

Impact of the Russo-Ukrainian war on FDI flows and international trade relations: An empirical investigation

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Abstract

Since 2020, local and international trade, foreign direct investment (FDI), multinational companies, and the global economy have been facing significant challenges due to the pandemic and the sudden emergence of the war between Russia and Ukraine. In the wake of the invasion in February 2022, these two events have prompted a range of reactions worldwide from policymakers, governments, and other interested stakeholders (Singh, 2022). The present study examines the impact of the Russo-Ukrainian war on foreign direct investment (FDI) and trade relations between countries. These two countries engage in trade with a multitude of states and regions, primarily the European Union (EU), numerous African, Asian, and even American countries, which the ongoing war may have significantly affected.

The data from 100 countries between 2000 and 2022 were subjected to analysis using the Generalized Method of Moments (GMM) technique. The specific context of global trade relations, supply chains, and foreign direct investment (FDI) provides a crucial theoretical and empirical rationale for this study, with a particular emphasis on the significance of Russia and Ukraine. In light of the existing research, the results illustrate that the ongoing conflict has resulted in a notable increase in military expenditure, which has had a detrimental impact on foreign direct investment and trade relations. This has resulted in a discernible deterioration in both bilateral and multilateral trade relations, as well as the disruption of long-standing supply chains, markets, and value chains that existed prior to the crisis across countries globally.

JEL classification : F51 ; M38 ; O57.

Keywords: Russia-Ukraine War, FDI, International trade Relations, 100 countries/5 regions, System GMM, Economic performance.

Introduction

The deaths and the humanitarian catastrophe caused by a large displaced and besieged population represent the most severe consequences of the invasion of Ukraine. However, this also gives rise to significant economic repercussions. In fact, the ongoing war, which has been in progress for over two years, has negatively impacted the likelihood of economic recovery following the pandemic. In accordance with the baseline projections, the global growth rate is anticipated to decelerate from 3.5% in 2022 to 1.7% in 2023 and 2.7% in 2024. This represents a notable decline from the historical average of 3.8% observed from 2000 to 2019. The International Monetary Fund (IMF) has revised the forecasts downward for 95% of advanced economies and nearly 70% of emerging and developing economies (IMF, 2023). The global economy continues to suffer as a result of the war, with significant disruptions to trade and shocks to food and fuel prices contributing to high inflation and the consequent tightening of global financing conditions.

The repercussions of the war and the trade and financial sanctions imposed on Russia have resulted in significant disruptions to global supply chains and trade exchanges. In response, the EU, the United States, and other countries have implemented economic sanctions against Russia, which has prompted international organizations to anticipate a potential collapse of its economy (World Bank, 2022a). In the absence of effective management, the situation has the potential to evolve into a global recession, particularly given the prominent roles of the two warring countries in the global market (Balbaa and al., 2022).

The Russian market exerts a considerable influence on nearly every economy worldwide, largely due to its extensive trade networks that span all continents. This is why numerous researchers have underscored that the war has a detrimental impact on bilateral and multilateral trade relations between countries and necessitates immediate attention (Saridakis and al., 2022; Estrada and Koutronas, 2022). Indeed, Russia and Ukraine are significant exporters of wheat, sunflower oil, soybeans, and other food products to countries in Europe, Asia, and Africa. This poses a threat to their food security.

Indeed, Russia and Ukraine are major exporters of wheat, sunflower oil, soybeans, and other food products to countries in Europe, Asia, and Africa. Such circumstances present a threat to the food security of these countries. In consequence of the aforementioned circumstances, the

European Union has augmented its commercial relations with Nigeria, Algeria, and other member countries of the Organization of the Petroleum Exporting Countries (OPEC) in Africa, with the objective of curbing its reliance on Russia. China is pursuing a strategy of intensifying its trade relations with Russia with the objective of securing a greater volume of Russian energy resources at a potentially reduced cost. This suggests the possibility of increased trade and a surge in foreign direct investment from Europe to African and Asian countries as a result of the ongoing war in Ukraine (Mykhnenko, 2020; Ozili, 2022).

In order to examine the implications of the war between Russia and Ukraine on trade and foreign direct investment (FDI) flows into African and Asian countries from Europe and other parts of the world, this study employs annual data spanning the period from 2000 to 2020. The objective is to identify potential solutions to the aforementioned issues. This investigation employs foreign direct investment (FDI) and trade (% of GDP) as dependent variables. The explanatory variables of interest include GDP growth, which serves as a proxy for economic growth; export of goods and services (annual % growth); external balance on goods and services (% of GDP); food export and food import; military expenditure (% of general government expenditure); fuel exports (% of merchandise exports); fuel imports (% of merchandise imports); and fossil fuel energy consumption (% of total). In this context, the econometric technique is based on an estimation method that was initially developed for use with dynamic panels. This is the method of generalised moments in a system, initially proposed by Blundel and Bond (1998).

The following sections present a literature review, specify the econometric model used, interpret the results and deduce the implications of the war. In conclusion, we present our findings.

1. Literature Review

Many scholars have proven that FDI enhances the growth and development of nations' economies (Eller and *al*, 2005). The primary factors influencing and attracting foreign direct investment (FDI) flows are political stability, exchange rates, government policies, lower wages and production costs, and ease of communication (Dabrowski 2016 ; Handi et al., 2020). Estrada and Koutronas (2022) examined the impact of the Russian invasion on FDI and trade flows between the EU. Estrada and Koutronas (2022) examined the impact of the

Russian invasion on foreign direct investment (FDI) and trade flows with the EU. Their findings revealed that the conflict has had a significant effect on a range of sectors, including agriculture, industry, and manufacturing, as well as on FDI movements. Ristovska and al. (2017) investigated the influence of foreign direct investment (FDI) on the economic development of Macedonia. The transmission channels for this effect were identified as the influx of multinational companies and trade.

