POLAC INTERNATIONAL JOURNAL OF ECONOMIC AND MGT SCIENCE (PIJEMS)
DEPARTMENT OF ECONOMICS AND MANAGEMENT SCIENCE
NIGERIA POLICE ACADEMY, WUDIL-KANO

CAPITAL INFLOWS AND INDUSTRIAL OUTPUT: THE ROLE OF TRADE OPENNESS IN SUB-SAHARAN AFRICA

Amaka Gladys Eje-Ojeka Department of Economics, Federal University of Lafia, Nigeria

Ambrose Attah Diemsan Department of Economics, Federal University of Lafia, Nigeria

Ilemona Adofu Department of Economics, Federal University of Lafia, Nigeria

Obadiah Jonathan Gimba Department of Economics, Federal University of Lafia, Nigeria

Abstract

The study investigates the effect of Capital inflows together with trade openness on Industrial output in Sub-Sahara African countries. This was done to test the Interactive technique called the modernization hypothesis in Sub-Sahara African countries. The study used secondary data spanning from 2002 to 2021 sourced from the World Development Indicators, and Fully Modified Ordinary Least Square (FMOLS) was employed to analyze the data. The Principal Components Analysis (PCA) technique was used to generate a single index that gives the measures of Capital inflows and Trade Openness. The empirical result showed that Trade openness and Active Labour have a positive and significance relationship with Industrial Output, Capital Inflows have positive but insignificance effect on Industrial Output. Similarly, when Trade Openness was interacted with Capital inflows, the result revealed a positive but non-significant effect on Industrial Output. And Institutional Adequacy has an inverse and significant effect on Industrial output. The study therefore concludes that, Trade Openness policy together with Inflows of capital enhances the effectiveness of industrial Output in Sub-Sahara African countries.

Keywords: Industrial Output, Trade Openness, Interactive model, FMOLS.

JEL Classification:

1. Introduction

While Latin American and Asian economies have been recipients of large inflows of foreign capital in the 1990s, Africa has been largely left out of this net flow of capital to developing economies. For example, African and Middle Eastern countries received less than 10 per cent of FDI flows to developing countries (United Nations, 2020). In the case of portfolio flows, Africa have received an even lower share of net flows to developing nations in 1996 it was 1.6 per cent. As a result, Africa continues to rely on Official Development Assistant (ODA) flows for the lion's share of capital inflows to close the domestic savings-investment gap.

Eradicating poverty and promoting employment through sustainable growth of industrial output production are among the fundamental goals of the United Nations' Sustainable Development Goals (SDGs) to be reached by 2030 (United Nations, 2020). In achieving the SDGs, foreign capital inflows (CF), trade openness (TRO) and the development of the industrial sector have been identified as one of the key strategic plans to be promoted in the SSA countries. The plan is to create employment, increase domestic savings, encourage foreign investment, export promotion and boost industrial output production through innovation and infrastructural development (Nurunnabi *et al.,* 2020). Unfortunately, over the last

two decades, the region experienced the worst economic performance on record when compared to other regions of the world. For example, the region is threatened with high levels of unemployment, poverty, sluggish output growth and challenges of diversifying their economies in achieving industrialization and export growth. The SSA region recorded its dawdling growth rate in 2015, the first time since 1998.

Trade openness refers to the outward and inward orientation of a given countries economy. Outward orientation refers to economies that take considerable advantage of the opportunities to trade with other countries whereas, inward orientation refers to economies that overlook taking or unable to take advantage of the opportunities to trade with other countries (Karen. 2015). The effect of trade is much-admired on that it increases competition and enhance efficiency. Trade openness is therefore assumed to be an engine of economic growth and industrialization and countries that liberalize their imports and orient production toward exports are assumed to experience faster growth than those Countries that do not, and a faster rate of opening provides greater prospects for development. According to Khobai and Moyo (2020), trade openness is a policy option that boosts productivity in the domestic economy by providing access to cheaper and improved technology, enhanced quality of inputs and managerial skills from overseas. Also, Adamu and Dogan (2017) opined that trade openness brings competition which promote efficiency in the domestic economy which benefit local consumers. Exporting firms in the domestic country may be able to take advantage of economies of scale brought about by the larger market (Adofu & Okwanya, (2017)).In the same vein, Gui-Diby and Renard (2015), Majumder (2019), Majumder *et al* (2022), and Opoku *et al* (2019) noted that FDI inflows also have the potential of bringing with it financial as well as knowledge assets needed by developing countries to improve their productivity. Bodman and Le (2013) asserted that FDI is one of the significant conduits of technology transfer and human capital development across borders needed for a country to industrialize.

According to IMF, GDP and export growth of SSA region decreased from 2.9% to 1.4%. The inability to diversify the economy, enhance trade liberalization and development of the critical sector (like the industrial sector) have been hypothesized to be one of the major reasons why the SSA region is experiencing such a low economic growth and performance. Moreover, IMF World Economic Outlook (2021) projection further revealed that the recovery rate in SSA region is likely to lag behind the rest of the world with an aggregate growth rate of 3.6% over the 2020–2025 periods as compared to the rest of the world which is put at 14%.

