89%
Lviv oblast	21 833	3,62%	2626,5	5,42%	2747,7	96%
Mykolaiv oblast	24 598	4,08%	1264,7	2,61%	1330,6	95%
Odesa oblast	33 310	5,52%	2469	5,10%	2642,6	93%
Poltava oblast	28 748	4,76%	1630,1	3,36%	1753	93%
Rivne oblast	20 047	3,32%	1173,3	2,42%	1169,7	100%
Sumy oblast	23 834	3,95%	1299,7	2,68%	1432,7	91%
Ternopil oblast	13 823	2,29%	1142,4	2,36%	1168,9	98%
Kharkiv oblast	31 415	5,20%	2914,2	6,01%	3195	91%
Kherson oblast	28 461	4,71%	1175,1	2,43%	1240	95%
Khmelnytska oblast	20 645	3,42%	1430,8	2,95%	1527,1	94%
Cherkasy oblast	20 900	3,46%	1402,9	2,90%	1531,5	92%
Chernivtsi oblast	8 097	1,34%	922,8	1,90%	938	98%
Chernihiv oblast	31 865	5,28%	1245,3	2,57%	1415,9	88%
Kyiv	839	0,14%	2611,3	5,39%	2602,8	100%
Sevastopol	864	0,14%	379,5	0,78%	395	96%
Total	603 628	100%	48457,1	100%	51706,6	94%

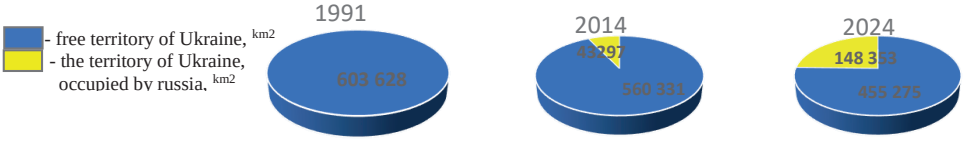


Figure 1. Dynamics of changes in Ukraine's territory

Thus, the data analysis shows that in 2014, 43,300 km², or 7% of Ukrainian territory, was under temporary russian occupation. After the full-scale russian invasion in 2022, this area increased by 2.9 times (Taranenko, 2023).

To get a full picture of the losses, let's analyse the dynamics of population losses in Ukraine compared to 2001. Table 3 shows the change in population in 2010, 2015 and 2022 compared to 2001 (Website of the State Statistics Service of Ukraine. Population).

Table 2. Dynamics of losses of the territory of Ukraine as a result of the russian occupation

Region	Occupation date	Area (km²)	% losses by area of the region	% loss of total area
Autonomous Republic of Crimea	20.02.2014–	26 945	100%	4,46%
Donetsk oblast (ORDLO)	07.04.2014–	15 075	57%	2,5%
Luhansk oblast (ORLO)	29.04.2014–	26 256	98%	4,35%
Kharkiv oblast	24.02.2022–	603	2%	0,10%
Zaporizhzhia oblast	24.02.2022–	19 861	73%	3,29%
Kherson oblast	24.02.2022–	20 492	72%	3,39%
Chernihiv and Sumy oblasts	24.02.2022–06.04.2022	13 996	25%	2,32%
North and east Kharkiv oblast	24.02.2022–08.09.2022	12 024	38%	1,99%
North of Kyiv oblast	24.02.2022–04.04.2022	7 096	25%	1,18%
Parts of Mykolaiv oblast and the right-bank part of Kherson oblast	26.02.2022–11.11.2022	6 005	11%	0,99%
Returned		39 121		6,48%
Lost and not returned		109 232		18,10%
Total lost		148 353		24,58%

The dynamics of population change is shown in the form of a graph in Fig. 2 (Website of the State Statistics Service of Ukraine. Population).

