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Panel Data Analysis of the effect of free Trade on FDI Inflow in Selected African Countries

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Abstract

This paper investigate the effect of free trade on FDI inflow in African countries over the period 1981–2021. The paper employed the panel Autoregressive Distributed Lag ARDL model. The results revealed that open trade has positive impact on FDI in the selected African countries. It shows that 1% increase in trade openness of the selected African countries will increase FDI inflow by 3.1%. The short-run country-wise result revealed that Trade liberalization positively affects FDI in Ghana. The paper recommended that African countries should vigorously pursue trade liberalization policy as a potent and deliberate effort to attract FDI inflows so as to create a positive impact on the economies of Africa.

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Keywords: Trade liberalization; Panel ARDL; FDI
JEL Classification: O24, C23, F21

1.0 Introduction

Trade liberalization is used to describe the reducing of trade tariffs, quotas and non-tariff barriers thereby creating a free trade zone. The eliminations of all trade barriers make ease the difficulties associated with international transactions among the economies of the world. It enables the countries worldwide to capture identify markets where they can enjoy comparative advantage i.e. they can easily produce goods and services at a cost lower than the cost experience under autarky. Restrictions on Foreign Direct Investment are reduced by many countries and incentives been adopted in order to encourage FDI (United Nations Conference on Trade and Development, 1996). Third world and developing countries are mostly characterized by adequate domestic resources require to finance both domestic and foreign investment which is necessary for greater economic growth and development. This may be caused by the low saving rate and repeated budget deficits particularly in Sub-Saharan African countries. The recent upsurge in capital inflows particularly FDI to Africa particularly SSA is due to the rise in global competition for natural resources (World Bank, 2012).

Most trade deficits in African countries is cause mainly by the common external and structural hurdles present in these apart of the world. The region's over dependence exploratory products exports, such as oil, minerals, and agricultural products, exposes it to volatile global commodity prices and dwindling market demand. Insufficient diversification into manufacturing and limited integration into global market links, has created vulnerability, preventing the region from capitalizing on higher-value exports. Similarly, External shocks in terms of the COVID-19 pandemic, further disrupted trade flows, weakened economic stability, and intensified reliance on imports for essential goods, (UNCTAD, 2021; World Bank, 2022).

Empirical studies have identified a strong linkage between a country's rate of economic growth and trade liberalization, as well as the dynamic effect of trade liberalization on FDI.

Additionally, determining factors such as market size, trade openness, labour force, infrastructure, and political stability have been found to influence FDI and economic growth in developing Asian countries (Trawally O, 2024). The significance of trade liberalization and foreign direct investment (FDI) in shaping the economic trajectory of developing Asian countries has become increasingly apparent (Zhai H., 2023).

Foreign Direct Investment indirectly promotes economic growth in developing countries through the dissemination of foreign advance technology, better production facilities, economies of scale and other resources onto domestic production. Trade liberalization has help to increased market access and integration of developing countries, leading to the raised in export opportunities and flow foreign of investments. This has promoted industrial and infrastructural development and also led to the movement of technology and managerial expertise from foreign companies to the domestic investment, and these has in a greater dimension enhances the productivity of the domestic firm and hence increase domestic output (Ali L. 2020).

The major objective of undertaken research is to explore the effect of trade liberalization on FDI inflows in selected African countries.

The paper is divided into five subsections with introduction being section one. Section two is the conceptual framework and empirical literature. Section three presents the research methodology, presentation of results is in section four. The fifth section contain conclusion and recommendation.

2.0 Literature Review

2.1 Conceptual Literature

2.1.1 Trade Liberalization

Trade liberalization is a government policy aim at exhibiting unrestricted trade in good and services across a country`s border (World Trade Organization, 2011). For a country to be considered free trade country, that country must be actively engaged in becoming more "open" to international business. In order to become economically liberalized, the government in that country must adhere and promote policies that promote trade restriction. A country with effective trade liberalization policies will be more open to trade than those without. (Chakravarthi Raghavan, 2004) posits the certain conditions for trade liberalization includes reducing tariffs and residual quantitative restrictions as well as taking measures to reduce non-tariff barriers associated with a country's imports and exports. Non-tariff barriers such as import quotas, voluntary export restraints, export subsidies, technical barriers, countervailing techniques, and restrictive state- trading interventions are also pertinent (Beghin, 2006).