Industrial output cannot be sustained in the absence of requisite financial flows and favourable trade. Although, existing domestic resources can be efficiently used to attain industrial productivity, the gains from such productivity can only be sustained if there is continue and consistent financial flows from other countries. According to the World Bank (2000), low-income countries cannot provide enough finance for their domestic production and investment because of paucity of savings; hence, capital inflows become a necessary ingredient that will support domestic industrial output. The Bank states that under condition of low capital accumulation, “attaining rapid and sustained industrial output would depend on the provision of external financing, not only to compensate for the resource drain through terms of trade losses but also to supplement domestic savings.”

Raja and Zingales (2004) state that international trade generates competition for financial flows and capital which most times elicit reforms in countries’ financial systems so as to be able to compete internationally. Previous studies have shown that financial development is a necessity for economic growth (Levine, Loayza & Beck, 2000; King & Levine, 1993; Schumpeter, 1982). However, as important as the financial sector is, many SSA countries have weak and grossly uncompetitive financial market when placed side by side with other developed countries. According to World Bank (2022), the advent of COVID-19 caused capital flows to increase among countries in recent years. The bank

believes that if the economy of the world (and particularly, the developing countries) is to recover, well-articulated financial support must move from the rich to the poor countries. The Bank advocates what it called "a bold reform agenda that includes policies that create fiscal space, along with policies to speed up job creation." In the SSA, some countries like South Africa and Nigeria have since begun developing and implementing policies and reforms in different shapes to still stabilize their economies despite the biting effect of the pandemic. As of December 2021, according to the World Bank (2022), the COVID-19 crisis has triggered investment in energy, telecommunications and other infrastructures. Majority of these investments are made possible with financial assistance in form of capital flows.

Sub-Sahara African countries have recorded low performance in the industrial sector, and this may be due to the shocks in trade and FDI inflows. This is because Di Pace et al. (2020) expounded that developing countries may not benefit fully from their trade engagements and FDI inflows as they are very vulnerable to external shocks. Also, Davidson et al. (2010) argued that data of macroeconomic variables such as trade openness and FDI are generally non-stationary, that is a part at least of their movement each quarter is random. Accordingly, this feature makes industrialization long-term future considerably uncertain.

Aremo and Arambada (2021) posit that the controversy relating to the relationship between trade openness, financial development and industrial productivity is yet to be settled in the literature. Hence, there is no consensus agreement. Whereas some scholars believe that trade openness is the basis for financial development, others hold the view that the latter provides the basis for the former to thrive. Beyond the inconsistency argument, empirical studies on capital inflows and trade openness in SSA countries have largely concentrated on their determinants and effect on economic growth without paying much attention to capital inflows and industrial output, the role of trade openness. To the best of our knowledge, not much has been done in the literature to examine the combined effect of trade openness and capital inflows on industrial output in SSA. The study therefore tries to answer the following questions: What is the effect of capital inflows on industrial output in SSA? What is the effect of capital inflows together with trade openness in SSA. To answer the above questions, the study will therefore examine capital inflows and industrial output and the role of trade openness in sub-Saharan African countries. Specifically, the study seeks to; examine the effect of capital inflows on industrial output in SSA; to investigate capital inflows together with trade openness in SSA.

The rest of the study will organize as thus: Section 2 provides literature review, section 3 presents methodology. Section 4 provides result and discussion, while section 5 presents conclusion and recommendations.

2. Literature Review

2.1 Theoretical Framework

Global capital mobility occurs as a result of international allocation of assets by investors from countries with surplus capital for great returns. While Foreign Direct Investment (FDI), Official Development Assistance (ODA), and Debt are all forms of capital inflows, the significance of these inflows in emerging economies like Sub-Sahara African countries has been enormous. Some developed and developing economies has gained benefit in form of technology and knowledge through corporate capability enhancement and individual from the spill-over effect of FDI, ODA, and Debt (Saibu, 2014). It is obvious that FDI is heavily channeled to the developed and developing countries, but evidence reveals that the developing-enhancing effects of FDI are felt more in the developing economies such as Africans economies. However, the developing economies have been experiencing low capital inflows Saibu (2014). To this end, the study seeks to examine the effect of Capital inflows together with trade openness on Industrial output in Sub-Sahara

African countries. The scope of the study covered the period of 2002 to 2021. This empirical study is based on secondary data; data on capital inflows, industrial output, and trade openness were sourced from the World Development Indicators (WDI). And data on institutional adequacy was obtained from World Governance Indicators (WGI) of the World Bank database.

Theoretically, to account for the Industrial Output as influenced by capital inflows in Sub-Sahara African countries, the study adapted the Ak model propounded by Rebelo (1991) as adapted by Saibu (2014) in investigating the effects of capital inflows on economic growth. The Sub-Sahara African countries just like other developing countries also rely heavily on capital inflows for growth. The AK model states that output is a function of total productivity and capital stock:

Thus:

$$Y = AK \qquad (1)$$

Where Y denotes total output, A is the total factor productivity and K represents the capital.