In a similar vein, Singh (2022) examined the ramifications of the Ukraine conflict on South Asia's economic landscape. The results indicate that the ongoing war is exerting a detrimental impact on the Russian economy, global supply chains, and the value chain, precipitating a surge in food prices, elevated oil prices, and a decline in oil production. Similarly, Cihix and al. (2022) conducted an empirical study examining the impact of the Russo-Ukrainian war on global trade and development. Their findings revealed that the war and sanctions have disrupted value chains, supply chains, and long-standing trade relationships. The findings of Alam and al. (2022) illustrate a robust correlation between the ongoing conflict and the pricing of commodities in the G7 and BRICS markets. Furthermore, Mykhnenko (2020) investigated the underlying causes and potential consequences of the conflict. Domestic, human, and economic factors are the primary causes of depopulation, migration, and economic decline, which have contributed to the erosion of development, particularly in the eastern region of Ukraine (Shahbaz and al, 2013). Ozili (2022) posits that the PMI index¹ and commodity prices have risen in response to disruptions in global supply chains. Umar and colleagues (2022) evaluated the impact of the Russo-Ukrainian conflict on conventional metals and clean energy markets, concluding that it had a pronounced effect on coal, nickel, platinum, gold, palladium, and other metals.

In a study conducted by Mbah and Wasum (2022), the impact of the Russo-Ukrainian conflict on the top economic actors on the global stage was examined. The findings revealed that the Russian and global economies are experiencing the ramifications of the war through a precipitous surge in inflation and commodity prices, which is exerting a deleterious influence on economic growth and investment flows. Saridakis et al. (2022) evaluated the impact of the military invasion on food, metals, energy, and international trade. Their findings suggest that

¹ The Purchasing Managers' Index is an economic indicator that measures the confidence of business leaders. The purpose of this report is to provide an estimate of the trend in economic growth.

the United States is likely to become the primary supplier of gas to Europe. Meanwhile, China and Turkey may benefit from lower oil and gas prices. However, global food inflation rates are projected to remain elevated, and trade disruptions are anticipated to persist.

Abu Hatab (2022) asserted that the invasion has the potential to disrupt food supply chains in Africa, thereby endangering the continent's food security. This could have a long-term impact on the ability to achieve the zero poverty and hunger targets set out in the Sustainable Development Goals (SDGs). In a recent study, Estrada and Koutronas (2022) have proposed a theoretical framework for analyzing the economic dimension of this military territorial conflict, which has had a significant impact on bilateral trade and investment flows between Russia and the EU.

The environmental damage caused by war was examined by Rawtani et al. (2022), which has a significant and negative impact on geopolitical, economic, health, and infrastructural elements, with negative consequences for people and the planet. The environmental damage caused by war was examined by Rawtani et al. (2022), which has a significant and negative impact on geopolitical, economic, health and infrastructural elements, with negative consequences for people and the planet. However, Shahzad et al. (2023) conducted an analysis of the dynamic interaction generated by economic volatility and geopolitical risk in traditional non-renewable energy and precious metal markets. The global connectivity has been observed to increase during the course of the Russo-Ukrainian conflict. This indicates that geopolitical risk and financial instability are significant determinants of energy market dynamics. The findings of Balbaa et al. (2022) indicate that geopolitical tensions resulting from armed conflict have a detrimental impact on global supply chains, precipitating commodity price fluctuations and raising energy costs.

In a recent study, Tiwari et al. (2022) examined the impact of the ongoing Russo-Ukrainian conflict on the exchange rate of the Indian rupee against the US dollar. The findings of the study indicate that the war has had a negative impact on the Indian currency. Khudaykulova and Yuangiong (2022) demonstrated that the war has resulted in an abnormal increase in inflation and debt. Sandoval Velasco et al. (2022) confirmed a significant impact on EU policies, which, in turn, have led to transformations in long-term financial and budgetary policies.

2. Empirical Strategy, Conceptual Data, and Results

The prevailing view is that the ongoing conflict has had a detrimental impact on both countries involved, particularly on Russia due to the imposed trade and financial sanctions. There is a paucity of studies that have demonstrated a connection between the war and economic growth, commodity prices, food security, oil prices, and other energy products, which requires further investigation. This article contributes to the knowledge base in this area.

2. 1. Problematic

This study employs an empirical approach to assess the impact of the Russo-Ukrainian conflict on foreign direct investment (FDI) and trade exchanges. To this end, we analyze the situation of 100 countries², which are grouped into four heterogeneous groups and an aggregated sample (Table 1). The objective is to provide a regional analysis that takes into account differences in economic performance, trade relations, and levels of development.

Table 1: List of 100 Countries

Groups	Countries
Africa (34 Countries)	Algeria, Angola, Benin, Botswana, Burkina Faso, Cameroon, Cape Verde, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Egypt, Ethiopia, Gabon, Ghana, Guinea-Bissau, Kenya, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe
Asia (20 Countries)	Saudi Arabia, Arab Emirates United, Armenia, Bangladesh, China, Hong Kong, India, Indonesia, Israel, Japan, Korea, Kuwait, Malaysia, Pakistan, Philippines, Qatar, Singapore, Thailand, Turkey, Vietnam.
Europe	Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany,

² The selection of countries and the period of study are contingent upon the availability of data and the existence of close trade and financial relations with Russia and Ukraine.

(32 Countries)	Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.
America (14 Countries)	Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Ecuador, Mexico, Nicaragua, Paraguay, Peru, United States, Uruguay.

Note: Table made by the author.