2.1.2 The concept of Foreign Direct Investment

FDI had been discussed from the perspective of both the positive and negative effect in among the host countries around the world. The meaning and features and types of FDI have also been discuss. FDI refers to the official action of a citizens of one country to acquire the ownership of assets in another country with the different business-oriented purposes like production, distribution, advertisement (Moosa 2002). According to the United nations 1999 World Investment Report (UNCTAD, 1999) FDI as can simply be describe as an investment involving a lasting interest and control of a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor.

2.2 Theoretical Review

The traditional trade theories like the classical and the neo-classical theory such as the comparative advantage and the absolute advantage by David Ricardo and Adam Smith and the Heckscher Ohlin and Samuelson theories served as the basis of all trade theories of our time. The argument for the relationship among trade openness, foreign direct investment and the real sector of an economy can be link to these theories. International trade exists as a result of differences in technology (classical theory) or in relative factor endowment (neo-classical theory) (Salvatore, 2007). Both the classical and the neo-classical theories proposes that gains from trade come from specialization and trade and that all countries will benefit from trade.The endogenous growth theories which emerged in the 1980s and 1990s is another theoretical perspective that can be used to support the relationship between trade openness and real sector performance. This school was founded and coined by (Lucas, 1988: Romer, 1989, Grossman and Helpman, 1991;) as noted by (Aghion & Howitt, 2009), argue that there exists a positive relationship between trade openness and economic growth. This, according to the theorists, arises from access and acquisition of advanced technologies which implies that the more open an economy is, the economy will have a better chance of acquiring and applying advanced technologies developed in other countries.

Hence, it can be concluded that trade openness provides not only access to FDI and technological innovations but also a gateway for access to new markets with its attendant competition that encourages efficiency and innovation through Research and Development (R&D). (Aghion & Howitt, 2009).

2.3 Empirical Literature

Several studies have examined the link between trade and FDI around the globe. However, the following studies are observed as being pertinent to the paper of this relationship. Gonfa & Phoo (2023) explore the he mediation effects of foreign direct investment (FDI) through trade liberalization on economic growth in Asian countries. Using an extensive dataset spanning 22 years across 48 nations and employing the fixed-effects regression and Sobel Z-value tests. The result indicates an indirect effect. lnTLlnFDI demonstrates a positive and significant relationship between trade liberalisation and foreign direct investment (FDI) in their combined effect on economic output (lnGDP). Noel and Koye (2022) explore the dynamic impact of foreign capital inflows and trade openness on output performance and national productivity in 31 selected countries in sub-Saharan Africa (SSA) for the period spanning from 1985 to 2018. The paper employed random effects and fixed effects models to estimate the coefficients. Both estimates revealed a significant relationship between output performance and the independent variables. The paper further found that foreign capital inflows, trade openness and inflation rate have a positive and significant influence on output performance and national productivity.

Badamasi and Sule (2020) looked at the impact of trade openness on Foreign Direct Investment in Sub-Sahara African Countries for the period of 2000 to 2017. The paper employed panel co integration test and fully modified least square method (FMOLS). The findings reveal that, trade openness was positive and statistically significant in influencing FDI in the region

Selahattin and Gözgör (2015) examine the relationship between FDI and openness over the period 1986–2010 for Turkey. Granger causality analysis has been performed to determine the relationship between the variables in the model and it is concluded that the cause of FDI is trade openness. Asghar (2016) investigate the relationship between FDI inflows and trade openness in South-Asian economies. Taking seven countries as a case paper for the period 1998-2010. Applying random effects estimation on panel data. The findings revealed a

significant relationship between trade openness and foreign direct investment inflows in the selected countries. Trade openness shows a positive and significant impact on FDI inflows in South-Asian countries.

