AKSU JOURNAL OF MANAGEMENT SCIENCES (AKSUJOMAS) VOL. 9 NO. 1, JUNE, 2024.

FOREIGN DIRECT INVESTMENT AND GROSS FIXED CAPITAL FORMATION IN NIGERIA: EVIDENCE FROM AUTO REGRESSIVE DISTRIBUTED LAG (ARDL) MODELLING

BY

Nseabasi Imoh ETUKAFIA [1]
nseabasiietukafia@uniuyo.edu.ng

Ekwere Raymond ENANG [2]
Linus E. ELE [3]

[1, 3] Department of Banking and Finance
University of Uyo
Akwa Ibom State

[2] Department of Accounting
University of Uyo
Akwa Ibom State

ABSTRACT
This study was designed to investigate the long run and short run implications of foreign direct investment inflow on growth in gross fixed capital formation in Nigeria from 1981 to 2022. Other variables considered germane to the study were also employed to determine their implications on GFCF and to further ensure robust results. Data employed for analysis were obtained from Central Bank of Nigeria statistical bulletin published in 2023. Econometric procedure adopted for investigation was the Auto Regressive Distributed Lag modeling. The result of the long run coefficient signifies that foreign direct investment negatively related with gross fixed capital formation. However, the results of the short run dynamics between foreign direct investment and gross fixed capital formation are incompatible. While FDI in the contemporaneous period impeded growth in capital formation, nevertheless, past values of FDI in one year lag significantly supported growth in gross fixed capital formation. Therefore, we strongly suggested that a feasible institutional framework be put in place to objectively monitor and allocate foreign direct investments to

preferred sectors of the economy germane and strategic to the growth of capital formation in Nigeria.

Keywords*: Gross Fixed Capital Formation, Foreign Direct Investment, Government Capital Expenditure, Economic Openness, Total Savings, Gross Domestic Product.*

JEL Classification: C5, C58, F21, H54,

Introduction:

The implication of inflow of foreign direct investment into the Nigerian economy is exceedingly debated by scholars, economic and financial theorists as well as policy makers across the global perspective. Foreign direct investment implies ownership of long term assets in a foreign economy. This involves the acquisition of existing physical production facilities or plants by foreign investors. Similarly, it entails the purchase of shares in foreign business entities whereby the foreign investor acquire significant shareholding.

Foreign direct investment connotes the construction of a new production plant in a foreign economy. FDI may also be considered as an investment made to acquire a lasting management interest, usually no less than ten per cent voting stock in an entity located and operated in a foreign economy. It could also be considered as the acquisition of existing physical production assets or facilities by foreign investors. It also entails the purchase of shares in domestic business entities by foreign investors whereby the foreign investor acquire significant shareholding. Scholars and policy makers consider FDI as a compelling catalyst for sustainable national economic growth since it has the capacity of promoting domestic investment through stimulating gross fixed capital formation.

It has been variedly accentuated that adequate investment in capital stock contributes significantly to growth and development. Nevertheless, in Nigeria investment in capital formation is abysmally low. Inadequate long term financing in Nigeria constitutes a fundamental hindrance to capital formation and hence a deterrent to growth. The relationship between foreign direct investment and capital stock in Nigeria remains ambiguous. The Nigerian economy is a mono-cultural in nature as the economy largely

depends on revenue from exports of oil and gas. The price of oil and gas at international market is not determined by Nigeria, but by the cartel, known as, Organization of The Petroleum Exporting Countries (OPEC). Therefore, the Nigerian economy is susceptible to the vagaries of external shock. Similarly, savings in Nigeria is disgustingly low due to low income. Monies pillaged by the politicians are accumulated outside the banking system, which further cripple investment in capital stock. To supplement the deficient level of domestic investment in capital formation, policy makers formulate various policy options to enhance increased inflow of foreign direct investment to bridge the financing gap to support growth. Among the options include economic reforms and liberalization. Adequate financing of gross fixed capital formation is considered as a key factor in growth process. Nevertheless, in spite of the various reforms the country has implemented, the economy is still appallingly stunted due to awful level of investment in capital stock. Economies with deficient capital stock experience slower growth rate compared to countries with adequate funding of capital formation. According to Misun and Tomsik (2002), countries with substantial inflow of foreign direct investment are rapid in their economic transformation process. According to economic and financial theorists, capital formation is crucial to economic growth. Growth can be sustained if strategic policies aimed at transforming the dwindling economies are geared towards maintaining a huge proportion of capital formation are initiated.

