Sustainable Development in the Conditions of the Russian-Ukrainian War: The Local and Global Dimension

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ABSTRACT

The escalation of the Russian-Ukrainian war poses a serious threat to achieving the United Nations Sustainable Development Goals (SDGs). The challenges to meeting the SDGs by 2030 will be even greater, considering the current conditions. The consequences have spread not only to the countries directly involved in the war, but also to a global level.

Before the full-scale invasion in 2022, Ukraine had made progress in 15 of the 17 SDGs. However, the war nullified all previous achievements in Ukraine's development progress. Yet, despite these negative tendencies, the SDGs provide a good basis for determining Ukraine's development priorities, and are also an effective way to attract financial support to increase the country's resilience and recovery. Although war complicates the movement toward the goals of sustainable development, it necessitates the socially responsible position of different states, businesses, and international organisations.

The paper aims to assess the impact of the Russian-Ukrainian war on indicators that characterize the economic dimension of SDGs, based on a comprehensive analysis of the available data, a literature review, and empirical estimations. Ordinary Least Squares (OLS) methodology for time series data was used to estimate the main functional dependencies. The investigation proves the destructive impact of war on the global economy, seen mostly through increases in commodity prices, trade, and supply chain distraction. The obtained results confirm the need to support sustainable development as a foundation for peaceful societies, national resilience, and recovery at the local and global levels.

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Introduction

The Russian-Ukrainian war which erupted in 2014 has not only had profound consequences for Ukraine and the immediate region, but has also reverberated around the globe. Sustainable development, a universal goal set by the United Nations, seeks to balance economic, social, and environmental progress. The war in Ukraine has had a far-reaching global impact on the pursuit of that development.

This article explores how the conflict affects sustainable development goals not just in the region, but also globally. The main focus is on the economic dimension.

1. Economic Dimension of the SDGs

The proposal from the Stockholm Resilience Centre suggests that the conflict is affecting the Sustainable Development Goals (SDGs) associated with the biosphere, economy, and society. SDG 17, which focuses on Partnerships for the Goals, encompasses all dimensions, including the biosphere, society, and economy (Stockholm Resilience Centre, 2017). Preliminary analysis of the literature shows that the biggest global impact is felt through the economic dimension (Pereira et al, 2022; de Groot et al., 2022; Jenkins, 2023). The armed conflict between Russia and Ukraine triggered an economic recession, damaged the global economy, and impeded the post-COVID recovery (World Bank, 2022).

According to Pereira et al (2022, p.284-286), the Russian-Ukrainian war has made it impossible to achieve the following SDGs within the economic dimension: SDG 8, SDG 9, SDG 10, and SDG 12. The impossibility of SDG 8 comes as a result of the global recession and GDP loss, the decrease in economic upgrading due to the sanctions, destruction of business development and increased unemployment, the risk of human trafficking, reduction in tourism, and domestic financial institution crises. Obstacles in the way of achieving SDG 9 include infrastructure destruction and inflation, reduction of industry, unemployment, financial market disruptions, and sanctions reducing industry capacity. The levelling of progress toward SDG 10 is caused by reduced economic growth, increased inequalities and repression, and evidence of forced child and adult mobilisation to Russia. And of course, the full-scale invasion influences SDG 12 because the increase in demand for fossil fuel, environmental pollution, and economic crisis can reduce the establishment of sustainable practices.

In analysing obstacles to SDG 17, we recognise that: Economic crises reduce the resources for developing countries and their GDP (UNCTAD, 2022, Ruta, 2022); the war affected the trading environment and macroeconomic stability (Guenette et al, 2002); the war blocked the global partnership between countries (Pereira et al, 2022, p.286).

2. Ukraine

Ukraine has experienced a degree of destruction unprecedented in Europe since World War II, and the recovery process back then for Germany and the United Kingdom took two to three decades following on from the end of the war (Jenkins, 2023).

Fig. 1. Ukraine: Real GDP growth, 1991-2022.
Source: International Monetary Fund (IMF)

