Research on the Impact of International Trade on Economic Growth in the Democratic Republic of Congo

Mwange Sagali Esther[1], Fan Jiajing[2]

Zhejiang University of Science and Technology

Abstract: *International trade has an important impact on the country's economic growth. Based on 2001-2020 data, this paper analyzes the key variables and components of the Democratic Republic of Congo's international trade and economic growth indicators, such as GDP, imports, exports, foreign direct Investment (FDI), exchange rate, etc. Using the Autoregressive Distribution Lag (ARDL) method found that international trade (exports and imports) promoted the economic growth of the Democratic Republic of the Congo in the long term but hindered development in the short term. Capital stock, population growth, and inflation have all been found to have a positive impact on GDP (economic growth) in the short and long term. In contrast, foreign direct investment was found to have a negative impact on GDP growth. Through data analysis, this paper believes that foreign funds need to flow directly into the primary sector (agriculture) and industrial sectors of the Democratic Republic of the Congo, rather than mineral mining and other service sectors. The government should strengthen local production companies to add value to raw materials before exporting. In addition, domestic consumers should be encouraged to patronize locally manufactured goods and services. This can be achieved by organizing rural trade fairs and exhibitions to bring goods made in the Democratic Republic of the Congo to thousands of households.*

Keywords: international trade, economic growth, trade openness, GDP, the Democratic Republic of the Congo

1. Introduction

Studying international trade impact on economic growth plays an essential role in making sustainable economic development and environmental dynamics decisions. Abendin and Duan (2021) considered international trade as a momentous foundation of global economic growth. Countries constantly examine trade-growth effects to determine whether they are gaining or losing in trade flows. Most nations trade their natural resources or commodities in support of their economic growth. Thus to say international trade flows are associated with comparative advantages or countries and regions. Therefore, the topic remains of utmost importance for policy-makers and the government. For instance, Tian et al. (2018) argued that nations seek trade to aid economic development. In this case, countries seek out a share of the trade pie. In addition, the trade-related researches have focused on levels of economic flows and imbalances, foreign direct investments, exchange rate, inflation, and regional integration success as measures against growth.

Africa has had a spectacular economic performance during the last 15 years, with an average growth rate of more than 5% in the real gross domestic product (GDP) between 2001 and 2020, related to scarcely more than 2% in the 1980s and 1990s (African Economic Outlook, 2021). The Central African Economic and Monetary Community (CAEMC) chose a trade liberalization agenda as well. The majority of the nations in the sub region joined the Structural Adjustment Program (SAP) in the late 1980s, bolstered by their WTO membership, and developed international, regional, and bilateral free trade agreements (development has a huge impact on the economic growth and political stability of the continent (Mbingui and Etoka-Beka, 2021; Madariaga, 2010).

In as much as many factors affect DRC's economic performance, the Covid-19 has hugely affected cross-border trade (Zhou et al., 2020). Therefore, a thorough investigation into the impact of international trade on economic growth in a country regarded as having low economic growth is essential. The researcher is mainly concerned with the effects of international trade on DR Congo's economic growth.The core purpose of this research is to investigate the impact of international trade openness on the country's economic growth from 2001 to 2020. The researcher considers key variables and components of economic growth indicators such as Gross Domestic Product, imports, exports, foreign direct investments (FDI), exchange rate, etc., to analysis trade openness-economic growth relationship.

2. Literature Review

a) Review of International Trade
Foreign trade, also refers to international trade, external or cross trade, relates to all commercial transactions (private and governmental, sales, investments, logistics, and transportation) that take place between two or more regions, countries, or nations that are located outside of their political boundaries. It largely consists of import and export trading. Import trade refers to purchase of good or services from a foreign country to home country while export trade is all about the sale of goods or services to a foreign country (Kalaitzi and Cleeve, 2018). According to Mbingui and Etoka-Beka (2021) foreign trade is influenced by several factors including endowments, preferences, technologies, exchange rate, distance and gross domestic product (GDP). International trade lead to variety and quality of commodities (goods and services) for consumers, whilst it also increases the competition between domestic and foreign firms (Dogru and Bulut, 2018; Isik, 2015). Besides, international trade has foster cooperation and reduce

regional barriers. The interconnections, diplomacy, political relations, collaboration have all promote global peace.

Osabuohien et al. (2019) revealed that the evidence of international trade impact on growth and development had been discussed in the 18th century by classical economics such as Adam Smith and David Ricardo. In the 17th century, Adam Smith (1776) argued that broader markets would lead to higher accumulation of capital and higher technologies, which in returns improve the division of labor and productivity yielding economic growth. Furthermore, in the 18th century, another classical and economics legend, International markets, as per David Ricardo, could not only postpone the eventual decline in profit margin carried on by higher salaries and land restrictions, but also allow countries to specialize in goods with lower opportunity costs and a stronger absolute and comparative, resulting in larger welfare gains.