This paper is structured into five sections. Following introduction in section one, we review theoretical and empirical literature in section two. Econometric methodology is presented in section three. In section four, we conduct the various econometric tests as well as discussing the findings of tests, while in section five; we present the conclusion of the study and the recommendations of the study.

Literature Review

Theoretical Literature.

In this section, we review the relevant theory of investment in capital stock on which this study is hinged. This study is established on the accelerator theory of investment which is commonly related to Keynesian theory of investment function assumed to be a simple function as well as a complex function of expected discounted rate of return and the cost of capital. This

theory also relies on the assumption of fixed prices and was proposed by Clark (1917). The theory is based on the conjecture that demands for capital goods is a derived demand and thus, contingent on the demand for consumption goods. According to Clark (1917), accelerator theory focuses on the demand for finished products and are handled in relations with the demand for capital goods, such as machines, construction equipment and work in process. This implies that accelerator principle is concerned with the basic relationship between the size of capital stock and the demand for its final product. Therefore, an increase in the demand for capital goods will elicit the corresponding increase in investment in capital formation. Thus, increasing national income or output promotes gross investment in capital formation. In this, the theory was structured to establish a causal association between national income and investment in capital formation and to ascertain the effect of marginal consumption and gross spending. According to Jorgenson (1963), if the price of output is assumed to be constant such that the variables of price s and r are also reduced to constant, the user cost of capital can be specified as ($c = s[\delta + (\partial s / \partial t)/s]$) and are assumed to be fixed and exemplified as follows:

$$K = \boldsymbol{\alpha} Y \quad (1)$$

This is a famous accelerator procedure where:
K is the required stock of capital; $\boldsymbol{\alpha}$ represents the ratio of capital – output which is the ratio of the desired stock of capital to expected national income or output, while Y is the expected national income or output. In equation 1 above, $\boldsymbol{\alpha}$ is equal to K/Y and also the accelerator coefficient. If equation undergoes first difference and equation 1 becomes

$$I = \Delta k = \boldsymbol{\alpha} \Delta Y \quad (2)$$

Thus, from equation 2, variation in investment in capital stock is implicitly proportional to changes in national income or national output. Invariably, investment at all times is contingent upon output growth and the relationship is specified as expressed below in equation 3:

$$I = \boldsymbol{\alpha} Y \quad (3)$$

According to Eklund (2013), it is conjectured that the prices of investment in the desired capital stock are flexible and are partially adjusted; therefore, investment in capital formation becomes a function of prices of output, input and the cost of capital. In summary, the theory highlights that every

economy attempts to close the crevice between desired capital stock and actual capital stock.

Empirical Literature

Economic and financial theorists have suggested that capital formation plays a crucial role in the models of economic growth (Beddies 1999; Ghura and Thadjimichael 1996, Ghura, 1997). However, studies conducted on the relationship between foreign direct investment inflows and fixed capital formation both in Nigeria and beyond remained unsettled in view of the conflicting findings reached.

Emako, Nuru and Menza (2023) examined the influence of foreign direct investments on capital accumulation in sixteen developing countries for a period ranging between 2005 and 2018. The result of panel data analysis exemplified that foreign direct investments positively impacted on physical capital accumulation in these countries. The study also demonstrated that foreign direct investment positively influenced human capital formation. It was therefore, recommended that developing countries should give attention to foreign direct investment in education and manufacturing sectors.

Olowe (2022) investigated the influence of foreign direct investments on capital formation in Nigeria for the period between 1980 and 2020. The Augmented Dickey Fuller test and the Autoregressive Distributed Lag model were used for data estimation, and variables of the study were interest rate, inflation rate, FDI, government expenditure, gross domestic product, exchange rate and capital formation. The study revealed that foreign direct investment positively and significantly influenced capital formation in Nigeria.