Following Saibu (2014), the supply of labour is assumed to be excess, and the quantity and quality of capital determines production. In reality the productive sector does not have access to all the capital mobilized as part of the capital is also consumed by the financial system because the financial system is the intermediating units. The efficiency of the financial intermediation (Ø) determines the amount of investable capital since part of the mobilized investible savings (1-Ø; $0 < Ø < 1$) which is the cost of financial intermediation per unit of savings is consumed by the financial system. This means that the fraction (Ø) is the only total domestic savings that is available for investment, (Saibu, 2014). Therefore, the economic growth rate in the long run is expressed as a function of total factor productivity, efficiency of financial intermediation and the saving rate.

$$g = A\left[\frac{I}{Y}\right] - \delta = ØS - \delta \qquad (2)$$

where g denotes the output growth, A represent the factor productivity, I is change in capital and Y is output, δ denote the rate of depreciation, and Ø represent the proportion of saving that is converted to investment and *S* denote the gross savings rate. From equation (2) $ØS_t = I_t$ which indicates a closed economy. According to Bailliu (2000), the presence of Net Capital Flows (NCF) makes available larger savings for investment more than when there is absence of net capital flows (NCF). Then the equilibrium in the capital market will be:

$$Ø * (S_t + NCF_t) = I_t \qquad (3)$$

The inclusion of capital inflows in equation (2) transforms the equation to a small open economy as seen in equation (3). Here the model assumes there is foreign investment in form of foreign donors, grant, and aids in the economy to aid deficiency in domestic savings. With this, economic growth rate in the long run becomes:

$$g^* = A^* \frac{I^*}{Y} - \delta = A^* Ø^*\left[\frac{S+NCF}{Y}\right] - \delta = A^* Ø * (S+ncf)^* - \delta \qquad (4)$$

Equation (4) indicates that in the long run, inflows of capital influence growth in a small open economy. Saibu (2014) stated that Trade policy aids the flow of capital through trade. And that total trade consists of both capital goods and consumer goods; hence developing countries overcome some domestic resources constraint through the help of trade liberalization that allows capital goods.

2.2 Empirical Review

Akorsu and Okyere (2023) examined the asymmetric effect of trade openness and FDI on industrialization in Ghana. In achieving this, contemporary time series approaches, involving Autoregressive Distributed Lag (ARDL) and Non- Linear Autoregressive Distributed Lag (NARDL) approaches to cointegration, were used to analyze the time series data from 1983 to 2019. The results revealed that in both the long- and short-run, the positive shocks in trade openness have no effect on industrialization and the negative shocks in trade openness cause industrialization to fall. Regarding FDI, the positive shocks in FDI exert positive effect on industrialization in both the long- and short-run, but the negative shocks exert no effect on industrialization in the long-run, however, a positive effect on

industrialization in the short-run. Findings from the study imply that trade openness in both the long- and short-run is detrimental to industrial progress in Ghana. Also, FDI is much needed for Ghana to industrialize her country.

Nyinawumuntu, Makala, and Han (2022) investigated the impact of trade openness on domestic investment in selected Sub-Saharan African countries. The study uses panel data of 19 African countries covering the study period 1980-2020. This research uses as a baseline model the pooled Ordinary Least Square (OLS) and fixed effects (FE) with robust standards errors and assuming an AR(1) disturbances. Further, we estimated the fixed effects with country specific effects assuming AR(1) disturbances and adjusted for autocorrelation, and finally, we used the random effects with instrumental variables and the Generalized Method of Moments (GMM) to deal with endogeneity issues in our data. The empirical findings give evidence of a positive impact of trade openness on domestic investment in Africa. Regarding our control variables, the research concludes on the one hand, that the weak development of the credit sector in Africa does not encourage domestic investment and on the other hand, it is argued that the size of population does not improve the domestic investment in Africa.

Agyei and Idan (2022) assessed the moderating role of institutions in the trade openness and inclusive growth nexus in Sub-Saharan Africa (SSA). Based on the System General Method of Moment estimation technique applied to data from 39 SSA countries from 1996 to 2017, the results offer support for the assertion that institutions strengthen the positive relationship between trade openness and inclusive growth in SSA. Thus, the study recommends that SSA economies should pursue policies aimed at improving government effectiveness, reducing corruption, enhancing regulatory quality, abiding by the rule of law, and allowing voice and accountability. The environment of responsible institutions, transparent business, protected civil liberty, respected political rights, control of corruption, and political stability promote the expansion of international trade by reducing transactional costs and risks related to trading.