Tahmad and Adow (2018) investigates the long-run equilibrium relationships between trade openness and FDI in the Sudanese economy by sector within the 1990-2017 period. The paper employs Johansson co-integration technique. The findings of the analysis show that there is a long-run equilibrium relationship between trade openness and FDI flow.

Shuddhasattwa (2021) investigates the causal relationship between trade openness and foreign direct investment (FDI) inflows in Romania during the period 1997–2019. The Auto Regressive Distributed Lag (ARDL) Bounds test procedure was adopted to achieve the abovementioned objective. Trade openness has negative and statistically significant long-run and short-run relationships with FDI inflows in Romania throughout the period.

Seyoum et al. (2014) examined the relationship between foreign direct investment and trade openness in Sub-Saharan economies, using Panel data for 25 sub-Saharan African economies over the period 1977–2009. Their paper employed Granger causality. The results indicated that a bidirectional causality relation was identified between trade openness and foreign direct investment in Sub-Saharan economies.

Shah and Khan (2016) assessed the impact of trade liberalization on inward FDIs in six emerging countries, namely Brazil, China, India, Mexico, the Russian Federation, and Turkey, for the time period of 1996 to 2014 using the random effects model. The results indicates that, market size, and human capital have a positive and significant impact on FDI inflows, while trade and regional trade agreements prove to be insignificant, but preferential trade agreement positively impacts on FDI inflow.

Makoni (2018) analyze the effect of trade openness on foreign direct investment in African countries, considering nine African countries, for the period 2009–2016. The paper employed the pooled OLS, Least Squares Dummy Variable (LSDV), Fixed Effects (FE) model, Random Effects (RE) model, Generalized Method of Moments (GMM) model, and the Generalized Least Squares (GLS). According to the results of the random effects model, foreign direct investment was positively related with trade openness.

Wickramarachchi (2019) try to identify the key determinants of FDI inflows in Sri Lanka during the period from 1970 to 2014. The paper was conducted based on a supply and demand framework using ARDL method. The results revealed that trade openness and real wage index did not have any significant relationship with FDI inflow in Sri Lanka.

Based on the literature review, the paper attempt to fill the following gap. Firstly, research studies on trade liberalization are few, specifically studies that examine these selected countries which are believed to have made some break through on FDI inflow in recent years. Secondly, these countries were given special concerned because they represent different sub-regions in Africa and are considered as the major economic powers of these sub-region. South Africa to represent Southern Africa, Morocco to represent north Africa, Kenya to represent East and Nigeria to represent West Africa

3.0 Methodology

3.1 Sources of Data

To be able to estimate the link between trade and FDI in Africa. Secondary data were used in the paper. Foreign direct investment (FDI) which is the dependent variables was retrieved from the World Bank Development indicators and trade openness (TOP), real GDP, money supply and government expenditure are the explanatory variable of used in the paper. All of which were also source from World Bank. The resulting database runs for the years 1981-2021 with annual frequency for five countries i.e Nigeria, Ghana, South Africa, Kenya and Morocco.

3.2 Model specification

As established in the literature and the theoretical literature, the relationship between FDI and trade liberalization can be examine using the model specified below. The equation to be estimated is similar to the one specified and estimated by Chiatchua and Pegou (2020), the adopted model is as below;

$$\log FDI_{it} = \beta_0 + \beta_1 GDPG_{it} + \beta_2 \log INF_{it} + \beta_3 WAGA_{it} + \beta_3 \log TEL_{it} + \beta_4 OP_{it} + \beta_5 COR_{it} + \beta_6 TAX_{it} + \mu_{it} \quad (1)$$

Where:

FDI is FDI net inflows, GDPG denotes growth rate of per capita GDP, which is a proxy for market size; INF denotes the rate of inflation; logTEL shows the percentage of

Mobile cellular subscription; while logWAGA is a proxy for yearly wage; OP is a proxy for the degree of openness, COR the exposure to administrative bottleneck and corruption, TAX denotes taxes on income, profits and capital gains.