Nyiwul and Koirala (2022) also studied the influence of foreign direct investment on agricultural development in 16 developing countries. Panel vector auto regression approach was used for data analysis. The study concluded that there was a two way relationship between foreign direct investments and agricultural development in these countries. The study added that FDI had beneficiary tendencies on the host countries.

Polloni-Silva et al. (2021) studied the effect of foreign direct investments on the productivity of municipalities in the state of São Paulo in Brazil for the period between 2010 and 2016. The fixed effects generalized least squares method was adopted for data analysis. The study concluded that foreign direct investments positively determined human capital status in Brazil.

Djokoto (2021) also studied the influence foreign direct investment on agricultural development of 64 countries from 1997 to 2016. Using regression analysis, the study observed conflicting results on the effect of foreign direct investment on capital accumulation. While no impact was found on the developing economies in the short run, negative impact was found on the developed economies. The study recommended a friendly and absorptive investment environment on the part of the host countries.

Soe (2020) investigated the effects of foreign direct investment on economic growth and domestic investment on Myanmar economy for the period ranging between 2012 and 2017. From the data analysis, using a panel vector autoregressive model, it was found that the effect of foreign direct investment depends on the sector of interest. The effect was found to be more intense in the non-oil and gas sector, while infinitesimal effect was detected in the oil and gas sector.

Imoughele (2020) also investigated the effect of foreign direct investment on the output of the Nigerian industrial sector from 1986 to 2018. The study employed the Auto Regressive Distributed Lag (ARDL) bounds testing approach to ascertain the existence or otherwise of long run equilibrium cointegrating relationship. From the data analysis, it was found that a long run relationship existed between foreign direct investments and industrial sector output. The study recommends that enabling environment should be put in place to attract foreign direct investments to augment domestic capital needed to expand and improve the productive capacity of the industrial sector of the country.

Omorokunwa and Ajao (2019) examined the influence of foreign direct investment on public-private investment in Nigeria. The ARDL bound estimator was employed for the study. The analysis of annual data of 1981-2016 showed that expenditures have direct effect on investment both in short-run and long-run with a weak negative influence. The study

recommended that government should focus more inwards on a long-term increase of domestic investment in Nigeria.

Ahmad, Hdia, LI, Wang and Tian. (2018) assessed the effects of foreign direct investment on domestic investment and economic growth in China. The study, using DOLS, FMOLS and GMM estimators, on data collected in 30 provinces between 2000 and 2014, found that FDI had a negative effect on capital formation due to its polluting characteristics.

Fahinde, Abodohoui, Mohiuddin and Su (2015) analyzed the effects of capital inflows on domestic investment in the Economic and Monetary Union of West Africa (WAEMU). The study was based on the GMM method of Arellano and Bond (1991) applied to a panel of WAEMU countries over the period 1996 and 2011. From the result of the analysis, it was found that FDI had a significant negative effect on physical capital formation in the economies of the West African Economic and Monetary Union (WAEMU). This awkward result was attributed to weak technology transfer, as MNEs do not hire local workers in positions where they can acquire knowledge.

Ugochukwu, Modebe and Onyeanu (2014), conducted a studied on the impact of foreign direct investment on capital accumulation in Nigeria. Data for the study was sourced from CBN statistical bulletin for the period covering 1986 and 2012. From the data analysis using ordinary least square method of estimation, it was discovered that foreign direct investment positively but insignificantly influenced capital formation in the short-run. The study suggested that government should intensify efforts at attracting more foreign direct investments into the country as it positively impacted on capital formation in the country.

Alkhasawneh (2013) investigated relationship between foreign direct investment and economic development in Qatar from 1970 to 2010. It was observed from the study that FDI was affected mainly by government spending and gross domestic product. The study which was based on Augmented Dickey-Fuller (ADF), Johansen cointegration and Granger Causality tests confirmed a strong and positive relationship between economic growth and FDI inflows. The study recommended that the

government should create enabling economic environment to attract qualitative and quantitative foreign direct investments into the country.