2. 2. Data Descriptions

This study employs macroeconomic data from the World Development Indicators (WDI, 2023), the Economic Outlook of the Organisation for Economic Co-operation and Development (OECD, 2023), and the websites of central banks. The World Governance Indicators (2023) provide data for the three aggregated governance indicators. The observations are annual and cover the period from 2000 to 2022.

2. 3. Descriptive Analysis of Variables

The two dependent variables in the model to be estimated are foreign direct investment as a percentage of GDP (FDI) and trade flows (COM)³. The explanatory variables include the GDP growth rate (GDP_Growth), the annual growth of goods exports (X_B) and the external balance of goods and services as a percentage of GDP (BC_EXT), food exports as a proportion of total exports (X_Alim), food imports as a proportion of total imports (M_Alim), military expenditure as a percentage of total public expenditure (G_mil), the proportion of fuel exports in total goods exports (X_carb), the proportion of fuel imports in total goods imports (M_carb) and the share of fossil fuel consumption in total energy consumption (C_EF).

Three governance measures are employed to assess the quality and effectiveness of governance. These indicators are as follows: political stability and the absence of violence (PS), control of corruption (CC), and regulatory quality (RQ)⁴.

³ The determination of this variable is contingent upon the ratio of trade openness $(X + M)/GDP$.

⁴ The choice of these three indicators is to a large extent contingent upon the findings of the estimated results.

The descriptive analysis demonstrates a considerable range of variations and consistency across the four sub-regions, as well as the aggregated sample (Table 2). The results demonstrate that the mean FDI rates are approximately 3.542%, 4.459%, 9.685%, and 3.417% in African, Asian, European, and American countries, respectively, with standard deviations of 0.0518, 0.0789, 0.3917, and 0.0243. Similarly, the degree of trade openness (COM) is 60.244%, 108.428%, 115.115%, and 60.875% in Africa, Asia, Europe, and the Americas, respectively, with standard deviations of 0.2685, 1.0288, 0.6193, and 0.7439. The global sample exhibits a mean of 5.674% for FDI and a mean of 87.528% for trade openness, with standard deviations of 0.2282 and 0.7099, respectively (Global Sample, Table 2).

The economic growth rates (GDP_Growth) for the African, Asian, European, and American regions during the period 2000-2022 were approximately 4.253%, 4.751%, 2.515%, and 2.936%. With regard to the African subgroup, the minimum and maximum values are -20.491% and +26.524%, respectively, and were recorded in Sierra Leone in 2015 and 2002. In the case of Asian countries, the growth rates observed range from a negative figure of -14.10%, recorded in Armenia in 2009, to a positive figure of +26.170%, achieved by Qatar in 2006. In Europe, the lowest growth rate was -14.838%, observed in Lithuania in 2009. With regard to the highest growth rate, namely 24.370%, this was achieved by Ireland in 2015. Finally, among American countries, the best performance, namely 13.417%, was recorded by Peru in 2021, while the poorest performance was observed in Argentina in 2002, with -10.894%. The mean economic growth rate across the one hundred countries under consideration is 3.611%, with minimum and maximum values of approximately -20.491% and +26.524%.

Table 2: Descriptive Statistics

Group : Africa					
Variables	Obs.	Mean	Std. Dev.	Min.	Max.
FDI	782	0.0354213	0.0518232	0.0518232	0.3981094
COM	782	0.6024413	0.2685388	0.0007749	1.568618
Tx_GDP	782	0.0425372	0.0440353	-0.2049107	0.2652414
X_BS	780	0.0620864	0.1775883	-0.9636442	1.521848
BC_EXT	782	-0.0596752	0.1304999	-0.4966263	0.447792
X_Alím	782	0.2644993	0.254411	0.0001566	0.9879475
M_Alím	782	0.1786754	0.0977764	0.0404889	0.7632477
G_mil	782	0.0759791	0.04367	0.0118743	0.4315519
X_carb	782	0.2278247	0.3374775	0	1.901119
M_carb	782	0.1536457	0.089567	0.0057855	0.5062547
C_EF	736	0.3962562	0.306768	0.0001775	0.9999763
SP	782	-0.5758326	0.8382974	-2.665278	1.2236
CC	782	-0.5921294	0.603848	-1.597468	1.24492
QR	782	-.6487531	0.5323213	-1.870021	0.6622112
Group : America					
FDI	322	0.0341737	0.0243159	-0.0308352	0.1321158
COM	322	0.6087539	0.7439608	0.0625955	9.676419
Tx_GDP	322	0,0293609	0,0358224	-0,1089446	0,1341753
X_B	322	0.0392681	0.0693583	-0.2265817	0.2999139
BC_EXT	322	-0,0103654	0,064588	-0,2785324	0,1550859

X_Alim	322	0.3101529	0.2015609	0.0484378	0.848977
M_Alim	322	0.0884742	0.0340534	0.0228185	0.1763758
G_mil	322	0.0544004	0.0347876	0	0.1337993
X_carb	322	0.1701512	0.1824651	0.0001611	0.6677141
M_carb	322	0.1306845	0.0596267	0.015355	0.3379177
C_EF	322	0.6945335	0.1755543	0.2820042	0.9198344
SP	322	-0.0923122	0.7353706	-2.376027	1.262337
CC	322	0.0914908	0.9551305	-1.436839	2.061873
QR	322	-0.0203583	0.919576	-1.365254	1.886385
Group : Asia					
FDI	460	0.0445917	0.0789655	-0.0275744	0.5851837
COM	460	1.084289	1.028757	0.195596	9.585614
Tx_GDP	460	0.0475103	0.0417013	-0.141	0.2617024
X_B	460	0.0687614	0.1068703	-0.335	0.8561331
BC_EXT	460	0.0530448	0.1353257	-0.2793244	0.4845214
X_Alim	460	0.0726436	0.0717552	0.0000339	0.3175201
M_Alim	460	0.0891105	0.0468548	0.0223566	0.2496799
G_mil	460	0.1126561	0.0761788	0	0.3922256
X_carb	460	0.2165453	0.3150021	0.0002382	0.9649099
M_carb	460	0.1389386	0.1012404	0.0014818	0.395181
C_EF	460	0.7953119	0.1906723	0.1	0.9999999
SP	460	-0.237616	0.9815015	-2.810035	1.599123