This model is modified to include other important variables in the model. The new model to be specified is given below.

$$\log FDI_{it} = \beta_0 + \beta_1 TOP_{it} + \beta_2 \log RGDP_{it} + \beta_3 \log MS_{it} + \beta_4 GE_{it} + \mu_{it} \quad (2)$$

In the above equation, βi is the intercept or slope of the coefficients logFDI, logTOP, logRGDP, logMS and logGE denotes the logarithms of foreign direct investment, trade openness, realGDP and government expenditure respectively. The logarithmic transformation of any variable is to transform it into a dataset that is more normalized so as to control or minimize the problems of heteroscedasticity. log denotes natural log operator, while μ_t represents white noise error term, and β is the parameter, t denotes time period, i represents the country subscript (i = 1, …,5) and (t = 1981, …, 2021).

3.3 Estimation Procedures

3.3.1 Pre-estimation Test

3.3.2 Panel Unit Root Test.

3.3.3 Levin, Lin and Chu (LLC) test

The first-generation panel unit root test was coined by Levin and Lin in 1992 and published in a working paper in 2002 with Chu as co-author. The test relies on the t-statistics estimated and is powerful compare to when individual observation unit root is estimated as β is homogenous

across all regions of the panel (Levin et al., 2002). The LLC test is an extension of the Dickey Fuller/Augmented Dickey Fuller unit root test. The test is express in the following equation;

$$\Delta z_{i,t} = \phi_i + \beta_{iyi,t-1} + \sum_{k=1}^{n} k_i \Delta y_{i,t-k} + \varepsilon_{it} \quad (3)$$

Where, Δ represent the first difference operator, Zit is the individual country, t is the time period and is given as t = 1, 2, 3,…T

The null and the alternative hypothesis are as follows

$H_0 : \beta_1 = 0$ for all countries i

$H_1 : \beta_1 < 0$ for all countries, i

Hence the null for this test is that all series are nonstationary and for the alternative all series are stationary.

3.3.4 Im Pesaran and Shin (IPS, 2003) Test

This was presented by IPS to solve the problem of serial correlation by assuming heterogeneity between units in panel that are dynamic. The basic equation for the IPS panel unit root test is given as follows:

The hypotheses are given as:

$$\Delta Y_{i,t} = \pi_i + \beta_i Y_{i,t-1} + \sum_{k=1}^{n} k_i \Delta y_{i,t-k} + \alpha_{it} + \varepsilon_{it} \quad (4)$$

$H_0 : \lambda_1 = 0\ \beta_i$ for all i

$H_0 : \lambda_1 < 0\ \beta_i$ for at least one i

The null hypotheses of this test is that all series are not stationary while the alter hypothesis is that all series are stationary where i = 1,2…N which is the entity t = 1,2…N which stand for the period. Δ is the difference operator Y is a variable, β, α, π are coefficients and μ is the error term. The IPS test apply individual unit root in each cross section.

3.3.5 Panel Autoregressive Distributed Lag (PARDL).

This symmetric modelling is presented according to the Pesaran et al. (1996) and Pesaran et al. (2001). We estimate the symmetric panel ARDL to determine the linear impact of trade liberalization on foreign direct investment of the African economies. The linear panel ARDL representation is written as follows, as stated by Pesaran et al. (2001):

$$\begin{aligned}\Delta \log FDI_{it} = {} & \beta_{0i} + \beta_{1i} \log FDI_{i,t-1} + \beta_{2i} \log TOP_{i,t-1} + \beta_{3i} \log\log RGDP_{i,t-1} \\ & + \beta_{5i} \log MS_{i,t-1} + \beta_{5i} \log GE_{i,t-1} + \sum_{j=1}^{p1} \phi_{ij} \Delta FDI_{i,t-j} + \sum_{j=1}^{p3} \phi_{ij} \Delta \log TOP_{i,t-j} \\ & + \sum_{j=1}^{p4} \phi_{ij} \Delta \log RGDP_{i,t-j} + \sum_{j=1}^{p4} \phi_{ij} \Delta MS_{i,t-j} + \sum_{j=1}^{p4} \phi_{ij} \Delta \log GE_{i,t-j} + \mu_{it}\end{aligned} \quad (5)$$