Onakoya (2012) investigated the influence of foreign direct investment on economic growth in Nigeria. Onakoya (2012) adopted Augmented Dickey-Fuller (ADF) Unit Root Test, Granger Causality test and ARDL Bound test for data estimation. Findings from data analysis found that foreign direct investments generated significant influence on the outputs of the economy, though with varying degree of influences depending on the sector of the economy.

Al-Sadig (2012) investigated the relationship between foreign direct investment and gross capital formation. The generalized method of moments (GMM) was used for data analysis. It was observed that foreign direct investment significantly promoted capital accumulation in developing countries between 1970 and 2000. It was also noted in the study, among other things, that the availability of human capital in the host country determined the effectiveness of foreign direct investment in low-income countries. The high availability of a well-educated labor force increases the efficiency of foreign direct investment in capital formation.

Eregha (2012), carried out a study on 10 countries of the Economic Community of West African States (ECOWAS) from 1970 to 2008, on the effect of foreign direct investments on capital formation. The study revealed that foreign direct investment has no positive effect on capital formation. The study concluded that the failure of developing countries to benefit from technological spillovers from foreign direct investment is due to dearth of human capital and technical knowhow.

Karimi and Zulkornain (2009) also examined the causal relationship between FDI and economic growth using the Toda-Yamamoto test for causality. The study was based on the Toda-Yamamoto test for causality relationship and the bounds testing (ARDL). Time-series data covering the period between 1970 and 2005 for Malaysia, the study found, in the case of Malaysia there is no strong evidence of a bi-directional causality and long-run relationship between FDI and economic growth. This suggests that FDI has indirect effect on economic growth in Malaysia.

A study by Apergis, Katrakilidis, and Tabakis (2006), using panel integration and co- integration testing, found that FDI inflows stimulated domestic capital formation in 30 developing countries during the period 1992–2002. The study submitted that FDI affects capital formation in developing countries through many channels, such as the provision of more advanced production technology, improved organizational and managerial skills, marketing expertise, and market access.

From the empirical review, there is no generalization over the effect of foreign direct investments on physical capital accumulation. While some studies found positive relationship, others found negative and some found no relationship at all. Also, most of the studies reviewed are not sufficiently broad and comprehensive. In the literature so far, there is no study that has considered the nature of foreign direct investment on gross fixed capital formation. This study, therefore, is intended to fill these gaps.

Data and Specification of Model

This study is designed to ascertain the connection between foreign direct investment inflow into the Nigerian economy and growth in domestic capital stock. Annual time series data straddling between 1981 and 2022 employed in the econometric analysis were collated from the statistical bulletin published in 2023 by the Central Bank of Nigeria. The variables of study are gross fixed capital formation (GFCF) which represents dependent variable; while independent variables are foreign direct investment ((FDI); trade openness which is symbolized by OPN and measured by (imports + exports)/2; TSV infers total domestic savings and represents total income minus total spending. Another important independent variable of study is the real gross domestic product (RGDP). RGDP measures the value of economic output adjusted for variation in prices (inflation or deflation), while GCXP is an indicator of government capital expenditure in infrastructural development.

Econometric Procedure

The econometric model adopted for this study is situated on the accelerator theory of investment reviewed above and given as $I = \alpha Y$. This model is augmented and amplified to suit the dynamics in this study. Thus, the functional relationship based on the theoretical model and the variables defined above is augmented and exemplified in equation 4 below:

GFCF = f(FDI, OPN, TSV, GDP, GCXP) 4

Equation 4 is transformed into a linear relationship and a stochastic white noise error term ($\mathcal{V}_t$) is integrated and presented as in equation 5 below:

$GFCF = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1 FDI + \boldsymbol{\alpha}_2 OPN + \boldsymbol{\alpha}_3 TSV + \boldsymbol{\alpha}_4 GDP + \boldsymbol{\alpha}_5 GCXP + \mathcal{V}_t$ 5