Fig. 2. Ukraine: Poverty, Inflation, Unemployment
Source: World Bank Database

Apart from the humanitarian disaster, the Russian invasion has inflicted severe damage on Ukraine's economy. This has resulted in a sharp drop in GDP and a significant increase in unemployment, as reported in various sources (Kyiv Independent 2022, National Bank of Ukraine 2022, Ministry of Economy of Ukraine 2023). Ukraine's economic output is now at a fraction of its pre-war levels. In the first year of the conflict, the country lost 30-35% of its GDP, leading to the largest recession in Ukraine's history (see Figure 1). Its GDP is projected to grow in 2023, if only by 0.5%. Results of some investigations show that losses in total factor productivity are expected to plummet by about 7% by 2035, and that the negative effects will fade away only slowly over the following decades (Egert et al., 2023). The cost of reconstructing the damaged and destroyed physical infrastructure is estimated to be between 130% and 330% of Ukraine's GDP before the COVID-19 pandemic, as indicated by Becker et al. (2022).
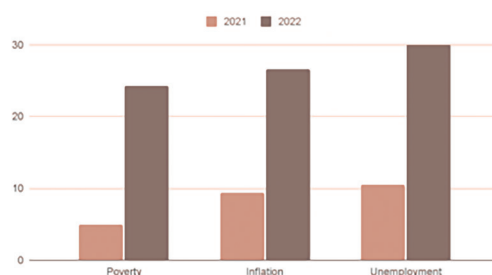
For the people of Ukraine, incomes have dropped against a background of high inflation and unemployment. Poverty in the country increased from 5.5% of the population to 24.2% in 2022 (Figure 2), and the number could rise to as high as 55% by the end of 2023, according to the World Bank overview (World Bank, 2023). The war pushed 7.1 million more people into poverty, undoing 15 years of progress (Kilfoyle, 2023).

3. Global Consequences

The war has unfolded during a challenging period for the global economy. The world has been striving to recover from the economic downturn caused by the pandemic, but this recovery is slowed by persistent COVID-19 outbreaks and reduced governmental assistance, the World Bank (2022) noted. Moreover, inflation rates are on the rise in numerous nations, prompting major economies to raise interest rates to control it. The disruptions in global trade and investment are anticipated to hinder the growth of developing countries and intensify inflationary pressures, espe-

cially if governments opt to implement trade restrictions to protect their domestic economies (Ruta, 2022).

According to research by Kammer et al, impacts will flow through three main channels:

1. Higher prices for commodities like food and energy will push inflation up further, in turn eroding the value of incomes and weighing on demand;

2. Neighbouring economies will grapple with disrupted trade, supply chains, and remittances, as well as a historic surge in refugee flows;

3. Reduced business confidence and higher investor uncertainty will weigh on asset prices, tightening financial conditions and potentially spurring capital outflows from emerging markets (Kammer *et al.*, 2022).

Russia and Ukraine are major commodities producers, and disruptions have caused global prices to soar, especially for oil and natural gas. Food costs have jumped, with wheat, for which Ukraine and Russia make up 30 percent of global exports, reaching a record high (Kammer *et al.*, 2022). Similar channels are defined in the Ruta investigation. This report outlines five specific trade and investment channels that will be impacted by the conflict in Ukraine. These include disturbances in commodity markets (especially food and energy), logistic networks, supply chains, foreign direct investment, and other specific sectors (Ruta, 2022).

From a macroeconomic standpoint, increased prices for food and energy will lead to a decline in real incomes and a reduction in global import demand. Sanctions will not only impose economic burdens directly on Russia, but also on its trade partners. Apart from Russia and Ukraine, the negative effects on gross domestic product (GDP) are being particularly felt in Europe due to the region's geographical proximity and reliance on Russian energy. Trade expenses were increased due to sanctions, export limitations, elevated

Table 1. Indicators and channels of the global influence of the Russian-Ukrainian War: Economic dimension

Chanel	Macroeconomic indicator	Effects
Trade	Trade Balance	Commodity market distraction (especially food and energy), global import demand depression, global supply chains (GVC), and logistic networks.
Investment and Financial Stability	Foreign Direct Investment	Tightening global liquidity, let down in credit quality, corporate and sovereign debt elevation, and decline in renewable energy investment.
Global Inflation	Commodity prices	Increasing commodity prices (especially agricultural and energy).
Labour market	Unemployment rate	Declining real wages, and decreasing demand for workers because of uncertainty
Inequality	Income inequality	Higher prices, unemployment, debt escalation, increase in the level of poverty

Source: Developed by the author

energy costs, and transportation disruptions. Consequently, the war's impact on global trade in 2022 surpassed its impact on the overall global GDP (WTO, 2022).

Based on an analysis of previous studies on the topic, and reports of international organisations, we have systematised channels of global economic influence and the corresponding macroeconomic indicators which are primarily affected by the war and will be used for further research (Table 1).

The estimated decline in global income is 0.7 percent, with low-income countries losing 1 percent and high-income countries losing 0.6 percent (Figure 3). Given the relative size of energy in GDP, the expected impact from the increase in energy prices as compared with the impact of prices of crops and stylised sanctions on total income are much higher (Ruta, 2022).