Commenting on Ricardo and Smith assertions, countries that enter cross border trade benefit equally. According to Tian et al. (2018), international trade may lead to resource and environmentally harmful balances and trade diversions. This type of trade may allow a country to partially decouple its domestic economy and ecosystem while consuming goods from other countries' economic systems. According to Semancikova (2016) recent economies have become more connected with external factors such as openness due to liberalization and globalization and economic integration and foreign diplomacy and trade. In Africa, ECOWAS and SADC are among the regional integrations that have liberalize many trade, security and political agreement. Oloyede et al (2021) indicated that these regional agreements possess the ambition of facilitating trade among countries by reducing costs of transaction like tariff and non-tariff barriers and breaking the limitation. UNCTAD's (2013) report observes that international trade increases the income and employment of the economy, nevertheless the additions have not trickled down to the poor. By observing the above studies, the current paper intends to analyze the relationship between international trade and economic growth in the DR Congo.

b) Review of Economic Growth

Economic growth can be defined as the development of economic activity that leads to an increase in the goods and services produced by the community (Sukirno, 2012). One of the indicators to measure the economic status of a region is GDPR. GDRP is basically the amount of added value generated by all business units in a specific country/region, or the sum of the final value of goods and services produced by all economic units. Economic growth refers to the real per capita income that can continue to increase over a long period of time (Abubakar et al., 2016; Clunnies, 2009). Awe (2013) believes that economic growth is a process in which the real per capita income of a nation rises over a long period of time. Therefore, when the production capacity of an economy increases, it will increase, and the production capacity is used to manufacture more goods and services. Economic growth refers to the process by which the economy increases its production capacity over time, which also increases national output and income levels.

c) DR Congo International Trade and Economic Growth

The Democratic Republic of the Congo is the country with the largest land area in Central Africa and the third most populous country (World Bank Report, 2011). According to the Human Development Index of the United Nations Development Programme, the Democratic Republic of the Congo is classified as a least developed country, partly due to long-term political instability (International Trade Center, 2021). In 2019, according to the Economic Complexity Index, the Democratic Republic of the Congo's GDP (current US dollars) is the 88th economy in the world, 96th in total exports, 116th in total imports, and 178th in per capita GDP (current US dollars) (ECI) Ranked 143th among the most complex economies). In addition, the Democratic Republic of the Congo borders nine countries and has complex economic, immigration, and political relations with each country. Its development has had a significant impact on the economic growth and political stability of the African continent (Mbingui and Etoka-Beka, 2021).

The Democratic Republic of the Congo has joined a number of world and regional organizations to promote sustainable development and political goals. For example, the Democratic Republic of the Congo (DRC) is a member of the Economic Community of Central African States (ECCAS), Southern African Development Community (SADC), Common Market for Eastern and Southern Africa (COMESA), African Union (AU), United Nations (UN), Economics of Great Lakes Countries Community (ECGLC), World Trade Organization (WTO) and other organizations.

From the perspective of the World Trade Organization (WTO, 2016), the opening of the Congolese economy has made significant progress in strengthening trade, with trade accounting for 137% of its GDP. Measured by the degree of trade openness, international trade in 2012, 2013 and 2014 were 142.60%, 143.24% and 165.64% respectively (World Bank, 2015).

Figure 1: Map of Democratic Republic of Congo

3. Methodology

a) Data Type and Sources

The study employed yearly time series data for the period 2001 – 2020 obtained from published sources. The major sources of data includes; World Bank's World Development Indicators (retrieved 2021), Central Bank of Democratic Republic of Congo (retrieved 2021); World Trade Organization (WTO Trade Statistics, 2021); the International Monetary Fund, 2021; African Development Indicators, 2021. The main variables retrieved are exports of goods and services (annual % growth), GDP growth (annual %), imports of goods and services (annual % growth), GDP per capita growth (annual %), GNI growth rate, Inflation, consumer prices (annual %), Foreign direct investment, net (BoP, current US$)

b) Econometric Approach

The research relied heavily on previous empirical literature patterns and selected critical determinants of the independent and the dependent variables (import, export, population, inflation, gross domestic product, and foreign direct investment) for analysis. The study used secondary data from credible and official websites to investigate the international trade impacts on the economic growth of the Democratic Republic of Congo.