Nthangu and Bokana (2022) examined 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) between 1985 and 2018. The study employed random effects and fixed effects models to estimate the coefficients. However, the results from the two models portray similar behaviors. Both estimates revealed a significant relationship between output performance and the independent variables. This suggests that the macroeconomic variables examined are good explanatory variables for analyzing the determinants of output performance and national productivity in the SSA region. The study further found that foreign capital inflows, trade openness and inflation rate have a positive and significant influence on output performance and national productivity. In contrast, exchange rate and interest rate exhibited a negative and significant relationship with such output performance. This result implies that policymakers in SSA countries must formulate policies that can successfully ensure trade openness and promote foreign capital inflows so as to stimulate national productivity and boost output performance in the region. Therefore, it can be concluded that foreign capital inflows and trade openness affect the industrial sector in contributing to output performance and national productivity in the SSA countries.

Aremo and Arambada (2021) study the individual and combined effects of trade openness and financial development on the economic growth of sub-Saharan African (SSA) countries between 1980 and 2017. The study splits the selected countries into low- and middle-income countries and used the panel dynamic GMM to analyze the countries data and finds that in the low-income countries, trade openness positively impacts on economic growth while financial development does not. In the middle-income countries, trade openness has mixed effect on economic growth.

Mugun (2021) investigated the effect of trade openness on economic growth in Sub-Saharan Africa. Control variables used in the regression included oversees development assistance, population growth rate, domestic credit and foreign direct investment. Trade openness, inflation and capital stock were explanatory variables and economic growth the dependent variable. This study was modeled using the Neoclassical Growth theory. One- step difference Generalized Method of Moments results revealed that trade openness had a positive and significant effect on economic growth, capital stock positive and insignificant relationship, while inflation had positive and insignificant relationship with economic growth in SSA.

Thi-Thuy and Trong (2021) investigated the effect of openness (financial and trade) on the financial development of selected 64 developing countries from 2003 to 2017 using a Bayesian averaging modeling technique. Due to some elements of uncertainty in the data collected, the study finds that trade openness contributes reasonably to financial development in developing countries, especially in countries with relatively better institutional frameworks. Similarly, the finding of Thi-Thuy and Trong (2021) reveals that good institutional environment is indispensable for developing countries to achieve financial development.

Kong, Peng, Ni, Jiang and Wang (2021) examine how trade openness affects the Chinese economic growth quality under fluctuating exchange rate system. Using the ARDL technique, the study discovers that trade openness positively influences economic growth quality in the long and short runs. Although, the effect is different across regions due to thresholds.

Wajda-Lichy, Kawa, Fijorekand, Denkowska (2020) investigated the effect of trade openness on the financial development of eleven European Union member countries using Granger causality bootstrap modeling. The authors find that finance-trade effects are country-specific; significant causal relationship exists between trade openness and financial development in 8 EU countries. The effect is chiefly inverse. Financial development on the other hand, Granger caused trade openness in 6 EU countries during the period out of which their regression coefficients are positive. Bandura (2020) investigated the connection among trade openness, institutions, and financial development of 26 SSA countries from 1982 to 2016 using the GMM method. The study finds that trade openness significantly impacts on financial development during the period under consideration. However, there exist a weak but positive relationship between institutions and financial developments. The combined effect of trade openness and institutions on financial development is however not significant enough to warrant much inference.

Salama and Moza (2019) examined trade openness and economic growth impact in Tanzania for the period 1981 to 2017. The study utilized cointegration and vector error-correction mechanism (VECM) approach to test the relationship between trade openness and economic growth and granger causality test to examine the casual relationship between the variables. Unit root tests showed that the variables were integrated after taking first difference, the Johansen co-integration result showed that the variables were co-integrated. The VECM estimate showed that there is positive long run relationship between trade openness and economic growth in Tanzania over the study period, this positive result of trade openness is possibly attributable to the fact that Tanzania unlocked its borders to international traders. In addition, granger causality test revealed that there is no causal relationship between trade openness and economic growth in Tanzania. Based on this finding the study recommended that government should encourage the production of domestic product for export purpose by developing more domestic industries and attract more investors in the economy.

Nyang'oro (2017) assessed how capital flows affect the economic growth of 26 sub-Saharan Africa countries between 1980 and 2011 by employing the GMM to analyze the effect of capital inflows (private equity, debt flows and portfolio equity) on the gross domestic product of the selected countries. The study finds that while private equity and debt, negatively affect

economic growth, portfolio equity positively affects economic growth in the countries. This is attributable to the prevalence of low financial integration in the countries. The combination of gross and net capital inflows negatively affects economic growth. However, the effect of gross capital flows volatility and net capital inflow volatility are both positive on economic growth. This study is relevant to our present study because its findings support the believe that issues relating to capital inflows could be resolved by improving financial markets and promoting strong domestic financial institutions.