The pandemic exposed the weaknesses of just-in-time supply chains, and the economic repercussions of the war in Ukraine

have emphasised the extra risks inherent in such a system (Jenkins, 2023). The Russian invasion of Ukraine is already beginning to cause extensive and debilitating supply chain disruption around the globe. Experts believe that the war will likely cause supply chain disruption in four major areas: commodity price increases, firm-level export controls and sanctions, cyber security collateral damage and supply chain turmoil, and geopolitical instability (Interos Report, 2022).

UNCTAD's World Investment Report 2023 shows a widening annual investment deficit that developing countries face as they work to achieve the SDGs by 2030. The gap is now about $4 trillion per year – up from $2.5 trillion in 2015 when the SDGs were adopted. The report shows that global foreign direct investment (FDI) fell 12% in 2022. The report highlights that developing countries need renewable energy investments of about $1.7 trillion each year, but attracted only $544 bil-

Fig. 3. Real GDP growth (Annual percent change)
Source: IMF, World Economic Outlook, October, 2023.

lion in clean energy FDI in 2022 (World Investment Report, 2023).

The Russian invasion of Ukraine has led to a substantial increase in the prices of energy and food since the start of the war, as Russia and Ukraine were major suppliers of energy and food for European countries. Global inflation has increased to 8.6 percent.

The influence of the war on inequality may vary somewhat depending on the financial situation of each country, but those with very high debt may suffer much more complex consequences if the conflict continues. It was found that inequality increases during violent conflict, and will do so in particular in the five years following the end of conflict. Previous investigations on this issue show that income inequality increased by around 1.7 Gini points during the war (Bircan, 2017).

Earlier research showed that the impacts of the armed conflict on inflation and unemployment would be global (Ruiz-Estrada, 2022), and that this will likely be translated into the loss of purchasing power, and poverty. The effects are being felt through food and energy inflation, declining real wages, growing inequality, shrinking policy options, and higher debt in developing countries. A slowdown in economic growth and aggregate demand will also reduce demand for workers as uncertainty and worsening expectations affect hiring.

Currently, on the base of secondary data analysis, we can observe more negative tendencies in Ukraine, where the unemployment rate has increased to 30%. More than five million jobs in Ukraine have been lost. The global unemployment rate did not rise when the full-scale invasion began, but by the end of 2022, the unemployment rate in the world had decreased by 0.4 percentage points (-6.45 percent) on the previous year. Unemployment rates continue to decrease in neighbouring European countries. For the European Union as a whole, the unemployment rate stood at 5.9% in August, the same as in May and June.

4. Data and Methodology

The annual data for the period of 2000-2023 was used to study the impact of the Russian-Ukrainian war. The analysis includes a sample covering global and Ukraine statistics. The data is transformed into logs to prevent the influence of outliers.

The selected list of dependent variables corresponds to the results of the previous analysis of the channels through which the war influences the global economic dimension of sustainable development (Table 2). The dependent variables are as follows: gdp_g_t – world GDP growth (%), $energy\_pr_t$ – World Bank energy commodity price index (2010=100); agr_prt – World Bank agricultural commodity price index (2010=100), $ineq\_g_t$ – difference in the income share for bottom 40% and top 10%, world average, World Inequality Database; $unempl\_g_t$ – global unemployment rate (as a share of the total labour force); $trade\_g_t$ – external balance of goods and services (% of GDP); and inv_g_t – global FDI (in millions of US dollars).

For independent variables characterizing the impact of the Russian-Ukrainian war, we used both variables that describe the direct influence of military actions, and economic indicators reflecting the participation of Rus-

sia and Ukraine in global trade. The indicator of involvement of the conflicting countries in global value chains closely correlates with the military actions and sanctions against Russia.

The list of explanatory variables includes military_ukr$_t$ – military expenditures in Ukraine (% of GDP); war_ukr$_t$ – dummy variable (4– period of full-scale invasion from 2022 till 2023, 2– preparing for full-scale invasion, 2021, 1– period of invasion 2014-2020); gvc_ukr$_t$ – Ukrainian GVC-related trade (% gross trade), gvc_rus$_t$ – russian GVC-related trade (% gross trade).

The data were obtained from the World Bank Database, World Inequality Database, World Integrated Trade Solution Database, and UkrStat Database[1].