Where Δ is the first difference operator and β0i is a constant, ϕij (s =1, 2, 3, 4) are the short-runcoefficients,βki (k =1,2,3,4) are the long-run coefficients and μit is an error term. The optimal lag orders on the first-differenced variables are selected based to the Schwarz information criterion (SIC) or the Akaike information criterion (AIC). The linear equation could be formulated to include an error correction term as follows:

$$\begin{aligned}\Delta FDI_{it} &= \beta_{0i} + \beta_{1i}\log FDI_{i,t-1} + \beta_{2i}\log TOP_{i,t-1} + \beta_{3i}\log\log RGDP_{i,t-1} \\ &+ \beta_{5i}\log MS_{i,t-1} + \beta_{5i}\log GE_{i,t-1} + \sum_{j=1}^{p1}\phi_{ij}\Delta FDI_{i,t-j}\beta_{0i} + \sum_{j=1}^{p1}\phi_{ij}\Delta TOP_{i,t-j} \\ &+ \sum_{j=1}^{p3}\phi_{ij}\Delta RGDP_{i,t-j} + \sum_{j=1}^{p4}\phi_{ij}\Delta MS_{i,t-j} + \sum_{j=1}^{p3}\phi_{ij}\Delta\log GE_{i,t-j} + \lambda_i ECT_{i,t} + \mu_{it}\end{aligned} \quad (6)$$

where the $ECT_{i,-j}$ denotes the symmetric error correction term for each unit derived from the long-run relationship. The parameter λi measures the error-correcting speed of adjustment of the model to long run equilibrium for each unit derived.

3.3.6 Post-estimation Test

3.3.7 Cross sectional Dependence (CSD)

This occurs when the error term of one cross-section affects the error term of another cross-section. This is cause by the estimation bias of the estimation bias of the coefficients. When the model's coefficients are supposed to be heterogeneous but are estimated as homogeneous or vice versa, this would result into cross-sectional dependence. Breusch-Pagan LM test is used to check CSD. The null hypothesis of no CSD is that one cross section's error term does not affect another cross-section error term. Hence, the null hypothesis should be rejected if the value of probability from the CSD test result is less than five percent.

3.3.8 Serial correlation

Serial correlation occurs when the error term of one period is influencing the error term of another period. It is a feature of data that portrays the similarity among the same variables' values over successive intervals of time. Panel model should be free of autocorrelation to avoid the standard error being biased, which makes the result less efficient. The error terms should not be correlated over time. Durbin Watson test is used to check for serial correlation. The null hypothesis of no serial correlation is that the error terms are not correlated over time. Thus, the null hypothesis is rejected if the value of t statistics from the serial correlation test result is less than 1.5 and greater than 2.5.

3.3.9 Heteroscedasticity

Heteroscedasticity occurs when the error terms have no constant variance. The absence of homoscedasticity implies that the vector or sequence's random variables do not have the same finite variance. The test of heteroscedasticity is conducted to examine the difference between the restricted and unrestricted model. This is because the presence of heteroscedasticity tends to invalidate tests of statistical significance. Breusch-Pagan test is always used to check for heteroscedasticity. The null hypothesis of homoscedasticity is that the error terms have constant variance. Accordingly, the null hypothesis should be rejected if the probability value from the heteroskedasticity test result is less than five percent.

3.4 Definition and Measurement of Variables

The definitions and measurement of the variables are based on IMF's International Financial Statistics definitions and estimates, and the World Bank's World Governance Indicators and World Development Indicators.

Description of Variables and Their Measurement

Variables name	Abbreviation	Explanation	Measurement	Source
Foreign Direct Investment	FDI	Net inflows of investments for acquiring a lasting managerial interest in an investment operating in a different other than that of the investor	In million USD	WDI
Trade Openness	TOP	It is the ratio of the sum of import and export to GDP.	Percentage of GDP	
Real Gross Domestic Product	RGDP	Annual change in the total value of all final goods and services produced in the country, adjusted for inflation	In million USD	WDI
Broad Money Supply	MS	Measure of the quantity of money consisting of M1, plus savings & small-time deposits, overnight commercial bank deposits, plus non-institutional money market accounts	In million USD	WDI
Government final consumption expenditure	GE	All government current expenditures for purchases of goods and services	In million USD	WDI