It is imperative to conduct various econometric tests to authenticate the veracity of the data as a pre-requirement for the estimation of time series models. To evade possible nonsensical regression conclusions arising from the existence of unit root, the stationarity property of the series were examined based on Augmented Dickey Fuller (ADF) unit root procedure. The variables considered in this study were individually examined to guarantee their admissibility or non-existence of stochastic non-stationarity at 5 percent level. ADF test was conducted based on equation 6 below:

$$\Delta Y_t = \lambda_0 + \lambda_{1t} + \beta Y_{t-1} + \sum_{J=1}^{K} \square_j \Delta Y_{t-j} + \mathcal{V}_t \quad 6$$

where Y_t represents relevant time series, Δ signifies first difference operator, t refers to linear trend while $\mathcal{V}_t$ symbolizes stochastic white noise. The null hypothesis (Ho) of no existence of unit root was examined. Therefore, failure to reject the null at a level resulted in the differencing of the series until stationarity is arrived at and the null rejected. To enhance non- correlated errors, additional lag terms could be incorporated by applying Akaike Information Criterion (AIC) to make certain that the preferred lag length was maintained. The result of augmented Dickey Fuller unit root is presented in Table one.

The ARDL bound testing approach which, characteristically is a least square regression technique with lags of dependent and independent variables and notations such as p, q_1, q_2, q_3,……,q_n was developed and made popular by Pesaran, Shin and Smith (2001). Following from the above, p represents the number of lags of the response variable; q_1 is the number of lags of the first independent variable and q_n signifies the number of lags of the k^{th} explanatory variables. Thus, in this study, we specify the ARDL model in equation 7 as:

$$Yt = \delta \sum_{i=1}^{p} 0_1 \, y_{t-1} + \sum_{j=1}^{k} \sum_{1=0}^{qj} xj_{,t-1} \, \beta j, \, I + V_t \quad 7$$

Practically, not all the variables in equation 7 could be lagged, especially repressors such as xj and may be operated as $q_1=0$, $q_2=0,\ldots..,q_n=0$. These variables may operate without lag terms and are referred to as static regressors. We, therefore, applied the ARDL modeling to estimate the dynamic relationship between the regressand and a set of regressors and hence transformed the ARDL model into a long run equation which depicts a long term response of capital formation to variations in the set of independent variables. Thus, we express the estimated long run representation in equation 8 below:

$$\theta = \frac{\sum_{i=1} \beta_{j,i}}{1 - \sum_{i=1}^{p} Ýi} \quad 8$$

Conventionally, estimating cointegrating relationships, with the application of Johansen's (1991, 1995) procedure entails all variables to become stationary at a level, that is I(0) or at first difference, which is symbolized as I(1). Therefore, to outwit this short-coming, Pesaran and Shin (1999) articulated that coointegrating relations could be estimated as auto regressive distributed lag models and each of the variables can be treated with different number of lag terms and equation 8 above was transformed by substituting long run coefficients in order to obtain a difference equation which is presented in equation 9:

$$\Delta y_t = \sum_{i-1}^{p-1} \gamma_i \Delta y_{t-1} + \sum_{j=1}^{k} \sum_{1=0}^{qj-1} \Delta X_{j,\ t-\acute{\imath}\ \ddot{\imath}} - \theta EC_{t-1} + \mathcal{V}_t \quad 9$$

We applied equation 8 for the verification of existence or non- existence of long run equilibrium coointegrating relation among the variables in the ARDL model (Pesaran, Shin, and Smith (2001).Thus, we advanced to the ARDL bounType equation here.d test to examine the long run equilibrium relationship among the variables and therefore, augmented equation 9 as represented in equation 10:

$$\Delta \mathrm{y_t} = -\sum_{i=1}^{p-1} \gamma_{\ddot{\imath}} \Delta \mathrm{y}_{t-1} + \sum_{j=1}^{k} \sum_{1=0}^{q_{j-1}} \Delta X_{\mathrm{j},\ t-\ddot{\imath}} - \beta \mathrm{j},\ddot{\imath} - \mathrm{py}_{\mathrm{t-1}^{-\alpha}} - \sum_{\mathrm{j=1}}^{\mathrm{k}} \mathrm{X_{j,t-1}} \, \delta \mathrm{j} + \mathcal{V}_{\mathrm{t}} \quad 10$$