Saibu (2014) examined the effects of capital inflow on economic growth and also investigated the role of trade openness in foreign capital inflow/growth nexus in Nigeria. The paper adopted the Principal Component Analysis (PCA) technique to generate a single index for capital inflow and trade openness. Distributed Lag (ARDL) bound testing methodology was used to analyze the time data. The result showed that the interaction between capital inflow and trade openness had significant impact on growth, thus this study provides empirical support for the modernization hypothesis that capital inflow and trade policy are complementary and growth enhancing. The study therefore concluded that trade liberalization policies enhance the effectiveness of capital inflow and promote higher economic growth in Nigeria.

Eris and Ulasan (2013) use the Bayesian averaging technique (model) to investigate how trade openness affects growth and financial development. The study does not find any empirical evidence in their study that supports long-run relationship between the variables.
Empirically, not much has been done to validate capital inflows and industrial output relationship in Sub-Sahara African countries. Most studies focused on industrial performance and exchange rate volatility in some other African countries, some focused on Capital inflows and economic growth, as well as foreign capital inflows and human capital development, the work of Adekunle et al (2020), Oloke et al (2022), and Saibu (2014) will attest to this. The effect of trade openness and its interaction with capital inflows on industrial output in Sub-Sahara African countries and the introduction of Institutional adequacy as a control variable in the model has been scantily studied. Also, some studies used Principal Components Analysis (PCA) to generate a single and unique index, but as at the time of this research, to the best of the researchers' knowledge it has not been applied to the analysis of capital inflow and industrial output nexus in Sub-Sahara African countries. Minović, Stevanović, and Aleksić (2021) used PCA to generate an index for institutional quality. Saibu (2014) used PCA to create an index for capital inflows. Creane et al. (2003), Gries et al. (2009) Abdul Jalil et al. (2010) and Gounder (2012) used it to build a single measure of financial market development. While Alesina and Perotti (1996) adopted PCA method to create a measure of political instability. Sanchez-Robles (1998), Calderon and Poggio (2010) employed it to build an aggregate index for infrastructure.

3. Methodology

3.1 Model Specification

In setting up the model for this study, the works of Saibu (2014), and Oloke *et al* (2022) were adopted with modification. Excluding the variables that are not relevant in this study, the variables of interest used in this study are Industrial Output (IND), Active Labour Force (AL) Capital inflows (CF). Since trade opens economy for competition, create room for new technology, and also improve managerial skills, Trade Openness (TRO) is incorporated into the model and Institutional Adequacy which also aid trade is also introduced into the model as a control variable. Also, interactive technique was employed to show the interactiveness among the explanatory variables, Trade Openness and Capital Inflows.

The model is stated functionally as follows:

$$IND = F(AL, TRO, CF, IA, TRO*CF) \quad (5)$$

And mathematically, the model is stated as:

$$\log IND + \alpha 0 + \beta_{1i} \log Al_{it} + \beta_{2i} \log TRO_{it} + \beta_{3i} CF + \beta_{4i} IA_{it} + \beta_{5i} TRO * CF_{it} + \varepsilon_{it} \quad (6)$$

Where, IND is Industrial output, AL is Active labour which represents the working population in the economy measured as share of active labour force. TRO is Trade Openness, CF is Capital Inflows, and IA is the Institutional Adequacy. TRO*CF is the interaction between Trade Openness and Capital Inflows. α_o is the intercept, β_1 *to* β_4 are the regression parameters to be estimated, while $\mathscr{E}$ is the white noise error term, t shows the time parameters of the model and i shows the individual country. Furthermore, it is expected that all the parameters should have positive sign, that is, the independent variables should have positive effect on industrial output.

This study adopted the PCA techniques to generate an index that captures adequately the measure of Capital Inflows, Trade Openness and Institutional Adequacy. The PCA helps to generate a smaller number of uncorrelated variables which is called Principal Components from correlated variables without losing the original variability of the data set. While capital inflows will be analyzed by variables that have equity-like features which are FDI, and external debt, and Official Development Assistance. And Institutional Adequacy (IA) will be analyzed by the Control of Corruption (CC), Political Stability (PS), and Rule of Law (RL) indicators.

Table 1: Variable Description

Abbreviation	Variable	Measured as	Source
LogIND	Indusrtial Output in Sub-Sahara Africa	Industry Value Added	World Development Indicators (WDI), 2022.
LogAL	Active force	Total Labour Force	World Development Indicators (WDI), 2022.
TRO	Trade Openness		World Development Indicators (WDI), 2022.
CF	Capital Inflows	FDI, EXD, ODA using PCA technique.	World Development Indicators (WDI), 2022.
IA	Institutional Adequacy	CC, PS, RL using PCA technique.	Worldwide Governance Indicators (WGI) of the World Bank Database (WDI), 2022.

Source: Authors (2023)

IND is measured as Industry added value, AL is measured as total labour force, and TRO is measured as the ratio of imports plus export and gross domestic product. Capital Inflows is proxied by Foreign Direct Investment (FDI) which is measured as percentage of GDP net inflows, External Debt (EXD) which is measured as a percentage of Gross national Income (GNI), Official Development (ODA), and Institutional Adequacy (IA) is proxied by Control of Corruption(CC), Political Stability (PS), and Rule of Law (RL) which were measured as an estimates of governance and it ranges from -2.5 indicating a weak governance performance to 2.5 indicating strong governance performance. In the model, Industrial output, active labour, and trade openness were logged to harmonize the values of the variables.