The unit root test is used in the first phase to ensure that the variables are stationary. The second stage determines whether the variables have a long-term relationship. To determine causality between variables, the third step is to perform the Granger causality test. To characterize the long-term relationship between variables, Pesaran et al. (2001) created the ARDL cointegration approach. In the econometric literature, the advantages of this strategy over other standard methods are extensively documented. Johansen cointegration test is used to determine the number of cointegration vectors; it provides two different likelihood ratio tests; trace test and maximum eigenvalue test. Johansen's cointegration test is based on a vector autoregressive model (VAR). If the maximum eigenvalue and trace value are greater than the 5% critical value in the list, the decision criterion is to reject H0 (Farag, et al., 2021). VECM is a restricted vector autoregressive (VAR) model that allows short-term and long-term Granger causality. Granger (1969) developed a simple test to check the causality between variables. The study used Microfit software (Mircofit 5.0) for the data analysis. Microfit is a statistical package developed by Bahram Pesaran and Hashem Pesaran. It is intended for econometric modelling with time series data (Farag, et al., 2021).

4. Results

a) Descriptive statistics of variables

Before the main econometric analysis, it is important to conduct descriptive analysis of all the independent and independent variables. The research used data from 2001 to 2020 and the central tendencies and dispersion measures such as mean, median, standard deviation, probabilities', etc., were all reported in table 4.1. The maximum GDP growth was 9.47, whereas the minimum and mean was -2.10 and 5.15 respectively. Again, the maximum export and import values are 25.02 and 29.56 accordingly. The study discovered that inflation has ever risen to 35.99 and its lowest ever was 0.744. Furthermore, the FDI maximum value is 12.72, and its lowest and mean value are -1.30 and 4.41 orderly. The standard deviation and skewness of GDP was reported 2.7 and -0.95 respectively.

Table 1: Descriptive statistics of variables

Measures	EXPORT	FDI	GDP	GNI	IMPORT	INF	POP
Mean	11.33100	4.410642	5.150189	5.626242	11.27900	10.82036	66889527
Median	11.56000	3.039972	5.978136	5.540804	9.740000	7.685249	65659502

Maximum	25.02000	12.71601	9.470288	10.03811	29.56000	35.99366	89561404
Minimum	-0.880000	-1.304135	-2.100170	1.076911	-6.470000	0.744199	48428534
Std. Dev.	6.596885	3.559287	2.733835	2.119080	10.21932	9.963874	12913255
Skewness	0.084830	0.942141	-0.953851	0.143665	0.239534	1.173238	0.230396
Kurtosis	2.638941	3.111478	3.741703	3.199237	2.317365	3.630736	1.826131
Jarque-Bera	0.132623	2.969119	3.491210	0.101878	0.579580	4.919816	1.325248
Probability	0.935839	0.226602	0.174539	0.950337	0.748421	0.085443	0.515497
Sum	226.6200	88.21284	103.0038	112.5248	225.5800	216.4072	1.34E+09
Sum Sq. Dev.	826.8590	240.7019	142.0032	85.31954	1984.256	1886.297	3.17E+15
Observation	20	20	20	20	20	20	20

b) Trend graph of variables

As part of the preliminary investigation on the variables, the researcher conducted a trend graph of all the variables. It was observed that most linear variable with time is population (POP). All the other variables have been experiencing non-linearity over time based on the group multiple graphs presented in fig 2.Generally, the evolution of trade openness admits a fluctuating pattern over time, with recurrent and alternating oscillations, showing a zigzag trend
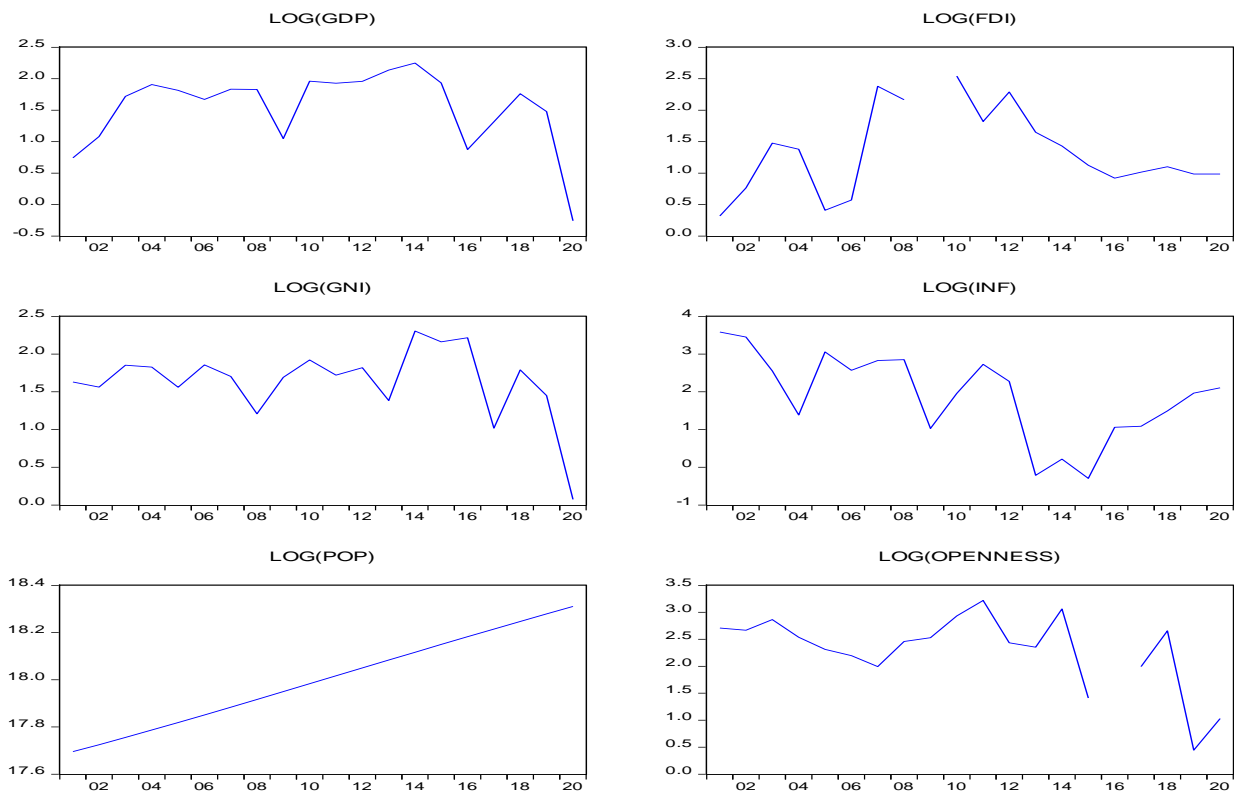

