Measuring and analyzing the impact of Russian-Ukrainian war on global economic growth (an econometric study)

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Abstract

This paper aims to investigate the effect of Russian-Ukrainian war on global economic growth by applying ARDL model, that allows for the estimation of both short- and long-term dynamic connections, based on the time series approach for monthly data, The econometric study's findings demonstrated that the Russian conflict had a significant impact on the world economy, negatively affecting trade volume, the prices of food and energy, several international sanctions were placed on Russia following the Russia-Ukraine war in an attempt to persuade it to defuse the situation. The study results may contribute to opening horizons for future research that may help clarify the impact of the crisis on the Arab region or developing countries that are more affected by both the food and energy crises.

Keywords: Russian war, Ukraine, energy crisis, food crisis, ARDL model

Introduction:

Russia has continued to support the Commonwealth of Independent States, including Ukraine, even since the Soviet Union fell apart. Between 1991 and 2013, Russia gave the Ukrainian budget a total of $250 billion in subsidies. Additionally, Russia and Ukraine have consistently collaborated in a number of areas, and in 2011, commerce between the two nations

surpassed $50 billion. It is noteworthy that prior to the Corona outbreak in 2019, Ukraine's trade volume with all EU member states was lower.

In Russia, the energy industry is regarded as one of the most significant business assets and fundamental economic cornerstones. In 2000, the government's reliance on the oil and gas industry was 47%; by 2012, it was 50%... Ozili, Peterson (2022)

Due to the novelty of this topic, the literature that has addressed it is not much, we mention the following and a division between moral and non-moral impact:

Muhammad Balbaa (2022) Study, The study examined how the global economy was impacted by the Russian-Ukrainian War. It was discovered that the invasion had an impact on the world economy, as evidenced by the disruption of the worldwide supply chain. This may be seen in the energy supply shocks that take the form of trade shocks that raise the cost of energy, commodities, and food, all of which contribute to increased global inflation in several nations. Sanctions on a belligerent state are not the ideal course of action since they disproportionately harm non-belligerent states, especially when these governments have economic allies, as the war between Russia and Ukraine has demonstrated.

Mhlanga, David & Ndhlovu, Emmanuel (2022), elucidate the diverse worldwide predicaments resulting from the crisis and the ways in which these barriers impact Africa's prospects of achieving sustainable development objectives. Using SDGs 1 and 2 as an illustration, the study discovers that Africa is presently dealing with food and energy shortages, high inflation, with growing commodity costs that might make hunger and poverty worse. These events are caused by the conflict and international sanctions placed on Russia that have produced a disruption in the global supply chain. As stated in the study, Africa should emphasize regional collaboration and structural transformation, reconsider The global financial system and development finance structure, and remain steadfast in its commitment to resilience building. Subsequent investigations may concentrate on the efficacy of non-punitive dispute settlement techniques.

Ozili, Peterson. (2022), investigates the effects of the Russia-Ukraine war on the world economy. Sanctions on Russia were imposed with the intention of hurting the country, but they also indirectly affected the world economy by upsetting based on statistics from the Eurozone

and data from across the world., Russia, and Ukraine, the results indicate that the price of food and food ingredients increased globally, as did the PMI. The day of the invasion saw a decline in the worldwide stock market index. Due to energy and fuel shortages that resulted in higher gasoline costs for transportation inside the euro area, the transport component of the consumer price index also increased in the month of the invasion. Ukraine was more severely damaged by the invasion than Russia or the eurozone as a whole. There was a significant relationship between core consumer prices in the euro region and Ukraine during the invasion. Russia and the euro area have a strong correlation with the inflation of food prices. Additionally, there was a significant and favorable link between the World Food Price Index and the World Oil Price Index during the same month., global oil price index, global dairy price index, and global grain price index. worldwide price increases brought on by the battle increased worldwide inflation. Despite Israel's mediation in the Russia-Ukraine conflict settlement, the crisis' economic effects are still felt throughout much of Europe and beyond.

Duho, King et al. (2022), looks at how the conflict between Russia and Ukraine has affected African nations, focusing especially on regional economic groups. A chronology analysis including significant occasions both before and during the war was included in the research. To present a vivid analysis of the events and its ramifications for Africa in particular, as well as for the globe at large, reference to a variety of scholarly and media publications was necessary. Analyzing the crisis' effects involved looking at eight (8) distinct African regional economic groupings. First, the research offers a summary of the major events that need further investigation as well as the context to the war.