4. Result and Discussions

Table 2: Descriptive Statistics Result

Stat	LOGIND	LOGAL	LOGTRO	CF	IA
Mean	3.599	15.141	4.063	-0.119	-0.145
Median	3.083	15.748	4.049	-0.050	-0.393
Maximum	14.634	17.992	5.055	4.723	2.959
Minimum	2.223	3.094	2.794	-3.388	-2.646
Std. Dev.	2.384	2.664	0.355	0.679	1.365
Skewness	4.219	-3.317	0.131	0.091	0.278
Kurtosis	19.251	14.392	3.297	15.161	2.093
Jarque-Bera	6147.359	3185.880	2.886	2711.985	20.735
Probability	0.000	0.000	0.236	0.000	0.000
Observations	440.000	440.000	440.000	440.000	440.000

Source: Authors (2023).

The table shows the descriptive statistics of the dataset. This was conducted to determine if the variables are normally distributed or not. Looking at the mean and the median of each variable, they are in close range. For Industrial Output (IND), Active Labour (AL) and Trade Openness (TRO), their mean are greater than their standard deviation, this shows that these variables are dispersed from the mean moderately. But Capital Inflows (CF) and Institutional Adequacy (IA) have mean values that are lower than their standard deviations. This is because the data has negative values.Trade Openness, Capital inflows and Institutional Adequacyhave a normal skewness of zero (0) which indicates that the distributions are asymentric around its mean that is they are normally distributed. While Industrial Output has a positive skewness, this implies that the distribution has a long right-tail with mhigher vales than the sample mean. But active labour has a negative skewness which indicates a long left-tail with more values lower than the sample mean.

4.2 Correlation Analysis

Table 3: Correlation Result

VARIABLES	LOGIND	LOGAL	LOGTRO	CF	IA	TRO_CF
LOGIND	1.000					
LOGAL	-0.881	1.000				
LOGTRO	0.098	-0.017	1.000			
CF	-0.067	0.057	-0.024	1.000		
IA	-0.129	0.094	-0.187	0.051	1.000	
TRO_CF	-0.024	-0.012	-0.082	0.945	0.039	1.000

Source: Authors (2023).

Table 3 shows the correlation analysis using data from 22 Sub-Sahara African countries. This is conducted to check if the variables are free from multicollinearity problem. This analysis reveals not only the association between variables but also the degree of such association. It shows the interdependencies between the explanatory variables. It is evidenced from the result that most of the correlation pairs are considerably low and would not result to multicollinearity in this study.

4.3 Cross-sectional Dependence Test

Table 4: Cross-sectional Dependence Result

Variables	Breusch-Pagan LM	Pesaran scaled LM	Bias-corrected scaled LM	Pesaran CD
Logind	1175.10***	43.96***	43.38***	-0.79
	0.000	0.000	0.000	0.427
Logal	4255.35***	187.23***	186.65***	56.02***9
	0.000	0.000	0.000	0.000
Logtro	975.38***	34.63***	34.05***	3.31***
	0.000	0.000	0.000	0.001
Cf	1257.34***	47.75***	47.17***	14.23***
	0.000	0.000	0.000	0.000
Ia	1367.29***	52.87***	52.29***	-0.94
	0.000	0.000	0.000	0.345

Note: The Null hypotheses for cross-section dependence test is that there is no cross-section in the procedure.*** means the Null hypotheses is rejected at 5% level of significant. Source: Authors (2023).

Table 4 shows the Bruesch-Pagan LM, Pesaran scaled LM, Bias-corrected Scaled LM, and Pesaran CD (2021) Cross-Section Dependence Test. The Cross-Section Dependence Testis used to ascertain whether a common factor is driving a macroeconomic variable in one Cross-Sectional unit and also driving same macroeconomic variable in another Cross-Sectional unit, due to globalization. From the result, it is evidenced that there is Cross-Sectional Dependence among the selected Sub-Saraha African countries as the probability values are less than the level of significance. This implies that a shock in any of these countries will also affect other countries within the region. Moreso, the existence of Cross-Sectional Dependence will influence the choice of the unit root test to be applied in this study.

Table 5.Panel Unit Root Test Using Levin, Lin & ChuTest

LEVIN, LIN, &CHU UNIT ROOT TEST.

Variables	Level	Probability	1st Difference	Probability	Remarks
Logind	-4.478	0.000	-	-	I (0)
Logal	-2.678	0.004	-	-	I (0)
Logtro	-2.394	0.008	-	-	I (0)
CF	-4.385	0.000	-	-	I (0)
IA	-1.313	0.095	-7.181	0.000	I (1)

The null hypothesis is rejected at 5% significance level. Source: Authors (2023).