Figure 2: Trend graphs of variables

c) Results of the Unit Root Test

The stationarity test is based on the Augmented Dickey-Fuller (ADF) test. The findings of the unit root test are presented in Table 2. The test regression included both an intercept (constant) and a linear trend and intercept with non linear trend for the log-levels and intercept with linear trend and an intercept with non linear trend for the first differences of the variables.

Table 2: Results of the Unit Root

Variable	Lags	Log Level		First Difference	
		Non Linear Trend	Linear Trend	Non Linear Trend	Linear Trend
GDPR	1	-1.0801	-1.4739	-4.0379**	-4.7946**
CAPITAL	1	0.20203	-1.0188	-2.3483	-3.3479**
FDI	1	-1.7487	-2.2959	-3.6361**	-3.7338**
INFLATION	1	-2.2526	-2.8260	-3.6112**	-3.5166**
POPULATION	1	-1.9041	-0.86677	0.016180	-34.8757**
OPENNESS	1	-1.6931	-2.6726	-2.9019	-3.1070**

** denotes the rejection of the null hypothesis of non-stationarity at 5% significance level.

The ADF test involves testing the null hypothesis of non-stationarity of the variables against the alternative hypothesis of stationarity. As can be seen from the second and third columns of Table 2, when the regression is

estimated at the log level (with and without linear trend), none of the variables becomes stationary. This is because the values of the test statistic for all the variables with and without linear trend are less than the critical ADF value of −3.00 in absolute terms at 5 percent level of significance. Thus, the ADF unit root test results in the table indicate that the null hypothesis of non-stationarity (with and with no trend) cannot be rejected for all the variables at the log levels. This means that the variables are integrated of order one or higher since none of them is stationary at the log level.

All the variables become stationary after the first difference. This can be seen from columns four and five of Table 4.2. This is because the test statistic values for the variables are greater than the critical ADF value of −3.00 (with and with no linear trend) in absolute terms at 5 percent significance level. Therefore, the null hypothesis of non-stationarity can be rejected and the alternative hypothesis of stationarity accepted. Thus, the first difference of the variables is integrated of order zero, I(0) indicating that they are stationary. The unit root test show that all the variables are of order I (1). The results of the ADF test go to suggest that all the variables are I(1) at the log levels but I(0) at the first difference, demonstrating the existence of unit root in the data for the variables used. The existence of unit root accentuates the presence of non-stationarity in the variables and hence the use of the first difference of the variables for estimation and analysis. Johansen cointegration test is run to know if the variables are cointegrated

d) Results of the Bounds Test for Cointegration

From Table 3, the computed F-statistic F_{GDP}(GDP|OPENNESS, POPGR, INFL, FDI, K) = 8.5352, was bigger than the upper bound critical value of 4.781 at 1 percent significant level. Also, F_{POGR} (POPGR|GDP, OPENNESS, INFL, FDI, K) = 33.2734 is higher than the upper bound critical value of 4.781 at 1 percent significance level. This entails that the null hypothesis of no cointegration is rejected meaning that there exists long-run cointegration relationships between the variables when the regressions are normalized on both GDP_t and $POPGR_t$ variables.