Allam, Bibre, and Sharp (2022) examine the escalating impacts of the COVID-19 pandemic and the Russia–Ukraine war. This perspective paper explores the escalating impacts of the COVID-19 pandemic and the Russia–Ukraine war from different perspectives, focusing on the role of climate finance in achieving just and equitable transition mechanisms and the role of peace in accelerating and supporting this pursuit. It is driven by the recognition that there is an urgent need to accelerate the decarbonization agenda, as articulated in the pre-COP26 discussions and the resulting Glasgow Climate Pact, through mitigation measures that can be disaggregated in terms of cost and scale. This is further reiterated in Part III of the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), which

addresses climate change mitigation, emphasizing the required policy shifts and technology development needs. However, green technology comes with a green premium, being more expensive to implement in geographies that cannot absorb its costs in the immediate short term. This creates an unfair and unjust landscape, where those who need green technology are unable to access it but are often on the front lines of climate change impacts. Natalia and Anastasia (2018) explored the social and economic impacts of the war in Ukraine on Europe. The aim of the article is to identify and detail the social impacts of the war in Ukraine and gain an understanding of its impact on European stability, and on Ukraine's position in the European arena. The article was prepared using methods such as: analysis of Ukrainian and European research papers, comparison and generalization of facts about the war in Ukraine. The article studied the social consequences of the war in Ukraine, such as migration, unemployment, crime growth, population decline, etc. The social dimension of the war in Ukraine was described, which has an impact on European stability and geopolitical situation, especially Ukrainian migration. At the end of the article, the authors presented conclusions and mechanisms for resolving the war in Ukraine. Ukraine also needs an integrated approach to solve all economic and social problems in the country. Only an integrated approach will allow using available Ukrainian resources and advanced European experience to ensure the economic and social stability of the country.

Nasser, Nugroho, and Lackner (2022) conducted a study on the impact of the Russia-Ukraine conflict on global food crops. This study investigates the impact of the Russia-Ukraine conflict on the global food situation. The study conducted a descriptive analysis and literature review to answer this objective. Russia and Ukraine play a key role in global food production and trade. However, the war has disrupted food production in Ukraine. The estimated Ukrainian production of wheat, soybeans, and corn in 2022-2023 has declined sharply. On the other hand, Russian production of these three food products shows positive growth during the same period. Moreover, the global supply chain and food trade have been disrupted, causing global food prices to increase. From March to May 2022, the average global price of wheat, soybeans, and corn has increased significantly compared to what it was during and before the COVID-19 pandemic. Finally, this poses a risk to global food security, especially for low-income countries that rely heavily on food imports from both countries. Therefore, all countries should be prepared for the possibility that the SDGs will not be achieved. Georg, Hans, and

Andrea (2022) studied whether the Russian invasion of Ukraine increased anti-globalization sentiment in Austria. The Russian invasion of Ukraine caused disruptions to international trade and highlighted the dependence of small open economies in Europe on imports, especially energy. These events may have changed Europeans' attitudes towards globalization. The study was conducted on two waves of representative population surveys in Austria, one immediately before the Russian invasion and the other two months later. Our unique dataset allows us to assess changes in Austrian public attitudes towards globalization and import dependency as a short-term response to the economic and geopolitical turmoil at the beginning of the war in Europe. This finding shows that two months after the invasion, anti-globalization sentiments were not widespread in general, but people became more concerned about strategic external dependencies, especially in energy imports, suggesting that citizens' attitudes towards globalization are mixed.

From our analysis of previous studies, the impact of the Russian crises has varied depending on the size of the country and its economic strength. Most oil countries have benefited economically from that war due to the cessation of oil supplies from Russia, while the impact has intensified on developing countries that depend heavily on energy and wheat supplies from Russia and Ukraine. However, at the global level, war has contributed to the staggering of the global economy and the increase in food crises around the world. In this study, we will rely on real quarterly data to build a standard model to study the impact at the global economic level.

Additionally, the paper offers a framework for how the crisis has affected energy and food policies, with consequent effects on the economy like inflationary pressures. The study illustrated how trade is affected by the conflict and what that means for foreign policy with Russia. The distinct structural features reveals various national and regional exposures to the consequences of conflict amid the catastrophic COVID-19 pandemic, which together are exacerbating the already grave circumstances in each of the eight (8) regional blocs, despite the Russo-Ukrainian war's overall negative effects on the continent. The unfavorable circumstances that the eight continents are facing are strongly skewed in the direction of an external shock (the Russo-Ukrainian conflict).

If the Russian-Ukrainian conflict de-escalates, it would be dangerous for African nations to take a "wait and see" stance, believing that these circumstances would ultimately improve on their own. Policymakers, business executives, and African scholars can benefit from the study's practical consequences. In a complicated global geopolitical framework, the study also demonstrates how investments in food policy and the energy sector are essential to African self-reliance.

Study problem:

The problem of the study is summarized in estimating the impact of the Russian war on the growth of the global economy, reviewing the status of the Russian economy as well as the Ukrainian economy, and then the impact of the Russian-Ukrainian crisis on economic indicators, and from here we conclude the following research questions:

- Did the Russian-Ukrainian crisis affect the global economy?
- What are the economic aspects and dimensions of the Russian-Ukrainian crisis, and the size of the losses that were monitored?
- How did the countries affected by this crisis deal with it and what policies did they follow?