The use of unit root test is used to determine the stationarity property of the data is important in empirical research. This is so because using non-stationary data in any analysis may lead to a spurious result as most these variables are trending in nature. It is on this note that this study employed the Levin, Lin, and Chu and Augmented Dickey-Fuller (ADF) test to determine the stationarity of the variables. From the result, it can be seen that Industrial Output (IND), Active labour (AL), Trade Openness (TRO) and Capital Inflows are stationary at level, while Institutional Adequacy is Stationary at first differencing. This means that the data used in this study have the combination of I (0) and I (1) variables The existence of cross-sectional dependence across the units necessitates the use Panel Cointegration Test to check if there is a longrun

relationship between the dependent variable and independent variables.

Table 6: Johausen Fisher Panel cointegration Test (Long-run Relationship)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-4.335	1.000	-4.995	1.000
Panel rho-Statistic	3.858	1.000	4.972	1.000
Panel PP-Statistic	-5.146**	0.000	-3.291**	0.001
Panel ADF-Statistic	-6.969**	0.000	-6.324**	0.000
Group rho-Statistic	6.156	1.000		
Group PP-Statistic	-2.864**	0.002		
Group ADF-Statistic	-4.810**	0.000		

Note: the null hypothesis is that there is no cointegration. ** implies statistical significance a 5% level. Source: Authors (2023).

Table 6 reveals the long run relationship between the variables. In all, there are 7 tests and 11 test statistics. It is noticed that the probability values are less than 5% in 6 out of the 11 tests. With the mixed results, our decision can be based on the verdict of the majority and the null hypothesis is rejected. Therefore, the evidence is sufficient to say that there is a long run relationship among the dependent variable and the independent variables. It further shows that Active Labour, Capital Inflows, Trade Openness, and Institutional Adequacy have a long run effect on the Industrial Output of the selected Sub-Sahara African countries.

Table 7: Estimated Result of the Relationship between Dependent and the Independent Variables

Dependent Variable: LOGIND Method: Fully Modified Ordinary Least Square (FMOLS)			
Variables	Coef.	t-Stat.	Prob.
LOGAL	0.184***	13.610	0.000
LOGTRO	0.181***	4.516	0.000
CF	0.007	0.045	0.964
IA	-0.086***	-3.342	0.001
TRO_CF	0.002	0.900	0.369
R-Squared	0.594		

Source: authors (2023). *** indicates significance at 5%.

Table 7 shows the estimated result of the relationship between industrial Output and AL, TRO, CF, IA and the in interactive variables. IA did not follow the a priori expectation. The R-Squared shows that 59% of the variation in Industrial Output is explained by the independent variables in the model. Although, CF has a positive but insignificant relationship with IND, but AL and TRO have a prominent positive relationship with IND. While IA has significance but an inverse relationship with IND. Moreso, the interactive variables are seen to have insignificance positive relationship with IND in Sub-Sahara African Countries.

In a nutshell, the positive but insignificant relationship that exist between Industrial Output and Capital Inflows revealed that the components of Capital inflows which is FDI, EXD, and ODA, may likely spur up Industrial Output in Sub-Sahara African countries but the effect is not significance. The reason for this result may be caused by the inability of the appropriate institutions or

entity to direct these inflows towards industrial development.

5. Conclusion and Recommendations

The study focuses on the effect of inflows of capital together with trade openness on Industrial output in Sub-Sahara African countries spanning from 2002 to 2021. The study used annual data for 22 SSA countries sourced from the World Development Indicators (WDI) and FMOLS was employed to analyze the data. From the empirical result, Capital Inflows have positive but insignificance effect on Industrial Output. Although, individual components of capital inflows might have caused this insignificance, active Labour and Trade Openness have positive and significance relationship with Industrial Output. The components of Trade Openness might have a contrary effect as reported by earlier studies.

The interaction between Trade Openness and Capital Inflows shows a positive effect on Industrial Output though non-significant. The positive effect shows that they complement each other and provide support for the modernization hypothesis as reported by Saibu (2014). The negative but significant effect of IA may stem from the fact that institutions in SSA are weak. It is said that institutions are the strength of every economy. The study concludes that Trade openness or policy together with Capital Inflows enhances the effectiveness of industrial Output in SSA.

In view of the above, this study therefore recommends that policy makers particularly the ministry of Trade, Commerce, and Industry should work in synergy with private sector to provide an enabling environment for industries to strive and order for foreign capital inflows to have significance effect on industrial development, and also implementation of trade liberalization policy that will enhance the inflows of foreign capitals and thus promote industrial development in Sub-Sahara Africa.

References

Adamu, F. M. & Dogan, E. (2017). Trade openness and industrial growth: Evidence from Nigeria. *Panoeconomicus,* 64(3), 297–314.

Adekunle, I. A., Ogunade, A. O., Kalejaiye, T. G., & Balogun, A. M. (2020). Capital Inflows and Industrial Performance in Nigeria: Including the Excluded. *Jurnal Ekonomi & Studi Pembangunan 21*(1), 37-52.