The computed F-statistics when the regressions are normalized on inflation, FDI, capital and openness are 2.1547, 1.3895, 1.1794 and 2.2216 respectively. Since these statistics are less than the lower bound critical value of 3.516 at both 5% and 1% levels of significance, the null hypothesis of no cointegration is accepted implying there is no long run association among the variables when the regressions are normalized on inflation, FDI, capital and openness.

However, this study is based on growth theory, hence GDP_t is used as the dependent variable. Consequently, the results of the other regressions are neglected. Therefore, there is the existence of cointegration among the variables in the growth equation.

Table 3: Results of the Bounds Test for Cointegration

Variables	F-statistic	Probability	Outcome
F_{GDP} (GDP| OPEN, POP, INFL,FDI,K)	8.5352	0.003**	Cointegration
F_{POP}(POP| GDP,OPEN,INFL,FDI,K)	33.2734	0.001**	Cointegration
F_{INFL}(INFL| GDP,OPEN,POP,FDI,K)	2.1547	0.145	NoCointegration
F_{FDI}(FDI| GDP, OPEN,POP,INFL,K)	1.3895	0.315	NoCointegration
F_K(K| GDP, OPEN, POP,INFL,K)	1.1794	0.395	NoCointegration
F_{OPEN}(OPEN| GDP,POP,INFL,FDI,K)	2.2216	0.136	NoCointegration

Lower Bound I(0) = 3.516 and Upper Bound I(1) = 4.781 at 1%.
** denotes the rejection of the null hypothesis of no cointegration at 1%.

e) Results of the Estimated Long-Run Growth Equation using the ARDL Approach

The bounds test results show that long-run cointegration relationships exist among the variables. Hence equation (12) is estimated using ARDL(1,1,0,1,1,0) selected based on Akaike Information Criterion (AIC). The results obtained by normalizing real GDP growth (GDPR) in the long run are reported in Table 4. The coefficients indicate the long-run elasticities.

Table 4: Estimated Long Run Coefficients using the ARDL Approach

ARDL(1,1,0,1,1,0) selected based on Akaike Information Criterion Dependent variable is LOGGDPR				
Regressor	Coefficient	Standard Error	T-Ratio	P-Value
Ln*OPENNESS*	0.31577	0.17023	1.8550*	0.091
Ln*K*	0.30420	0.10033	3.0320***	0.011
Ln*FDI*	-0.19525	0.029850	-6.5412***	0.001
Ln*INFL*	0.097414	0.065382	1.4899	0.164
Ln*POPGR*	3.2015	1.4482	2.2107**	0.049
CONSTANT	-59.2026	23.4210	-2.5278	0.028

" *** (**) (*)denote the rejection of the null hypotheses at 1% (5%)(10%)"

The coefficient of OPENNESS in the long run growth equation is positive and significant at 10 percent significance level. The sign of the OPENNESS variable supports the theoretical conclusion that trade openness contributes positively to GDP growth. From the results in Table 4, the coefficient of openness is 0.32, which means that a 1% rise in trade openness leads to approximately 0.32% increase in GDP growth. This implies that trade openness (sum of export and imports to GDP, a measure of international trade) has a very high significant impact on GDP growth. This is in line with the classical views on the importance of trade in the macro economy's theoretical expectations. Other empirical research such as Oloyede et al. (2021), Edeminam (2021), Yanikkaya (2003), and Wacziarg (2003) support this hypothesis (2001).

The coefficient of capital stock, which is 0.30420, is positive and significant at 1 percent significance level. A coefficient

of 0.30420 for capital indicates that all things being equal, a 1 percent increase in capital stock raises GDP growth by approximately 0.30%. This means that gross fixed capital formation (a proxy for the capital stock) exerts a strong influence on GDP growth. This positive relationship between capital stock and GDP growth is consistent with the expectation of classical economic theory. It is also consistent with the results obtained by (Kalaitzi, and Cleeve, 2018; Aryeetey, and Fosu, 2005).

The coefficient of foreign direct investment (FDI) expressed as a ratio to GDP was found to be -0.19525 but significant at 1 percent significance level. Thus, a percentage increase in FDI reduces GDP growth by approximately 0.195%. This is quite implausible since it is expected that FDI inflows enhance knowledge and technology transfer, thereby resulting in growth. It is also expected that additional inflows of FDI adds to output and not to reduce it. However, this results is consistent with the results obtained by Mongale and Monkwe (2015).