Importance of the study:

The importance of the study comes from the importance of the topic it addresses, as we recently witnessed the Russian-Ukrainian crisis that escalated into a war in early 2022 and studying the impact that resulted from this crisis, and how to avoid the negative effects resulting from that war, and economically, the war contributed to many of the problems that were monitored, which the paper addressed in some detail:

- The crisis of rising energy prices
- Threat to food security and supply chains
- The extent of the impact on global economic growth

Study objectives:

The main objective of this study is:

Study the impact and analysis of the Russian-Ukrainian crisis on global economic growth.

Study limits:

The spatial boundaries of the research are the global economy, while the time boundaries are the period from 2021 to 2022.

Study methodology and method: The study uses a standard model to estimate the impact of the Russian-Ukrainian war on global economic growth, using quarterly data for the period from 2021 to 2022, which is the period in which the war broke out.

Study plan: The study is divided into two parts in addition to the introduction and results. The first part deals with the analysis of the crisis between the two sides, how it started, and its impact on global growth. The second part presents the statistical application to measure the impact of the Russian war on global growth using monthly data for the period from 2021 to 2022 by applying the least squares method, followed by the results and recommendations of the study

First: The reasons of the Russian-Ukrainian War

How did the Russia-Ukraine conflict begin? Since the early years of the twenty-first century, Ukraine has alternated between the West and Russia. Consequently, Ukraine has been unwilling to completely join a Western alliance and has been hesitant to accept absolute Russian domination. 2008 saw Ukraine's formal intention to accede to the North Atlantic Treaty Organization (NATO). After Russia said that it would not permit Ukraine to join NATO, the US supported this strategy, but France and Germany protested. Ozili, Peterson (2022).

Following then, the intention to join Ukraine was shelved till later. A new president of Ukraine was elected in February 2010 on the platform of establishing Ukraine as a "neutral state" that would work with Russia and Western alliances like NATO and the European Union.

Not long after Crimea was taken by Russia in 2014. The annexation resulted in violence in Donbass in addition to fierce warfare and carnage along the border regions dividing Russia and Ukraine from Eastern Europe. Since then, attempts to lessen Ukraine's dependency on Russia by getting it to join NATO and the EU have improved popular sentiment in Ukraine toward the West. However, since 2010, Russia's opposition to Ukraine joining NATO has raised tensions between the two nations. Although it would take some time to fully understand the economic effects of Russia's invasion of Ukraine, first indications point to a significant change in global economic statistics. outcome of the assault. Shelest, H. (2015).

Second: International Response to Russia's Invasion

In response, many nations denounced Russia's invasion of Ukraine in the open. In response, several countries, including the US, the UK, the EU, France, Japan, Australia, Canada, New Zealand, and Taiwan, imposed sanctions on Russia. Among the penalties imposed on Russia in the wake of the invasion in 2022 are:

1. Preventing certain Russian banks from utilizing the international payments network SWIFT. One of the most secure networks in the world, SWIFT connects 11,000 financial institutions across 200 nations, In reaction to Russia's invasion of Ukraine, New Zealand has outlawed the supply of commodities to its armed forces and security services, while Australia placed eight members of the Russian Security Council under financial sanctions and travel bans.

2. The United States has prohibited Russia from receiving combat technology transfers, so significantly impeding Russia's ability to develop its military and space industries. Russian purchases of US semiconductors, communications, cryptographic security, lasers, sensors, navigation, avionics, and maritime technology will be restricted because of the embargo. Additionally, the US has prevented the Russian Central Bank and financial organizations from accessing their foreign exchange reserves kept in the US. This implies that US dollars cannot be used for transactions by Russian financial institutions or the Russian Central Bank, Outlawed Russian deposits into EU banks over €100,000, Russian accounts kept by EU central securities depositories, and Russian customers' sales of assets denominated in euros. The listing of Russian state-owned company shares on EU trading portals has been prohibited by the EU.

3. All imports of Russian gas and oil have been prohibited by the US..Mhlanga, also all current export licenses pertaining to Russia were canceled by Canada. David & Ndhlovu, Emmanuel. (2022)

4. Targeting 70% of Russia's banking industry as well as important state-owned businesses, the European Union has slapped financial sanctions on the country. As The EU outlawed the export, transfer, supply, or sale of technologies for oil refining to Russia. Duho, and others (2022).

5. The EU imposed a ban on the export of all aircraft, spare parts and equipment to Russian airlines, as well as to the Russian space industry. The EU suspended visa agreements with prominent Russian figures. This means that Russian diplomats, officials and businessmen will no longer be able to benefit from visa facilitation provisions that allow privileged access to the EU3. Duho, King Carl Tornam, et al (2022).

6. Every airplane, piece of gear, and spare item shipped to Russian airlines, or the Russian space sector are prohibited by the EU. Visa deals with well-known Russian individuals were halted by the EU. This implies that the measures pertaining to visa facilitation that grant preferential entry to the EU will no longer be available to Russian diplomats, officials, and businesspeople. The UK forbade Aeroflot, a Russian airline, from using UK airspace. White House, 2022.