CC	460	0.1583989	0.9099391	-1.597115	2.301146
QR	460	0.2371223	0.767586	-1.151944	1.856512
Group : Europe					
FDI	736	0.0968542	0.3917046	-3.914367	4.490809
COM	736	1.151156	0.6192888	0.0557329	3.881204
Tx_GDP	736	0.0251534	0.0373116	-0.1483861	0.2437045
X_BS	736	0.0542799	0.0798573	-0.2786144	0.5204984
BC_EXT	736	0.0098448	0.1111747	-0.4189829	1.001942
X_Alím	736	0.1005371	0.0666427	0.010761	0.4615482
M_Alím	736	0.0978504	0.0336144	0.0291329	0.2183449
G_mil	736	0.03358	0.0144272	0.0085839	0.0882786
X_carb	736	0.0886406	0.1220823	0	0.7903185
M_carb	736	0.1223654	0.0617007	0.0026161	0.4525173
C_EF	736	0.7248775	0.1816211	0.1305622	0.9998652
SP	736	0.7340974	0.4776596	-0.8197949	1.758681
CC	736	0.9701912	0.8795178	-1.748722	2.459118
QR	736	1.043298	0.7172768	-1.020668	2.124782
Group : Global					
FDI	2300	0.0567392	0.2281742	-3.914367	4.490809
COM	2300	0.8752833	0.709976	0.0007749	9.676419
Tx_GDP	2300	0.0361134	0.0414267	-0.2049107	0.2652414
X_BS	2298	0.0567601	0.1231109	-0.9636442	1.521848

BC_EXT	2300	-0.0079814	0.1254282	-0.4966263	1.001942
X_Alím	2300	0.1800518	0.1980838	0.0000339	0.9879475
M_Alím	2300	0.1222703	0.0765656	0.0223566	0.7632477
G_mil	2300	0.0667258	0.0535371	0	0.4315519
X_carb	2300	0.1729556	0.2675738	0	1.901119
M_carb	2300	0.13748	0.0815725	0.0014818	0.5062547
C_EF	2254	0.6276121	0.283227	0.0001775	0.9999999
SP	2300	-0.0213188	0.9364077	-2.810035	1.758681
CC	2300	0.1536257	1.032979	-1.748722	2.459118
QR	2300	0.1578535	0.9871438	-1.870021	2.124782

Note : Table made by the author.

2. 4. Model and Methodology

This study presents a reduced-form empirical model as follows:

$$FDI_{i,t} = \alpha_0 + \alpha_1 FDI_{i,t-1} + \alpha_2 X'_{i,t} + v_i + u_i + \varepsilon_{i,t} \quad (1)$$

$$COM_{i,t} = \beta_0 + \beta_1 COM_{i,t-1} + \beta_2 X'_{i,t} + v_i + u_i + \varepsilon_{i,t} \quad (2)$$

The dependent variables are defined by FDI and COM. The lagged dependent variables are: $FDI_{i,t-1}$ and $COM_{i,t-1}$. α_0 et β_0 are the constant terms; α_1 , α_2 , β_1 , and β_2 are the coefficients to be estimated. $X_{i,t}'$ denotes the set of independent variables including export goods, external trade; food exports; food imports; military expenditure; fuel imports; fuel exports; economic growth; and fossil energy consumption; v_i stands for the country-specific effect; u_i are the year-specific effects, and $\varepsilon_{i,t}$ represents the error term.

In selecting the variables for analysis, we have drawn upon the work of Contractor et al. (2020), Alam et al. (2022), and Negri and Dincă (2023). To assess the impact of governance indicators on foreign direct investment (FDI) and trade relations, we have employed the methodologies proposed by Handi et al. (2020). In this study, we employ an estimation

method developed within the framework of dynamic panels, namely the system generalized method of moments (GMM) technique, as originally proposed by Blundell and Bond (1998). The method combines first-difference equations with level equations, thereby avoiding potential issues such as endogeneity, reverse causality, measurement errors, and omitted variable bias. This results in the generation of consistent and reliable estimates. Here is the translation. Baum and *al.* (2007) emphasized that this approach is robust to autocorrelation and provides consistent and efficient results when heteroscedasticity is unknown, as it utilizes the orthogonality condition. The reliability and validity of the results obtained from this technique are evaluated through the application of the Sargan test, which is used to assess the validity of the instruments employed, and Hansen's J statistic, which is employed to ascertain the presence of autocorrelation within the model.

3. Econometric Results and Economic Conclusions

In this section, we present a synthesis of the empirical results obtained from the various estimation exercises conducted across the five groups. The objective is to furnish sufficient data and to consider regional heterogeneity (Tables 3 and 4).

3.1. Scenarios

In order to address the problem statement put forth in this article, four distinct scenarios have been developed within each group. Upon analysis of the correlation matrices, it becomes evident that there is a strong correlation between the institutional variables (CC, SP, QR), which indicates the presence of a multi-collinearity issue among them. Accordingly, the two equations to be estimated are presented separately, with the variables labelled S_2 , S_3 , and S_4 . The first scenario (S_1) reflects the influence of exogenous factors exclusively.