The model depicting the relationship between FDI and capital stock in equation 5 is expressed empirically in a general form of long run ARDL function as:

$$\Delta gfcf_t = \phi_0 + \phi_1 gfcf_{t-1} + \phi_2 fdi_{t-1} + \phi_3 opn_{t-1} + \phi_4 tsv_{t-1} + \phi_5 gdp_{t-1} + \phi_6 gcxp_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta gfcf_{t-i} + \sum_{j=1}^{q1} \delta_j \Delta gfcf_{t-j} + \sum_{k=1}^{q2} \varphi_k \Delta fdi_{t-k} + \sum_{l=1}^{q3} \partial_l \Delta opn_{t-l} + \sum_{m=1}^{q4} \lambda_m \Delta tsv_{t-m} + \sum_{n=1}^{q5} \Omega_n \Delta gdp_{t-n} + \sum_{p=1}^{q6} \sigma_p \Delta gcxp_{t-p} + \mathcal{V}_t \quad 11$$

where: Δ symbolizes first difference of the variable, ϕ represents regression constant, q depicts maximum lag length, while $q_1 \ldots\ldots\ldots q_n$ are short run dynamics and t denotes time trend, whereas $\mathcal{V}_t$ indicates stochastic white noise.

To examine the existence of long run cointegrating equilibrium relationship among the variables in the ARDL bound test model, F- statistic is used as the tool for determining whether or not there is a cointegrating relationship. Pesaran, Shin and Smith (2001) conjectured that two sets of critical values are available for varied numbers of variables since ARDL model includes trend or intercept or both. It is envisaged that regressors in ARDL model are stationary at a level and are denoted as I(0) while it is also presumed that other set of regressors are stationary at first difference and bear I(1). However, if the F-statistic lies higher than the upper bound critical value at 5 percent level of significance, it could be confirmed that there is existence of long run cointegrating equilibrium relationship. It is also infers that there is no spurious cointegrating equations. Nevertheless, if the F-statistic is found to stay below the lower bound critical value at 5% level, it is adjudged that there is non-existence of long run cointegrating equilibrium relationship. But, if the F-statistic settles between the upper limit and the lower limit of the critical values at 5 percent level of significance, the analysis is questionable and considered inconclusive.

Generally, the bound testing technique is characteristically structured and applied to confirm the veracity of the null hypothesis (H_0) of no-existence of long run cointegrating relationship against the alternate hypothesis (H_1) of the existence of cointegration which is predicated on equation 11 and is explicated below:

H_0: ϕgfcf = ϕfdi = ϕopn = ϕtsv = ϕgdp = ϕgcxp = 0.

From the null hypothesis stated above, apriori, it is expected that long run relationship does not exist among the variables. Thus, the alternate hypothesis, H_1: $\phi gfcf \neq \phi fdi \neq \phi opn \neq \phi tsv \neq \phi gdp \neq \phi gcxp \neq 0$ conjectures that apriori, there exist long run cointegrating relationship among the variables captured in the ARDL model. With the confirmation that there exists a unique long run equilibrium relationship, then the conditional ARDL (p, q_1, q_2, q_3, q_4, and q_5) long run specification for the GFCF is expressed as below in equation 12

$$\Delta gfcf_t = \phi_0 + \sum_{i=1}^{p} \Delta\phi_1 gfcf_{t-1} + \sum_{j=1}^{q1} \delta_2 fdi_{t-1} + \sum_{k=1}^{q2} \partial_3 opn_{t-1} + \sum_{l=1}^{q3} \pi_4 tsv_{t-1} + \sum_{m=1}^{q4} \eta_5 gdp_{t-1} + \sum_{n=1}^{q5} \theta_6 gcxp_{t-1} + \mathcal{V}_t \quad 12$$

From equation 12, we estimated the short run constraints by exemplifying the error correction mechanism associated with long run coefficients and denoted as:

$$\Delta gfcft = \phi_0 + \sum_{i=1}^{p} \Delta\delta_1 gfcf_{t-1} + \sum_{j=1}^{q1} \Delta\partial_2 fdi_{t-1} + \sum_{k=1}^{q2} \Delta\pi_3 opn_{t-1} + \sum_{l=1}^{q3} \Delta\eta_4 tsv_{t-1} + \sum_{m=1}^{q4} \Delta\theta_5 gdp_{t-1} + \sum_{n=1}^{q5} \Delta\psi_6 gcxp_{t-1} + \xi ecm + \mathcal{V}_t \quad 13$$

where ξ represents the speed of adjustment mechanism while ECM denotes residuals generated and transformed from OLS regression equation in equation 5. Other variables are as earlier identified. The coefficient of error correction mechanism theoretically is expected to be negative and significant to lend credence that there exist a long run relationship.