7. The European Union banned Russia from all artistic and athletic competitions, including the Champions League and Eurovision. Russian aircraft are not permitted to fly in the airspace of Finland Latvia,,Belgium, Estonia, Poland Lithuania, , Bulgaria, Ireland, Moldova, Romania, Slovenia, and the Czech Republic. Certain Russian individuals' assets held in Swiss and Japanese institutions were frozen by Switzerland and Japan.

8. Switzerland has suspended a visa agreement that has made it simpler for Russians, particularly diplomats, to visit the country since 2009. It also outlawed five anonymous wealthy individuals who were close to Putin and had ties to Switzerland. The UK punished Russian banks monetarily by seizing the assets of Russian billionaires that were held in UK institutions. The largest bank in Russia, Sberbank, was also prohibited by the UK from taking pound payments. The UK said that it will progressively cease using Russian oil by the end of 2022. Bloomberg, 2022.

Third: The Impact on the Global Economy

1. Disruption of the Global Supply Chain:

    Due to the disruption of international supply chains caused by Russia's military invasion of Ukraine, activities in several industries may be impacted. Russia's export restriction and retaliatory import sanctions, which include its refusal to permit foreign commodities to travel through its skies and waterways for the length of the war, have the potential to disrupt global supply chains. This may cause import items to become more scarce and more expensive. Muhammad Balbaa. (2022).

2. Companies expected that the disruption brought on by trade restrictions and blockades across borders would force suppliers to stockpile inventories, which would raise prices. Increased security checks in nearby refugee camps and limitations on commercial aircraft along the Ukrainian-Russian border will also cause interruptions to border operations and the movement of products. When border officials handle refugees before responding to cross-border commodities, supplies and goods may be halted or delayed. Import costs will increase as a result, further upsetting the world supply system. Koengka M (2019).

3. Oil and Gas Price Spike:

    Numerous causes, including the COVID epidemic, restricted energy sources, and escalating tensions between Russia and Ukraine, have contributed to the rise in energy costs. Oil prices were from $80 to $95 during this period before the invasion. Oil prices have surpassed $100 per barrel since the invasion. One potential consequence of the invasion may be that European oil marketers and oil companies would find it more difficult to get energy supplies from Russia, the second-largest oil producer in the world, with most of its crude oil going to European refineries. Approximately two-fifths of Europe's natural gas supply comes from Russia, making it the region's biggest supplier overall. 2020; Zhitao Xu, et al.

    Given Russia's substantial proportion of oil exports, the invasion of Ukraine is expected to result in disruptions to the energy supply and eventually higher energy prices. In the long run, oil prices would rise if Russia retaliates by placing an embargo on energy supply to Europe and other nations, this effect may worsen. Russia's retaliatory embargo on energy exports would seriously disrupt the world's energy supplies and drive up energy costs. The conflict

between Russia and Ukraine has the potential to drive oil prices over $140 per barrel and drastically lower chances for global economic development, which would cause several non-European and European nations to enter a recession. Government of the United Kingdom, 2022.

It will take a while to fulfill the additional energy demand brought on by energy trade discussions as global energy prices continue to climb, even if the United States can release its energy reserves to alleviate the energy deficit in global energy markets.14 The increase in crude oil prices in 2021 as a result of a global shortage of the commodity is depicted in the accompanying image. Oil prices hit a record high of over $100 per barrel following the conflict—a figure not seen in over 14 years. Iikka Korhonen.(2019)
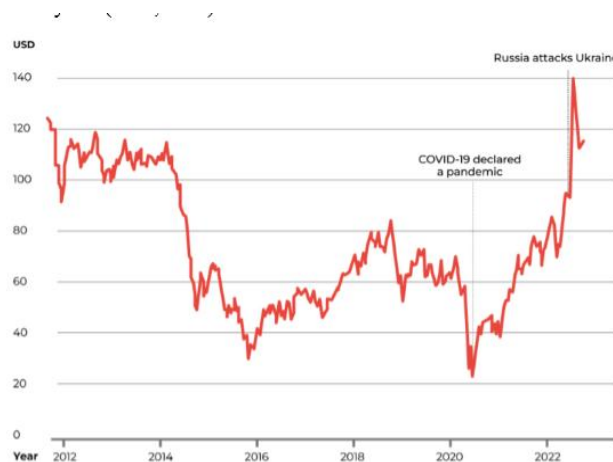

Figure (1) Crude oil prices after the outbreak of the Russian-Ukrainian war

Source: Chart from the US Energy Information Administration, based on data from Refinitiv

Fourth: Impact on the global banking system:

1. The global banking system has not been significantly impacted directly by Russia's invasion of Ukraine. The only banking sectors severely damaged by the invasion are foreign banks with significant operations in Russia. multiple multinational banks suffered when financial sanctions were imposed by nations against Russian organizations and wealthy Russians. The banks that are affected most include Unicredit in Italy, Raiffeisenbank in Austria, and Société Générale in France. However, the battle may have unexpected consequences for the global banking system

should pro-Russian organizations carry out a significant attack of the global payment network in retribution for financial sanctions imposed by the West. An attack on the global payment system can result in daily damages of up to $1.8 billion. Muhammad Balbaa. (2022).