The following base model is used to study the relationships between war characteristics and the main macroeconomic indicators:

$$\log(X_{it}) = a_0 + a_1 \log(X_{it-1}) + a_2 \log(\text{mil\_}ukr_t) + a_3 \text{war\_}ukr_t + a_4 \log(\text{gvc\_}ukr_t) + a_5 \log(\text{gvc\_}rus_t) + \varepsilon \quad (1)$$

where X_{it} represents the seven groups of dependent variables: energy_pr$_t$, agr_pr$_t$, ineq_g$_t$ unempl_g$_t$, trade_g$_t$, and inv_g$_t$, while ε_{it} is the error term.

We also performed the Variance Inflation Factor (VIF) analysis to assess the extent of multicollinearity in the Ordinary Least Squares (OLS) regression. This analysis aids us in preventing correlations among multiple explanatory variables within our regression equations.

5. Results

Firstly, a tests for stationarity for time series were used to ensure that no variable is stationary. The Augmented Dickey-Fuller Test (ADF), introduced by Dickey and Fuller in 1981, is a widely used approach in the analysis of time series data (Dickey and Fuller, 1981). Phillips and Perron Test (PP) is employed to verify the precision of the obtained results (Phillips & Perron, 1988). The results of these tests are shown in Table 2. In accordance with ADF and PP tests variables are stationary at I (0).

Table 2. Unit root test

	ADF (trend and intercept)	PP (trend and intercept)	Oder of interpretation
$\log(agr\_pr_t)$	-3,62**	-3,52*	I(0)
$\log(energy\_pr_t)$	-3,78***	-3,62*	I(0)
$\log(ineq\_g_t)$	-3,16**	-2,13	I(0)
$\log(unempl\_g_t)$	-3,95***	-3,80**	I(0)
$\log(gdp\_g_t)$	-5,50***	-5,25***	I(0)
$\log(trade\_g_t)$	-4,39***	-4,42**	I(0)
$\log(inv\_g_t)$	-4,62**	-4,85***	I(0)
$\log(mil\_ukr_t)$	-5,91***	-5,91**	I(0)
$\log(gvc\_rus_t)$	-5,94***	-5,46***	I(0)
$\log(gvc\_ukr_t)$	-3,36**	-2,86*	I(0)

Notes: ***, ** and * respectively showed for the significance level of 1%; 5% and 10%

The verification of the main functional dependencies is performed by the method Ordinary Least Squares (OLS) for time series data. The results are presented in Table 3 for seven regression models (1-7), each for every dependent variable.

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[1] The data didn't include variables from Ukrainian regions currently occupied by Russia.

Table 3. Results of empirical investigation

Explana-tory variables	Dependent variables/regression model number						
	$log(agr\_pr_t)$	$log(energy\_pr_t)$	$log(ineq\_g_t)$	$log(unempl\_g_t)$	$log(gdp\_g_t)$	$log(trade\_g_t)$	$log(inv\_g_t)$
	1	2	3	4	5	6	7
Constant	-	-	-0.084 (1.26)	5.035*** (5.89)	-	6.62 (1.87)**	-5.184 (0.95)
Lagged dependent variable	0.882*** (9.54)	0.898*** (5.78)	1.02*** (17.9)		-	0.934*** (6,83)	0.429** (2.14)
log (mil_ukr_t)	0.242*** (2.60)	0.289* (1.72)	0.005 (1.07)	0.134* (2.02)	-0.742 (-1.29)	- 0,385** (-2.03)	- 0.247 (-0.68)
war_ukr_t	0.119* (1.61)	0.147* (1.65)	0.003 (0.74)	0.021 (0.97)	-0.228 (-0.65)	-0.149* (-1.67)	-0.127 (-0.75)
log (gvc_ukr_t)	-0.931** (-2.08)	-3.235*** (-2.20)	0.022 (1.49)	-0.44* (-1.78)	5.710*** (2.01)	0.721* (1.657)	2.80* (1.61)
log (gvc_rus_t)	-0.831** (-1.92)	-3.425*** (-2.62)	-0,043* (-1.89)	-0.382* (-1.94)	6.20*** (2.15)	0.937* (1.82)	0.612 (0.49)
R^2 Adjusted R^2 BPG (P-value) DW	0.89 0.87 0.49 1.68	0.72 0.65 0.60 1.81	0.90 0.89 0.34 2.13	0.56 0.45 0.28 2.42	0,20 0.08 0.59 2.03	0.83 0,78 0.39 1.73	0.62 0.50 0.52 1.63

Notes: 1) ***, **, and * represent the levels of significance of 1%, 5% and 10% respectively.

2) The values of t-statistics are in parenthesis. 3) All variables are used in logarithms.

Source: Authors' calculations.