3.2. Results

The results demonstrate that the lagged effects of foreign direct investment (FDI_{t-1}) are predominantly positive and statistically significant across the various scenarios examined. This finding indicates that historical foreign direct investment has a significant impact on current FDI, thereby substantiating the influence of dynamic behaviour. With regard to the variable COM_{t-1} , the estimated coefficients for African, Asian (with the exception of S_3), and European countries are positive and statistically significant. However, for the American

samples (with the exception of S4, which displays a positive coefficient) and the aggregated sample, this variable has a negative impact on current international trade. The coefficient values are relatively low for the aggregated group (Table 4). This reflects a relatively rapid convergence speed, whereby a lower initial level of COM is associated with greater expected trade openness and foreign trade relations in the future.

The results indicate a positive and statistically significant relationship between economic growth rate (Tx_GDP), foreign direct investment (FDI), and trade openness for African and Asian countries. In contrast, the relationship is reversed for European countries, with GDP growth negatively and significantly impacting both dependent variables. This trend is also evident in the aggregated sample for trade exchanges.

The results illustrate that the coefficients associated with merchandise exports (X_B) are negative and statistically significant in African and Asian countries, with the exception of S1 and S3, as demonstrated in Table 3. This variable has a deleterious impact on foreign direct investment (FDI) in these countries. It can be reasonably assumed that in the event of low levels of exportation of goods, economic and political decision-makers in African countries will be inclined to encourage greater levels of foreign direct investment as a means of overcoming this disadvantage. This will have a positive impact on their trade exchanges, where the coefficients related to the variable X_B are positive and statistically significant (Table 4). This observation indicates that the expansion of trade, particularly the growth of exports in which African countries, with their respective comparative advantages, have attracted foreign investors, has resulted in increased trade openness and the extent of international trade in these countries (Mehrra Baghbanpour, 2016).

In the context of the presence of institutional variables (CC) and (QR) in Asian countries, it can be observed that good exports exert a significant but negative influence on trade openness (S2 and S4, Table 4). It can be observed that in the event of low merchandise exports (X_B), it falls upon policymakers to pursue new avenues for the successful establishment of trade relations with the rest of the world. Conversely, the results demonstrate that export goods have a stimulating effect on foreign direct investment (FDI) and trade openness in Europe, the Americas (FDI, S1) and globally (Tables 3 and 4). Indeed, the expansion of export goods creates more substantial opportunities for investment and international trade. Consequently, the improvement of merchandise exports encourages foreign investors to invest in these

countries, which increases their openness and multiplies their chances for international trade. This finding demonstrates that enhancing merchandise exports is a crucial strategy for augmenting foreign direct investment (FDI) and international trade in Europe, the Americas, and the global economy.

In contrast to the findings for Asian economies, the estimates indicate that the coefficients related to external trade (BC_EXT) are negative and statistically significant for African, European, and American economies (S4) (Table 3). The results demonstrate that a lower trade balance necessitates a more immediate reliance on foreign direct investment (FDI) to address the resulting deficit. Conversely, the analysis reveals that the influence of the trade balance on trade openness is positive and statistically significant for the five regions under examination. In the case of Asian countries, a positive and significant relationship is identified between the external balance and the level of FDI (S1 and S3) and international trade (with the exception of S4). This indicates that an elevated external balance provides greater potential for attracting foreign direct investment and intensifying international trade.

The results also indicate that food exports exert a positive and significant effect on foreign direct investment (FDI) in Europe and Asia (S2 and S4) and in the 100 countries (with the exception of S3). However, this variable exerts no influence on FDI in Africa, but instead has a pronounced adverse effect on their trade exchanges (Table 4). In the case of Asian economies with low costs (such as India, Bangladesh, Thailand, and Vietnam), the growth of food exports has been found to stimulate foreign direct investment (FDI) and trade exchanges. In contrast, the results for European and American countries, as well as the aggregated sample, are insignificant (see Table 4).

With regard to the FDI equation, the estimated coefficients for food imports (M_Alum) are found to be negative and statistically significant in African, European, and Asian countries (S1), whereas they are positive and statistically significant for the American group. Nevertheless, no significant correlation is evident when the aggregated sample is considered (see Table 3). This result is not unexpected, particularly in the case of African countries, where an increase in food imports has been observed to result in a reduction in both FDI and trade openness. This effect is not observed in Asia, Europe (with the exception of S1) or globally, where the impact of food imports on international trade remains insignificant (Table 4). The negligible impact of food imports on European trade (S2, S3, S4, Table 4)

demonstrates that the EU has a highly rigorous food security policy, which is capable of addressing the immediate challenges posed by the ongoing conflict. To illustrate, the food security of the region is unlikely to be significantly impacted by wheat and other agricultural products originating from Ukraine and Russia. It could also be argued that African countries, which are much more dependent on foreign food imports, would be more severely affected by the repercussions of this war than other regions of the world (Bakari and Mabrouki, 2017). This elucidates the inverse correlation between food imports (M_{Alin}), foreign direct investment (FDI) and trade exchange.

The evidence suggests that military expenditure has a negative and significant effect on foreign direct investment (FDI) and trade openness in Africa (with the exception of S3) and Asia (with the exception of S2). This suggests that an increase in military expenditure, in the absence of conflict or war, results in delays and impediments to FDI inflows and trade openness in these two regions (Ajefu, 2015). In the case of Europe, this variable has a negative effect on FDI and is not statistically significant in terms of international trade relations. This result is consistent with the findings of Aziz and Khalid (2019). In the case of the Americas, military expenditure has no effect on FDI and has a negative effect on trade exchange (S1 and S2). Overall, the effect is not statistically significant.