2. A reduction in economic growth and production

should pro-Russian organizations carry out a significant attack of the global payment network in retribution for financial sanctions imposed by the West. An attack on the global payment system can result in daily damages of up to $1.8 billion. As a result, Costs of inputs and outputs will increase, making more expensive goods and services unaffordable for some consumers. This will lead to decreased supply and perhaps decreased demand of goods and services, which will lower economic output. Consumer spending will be impacted as consumers spend more on gas and oil for cooking and home heating. After taxes, household disposable income will be less, which will result in less consumer expenditure. This will impact the consumer spending portion of the GDP. Ozili, Peterson (2022).

Fifth: Impact on global stock markets:

All worldwide stock markets saw a decline in stock prices when Russia invaded Ukraine. Investors fled for their lives as news of Russia's invasion of Ukraine spread. On February 24, 2022, the S&P 500 plummeted more than 250 points and the Dow Jones Industrial Average dropped more than 100 points., the day of the invasion. EuropeNext 100 dropped by over 400 points. More than 150 points were removed from the Shanghai Composite. But the day following the invasion, equities rose as a few nations imposed strict sanctions on Russia.

1. Global Inflation and Cost of Living:

Living standards will grow in several European nations, including Germany and the UK, if the invasion continues. For instance, the 5.5% inflation rate in the UK is already elevated. 4 This implies that people are still buying fewer items for more money. The cost of food, gas, oil, and food components will all rise as a result of the conflict. Life will become more expensive since necessities like vehicles, lights, and mortgage deductions could all rise in price. Secondary repercussions will be seen by emerging nations that depend on imported energy. Energy import costs will be higher for developing countries, which might lead to higher

local pump prices, higher food prices, and an overall increase in the import of goods even in the event of constant income. levels. Zhitao Xu,et al. (2020).

Sixth: Empirical Model

After discussing previous similar studies in the world and reviewing the emprical analysis used in each study, we will resort to the time series analysis methodology to estimate the relationship using the ARDL model, which allows estimating short-term and long-term dynamic relationships. Monthly data (2021: 2022) were used, and their source is the World Bank. This study uses the joint integration approach and the ARDL model. The research also uses the same method To find the causality relationship between the model variables. The variables used in this estimation are based on what was stated in the standard models used in previous similar studies, Total economic growth as a dependent variable, global inflation rate, global energy prices, global unemployment rate, and international trade growth rate.

Here are some common types of econometric models and their uses:

1. Linear Regression Models: Analyze the relationship between one dependent variable and one or more independent variables. Commonly used for forecasting and estimating the impact of changes in independent variables on the dependent variable.

2. Multiple Regression Models: Extend linear regression by including multiple independent variables. Useful in situations where the dependent variable is influenced by several factors.

3. Logistic Regression Models: Used when the dependent variable is binary or categorical. Helps in predicting the probability of a certain outcome.

4. Time Series Models: Analyze data points collected or recorded at specific time intervals. Useful for identifying trends, seasonality, and cyclical patterns.

5. Panel Data Models: Analyze multi-dimensional data involving observations over time on the same entities (individuals, firms, countries). Useful for controlling for individual heterogeneity.

VARIABLES	ADF- TEST

The ARDL model was used due to the short time period under study. It specializes in analyzing short time series as well as relationships whose variables may be parametric or semi-parametric. It is a flexible model unlike some types of standard tests that require a number of conditions, such as least squares regression, which requires a linear relationship, or the VAR model, which requires a long time series. We did not face any difficulty in obtaining the data, which came from the World Bank data, and the variables were expressive of the study questions and its objective.

Table No. (1) Definition of variables and their source

VAR	DEFINITION	SOURCE
Y	Global Economic Growth Rate	World bank data
X1	Global Food Index	World bank data
X2	Global Trade Growth Rate	World bank data
X3	Global Energy Prices	World bank data

1. Testing the stability of time series using both the ADF-test. The following table shows that all variables are unstable at the level, while they stabilized at the first difference.

Table No. (2) Unit root test for model variables

	level	*Difference*
Y	-1.938	-5.481***
X1	-0.5073	-3.911***
X2	-6.5245	-6.524***
X3	-0.8186	4.3223 ***
X4	0.47	-8.72**

Notes: t represents the time trend, while c represents the constant, (*) and (**) mean that the variable is stable at 1% or 5% respectively, the number following the critical values represents the number of lags.

To measure the short- and medium-term effect, the impact and response function (IRF) is used, the response functions (IRE) according to Cholesky decomposition, are used here to explain the internal relationship between variables, the following figure reflects the response of the dependent variable to shocks in the independent variables.