The coefficient of population that is 3.2015 carries a positive sign and it is also significant at 5 percent level of significance. The implication is that a percentage increase in population raises GDP growth by approximately 3.20%. Thus, the results suggest that in the long-run, population enhances growth. This is consistent with theoretical expectation since a rise in population increases the market size and raises aggregate demand in the economy.

f) Results of the Error Correction Model for the selected ARDL Model

Generally, the Error Correction Model (ECM) provides the means of reconciling the short run behaviour of an economic variable with its long-run behaviour. The existence of cointegration relationships among the variables implies the estimation of Error Correction Model to regulate the vigorous behaviour of the growth equation. The Error Correction Model captures the short run dynamics of the system, and its coefficient assess the speediness of adjustment to achieve equilibrium in the event of shocks to the system. Table 5 reports the results of the short-run dynamic growth equation.

Table 5: Error Correction Model for the Selected ARDL Model

ARDL(1,1,0,1,1,0) selected based on Akaike Information Criterion Dependent variable is dLnGDPR				
Regressor	Coefficient	Standard Error	T-Ratio	P-Value
dLn$OPENNESS$	-0.30408	0.33351	-0.91176	0.377
dLn$LOGK$	0.39323	0.12316	3.1929**	0.007
dLnFDI	-0.037806	0.044731	-0.84518	0.412
dLn$INFL$	0.013034	0.061935	0.21045	0.836
dLn$POPGR$	4.1384	1.9840	2.0860***	0.056
$CONSTANT$	-76.5291	32.2671	-2.3717***	0.033
$ecm(-1)$	-1.2927	0.16015	-8.0715**	0.001

$$ECM = logGPD - 0.31577 * logOPENNESS - 0.30420 * logK + 0.19525 * logFDI - 0.097414 * logINF - 0.32015 * logPOP + 59.2026 * C$$

R-Squared = 0.89121
R-Bar-Squared = 0.80219
S.E. of Regression = 0.094467

F-stat.   F(6, 14) = 15.0181[.001]
Mean of Dependent Variable = 0.076091
S.D. of Dependent Variable = 0.21240
Residual Sum of Squares = 0.098164
Equation Log-likelihood = 26.5415
Akaike Info. Criterion = 16.5415
Schwarz Bayesian Criterion = 11.3189
DW-statistic = 2.2592
** (***) denote the rejection of the null hypotheses at (5%) 1% level of significance.

The results from the table indicate that the model passed the diagnostic tests. The overall regression is significant at both 5% and 1% as can be seen from the R-squared and the F-statistic. R-squared value of 0.8912 indicates that about 89% of the variation in the dependent variable (dLnGDP) is explained by the independent variables. In addition, an F-statistic value of 15.018 suggests the joint significance of the determinants in the ECM.

From Table 5, the coefficients of the variables provide interesting results since they maintain their signs as in the long-run equation except the coefficient of the OPENNESS variable whose sign change from positive to negative. The coefficients indicate the short- run elasticities. The coefficient of the OPENNESS variable this time is negative. It is not statistically different from zero at both 5% and 10% levels of significance. This shows that in the short run, openness of international trade (export and import) could be detrimental to growth in D.R. Congo.

g) Results of the Estimated Correlation Matrix

The table indicated that there is a positive correlation between GDP growth (GDPR) and trade openness (OPENNESS) thus import and export. The reported correlation coefficient between GDP growth and OPENNESS is 0.07485. The positive relationship between GDP growth and OPENNESS is consistent with the findings obtained from the long run growth equation. However, it contradicts the short run results. The findings is consistent with Zahonogo (2017), who explored the impact of trade openness on economic growth in SSA. He employed a dynamic growth model using data covering the period 1980 to 2012 in 42 SSA countries. The study proofed the existence of a trade threshold below which an increase in trade openness had positive effects on economic growth while above this threshold the effects tended to decrease.

Table 6: Estimated Correlation Matrix of the Study Variables

Variables	1	2	3	4	5
GDPR	1				
K	0.44086*	1			
FDI	-0.006527	0.29021*	1		
INFL	-0.085627	0.23098*	0.081529	1	
POP	-0.13823	-0.15244	0.12311	0.13956*	1
OPENESS	0.07485**	0.34571	0.19020*	-0.38488	-0.41683

**p < 0.01, *p < 0.05.

5. Conclusion

This study finds out the impact of international trade on the GDP growth of the Democratic Republic of Congo. The

study used openness to measure export and imports, and key trade-related factors that significantly affect economic growth, such as foreign direct investment, inflation, etc., were added. GDP growth annual calculations were adopted and trigger the researcher to include the real capital and population since they provide a better understanding of the trade openness model. The study used secondary data from Word Bank, World Development Indicator 2020 and employed the autoregressive distributed lag (ARDL) approach to estimate the time series analysis.