Furthermore, the exportation of fuel has been observed to exert a detrimental influence on foreign direct investment (FDI) in Asia, the Americas, and the aggregate group. For the European (except S3) and African (S3) regions, this effect becomes positive, indicating that countries with natural resources, such as oil or gas, are more likely to attract foreign direct investment (FDI) (Table 3). This variable exerts a positive influence on international trade for European countries (S2 and S3, Table 4) and American countries (S1 and S3). However, the estimates for Asian countries indicate a negative contribution of fuel exports to FDI and international trade. Ultimately, these results imply that fuel exports increase in tandem with the demand for energy as an input in production, thereby accelerating FDI (in the case of African and European countries) and trade openness (in the case of European and American countries).

Conversely, the importation of fuel has a deleterious and substantial impact on foreign direct investment (FDI) across all five sub-panels. This result indicates that an increase in fuel imports leads to an increased demand for energy resources, which in turn affects the national

currency, deteriorates terms of trade, and reduces FDI and trade openness (in Asia and the Americas). However, this variable has a positive effect on trade exchanges in Africa and Europe, suggesting that if countries increase their fuel imports, they will further intensify their level of international trade.

The consumption of fossil fuels (C_EF) has a negative and significant effect on foreign direct investment (FDI) in African and American countries (S1 and S3), in contrast to the positive effect observed in European countries and the aggregated sample (S1). With respect to international trade, an increase in C_EF intensifies trade relations in Africa (S1), Asia (S1), and across the hundred countries studied. Conversely, it has the opposite effect on American countries and is ineffective in Europe. The findings indicate that an elevated consumption of fuels and energy exerts augmented pressure on the importation of oil and gas, which in turn results in a reduction in foreign direct investment (in Africa, Asia, Europe, and the rest of the world) and trade openness (in the Americas).

The three governance indicators have a positive and significant impact on foreign direct investment (FDI) and international trade in Asia, Europe, and across the hundred countries studied. Political stability (SP) has a positive effect on the growth of FDI, and together with control of corruption (CC), they have a joint positive effect on trade exchanges in Africa. However, in the case of the Americas, the three clusters remain ineffective for FDI and international trade (except for Regulatory Quality). Finally, diagnostic statistics from the GMM technique indicate that the estimates are consistent and reliable, as the results of the Sargan, AR(1), AR(2), and Hansen tests are not over-identified.

Table 3: Model Estimation Results. Dependent Variable: FDI

Variables	Africa				Asia				Europe				Amer	
	S ₁	S ₂	S ₃	S ₄	S ₁	S ₂	S ₃	S ₄	S ₁	S ₂	S ₃	S ₄	S ₁	S ₂
FDI_{t-1}	0.402* (0.000)	0.406* (0.000)	0.399* (0.000)	0.407* (0.000)	0.410* (0.000)	0.368* (0.000)	0.399* (0.000)	0.299* (0.000)	0.512* (0.000)	0.483* (0.000)	0.442* (0.000)	0.471* (0.000)	0.445* (0.000)	0.579* (0.010)
Tx_GDP	0.172* (0.000)	0.171* (0.000)	0.159* (0.000)	0.184* (0.000)	0.190* (0.004)	0.474* (0.000)	0.209** (0.012)	0.487* (0.001)	-2.28* (0.000)	-2.171* (0.000)	-2.325* (0.000)	-1.955* (0.000)	-	-
X_B	- 0.016** (0.012)	- 0.014** (0.034)	-0.016* (0.007)	- 0.015** (0.017)	-0.008 (0.772)	-0.105* (0.001)	-0.026 (0.503)	- 0.095*** (0.051)	1.310* (0.000)	1.221* (0.000)	1.487* (0.000)	1.172* (0.000)	0.049*** (0.053)	0.066 (0.187)
BC_Ext	-0.079* (0.000)	-0.073* (0.000)	-0.084* (0.000)	-0.078* (0.000)	0.054*** (0.098)	0.027 (0.344)	0.061** (0.047)	0.002 (0.969)	-1.603* (0.000)	-2.089* (0.000)	-2.243* (0.000)	-2.222* (0.000)	-	-
X_Alím	-0.014 (0.244)	-0.013 (0.249)	-0.012 (0.181)	-0.015 (0.225)	0.020 (0.746)	0.115** (0.013)	0.049 (0.400)	0.145* (0.007)	1.469* (0.000)	1.279* (0.000)	1.340* (0.000)	1.154* (0.000)	-0.019* (0.007)	-0.003 (0.777)
M_Alím	- 0.045** (0.029)	- 0.043** (0.039)	-0.053* (0.001)	- 0.045** (0.037)	- 0.126** (0.034)	0.184 (0.101)	-0.079 (0.398)	-0.009 (0.941)	-2.331* (0.000)	-2.042* (0.000)	- 0.419*** (0.082)	-1.679* (0.000)	0.130** (0.012)	0.150*** (0.054)
G_mil	- 0.026** (0.034)	- 0.006*** (0.053)	0.001 (0.980)	- 0.045*** (0.070)	-0.068* (0.008)	0.019 (0.775)	- 0.086** (0.033)	- 0.114*** (0.077)	-9.427* (0.000)	-8.648* (0.000)	-6.279* (0.000)	-8.240* (0.000)	-0.008 (0.881)	-0.062 (0.249)
X_carb	0.004 (0.269)	0.005 (0.370)	0.009* (0.045)	-0.001 (0.887)	- 0.029*** (0.054)	-0.055* (0.000)	-0.053* (0.001)	-0.050* (0.004)	0.157* (0.000)	0.120* (0.000)	-0.005 (0.915)	0.094* (0.002)	- 0.026** (0.038)	-0.012 (0.468)
M_carb	-0.081* (0.000)	-0.075* (0.000)	-0.081* (0.000)	-0.087* (0.000)	- 0.067** (0.020)	-0.071 (0.149)	-0.053 (0.316)	-0.146* (0.001)	-0.664* (0.000)	0.419* (0.000)	- 0.197** (0.011)	-0.417* (0.000)	0.028** (0.025)	-0.036 (0.399)
C_EF	-0.018* (0.000)	-0.019* (0.000)	-0.022* (0.000)	- 0.012** (0.012)	0.027 (0.235)	0.008 (0.689)	0.021 (0.343)	-0.023 (0.473)	0.172* (0.000)	0.275* (0.000)	0.245* (0.001)	0.291* (0.000)	- 0.025** (0.025)	-0.013 (0.292)