Figure (2) Analysis of response functions

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.
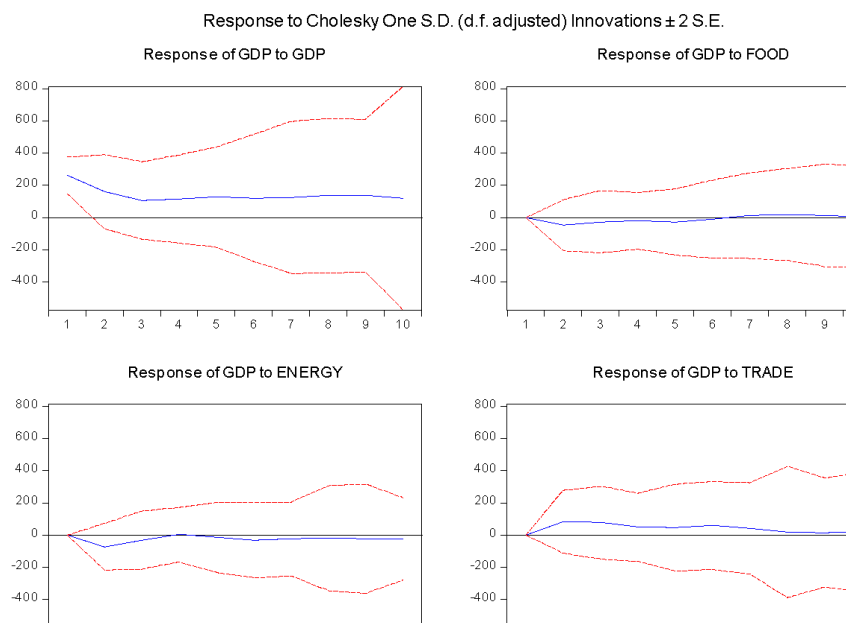
The correlation matrix is also a widely used test to study the interrelationships between variables and determine the degree of correlation. The following table shows the correlation matrix for the variables under study.

The Granger causality test was applied to the model variables and the results are shown in the following table. All variables combined affect the economic growth rate at a significant level of 1%.

The table below shows the results of the Johansen integration test analysis to estimate the long-run relationship between the variables, which confirms the existence of integration between the variables of the VAR model. The trace and max tests also indicate the possibility of integration when the cointegration techniques are used to test the existence of a long-run relationship between the integrated variables, where the variables are not stationary at the level. The Engle and Granger (1987) test is used to test for cointegration. The Engle and Granger (1987) test for cointegration depends on examining the pseudo-regression residuals that are performed using the variables. The following table shows the results of the integration test.

Table No. (3) Results of the joint integration test

From the previous results of the joint integration, the variables have a long-run relationship, so the model can be estimated by using the ARDL model. The results are divided into two parts, the first is the long-run dynamic relationship and the second is the short-run dynamic relationship as follows:

Table No. (6) Estimation of the ARDL model (short-term relationship)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.924557	0.044022	21.00201	0.0000
FOOD	-36.62985	10.01513	3.657451	0.0026

FOOD(-1)	-63.58617	16.84596	-3.774565	0.0021
FOOD(-2)	42.94540	13.06870	3.286128	0.0054
ENERGY	-1.970700	1.113616	-1.769640	0.0986
TRADE	-0.000163	0.000197	-0.829639	0.4207
TRADE(-1)	0.000344	0.000187	1.836189	0.0877
R-squared	0.977326	**Mean dependent var**		24632.92
Adjusted R-squared	0.967608	**S.D. dependent var**		1036.902
S.E. of regression	186.6192	**Akaike info criterion**		13.55722
Sum squared resid	487573.9	**Schwarz criterion**		13.90539
Log likelihood	-135.3508	**Hannan-Quinn criter.**		13.63278
Durbin-Watson stat	2.864042			

The model has excellent explanatory power, as indicated by the R-squared of 97% in the ARDL test results (short-run connection). The F-statistic value clearly indicates that the model is predictive. The sample does not exhibit any autocorrelation, as indicated by the Durbin-Watson statistic value of 2.86. As a consequence, every outcome confirms that the prediction model is true. The short-run test result demonstrates that there is a strong negative short-run link between the rate of globalization and the price of food worldwide. In the near term, there is a large inverse association between energy costs and the rate of global growth; however, this relationship is inversely negligible when it comes to the amount of global

commerce. The table that follows displays the shows the results of the long-run relationship between the variables

Table No. (7) Estimation of the ARDL model (long-run relationship)

Levels Equation

Case 1: No Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FOOD	11.9359	86.49185	2.450357	0.0280
ENERGY	-26.12172	22.49847	-1.161044	0.0650
TRADE	0.002394	0.003595	0.665946	0.0163

EC = GDP - (211.9359*FOOD -26.1217*ENERGY + 0.0024*TRADE)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	5.909303	10%	2.01	3.1
k	3	5%	2.45	3.63
		2.5%	2.87	4.16

1%	3.42	4.84

The long-run ARDL test is a good prediction since the statistical value f is more than the greatest value of 5% probability (7.71 > 3.49) in the F-Bounds test, which validates the model. The long-run relationship findings are displayed in the preceding table. Regarding the factors, over time, food prices have a considerable positive impact on the pace of global growth, but energy costs have a negative impact on the rate of global economic growth.