Empirical Results and Discussions

Unit Root Test

As a prelude to the estimation of time series models, and especially to conduct an ARDL bound cointegration test, the specification of the long run coefficients, as well as the estimation of the short run dynamics, it is necessary to examine the stationarity properties of the variables in order to conveniently bye-pass preposterous regression. The result of Augmented Dickey Fuller unit root test was conducted and the results presented in Table1 below:

Table 1. Result of Unit Root Test at 5 Percent Level Significance

	First	Second Difference	Order of	Lag

	Levels		Difference					
Variables	ADF Statistic	Critical Values	ADF Statistic	Critical Values	ADF Statistic	Critical Values	Integration	Length
GFCF	-1.955366	-1.949319					I(0)	1
FDI	-2.20368	-1.949319	-2.100307	-1.949609			I(1)	1
OPN	-2.879958	-1.949319	-2.992253	-1.949609			I(1)	1
TSV	-3.681997	-1.949319	-0.460412	-0.949609	-4.914233	-1.949856	I(2)	1
GDP	-4.202356	-1.949319					I(0)	1
GCXP	-3.306427	-1.949319	-3.035845	-0.949609			I(1)	1

Source: Researchers' computation.

The null hypothesis of absence of stationarity was not rejected at 5 percent level of significance at a level for all the variables. From the result in table one, only GFCF and GDP attained stationarity at a level, whereas FDI, OPN, and GCXP became stationary after first difference. However, TSV was stationary after second difference.

ARDL Bound Test Cointegration.

Due to the above deficiency, we bye – pass the examination of cointegrating relations using any of the common techniques, such as Johansen-Jesulius cointegration procedure and therefore, proceeded to apply the Auto Regressive Distributed Lag (ARDL) modeling for the implementation of bound testing cointegration technique to estimate the long run equilibrium relations; establishing long run coefficients and short run error correction mechanism.

Table 2. Result of the ARDL Bounds Test

Test Statistic	Value	K
F-statistic	7.254420	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Author's Computation

The result of the ARDL bound testing for the investigation of the existence or otherwise of long run equilibrium relationships is presented in table 2. The result of the bound test for cointegration between gross fixed capital formation and the set of independent variables is presented in Table two. The result of the ARDL bound test infers that the calculated F-statistic is 7.254420. This result is above the upper limit value of 3.75 and also above the lower limit value of 2.62 at 5 percent level of significance which denotes that the result is credible. Thus, we conclude that the null hypothesis of non-existence of long run equilibrium relationship is invalid and hence, rejected.

Results of the Long Run ARDL Model of GFCF and FDI.

The results of the long run response of gross fixed capital formation to FDI, OPN, TSV, GDP, GCXP are presented in Table three. It is disgusting to observe that foreign direct investment is not significant in the model. The t-value related to FDI is -1.715850. This infers a statistically negative relationship between foreign direct investment and growth in investment in capital stock. Against apriori expectation, foreign direct investment entered the model with a negative sign and exerted depressing though insignificant impact on capital formation. Based on this outcome, it could be inferred that a one Million Naira inflow of FDI depressed capital formation by 0.02 percent during the period under evaluation.

Table 3: Estimated Long Run Coefficients of GFCF of the ARDL Model ARDL (1, 2, 1, 0, 0, 0). Dependent Variable: GFCF based on Akaike Information Criterion (AIC)

ARDL Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.