Source: Authors compilation

4.0 Result and Discussion

4.1 Panel Unit Root Test

To proceed with the panel ARDL estimation, it is advisable to test the stationarity of the variables included in this paper by employing the Levin, Lin and Chu (LLC) test and Im Pesaran and Shin (IPS) Panel unit root test. The result for these tests is reported on table 4.1. According to the LLC test results, logGDP logFDI, and logGE are stationary at level (I0) while TOP, MS, are stationary after first difference. However, under the IPS test only EXR is stationary at first difference whereas, FDI, logGE, MS, logGDP, TOP, logDI are all stationary at level. Since the variables employed are of different order, the panel ARDL has therefore become valid.

Table 4.1 Panel Unit Root Test

Variables	**LLC**		**IPS**		
	Intercept	Intercept + Trend	Intercept	Intercept + Trend	Order of the variables
			At Level		
logFDI	-4.1483 (0.005)***	-5.7064 (0.0217)**	2.1184 (0.0716)*	-3.8582 (0.0000)***	I(0)
TOP	-4.1975	-5.2256	-1.4899	-2.4833	I(1)

	(0.0586)*	(0.1353)	(0.0681)	(0.0765)	
logGDP	-0.4710	-5.7583	-4.3218	-1.8990	I(0)
	(0.8340)	(0.0661)**	(1.0000)	(0.0288)**	
logMS	-1.6222	-5.0258	1.3159	-1.8920	I(1)
	(0.4612)	(0.2688)	(0.9059)	(0.0792)	
logGE	-0.9656	-6.2521	3.6647	-1.8714	I(0)
	(0.6043)	(0.0208)**	(0.9999)	(0.0306)**	
			At First Difference		
logLFDI	-12.3873	-12.5249	-8.8836	-8.7761	I(1)
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	
TOP	-12.4903	-12.8847	-8.5897	-8.5244	I(1)
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	
logGDP	-9.2395	-9.3697	-6.8790	-6.6637	I(1)
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	
MS	-10.3233	-10.3938	-8.0705	-8.0945	I(1)
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	
logGE	-10.1722	-10.2227	-6.9122	-6.8493	I(1)
	(0.0000)***	(0.0000)***	(0.0000)***	(0.0000)***	

Source: Researcher`s computation using Stata software 15 (2023). ***, ** and * indicate significance at 1%, 5% and 10% level respectively

4.2 Lag selection Criteria

To estimate the Panel Autoregressive Distributed Lag (p,q,q,q) econometric model, the paper first of all observed and estimate the optimal lag length. The Akaike information criterion (AIC) considered in this regard. The criteria states that the optimal model is the one with the smallest value of AIC. The Optimal lag selection after the estimation is therefore as follows; FDI 2, TOP 1, LogGDP 2, MS 1, and LogGE 1. Table 4.2 present the optimal lag selection order for AIC. As presented on the table ARDL (2 1 1 1 1) has the smallest value of AIC and therefore is the most appropriate model for this paper. The optimal lag selection is done to avoid serial correlation both in the stationary test and in the ARDL model.

Table 4.2 Lag Selection Criteria (AIC)

Variables	Optimum Lag
logFDI	2
TOP	1
logGDP	2
log MS	1
logGE	1

Source: Author`s computation using Stata software 15 (2023).

4.3 Panel Autoregressive Distributed Lag

After analysing the variables through the unit root test, it was discovered that, some variables are stationary at level while some are stationary after first difference. This satisfy the criteria for the use of Panel ARDL. The panel model was therefore employed to examine the impacts of Trade liberalization on the economic growth of African countries. The panel ARDL model shown in equation (3.3) and (3.4) was estimated using Pooled Mean Group (PMG) and Mean Group (MG) estimators to determine both the long-run and the short-run coefficients. As can be seen on table 4.9 below, the Hausman Test result indicated that, the null hypothesis is accepted based on the probability value of 5.53(0.2368) which is insignificant. This suggest

that the Pooled Mean Group (PMG) is more efficient and is more preferred above the Mean Group (MG) in this analysis. This paper therefore employed Pooled Mean Group (PMG) as the best technique of analysis.