Adofu, I & Okwanya, I. (2017). Linkages between trade openness, productivity and industrialization in Nigeria: A co-integration test. *Research in World Economy*, 8(2), 78–87.

Agyei, S. K & Idan, G. A. (2022). Trade Openness, Institutions, and Inclusive Growth in Sub-Saharan Africa,*Econ, Soc, Tech, & Climate Change - Original Research*, 3(9), 71-73.

Akorsu, P.K & Okyere, S. (2023). Trade openness, foreign direct investment and industrialization in Ghana, *Cogent Economics & Finance (2023),* 11, 31.

Aremo, A. G Arambada, O. D. (2021). Effect of trade openness and financial openness on economic growth in Sub-Saharan African Countries. *African Journal of Economic Review, 9*(1), 109-130.

Bandura, W. N. (2020). Trade openness, institutions and financial development in sub-Saharan Africa. *Journal of Studies in Economics and Econometrics*, *44*(2), 29-47.

Brafu-Insaidoo, W. G. and Biekpe. N. (2014). Determinants of foreign capital flows: The experience of selected Sub-Saharan African countries, *Journal of Applied Economics, 17*(1), 63–88.

Fapetu, O., Oluwole., F. O, Owoeye, S. D and Balogun, A. A. (2022). Corporate Governance And Financial Performance of Quoted Cross-Border Banks In Nigeria.Fuoye *Journal of Accounting and Management 5*(2), 281-295.

Githaiga, P. N and Kilong'I, A. W. (2023). Foreign capital flow, institutional quality and human

capital development in sub-Saharan Africa, Cogent *Economics & Finance, 11*(1), 21-42.

Gui-Diby, S. L., and Renard, M. F. (2015). Foreign direct investment inflows and the industrialization of African countries. World Development*,* 74, 43–57.

Hornung, H. (2002). A Generalized AK Model. Investment*, R&D,* and Long-Run Growth, 73-81.

Jarso, D. (2016). The foreign capital flows and Economic growth in Sub-Saharan Africa: the role of financial markets and institutional quality, Master's Thesis 2016 30 ECTS Norwegian University of Life Sciences School of Economics and Business.

Khobai, H., and Moyo, C. (2020). Trade openness and industry performance in SADC countries: Is the manufacturing sector different? International Economics and Economic Policy, 1–22.

Kong, Q., Peng, D., Ni, Y., Jiang, X. & Wang, Z. (2021). Trade openness and economic growth quality of China: Empirical analysis using ARDL model. Finance *Research Letters 4*(9), 45-62.

Majumder, S. C., Rahman, M. H., & Martial, A. A. A. (2022). The effects of foreign direct investment on export processing zones in Bangladesh using generalized method of moments approach. Social Sciences & Humanities Open, 6(1), 10-25.

Mugun, W. (2021). Effect of trade openness on economic growth in Sub-Saharan Africa: dynamic panel analysis, EPRAInternational Journal of Economics, Business and Management Studies (EBMS), 8(3), 24-30.

Nthangu, N. D. & Bokana, K.G. (2022). Foreign capital inflows, trade openness and output performance in selected sub-Saharan African countries. *Investment Management and Financial Innovations, 19*(1), 236-246.

Nyang'oro, O. (2017). Capital inflows and economic growth in sub-Sahara Africa, Working Paper No 285, African Development Bank Group, www.adb.org

Nyinawumuntu, E., Makala, U.E. and Han, F.L. (2022) Impact of Trade Openness on Domestic Investment in Sub-Saharan Africa. Open Access Library Journal*,* 9: e9171.

Rajan, R. & Zingales, L. (2004). *Saving capitalism from the capitalists: Unleashing the power of financial markets to create wealth and spread opportunity.* Princeton University Press, Princeton.

Saibu, O. M. (2014). Capital inflow and economic growth nexus in Nigeria: The role of trade openness. *Acta Universitatis Danubius. Œconomica, 10*(6), 98-112.

Thi-Thuy, D. P. & Trong, N. H. (2021). Impacts of openness on financial development in developing countries: Using a Bayesian model averaging approach, Cogent Economics & Finance, 9(1), 1-17.

The World Bank (2022). World Bank confirms economic downturn in Sub-Saharan Africa, outlines key polices needed for recovery, www.wb.org.

The World Bank (2000). Can Africa Claim the 21st Century? Washington, D.C., 132–142.

United Nations. (2020). The 17 Goals. Retrieved from https://sdgs. un.org/goals

Wajda-Lichy, M., Kawa, P., Fijorek, K. & Denkowska, S. (2020). Trade openness and financial development in the new EU member states: Evidence from a Granger panel bootstrap causality test, Eastern European Economics, 58(3), 242-263.

Wilfred, A. G. & Bokana, G. K. (2017). A Comparative Analysis of Effects of Education on Sub-Saharan Africa's Economic Growth. *Journal of Economics and Behavioral Studies,9*(4), 18-37.