Thus, over the past 10 years, Ukraine's population has declined by almost 40%. In particular, in 2013, the population of Ukraine was probably 45.5 million people. This figure is likely to be overestimated by several million, as no census was conducted and many factors were not taken into account. After 2013, there were events that had a negative impact on the population of the country. These events can be divided into three periods. The first period (2014-2016): the number of people decreased as a result of the occupation of Crimea and part of Donbas, as well as the first wave of migration abroad. The second period (2019-2021): the decline in Ukraine's population was caused by the pandemic and intense migration. The third period began with russia's full-scale invasion of Ukraine. Taking into account the research of the Institute of Demography on the migration of the

Ukrainian population (Website of the Ministry of Social Policy of Ukraine), it can be argued that in 2016 the population of Ukraine decreased to 42.7 million people, in 2021 the country had 37 million people. Thus, from 2013 to 2021, the country's population decreased from 45 million to 37 million, or by 8 million people, or 18%. From 2021 to 2024, Ukraine's population decreased from 37 million to 31 million, or by another 6 million people, or 12%. In other words, in total, over the past ten years, Ukraine is likely to have lost 14.5 million people, or a 30% decline in its population. The main reasons for this decline are natural decline, migration, population under occupation, pandemic, and losses during hostilities. It should also be noted that the decline in the economically active population is faster than the decline in the country's population as a whole. This is natural, as active and able-bodied people migrate. Pensioners tend to stay at home. Thus, russia's full-scale invasion has worsened Ukraine's demographics and intensified the negative trends in Ukraine's population that were observed even before the military aggression.

Table 3. Population change in Ukraine by regions

Region	year 2001	year 2010	2010 as a % of 2001	year 2015	2015 as a % of 2001	year 2022	2022 as a % of 2001
Vinnytsia oblast	1772,4	1649,48	93%	1610,6	91%	1507,74	85%
Volyn oblast	1060,7	1036,52	98%	1042,9	98%	1020,77	96%
Dnipropetrovska oblast	3567,6	3353,53	94%	3276,6	92%	3093,15	87%
Donetsk oblast	4841,1	4463,08	92%	4297	89%	4056,41	84%
Zhytomyr oblast	1389,5	1285,04	92%	1256	90%	1177,56	85%
Zakarpattia oblast	1258,3	1244,88	99%	1259,6	100%	1243,72	99%
Zaporizhzhia oblast	1929,2	1810,39	94%	1765,9	92%	1636,32	85%
Ivano-Frankivsk oblast	1409,8	1380,55	98%	1382,6	98%	1350,57	96%
Kyiv oblast	1827,9	1721,04	94%	1729,2	95%	1795,54	98%
Kirovohrad oblast	1133,1	1017,05	90%	980,6	87%	902,28	80%
Luhansk oblast	2546,2	2309,49	91%	2220	87%	2101,65	83%
Lviv oblast	2626,5	2548,90	97%	2537,8	97%	2476,11	94%
Mykolaiv oblast	1264,7	1188,92	94%	1164,3	92%	1090,49	86%
Odesa oblast	2469	2390,03	97%	2396,4	97%	2349,75	95%
Poltava oblast	1630,1	1498,47	92%	1449	89%	1350,56	83%
Rivne oblast	1173,3	1151,69	98%	1161,2	99%	1140,90	97%
Sumy oblast	1299,7	1171,03	90%	1123,4	86%	1034,36	80%
Ternopil oblast	1142,4	1088,32	95%	1069,9	94%	1020,95	89%
Kharkiv oblast	2914,2	2767,46	95%	2731,3	94%	2596,25	89%
Kherson oblast	1175,1	1092,83	93%	1067,9	91%	1000,37	85%
Khmelnytskyi oblast	1430,8	1333,15	93%	1301,2	91%	1227,47	86%
Cherkasy oblast	1402,9	1294,39	92%	1251,8	89%	1159,20	83%
Chernivtsi oblast	922,8	904,19	98%	910	99%	889,93	96%
Chernihiv oblast	1245,3	1108,63	89%	1055,7	85%	957,67	77%
Kyiv	2611,3	2785,29	107%	2888	111%	2950,70	113%
Autonomous Republic of Crimea	2033,7	1964,99	97%				
Sevastopol	379,5	380,5	100%				
Total	48475,1	45939,82	95%	42928,9*	93%*	41130*	89%*

* - without the population of the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol.