On table 4.3, the coefficients of error correction term is negative and is statistically significant at 1% level of significant, this is in line with the theoretical expectation. This proved that there is a significant long-run relationship between log, FDI, TOP, logGDP MS and logGE in the selected African countries. The ECT value of -0.68 implies that the disequilibrium from the short-run is adjusted at the speed of 68% every year until the long-run equilibrium is achieved.

The ARDL-Pooled Mean Group estimator revealed that, the relationship between Trade liberalization and FDI is positive and statistically significant at 5% level of significance. Economic growth also shows a positive and statistically significant relationship with FDI. This is in conformity with the priori expectation of the paper. This means that trade liberalization and economic growth have a long-run impact on the foreign direct investment inflow into the selected African countries. According to the results, a 1% increase in trade openness will bring about 3.1% increase in inflow of foreign direct investment into the selected African countries and if there is 1% increase in economic growth of the selected African countries foreign direct investment inflow will increase by 5%. Money supply exhibits a positive but statistically insignificant relationship with foreign direct investment in the selected countries. Government Expenditure has a negative and significant relationship with FDI inflow.

Table 4.3 Panel Autoregressive Distributed Lag

Dependent Variable Foreign Direct Investment (FDI)				
	Pooled Mean Group (PMG)		Mean Group (MG)	
Independent Variables	Long-run coefficients	Short-run coefficients	Long-run coefficients	Short-run coefficients
TOP	0.0317 (0.031)**		0.0024 (0.916)	
logGDP	0.553 (0.002)***		0.2174 (0.910)	
logMS	0.0009 (0.934)		0.0419 (0.469)	
logGE	-1.0479 (0.041)**		0.0230 (0.989)	
ΔTOP		0.0091 (0.493)		0.0123 (0.565)
ΔlogGDP		-0.2033 (0.863)		-0.0234 (0.990)
ΔlogMS		0.0549 (0.003)***		0.0272 (0.137)
ΔlogGE		-0.0968 (0.820)		-0.1297 (0.903)
Ect		-0.6895 (0.000)***		-0.8792 (0.000)***

Hausman Test	5.53(0.2368)
No. of Observations	200
Number of Countries	5

Source: Author`s computation using Stata software 15 (2025). Figures in parenthesis are probability values together with the associated coefficients, ***, ** and * indicate significance at 1%, 5% and 10% level respectively.

4.4 Individual Short Run Result for Pooled Mean Group (PMG)

Table 4.4 present the short-run coefficients of the observed variables of the selected African countries by considering the specific attributes of these countries. As presented on the result, Trade openness as a measure of trade liberalization have a positive effect on foreign direct investment in Ghana and Morocco. However, this relationship is only significant in Ghana. which implies that a US$1 million change in trade value foreign direct investment will change US$0.06 million in Ghana.

On the other hand, Nigeria, South Africa and Kenya Trade liberalization have negative and statistically insignificant relationship with foreign direct investment. The result for economic growth and foreign direct investment in the short-run revealed a negative relationship in Nigeria, South Africa and Kenya While it is positive in Ghana and Morocco. However, all the relationship are statistically insignificant which means the relationship is not impacting the economies of the selected countries. Money supply has positive relationship with foreign direct investment in the short-run in all the selected African countries except Kenya which has a negative impact on foreign direct investment in the selected countries. The interpretation is that in Ghana for every 1% increase in trade openness, the economic growth of the country will increase by 6%. Money supply has a negative and significant relationship with economic growth in Ghana, Nigeria South Africa. However, the relationship is not significant.

For the pooled mean group PMG, none of the relationship is significant and therefore revalidate the result of the Hausman test which shws that PMG is the best estimator.