DISCUSSION

The results of the standard analysis can be shown in the following points:

1. **Results of the short-run model**

In addition to the statistical F with high significance and the high explanatory power of 99%, the model also shows Durbin-Watson with a statistical value of 3.08, indicating that there is no strong connection between the variables. These findings support the validity of the model for prediction.

• The global food prices variable, the short-run relationship is negatively significant, where the coefficient values indicate that global growth would decrease by 36% if food prices rose by 1%.

• The energy prices, there is a short-run inversely significant relationship with the global growth rate, where the coefficient values indicate that global growth would decrease by 1.9% if food prices rose by 1%.

• The volume of global trade, the relationship is inversely insignificant in the short run.

2. **Results of the long-term model**

The model has significant explanatory power, as evidenced by the statistical value of F above the greatest 5% probability value (7.71 > 3.49), indicating that the long-term ARDL test is true.

• Food prices affect the global growth rate positively and significantly in the long run, where the coefficient values indicate that global growth would increase by 11% if food prices rose by 1%.

• Energy prices negatively affect global economic growth in the long run, The coefficient values indicate that global growth would decrease by 26% if energy prices increased by 1%.

• The volume of international trade affects the global economic growth rate positively and significantly in the long run, where the coefficient values indicate that global growth would decrease by 0.02% if the volume of international trade rose by 1%.

From here, the research questions can be answered, which are:

• Did the Russian-Ukrainian crisis affect the global economy? Yes, it was affected in the short and long run according to the global crisis indicators (food, energy, international trade).

The results of the empirical model are consistent with many previous studies, such as Mhlanga, David & Ndhlovu, Emmanuel (2022), Ozili, Peterson. (2022) and Nasser, Nugroho, and Lackner (2022), They all agree on the negative impact of war on food and energy prices, which could consequently affect global economic growth and the subsequent spread of food insecurity, poverty and malnutrition.

Recommendations for Policymakers:

1. Encourage diversification of energy sources and food supply chains to reduce dependency on specific regions, particularly Russia and Ukraine.
2. Temporarily adjust tariffs and trade barriers for essential goods.
3. Provide subsidies and grants to farmers to increase production capacity and offset input costs.
4. Implement measures to support crop diversification and invest in agricultural technology to boost productivity.
5. Accelerate the transition to renewable energy sources to reduce reliance on fossil fuels impacted by geopolitical tensions.
6. Consider temporary price controls on basic food and energy products to mitigate the impacts on the most vulnerable populations.

7. Build strategic reserves of key food and energy products to buffer against supply disruptions.

8. Support initiatives exploring advancements in production efficiency and resilience to climate change and geopolitical disruptions.

9. Collaborate with international organizations, other countries, and public-private partnerships to stabilize global markets.

Areas for Future Research

1. **Impact Assessment Studies:**

   Research Focus: Conduct studies to evaluate the specific impacts of the Russia-Ukraine conflict on global food and energy prices across different regions.

   Aim: Understand the transmission mechanisms of price shocks and identify vulnerable demographics.

2. **Stakeholder Analysis:**

   Research Focus: Analyze the roles of various stakeholders (governments, multinational corporations, and local producers) in food and energy supply chains.

   Aim: Develop strategies that better align interests to create resilient systems.

3. **Sustainable Practices:**

   Research Focus: Investigate sustainable agricultural practices and their potential to increase food security in the context of geopolitical instability.

   Aim: Propose innovative methods that farmers can adopt to enhance resilience.

4. **Energy Alternatives and Innovations:**

   Research Focus: Explore emerging technologies in energy production, storage, and distribution.

   Aim: Identify viable alternatives to reduce dependence on fossil fuels in the medium to long term.

5. Market Response Dynamics:

Research Focus: Examine how markets respond to crises and the effectiveness of various interventions (e.g., price controls, subsidies).

Aim: Build economic models that can aid in predicting the outcomes of specific policy actions during crises.

6. Consumer Behavior Analysis:

Research Focus: Study how rising food and energy prices affect consumer behavior and spending patterns.

Aim: Understand shifts in consumer choices that can inform both policymakers and businesses.

7. Global Supply Chain Resilience:

Research Focus: Investigate the vulnerabilities in global supply chains exposed by the war and develop frameworks for enhancing resilience.

Aim: Propose best practices for governments and businesses to minimize supply chain disruptions.

By adopting these recommendations and focusing on these areas of research, policymakers and stakeholders can work towards addressing the immediate challenges posed by rising food and energy prices while building longer-term resilience against future crises

COCLUSION

The study looked at how the Russian invasion of Ukraine affected the world economy. The invasion, according to the study, had a global economic impact due to a disturbance in the global supply chain. Shocks to the energy and trade supplies have served as examples of this. It has resulted in increased costs for food, energy, and commodities, which has raised worldwide inflation in many nations. This indicates that economic repercussions of political disputes frequently spread to neighboring nations and do not only affect the sanctioned nation.