The statistically significant Durbin-Watson coefficient (DW) indicates the absence of an autocorrelation between the residuals of the regression equations. Also the residuals were tested for heteroscedasticity through the Breusch-Pagan-Godfrey Test (BPG). According to test results, we can assume that there is no evidence of heteroscedasticity (we cannot reject the null hypothesis of homoscedasticity as P-value is greater than 0.05). The rejection of autocorrelation and heteroscedasticity hypothesis provide grounds for further analysis of the obtained results. The coefficient of determination (R^2) indicates a high proportion of

the variation in the dependent variable that can be predicted from the independent variable. According to the values of the adjusted R^2 indicator for multiple regression, the percentage of explanation of the dependent variable by the independent variables ranges from 8 to 89%. The highest level of significance is in case of inequality dependency (model 3), the lowest – for GDP dependencies (model 5). The percent of the variance in the response variable can be explained by the explanatory variables are 89% and 8% respectively.

The highest impact of the war is observed on commodity prices and global trade, a fact

confirmed by the statistical significance of the result and higher coefficients for explanatory variables. In particularly, the results indicate that the escalation of military actions (represented by variables $\log(mil\_ukr_t)$ and war_ukr_t) led to a 0.2% and 0.1% increase in prices of agricultural products respectively, and a 0.3% and 0.1% increase in energy prices. The opposite impact of these explanatory variables on global trade is observed, as their growth contributes to a deterioration of the dependent variable by 0.4% and 0.1% respectively. This result is in line with the previous assumption that the impact of the war on global trade exceeds its influence on the global GDP (WTO, 2022).

The independent variables used to characterize the economic impact of war ($\log(gvc\_ukr_t)$ $\log(gvc\_rus_t)$) are characterized by influencing almost all dependent variables. Thus, a decrease in Ukraine's involvement in global value chains leads to an increase in prices of agricultural products and energy resources, an increase in unemployment, a deterioration of global GDP, world trade, and FDI volumes (by 0.9%, 3.2%, 0.4%, 5.7%, 0.7%, 2.8% respectively, according to regression results). The impact of Russia's reduced participation in global value chains is even more significant, as a 1% change in this indicator leads to: an increase in global prices of agricultural products and energy resources, an increase in global inequality and unemployment levels, as well as a deterioration of global GDP and trade balance (by 0,8%, 3,4%, 0,04%, 0,3%, 6,2%, 0,9%correspondingly, based on the outcomes of the regression analysis).

The influence on energy, agricultural prices and global trade was observed in the case of both the economic characteristics of the impact of the war (participation in Russia and Ukraine in GVC) and in military terms (defence spending, intensity of attacks). In the case of global inequality and investments, the direct impact of war-related characteristics is negligible. This can be explained by the fact that global data do not allow for the consideration of characteristics specific to individual regions and the level of economic development. For instance, the decrease in investments due to the war is more pronounced for developing and low-income countries, while in some advanced economies and emerging markets (OECD Report, 2023; Crapps, 2023), investment volumes have increased. Countries with weak institutional and economic characteristics are disproportionately affected by income inequality. A similar explanation can be given for the minor impact on global unemployment, which corresponds with our previous analysis of secondary data.

6. Opportunities for Global Cooperation and Sustainable Development Goal Achievement

Due to the war, the world is becoming more and more disconnected and economically weaker. Yet, there exist several Opportunities for Global Cooperation and Sustainable Development Goal Achievement:

1. *Diplomatic Initiatives.* Diplomatic efforts to resolve the conflict are vital, not just for Ukraine but for global peace and stability. These efforts can open the door to sustainable development opportunities.
2. *International Aid and Support.* International aid and support can promote

sustainable development and humanitarian assistance.

3. *Energy Transition.* The conflict highlights the need for a global transition to renewable and sustainable energy sources to reduce dependence on volatile regions.

4. *Environmental Cooperation.* Collaborative environmental efforts can mitigate the ecological consequences of the conflict and promote sustainable practices worldwide.

Conclusions

The Russian-Ukrainian war has had world-level implications for the economic SDGs. The main channels of global economic influence are: Increases in commodity prices, trade, and supply chain distraction. On the one hand, the obtained results confirm the need to move in the direction of SDG achievement as a foundation for peaceful societies, national resilience, and recovery at the local and global levels. On the other hand, they point to the impossibility of achieving them without putting an end to the war.

Enhancing the comprehension, analysis, and surveillance of how war affects trade and development in developing nations and among vulnerable groups is of great significance for the international trade and development community. It is equally crucial to help countries to harmonise their trade policy responses. Only when we have a thorough grasp of these consequences can we establish resilient supply chains, minimise additional losses in trade and development, and prevent the widening disparities between developed and developing countries.

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