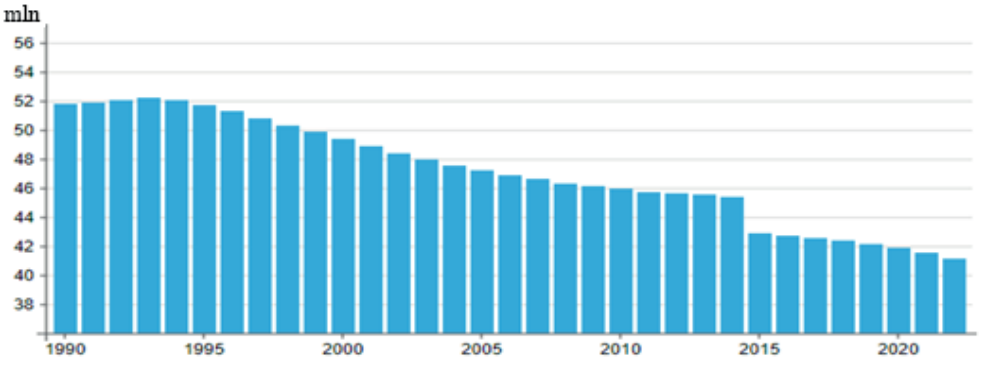


Figure 2. Dynamics of changes in the population of Ukraine

As of 2024, according to the Institute of Demography, 31 million people live in the government-controlled territory of Ukraine. Another 4.1 million live in the territories temporarily occupied by russia, about 4.9 million in the European Union and North America, and deportees to russia and Belarus (Website of the Ministry of Social Policy of Ukraine).

The demographic situation in Ukraine as of 2024 is shown in Fig. 3 (Website of the Ministry of Social Policy of Ukraine).

Thus, Ukrainians go abroad primarily because of hostilities on the territory of their country. And a significant number of them do not plan to return. According to various estimates, between 1.4 and 2.3 million Ukrainians plan to stay abroad. The negative impact of the current demographic situation is already evident. It affects the labour market, in particular, the shortage of personnel for the security and defence forces, which means that our resilience to the enemy is weakening; as well as the budget structure, which will change as it will be necessary to increase spending on the maintenance of older people, etc.

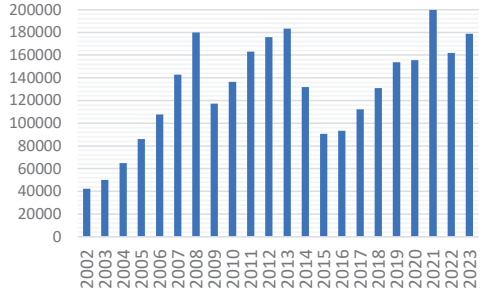


Source: Institute of Demography and Social Studies. Centre for Economic Strategy

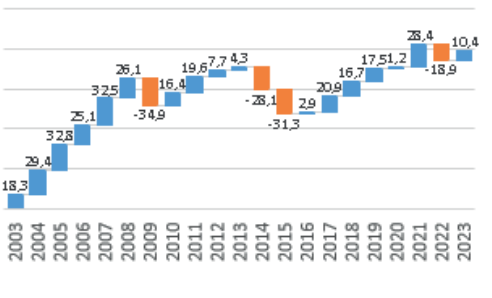
Figure 3. Distribution of the population of Ukraine as of 2024

The next step is to study changes in Ukraine's GDP. In general, gross domestic product (GDP) refers to a macroeconomic indicator that shows the market value of all final goods and services produced in a year in all sectors of the economy in the territory of a state for consumption, export, and accumulation, regardless of the nationality of the factors of production used (Website of the Ministry of Finance of Ukraine). A distinction is made between nominal and real GDP. Nominal, or absolute, GDP is determined in current (actual) prices of a given year. Real GDP (adjusted for inflation) is determined in the prices of the previous (or any other base) year. Real GDP thus takes into account the extent to which GDP growth is reflected in real output growth rather than price growth. If necessary, a country's GDP can be additionally converted into a foreign currency (most often into US dollars). The dynamics of nominal GDP in dollars, according to the World Bank and the IMF (Ukraine Third Rapid Damage and Needs Assessment (RDNA3), 2024), is shown in Fig. 4. Also, Fig. 4 also shows the change in GDP as a percentage of the previous year.