Sanctions against a belligerent state are not the best course of action because they affect non-conflicting nations as well. This is particularly true when the belligerent states are trading partners of non-conflicting nations. The Russia-Ukraine conflict has demonstrated this. Political leaders have to utilize diplomacy as a means of resolving disputes and endeavor to dissuade crises like the one between Russia and Ukraine. Subsequent research endeavors may evaluate the efficacy of utilizing talks as a means of resolving conflicts and deterring warring nations from asserting their power in the region.

The empirical study emphasis that, food prices affect the global growth rate positively and significantly in the long run, energy prices negatively affect global economic growth in the long run, the volume of international trade affects the global economic growth rate positively and significantly in the long run. So according to the results Russian-Ukrainian crisis affects the global economy in the short and long run using the global crisis indicators (food, energy, international trade)

References

1. Béné, C. 2020. Resilience of local food systems and links to food security – a review of some important concepts in the context of COVID-19 and other shocks. Food Sec. (https://doi. org/10.1007/s12571-020-01076-1).

2. Béné, C., Fanzo, J., Prager, S.D., Achicanoy, H.A., Mapes, B.R., Toro, P.A. & Cedrez, C.B. 2020. Global drivers of food system (un)sustainability: a multi-country correlation analysis. PLOS ONE 15, e0231071. (https://doi.org/10.1371/journal. pone.0231071).

3. Heydemann, S. (2018). Civil war, economic governance & state reconstruction in the Arab Middle East. Dædalus, 147(1), 48-63.

4. CNBC, 2022. https://www.cnbc.com/2022/03/31/the-nord-stream-2-pipeline-lies-abandonedafter-russia-invaded-ukraine.html. Visited: 16.04.2022.

5. Korhonen, Iikka (2019) : Economic Sanctions on Russia and Their Effects, CESifo Forum, ISSN 2190-717X, ifo Institut – Leibniz-Institut für Wirtschaftsforschung an der Universität München, München, Vol. 20, Iss. 04, pp. 19-22 Korovkin

6. Balbaa, Muhammad. (2022). The Impacts of Russian-Ukrainian War on the Global Economy. 10.13140/RG.2.2.14965.24807.

7. Mhlanga, David & Ndhlovu, Emmanuel. (2022). The Implications of the Russia-Ukraine War on Sustainable Development Goals in Africa. SSRN Electronic Journal. 10.2139/ssrn.4226510.

8. Ozili, Peterson (2022). Global Economic Consequence of Russian Invasion of Ukraine. SSRN Electronic Journal. 10.2139/ssrn.4064770.

9. Duho, King Carl Tornam & Abankwah, Stephen & Agbozo, Duke & Yonmearu, Gabriel & Aryee, Barnabas Nii & Akomanin, Oscar. (2022). Exploring the Russo-Ukrainian Crisis and Its Impact on African Countries: A Cross-Regional Analysis. SSRN Electronic Journal. 10.2139/ssrn.4085903.

10. UK Government, 2022. https://www.gov.uk/government/news/foreign-secretary-announces-65new-russian-sanctions-to-cut-off-vital-industries-fuelling-putins-war-machine Reuters, 2022. https://www.reuters.com/world/europe/canada-pm-trudeau-announces-moresanctions-against-russia-cancels-export-permits-2022-02-24/. Visited: 5.04.2022.

11. The White House, 2022. https://www.whitehouse.gov/briefing-room/statementsreleases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefiednatural-gas-and-coal/. Visited: 09.04.2022. Timofeev I.N.

12. "Sanctions for Sanctions Violation": U.S. Department of Treasury Enforcement Actions against Financial Sector. – Polis. Political Studies. 2020. No. 6. P. 73-90. https://doi.org/10.17976/jpps/2020.06.06 Topolewski

13. Mankoff, J. (2014). Russia's latest land grab: How Putin won Crimea and lost Ukraine. Foreign Affairs, 93, 60. Available online: https://www.foreignaffairs.com/articles/ukraine/201404-17/russias-latest-land-grab

14. Morteza EZZATI and Afsaneh Kazemi MEHRABADI, 2017. The Effect of Economic Sanctions from the Banking Channels (Monetary) On the Industrial Production of Iran. International Journal of Economic Perspectives, 2017, Volume 11, Issue 3, 801-809.

15. Koengka M, Losekann L, Fuinhas J. (2019). The relationship between economic growth, consumption of energy, and environmental degradation: renewed evidence from Andean community nations. Environment Systems and Decisions 39:95–107. https://doi.org/10.1007/s10669-018-9698-1

16. Zhitao Xu, Adel Elomri, Laoucine Kerbache, Abdelfatteh El Omri, 2020. Impacts of COVID-19 on Global Supply Chains: Facts and Perspectives. IEEE Engineering Management Review, Vol. 48, No. 3, Third Quarter, September 2020. DOI: 10.1109/EMR.2020.3018420

17. Bloomberg, 2022. https://www.bloomberg.com/news/articles/2022-02-28/european-banks-withrussia-links-get-pummeled-as-sanctions-hit. Visited: 15.04.2022.