The study's empirical results suggest that trade liberalization enhances GDP growth in the Democratic Republic of Congo in the long run but hampers growth in the short run. In both the long-run and short-run error correction model, the coefficients of capital, population, and inflation were growth-enhancing in the Democratic Republic of Congo economic growth. Meanwhile, foreign direct investment (FDI) was not. The influence of OPENNESS was not consistent.

In the extant literature, the influence of trade openness on economic growth is a point of contention. In some studies, the influence was beneficial, but in others, it was non-significant or even detrimental (Yaya, 2017). This study found that there exists a positive and significant relationship between GDP growth and trade openness in the long-run. The result means that a considerable percentage of the economic expansion of DR Congo is external.DR Congo should further the enhancement of the production of more exportable commodities with tax incentives and export promotion subsidies. These are necessary for accelerating international trade and GDP growth. Along with these, the government also needs to lower the export tariff in order to encourage more exports, as this is one more variable that has a positive impact on growth.

The government should encourage the import of capital goods and equipment that can be used for intermediaries' production and value addition. Conversely, the DR Congo government should discourage the importation of substitute goods that can be made locally. The government can do this by imposing strict restrictions such as quotas and an increase in import tariffs because importation has a negative effect on the economic growth of DR Congo.

References

[1] Abubakar O. A., Shuaibu, S. S., & Tsalla S. (2016). International Trade and Economic Growth: An Empirical Analysis of West Africa. *Journal of Economics and Finance,* PP 12-15.

[2] Abendin, S., & Duan, P. (2021). International trade and economic growth in Africa: The role of the digital economy. *Cogent Economics and Finance*, 9:1, 1911767,

[3] African Economic Outlook 2012

[4] Aryeetey, E. Fosu A. K. (2004), *Economic Growth in Ghana: 1960-2000*, Draft Chapter for AERC Growth Project Workshop, Cambridge.

[5] Awe, A.A. (2013). The Impact of Foreign Direct Investment on Economic Growth in Nigeria. *Journal of Economics and Sustainable Development, 4*(2).

[6] Clunnies, R. (2009). *Development economics*, London McGraw Hills.

[7] Dogru, T., & Bulut, U. (2018). Is tourism an engine for economic recovery? Theory and empirical evidence. *Tourism Management, 67*, 0261–5177.

[8] Farag, F. S., Ab-Rahim, R., & Mohd-Kamal, K. A. (2021). Foreign Trade and Economic Growth Relationship: Empirical Evidence from Libya. *International Journal of Academic Research in Business and Social Sciences*, 11(4), 181-190.

[9] Granger, C.W.J. (1969). Investigating causal relations by econometric models: cross spectral methods. *Econometrica* 37 (3), 424–438.

[10] Isik, C. (2015). Foreign direct investment in tourism: Panel data analysis of D7 countries. *Athens Journal of Tourism, 2(2), 93–103.*

[11] Kalaitzi, A., & Cleeve, E. (2018). Export-led growth in the UAE: multivariate causality between primary exports, manufactured exports and economic growth. *Eurasian Business Review*, 8:341–365.

[12] Madariaga, N. (2010). Measurement and Recent Developments in Franc Zone Trade Integration *Agence française de development*, 1-24.

[13] Mbingui, C., & Etoka-Beka, A. S. (2021). Effects of Trade Openness on Economic Growth in the Republic of Congo. Theoretical *Economics Letters*, 11, 724-742.

[14] Oloyede, B. M., Osabuohien, E. S., & Jeremiah O. Ejemeyovwi, J. O. (2021). Trade openness and economic growth in Africa's regional economic communities: empirical evidence from ECOWAS and SADC. *Heliyon,* (7) e06996.

[15] Osabuohien, E., Efobi, U., Odebiyi, J., Fayomi, F., & Salami, A. (2019). Bilateral trade performance in West Africa: a gravity model estimation. *African Development Review, 1–4.*

[16] Pesaran, O., Kuauma, K.P, & Guama, O. (2001). Bound Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, (16), 289-326.

[17] Semancikova, J. (2016). Trade, trade openness and macroeconomic performance. *Social and Behavioral Science*, (220), 407-416.

[18] Sukirno, K. (2012). Impact of foreign direct investment & domestic investment on economic growth of Malaysia. *Malaysian Journal of Economic Studies*, 50(1): 21-35.

[19] Tian, A. A., Sarpong, D. B., Ouedraogo, I. M., Hassan, R. A., Mensah-Bonsu, A., and Onumah, E. E. (2018). Assessing the Impact of Regional Integration and International Trade on Economic Growth and Food Security in ECOWAS. *Global Journal of Management and Business Research*, 18(2), 1-13.