The full-scale invasion caused large-scale damage to the Ukrainian economy and led to a rapid decline. In 2022, the national product shrank by almost a third (28.8% of real GDP). The biggest drop occurred in the second quarter of 2022, when parts of Kyiv region and northern Ukraine were temporarily occupied. At that time, GDP fell by 36.9%. This was due to the loss of production capacity, human capital, and national savings. As already mentioned, more than 6 million refugees fled to other countries, almost 5 million people became internally displaced, and more than a million men were mobilised into the Armed Forces of Ukraine. This resulted in job losses, lower incomes, and a decrease in the purchasing power of the population. However, the economy began to show signs of recovery in the third quarter of 2022. This was primarily due to businesses and households adapting to the changes and resuming consumption. As a result, in 2023, the Ukrainian economy grew by 10% after falling by 19% in 2022. The receipt of sufficient external financial assistance helped to resolve the issue of currency stability. The main driver of economic growth in the first half of 2023 was a strong recovery in private consumption amid stabilisation in the foreign exchange market and expectations of a successful counter-offensive. In the second half of the year, the economy was supported by a good harvest, no electricity shortages, and a recovery in seaport exports.



Nominal GDP of Ukraine for 2002-2023, million USD



Change in Ukraine's GDP compared to the previous

Figure 4. Nominal GDP growth in Ukraine in 2002-2023

It is worth noting that, alongside the gradual recovery of Ukraine's economy, there is another problem, namely the changing structure of the economy. In recent years, the share of public spending has been increasing in the overall picture. While in 2021, the share of public administration in our country's economy was only 7%, last year it reached approximately 26%. At the same time, the share of the extractive industry fell by about half - from 8% to 4%, agriculture dropped from 12% to 8%, and even IT and telecommunications declined from 5% to 3%. Thus, a significant share of GDP is

provided by government spending, which, in turn, is supported by aid and loans from partners, amounting to USD 42 billion in 2023 (Website of the Ministry of Finance of Ukraine). The simultaneous economic downturn and rising borrowing have led to a rapid change in the volume of public debt.

Public debt is the total debt obligations of the state to all creditors (legal entities and individuals, foreign states, international organisations, etc.) The public debt consists of the debt of the central government, regional and local authorities, as well as the debt of all corporations with state participation, in proportion to the state's share in their capital (Website of the Ministry of Finance of Ukraine).

In particular, in 2023, the public debt is already 85% of GDP, while in 2021 the debt was less than 49%. The total amount of public debt at the beginning of 2024 reached USD 145.3 billion, which is about UAH 5.6 trillion. According to IMF predictions, Ukraine's public debt will continue to grow and may reach 100% of GDP in 2025. The dynamics of Ukraine's public debt is shown in Figure 5 (Website of the Ministry of Finance of Ukraine).