Table 4.4 Individual Short Run Result for Pooled Mean Group (PMG)

Dep. Var. FDI

Ghana	Nigeria	Morocco	South Africa	Kenya	
ΔTop	0.0604(0.033)**	-0.0147(0.404)	0.0091(0.804)	-0.0048(0.833)	-0.0039(0.918)
ΔlogGDP	3.9280(0.160)	-2.9082(0.216)	0.3708(0.931)	-1.9032(0.122)	-2.9113(0.898)
ΔlogMS	0.0332(0.719)	0.0061(0.881)	0.0688(0.153)	0.0924(0.271)	-0.5048(0.151)
ΔlogGE	-1.2942(0.302)	0.4413(0.819)	1.0942(0.789)	0.0478(0.929)	-0.7788(0.854)

Source: Author`s computation using Stata software 15 (2025). Figures in parenthesis are probability values together with the associated coefficients, ***, ** and * indicate significance at 1%, 5% and 10% level respectively.

4.5 Diagnostic Checks

The diagnostic test is utilized to examine the model's adequacy, tests such as cross-sectional dependency test (CSD), multicollinearity, and heteroscedasticity test. The literature offers a variety of cross-sectional dependency test. The paper applied one of the most current and

frequently used tests: Pesaran CD test. The result of the test indicated that there is no cross-sectional dependence among the observed variables as seen on table 4.4. Multicollinearity occurs due to high intercorrelation among the explanatory variables. It is usually present when two or more independent variables contain the same information at a point. And this tends to increase the variance of the regression. Multicollinearity can be detected via the variance inflator factor (VIF) test. If the value of the VIF is greater than ten it shows the presence of multicollinearity, however if the value of the VIF is less than ten, it indicates the absence of multicollinearity. Table 4.5 shows the individual values of the observed explanatory variables of the paper. This is therefore an evidence to prove that there is no multicollinearity among the independent variables. the results illustrate that the model is free from heteroscedasticity issues utilizing the Breusch-Pagan test, which reveals an insignificant value at 0.6611 Durbin Watson Test for Autocorrelation has also been estimated and it was found that the estimate is free from autocorrelation as shown by the value of of the Durbin Watson statistics 1.8260

Table 4.5 Diagnostic Tests

Tests	VIF	Prob.
logGDP	**5.50**	
MS	**2.46**	
logGE	**6.99**	
TOP	**1.63**	
Pesaran CSD Test	**0.789**	**(0.4299)**
Breusch Pagan test for Heteros.	**0.61**	**(0.6611)**
Durbin Watson *Test for Autocor.*	**1.8260**	

Source: Researcher`s computation using Stata software 15 (2023). Figures in parenthesis are probability values.

5.0 Conclusion and Recommendations

Given that some variables are integrated of order one I(1), while some variables are of order zero I(0), the paper decided to employ Panel ARDL technique which utilizes both the Pooled Mean Group (PMG) and the Mean Group (MG) estimators to examine both the long-run and the short-run association among the variables. Pooled Mean Group (PMG) was selected as the efficient estimator to estimate the model based on the result of the Hausman test.

The ARDL-Pooled Mean Group estimator revealed that, Trade openness as a measure of trade liberalization and Economic growth have a positive relationship with Foreign direct investment and these relationships are statistically significant at 5% level of significance. This is in conformity with the priori expectation of the paper. This means that trade liberalization and economic growth have a long-run impact on the foreign direct investment inflow into the selected African countries. This finding supports the findings of Neol (2022), Badamasi S. N. and Sule (2020) and Mohammed and Hayewa (2020) who found the same positive relationship for African countries. Similarly, an increase in economic growth of the selected Africa

countries foreign direct investment inflow will increase. Money supply exhibits a positive but statistically insignificant relationship with foreign direct investment in the selected countries.

The individual countries result shows that, trade openness as a measure of trade liberalization has a positive effect on foreign direct investment in Ghana and Morocco. However, this relationship is only significant in Ghana. Arising from the paper findings, the following recommendation were considered pertinent;

Firstly, African countries should vigorously pursue trade liberalization policy as a potent and deliberate effort to attract FDI inflows as this will create a positive impact on the economies of Africa. Secondly, African countries should diversify their economy by investing more in the non-oil sectors such as the agro-industrial sectors of the economy in order to boost the volume of their trade in the international market.

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