				(0.014)									(0.021)		
Trend	0.040* (0.000)	0.040* (0.000)	0.044** (0.000)	0.038* (0.000)	-0.001 (0.994)	-0.011 (0.603)	0.012 (0.575)	0.024 (0.434)	0.379* (0.000)	0.166* (0.000)	-0.255* (0.000)	0.059 (0.155)	0.030* (0.004)	0.018 (0.256)	
CC	-	0.003 (0.304)	-	-	-	0.034* (0.000)	-	-	-	0.097* (0.000)	-	-	-	0.002 (0.143)	
SP	-	-	0.005* (0.000)	-	-	-	0.015* (0.007)	-	-	-	0.372* (0.000)	-	-	-	
QR	-	-	-	-0.005 (0.111)	-	-	-	0.037* (0.000)	-	-	-	0.150* (0.000)	-	-	
Number of Observations	702	702	702	702	440	440	440	440	704	704	704	704	308	308	
Number of Instruments	32	33	33	33	32	33	33	33	32	33	33	33	30	31	
AR(1)	0.030	0.029	0.030	0.028	0.075	0.050	0.066	0.055	0.076	0.071	0.066	0.070	0.034	0.131	
AR(2)	0.310	0.315	0.316	0.308	0.216	0.259	0.220	0.200	0.344	0.347	0.384	0.368	0.340	0.423	
Sargan	89.28	89.22	90.75	88.93	214.43	203.34	240.62	162.80	138.51	135.56	126.50	135.06	35.23	35.81	

Note : Author's estimates. Values in parentheses are p-values, * significant at 1%, ** significant at 5%, *** sign

Table 4: Model Estimation Results. Dependent Variable: COM

Variables	Africa				Asia				Europe				Amer	
	S ₁	S ₂	S ₃	S ₄	S ₁	S ₂	S ₃	S ₄	S ₁	S ₂	S ₃	S ₄	S ₁	S ₂
COM_{t-1}	0.524* (0.000)	0.559* (0.000)	0.525* (0.000)	0.530* (0.000)	0.057* (0.002)	0.037*** (0.055)	0.025 (0.171)	0.047** (0.012)	0.986* (0.000)	0.998* (0.000)	0.994* (0.000)	0.991* (0.000)	-0.059* (0.000)	-0.059* (0.000)
Tx_GDP	0.561* (0.000)	0.587* (0.000)	0.435* (0.000)	0.557* (0.000)	3.095** (0.012)	5.433* (0.000)	2.987*** (0.053)	5.089* (0.000)	-0.573* (0.000)	-0.579* (0.000)	-0.610* (0.000)	-0.550* (0.000)	-	-
X_B	0.150* (0.000)	0.141* (0.000)	0.170* (0.000)	0.147* (0.000)	-0.784 (0.161)	-1.696* (0.001)	-0.650 (0.301)	- 1.279** (0.016)	1.047* (0.000)	1.049* (0.000)	1.070* (0.000)	1.034* (0.000)	0.595** (0.025)	0.528** (0.023)
BC_Ext	0.338* (0.000)	0.367* (0.000)	0.281* (0.000)	0.321* (0.000)	4.295* (0.000)	2.647* (0.000)	0.164 (0.928)	2.275* (0.000)	0.264* (0.000)	0.145* (0.000)	0.299* (0.000)	0.183** (0.028)	-	-
X_Alim	-0.132* (0.000)	0.123* (0.000)	-0.109* (0.001)	-0.172* (0.000)	2.266** (0.044)	3.888* (0.000)	1.781*** (0.076)	3.689* (0.000)	-0.011 (0.695)	0.008 (0.853)	-0.004 (0.919)	0.011 (0.897)	-0.277 (0.268)	-0.281 (0.264)
M_Alim	- 0.206** (0.026)	-0.114 (0.201)	- 0.185*** (0.087)	-0.125 (0.345)	-0.167 (0.917)	0.465 (0.778)	-4.095 (0.310)	-1.031 (0.513)	0.118** (0.034)	0.085 (0.451)	0.013 (0.911)	0.080 (0.451)	3.610* (0.005)	2.470*** (0.093)
G_mil	- 0.086*** (0.062)	- 0.035*** (0.071)	0.115 (0.665)	- 0.133** (0.020)	1.858** (0.019)	1.707** (0.040)	2.154*** (0.085)	2.240* (0.004)	0.261 (0.284)	0.217 (0.474)	0.242 (0.411)	0.147 (0.864)	- 3.242** (0.036)	-2.888** (0.024)
X_carb	0.069* (0.007)	0.058** (0.027)	-0.023 (0.339)	0.065*** (0.068)	-1.195* (0.000)	-1.269* (0.000)	-0.600 (0.346)	-1.182* (0.000)	0.009 (0.282)	0.017** (0.017)	0.021*** (0.059)	0.015 (0.504)	0.449* (0.001)	0.235 (0.321)
M_carb	0.068 (0.351)	0.104 (0.167)	0.116** (0.047)	0.115 (0.221)	-0.649 (0.270)	-2.266* (0.000)	- 1.529** (0.016)	-2.809* (0.000)	0.185* (0.000)	0.179* (0.000)	0.156* (0.000)	0.176* (0.001)	-0.093 (0.852)	0.763 (0.283)
C_EF	0.053*** (0.058)	0.034 (0.258)	0.043 (0.131)	0.054 (0.215)	1.178* (0.000)	0.534 (0.169)	0.438 (0.183)	0.205 (0.581)	-0.002 (0.837)	-0.003 (0.745)	-0.008 (0.173)	0.002 (0.841)	-0.064 (0.790)	-0.137 (0.598)