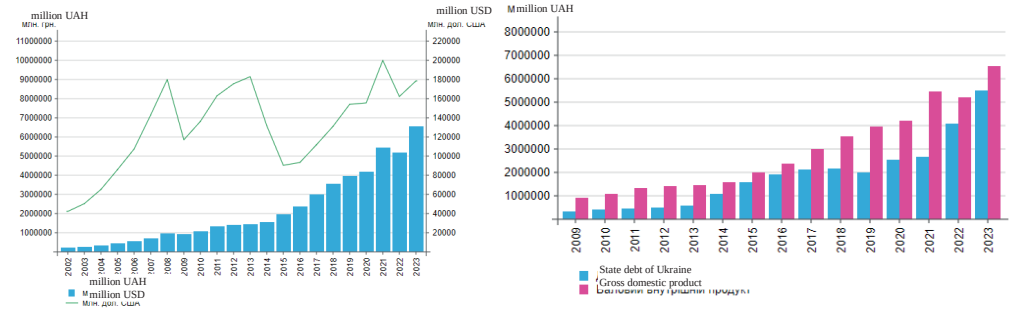


Figure 5. Dynamics of Ukraine's public debt in 2002-2023

As international experience shows, in general, debt is not a problem in itself. However, foreign borrowing should be linked to real investment and aimed at solving the country's off-budget problems. Unfortunately, foreign borrowings in Ukraine are currently used to solve defence and social problems that are directly related to the budget. Therefore, in the future, there is likely to be a need for new loans to service the external debt. This will have negative consequences for both financial sustainability and debt security of the state.

Conclusion

In summary, the analysis of Ukraine's economic losses over the past ten years has shown that:

firstly, there have been three waves of sharp deterioration in the economic situation in Ukraine, which are associated with both a decline in Ukraine's population and loss of territory, and a decline in GDP. The first period began in 2014 and is associated with the occupation of Crimea and certain districts of Donetsk and Luhansk regions. The second period (2020) is the result of the COVID-19 pandemic. The third (2022) is the full-scale russian invasion of Ukraine;

secondly, Ukraine's economic losses are mainly caused by active hostilities. The consequence of such actions is not only actual destruction or direct damage to Ukraine's physical infrastructure, but also a decrease in the country's territory and population, which directly affects Ukraine's GDP;

thirdly, in order to eliminate the negative consequences in Ukraine in the form of a deteriorating economic situation, it is necessary to comprehensively address the current problems.

In our opinion, the rapid development of Ukraine's economy is possible only if, on the one hand, the hostilities cease and most of the occupied territories are returned, which should be implemented

both militarily and through the art of diplomacy; on the other hand, the demographic problems in Ukraine are resolved, which requires not only the cessation of hostilities but also the search for ways to create conditions for increasing the birth rate in the country and reducing premature mortality, as well as changing the migration trend and ensuring migration growth.

Further research could be aimed at formalising the relationship between GDP and the country's population and lost territory, as well as developing recommendations for improving the economic situation in Ukraine during the post-conflict reconstruction period.

Recommendations

The materials of the article can be used as an integral part of the analysis of the economic situation in Ukraine over the past ten years, as well as in the formation and implementation of the country's economic, demographic and military-economic policies. The article may be useful to scholars and analysts involved in the development of forecasts, elaboration and justification of decisions on the development of the state.

References

1. *Damage to Ukraine's infrastructure as of 2022* (2022). Kyiv School of Economics. https://kse.ua/.
2. *Damage to the infrastructure of Ukraine as of 2023.* (2023). Kyiv School of Economics. https://kse.ua/
3. *Damage to the infrastructure of Ukraine as of 2024.* (2024). Kyiv School of Economics. https://kse.ua/
4. *Report on direct infrastructure damage, indirect economic losses from the destruction caused by russia's military aggression against Ukraine, and a preliminary assessment of Ukraine's needs for financing the recovery*. (2022). Kyiv School of Economics. 74 p.
5. Report on direct losses of infrastructure from destruction as a result of russia's military aggression against Ukraine as of 1 September 2022. (2022). Kyiv School of Economics. 41 p.
6. *Report on direct losses of infrastructure from destruction as a result of russia's military aggression against Ukraine for the year since the beginning of the full-scale invasion.* (2023). Kyiv School of Economics. 50 p.
7. *Report on direct infrastructure damage and indirect economic losses from destruction as a result of russia's military aggression against Ukraine as of June 2023.* Kyiv School of Economics. 60 p.
8. *Report on direct infrastructure losses from destruction as a result of russia's military aggression against Ukraine as of the beginning of 2024.* (2024). Kyiv School of Economics. 40 p.
9. *Ukraine First Rapid Damage and Needs Assessment (RDNA1)*. (2022). August 2022, the World Bank, Government of Ukraine, European Commission. 244 p.
10. *Ukraine Second Rapid Damage and Needs Assessment (RDNA2)*. (2023). March 2023, the World Bank, the Government of Ukraine, the European Union, the United Nations. 142 p.
11. *Ukraine Third Rapid Damage and Needs Assessment (RDNA3)*. (2024). February 2024, the World Bank, the Government of Ukraine, the European Union, the United Nations. 191 p.
12. On approval of the Procedure for determining the damage and losses caused to Ukraine as a result of the armed aggression of the russian federation. (2022). Resolution of the Cabinet of Ministers of Ukraine of 20.03.2022. № 326. https:// zakon.rada.gov.ua ' 326-2022-p
13. *Methodology for determining economic losses related to human losses, including indirect economic losses associated with a decrease in population and a corresponding decrease in the country's economic indicators caused to Ukraine as a result of the armed aggression of the*