[20] World Bank (2013), "Regulating foreign direct investment in Latin America. Indicators of investment regulations and options for investment climate reforms", available at http://iab.worldbank.org/~/media/FPDKM/IAB/Docu ments/Regulating-FDI-in-Latin- America.pdf (accessed March 7, 2021).

[21] World Bank, 2019. World Development Indicators. World Bank, Washington, DC.

[22] Zahonogo, X., Song, M., Cui, L. (2017). Driving force for China's economic development under industry 4.0 and circular economy: Technological innovation or structural change*? Journal of Cleaner Productivity*, 271, 122680.

Appendix
Model specification

$$Yt = f(A, K, L) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (1)$$

$$A = g(OPENNESS, POPGR, INFL, FID) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$GDPt = h(OPENNESSt, POPGRt, INFLt, FDIt, Kt, Lt) \ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3)$$

$$GDPt = h(OPENNESSt, POPGRt, INFLt, FDIt, Kt,) \ldots\ldots\ldots\ldots\ldots\ldots\ldots. (4)$$

$$GDPt = \beta_O + \beta_1 OPENNESSt + \beta_2 POPGRt + \beta_3 INFLt + \beta_4 FDIt + \beta_5 Kt + \mu t \ldots (5)$$

$$1nGDPt = \beta_O + \beta_1 1nOPENNESSt + \beta_2 1nPOPGRt + \beta_3 1nINFLt + \beta_4 1nFDIt + \beta_5 1nKt + \mu t \ldots\ldots\ldots (6)$$

long-run equation (6) as a general vector autoregressive (VAR) model of order p in z_t.

$$Z_t = \beta_0 + a_2 + \sum_{i=1}^{p} \emptyset i Z_{t-i} + u_t \qquad t = 1, 2, 3, 4, \ldots T \ldots\ldots\ldots. (7)$$

(VECM) corresponding to (7).

$$\Delta Z_t = \beta_0 + a_2 + \pi z_{t-1} + \sum_{i=1}^{p} \tau i \Delta Z_{t-i} + u_t \qquad t = 1, 2, 3, 4, \ldots T \ldots\ldots (8)$$

$$\Delta y_t = \beta_{y0} + a_t + \theta_{yy} y_{t-1} + \theta_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-i} + \sum_{i=0}^{p-1} \theta \Delta x_{t-1} + u_t \qquad t = 1, 2, 3, 4, \ldots T \ldots\ldots (9)$$

$$\Delta 1nGDP_t = \beta_0 + \theta_1 1nGDP_{t-1} + \theta_2 1nOPENNESS_{t-1} + \theta_3 1nPOPGR_{t-1} + \theta_4 1nINFL_{t-1}$$
$$+ \theta_5 1nFDI_{t-1} + \theta_6 1nK_{t-1} + \sum_{I=1}^{P} \beta_{1t} \Delta 1nGDP_{t-1} + \sum_{j=1}^{q} \beta_{2j} \Delta 1nOPENNESS_{t-1}$$
$$+ \sum_{k=1}^{q} \beta_{3k} \Delta 1nPOPGR_{t-k} + \sum_{I=1}^{q} \beta_{4l} \Delta 1nINFL_{t-1} + \sum_{m=1}^{q} \beta_{5m} \Delta 1nFDI_{t-m} + \sum_{p=1}^{q} \beta_{6p} \Delta 1nK_{t-p} + \mu_t \ldots (10)$$

ARDL $(p, q_1, q_2, q_3, q_4, q_5)$, the long-run model for GDP$_t$ can be estimated as:

$$1nGDP_t = \beta_0 + \sum_{I=1}^{P} \theta_1 1nGDP_{t-1} + \sum_{I=0}^{q1} \theta_2 1nOPENNESS_{t-1} + \sum_{I=0}^{q2} \theta_3 1nPOPGR_{t-1} + \sum_{I=0}^{P3} \theta_4$$
$$1nINFL_{t-1} + \sum_{I=0}^{q4} \theta_5 1nFDI_{t-1} + \sum_{I=0}^{q5} \theta_6 1nK_{t-1} + \mu_t \ldots\ldots (11)$$

The ECM is specified as follows:

$$1nGDP_t = y + \sum_{I=1}^{P} \beta_{1t} \Delta 1nGDP_{t-i} + \sum_{j=1}^{q} \beta_{2t} \Delta 1nOPENNESS_{t-j} + \sum_{k=1}^{q} \beta_{3k} \Delta 1nPOPGR_{t-k}$$
$$+ \sum_{I=1}^{q} \beta_{4t} \Delta 1nINFL_{t-1} + \sum_{m=1}^{q} \beta_{5m} \Delta 1nFDI_{t-m} + \sum_{p=1}^{q} \beta_{6p} 1nK_{t-p} + pECM_{t-1} + \mu_t \ldots\ldots (12)$$