Constante	0.329* (0.000)	0.301* (0.000)	0.320* (0.000)	0.306* (0.000)	-0.414 (0.306)	0.195 (0.533)	0.966** (0.049)	0.558 (0.104)	-0.048* (0.000)	-0.069* (0.008)	-0.026 (0.286)	-0.058 (0.173)	0.510** (0.041)	0.583** (0.043)
CC	- (0.042)	0.027** (0.042)	-	-	-	0.543* (0.000)	-	-	-	0.009* (0.001)	-	-	-	0.008 (0.795)
SP	-	-	0.041* (0.000)	-	-	-	0.428* (0.000)	-	-	-	-0.019* (0.000)	-	-	-
QR	-	-	-	-0.015 (0.454)	-	-	-	0.584* (0.000)	-	-	-	0.008* (0.000)	-	-
Number of Observations	702	702	702	702	440	440	440	440	704	704	704	704	308	308
Number of Instruments	32	33	33	33	32	33	33	33	32	33	33	33	30	31
AR(1)	0.002	0.001	0.001	0.001	0.273	0.264	0.321	0.283	0.120	0.127	0.118	0.125	0.311	0.312
AR(2)	0.849	0.862	0.692	0.737	0.345	0.395	0.588	0.511	0.338	0.331	0.338	0.331	0.343	0.337
Sargan	60.34	62.13	65.00	59.89	17.92	19.04	22.54	22.07	115.15	115.42	112.60	115.64	134.50	134.42

Note : Author's estimates. Values in parentheses are p-values, * significant at 1%, ** significant at 5%, *** significant at 10%

4. Implications of the War

A new trade and investment route was recently approved by EU President Ursula Von Der Leyen during the World Economic Forum (2023), which is expected to have long-term stimulating effects. This implies that there could be increased trade and foreign direct investment flows from Europe to African and Asian countries due to the ongoing war in Ukraine. Conversely, the war has the potential to result in elevated volatility in food price inflation, increased food insecurity, and a reduction in imports of essential goods.

The European Union is heavily reliant on Russian energy and Ukrainian agricultural products. It is reasonable to conclude that the European market would experience a reduction in energy imports, which would lead to an increase in oil and gas prices and, consequently, a decrease in foreign direct investment (Table 3). Furthermore, the war has a slight negative impact on food security, as the importation of wheat from Ukraine is not feasible during the conflict. The results of the analysis indicate that this war would have a significant impact on EU countries.

It is also evident that Asian countries would be significantly affected, given that Russia exercises considerable control over well-established trade routes with them. It seems probable that China will benefit from purchasing greater quantities of oil and gas from Russia during this period of conflict, potentially at lower prices. The intensity of the war would have a detrimental impact on the Asian economy, precipitating a surge in inflation, food insecurity, and elevated oil and gas prices in several countries within the region (Singh, 2022; Handavani & Purba, 2022). Additionally, other global regions, such as those in Africa, would also experience the ramifications of this conflict.

Conclusion

The invasion of Ukraine by Russia has resulted in the disruption and damage of trade relations and foreign direct investment (FDI) flows to various regions of the world, including Africa, Asia, Europe, and other areas that had previously benefited from these relations prior to the commencement of hostilities in February 2022. This provides compelling evidence that the ongoing conflict is having a deleterious impact on global economic growth and sustainable development in all countries (Singh, 2022; Abu Hatab, 2022). Moreover, foreign direct investment (FDI) and trade are subject to the influence of a number of significant

explanatory variables. The coefficients for export goods, international trade as represented by foreign trade, and food and fuel exports have demonstrated positive and statistically significant results in certain groups, while exhibiting no statistically significant results in others. Conversely, the inflow of foreign direct investment (FDI) and trade is influenced by a number of factors, including food and fuel imports, military spending, and fossil fuel consumption.

Furthermore, it is evident that the ongoing conflict between Russia and Ukraine has resulted in a notable surge in military expenditure, which has in turn precipitated a substantial deterioration in foreign direct investment (FDI) and trade relations. Consequently, this has resulted in the deterioration of bilateral and multilateral trade relations, as well as the disruption of long-established supply chains, markets, and value chains between countries worldwide (Papunen, 2024).

The full extent of the long-term economic consequences of the conflict between Russia and Ukraine remains to be observed. The impact of the war on countries is contingent upon two key factors: their level of dependence on imports from Russia and Ukraine, and their degree of involvement in the war. The economic signals and estimates presented in this study demonstrate that the current conflict presents significant challenges for political decision-makers and economists in terms of managing shortages of goods, rising inflation and rethinking public spending structures (Negri and Dincă, 2023).

In conclusion, it is imperative that prompt and efficacious measures, underpinned by robust policies, be enacted to address the situation in a manner conducive to peace and humanity. It is imperative that the international community begins to explore alternative avenues of resolution, as protracted conflict will not only inflict damage upon the global market, trade routes, and foreign direct investment (FDI) but may also precipitate famine, poverty, economic and social disparities, and even another global war (Glantz, 2024).

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