russian federation. (2022). Order of the Ministry of Economy of Ukraine of 02.11.2022. № 4363. https://ips.ligazakon.net/document/re39052?an=273.

14. Nykoliuk, O., P. Pyvovar, R., Nazarkina, G., & Stolnikovych, M. Bohonos. (2023). *Dynamics of the land fund: how the land resources of Ukraine have changed after 24 February 2022*. Kyiv School of Economics. KSE Agrocentre. 12 p.
15. Semenenko, O., Chernyshova, I., Taran, O., Kaplia, I., Musiienko, V., & Poberezhets, T. (2022). On assessing Ukraine's economic losses due to russian aggression and predicting their impact on the state of its national economy and the level of military and economic security (February-April 2022). *Social Development and Security*, *12* (2), 78-91. https://doi.org/10.33445/sds.2022.12.2.7
16. Khomutenko, V. P., & Khomutenko, A. V. (2023). Theoretical aspects of economic losses of Ukrainian enterprises as a result of the military aggression of the russian federation as a subject of forensic economic examination. *Expert: Paradigms of Legal Sciences and Public Administration, 3* (21), 79-90. https://doi.org/10.32689/2617-9660-2022-3(21)-79-90
17. Bohdan, I. (2024, 20 March). *Economic decline and recovery of Ukraine*. Dzerkalo Tyzhnia. https://zn.ua/ukr/macroeconomics/ekonomichne-padinnja-ta-vidnovlennja-ukrajini.html.
18. Marko, I., & Chernysheva, I. (2019). Assessment of losses of the national economy during the armed conflict in Donbas. *Banking, 1 (*149), 3-12.
18. Marko I., Chernyshova I. (2019) *Assessment of losses to the national economy during the armed conflict in Donbas.* Banking business. Scientific and practical journal. Kyiv. 2019. № 1 (149). С. 3–12.
19. Website of the State Service of Ukraine for Geodesy, Cartography and Cadastre. https://www.land.gov.ua.
20. Website of the State Statistics Service of Ukraine. Population. https://www.ukrstat.gov.ua/operativ/operativ2007/ds/nas_rik/nas_u/nas_rik_u.html.
21. Taranenko, V. (2023). How much territory was occupied by russia and how much was liberated by the Armed Forces of Ukraine. Data for the beginning of winter 2023. https://glavcom.ua/country/incidents/skilki-teritoriji-okupuvala-rosija-a-skilki-zvilnili-zsu-dani-stanom-na-pochatok-zimi-2023-roku-972101.html?fbclid=IwAR3pTbPpMFeZDP1etyXy3bu1QZIJGRJuEC9dW8Dgu5-zavaZrXiV5dPbEoU
22. Website of the Ministry of Finance of Ukraine. https://minfin.com.ua/
23. Website of the Ministry of Social Policy of Ukraine. https://www.msp.gov.ua/