FDI	-0.000227	0.000132	-1.715850	0.0965
OPN	-0.000143	0.000203	-0.701799	0.4882
TSV	0.453962	0.331294	1.370268	0.1808
GDP	0.001531	0.000587	2.610632	0.0140
GCXP	-0.076954	0.774743	-0.099328	0.9215
C	7393.229 452	439.94991	16.804707	0.0000

Source: Authors' Computation

The coefficient of openness of the economy is negative and not significant in supporting growth in capital formation. However, the supposition of the policy makers has always been to liberalize the economy in order to attract foreign investors to enhance growth in capital stock and economic growth. Nevertheless, with the result from the long run estimate, it is awful to note that OPN has a coefficient of -0.000203 and t – statistic of -0.701799 which is negatively related with gross fixed capital formation. This lethargic posture negates the hypothesized stance of policy makers who consistently accentuate openness of the economy as a panacea to depleted capital stock disposition in Nigeria.

However, it is a truism that total savings in Nigeria is grossly low due to extremely meager income. This is contrary to the supposition of government officials that income in Nigeria is adequately high to mobilize savings. Nonetheless, in support of theoretical expectation, total national savings with a positive coefficient of 0.453962 and insignificantly allied with GFCF with a t-statistic value of 1.370268 indicates that TSV did not significantly relate with GFCF.

The relationship between gross domestic product and gross fixed capital formation is very intriguing in the long run horizon. GDP generated positive and statistically significant t-statistic of 2.610632 with an analogous p-value of 0.0140 symptomatic of the fact that gross domestic product educed growth in capital stock in Nigeria between 1981 and 2022. Furthermore, a one unit increase in gross domestic product propelled capital formation by 0.151 percentage point. Contrary to supposition in government milieu that federal government capital expenditure was significant enough to elicit growth in gross fixed capital formation; the result of the long run estimate indicates adverse and non-significant relationship between government

capital expenditure and gross fixed capital formation. The t-statistic associated with GCXP is -0.0999328 with an interrelated p-value of 0.9215. This result is abysmally terrible in view of the yearly budgetary provision for capital expenditure. This position is authenticated by the coefficient of -0.076954 and the resultant t-statistic of -0.099328 inferring a dismal performance of federal government expenditure on accumulation of capital stock in Nigeria at 5 percent level of significant.

Results of the Short Run ARDL Model of FDI and GFCF

The results of the short run dynamics of the ARDL model related to FDI and GFCF is presented in Table 4 and the findings are discussed in this section. The ARDL ECM model produced fascinating results. Amazingly, the coefficient of one year lag (past values) of GFCF is 1.057136 and generated a t-statistic value of 10.25672. This result symbolizes a positive and highly significant support of past values of gross fixed capital formation, GFCF(-1), to contemporaneous GFCF growth in the short run. An implausible response is observed to flow from FDI in contemporaneous period to ΔGFCF. The sign of the coefficient is companionable with that of its long run counterpart. FDI yields a negative coefficient of 0.000193 with an allied t-statistic of -38.82407. This result infers that FDI significantly impedes growth in capital formation and negates policy makers' theoretical disposition supporting FDI inflow as a panacea to the country's deficient capital stock. However, an fascinating result is noted in the relationship between FDI lagged by one year (FDI(-1)) and GFCF.

The coefficient of one period lag of FDI is 0.000207 with a related positive and significant t –statistic value of 10.93951 which infers that FDI(-1) significantly promoted gross fixed capital formation. It is also detected, with disgust that openness of the economy in the current period (OPN) related significantly and negatively with investment in capital stock formation in Nigeria between 1981 and 2022. Notwithstanding the above result, past values of economic openness, OPN(-1) significantly and positively promoted growth in capital formation.

Nonetheless, in line with its long run counterpart, TSV associated positively with GFCF in the contemporary period. However, contrary to its long run insignificant relationship with GFCF, TSV with a t-statistic of 27.08 significantly and positively influenced growth in gross fixed capital formation. It is nostalgically observed that gross national savings at year

one lag TSV(-1) significantly impeded growth in capital formation. As previously suggested, this adverse relationship may be attributed to awfully paltry income levels in the country. Incompatible results are discovered in respect of the relationships between gross domestic product in the contemporaneous period (GDP) and gross domestic product lag in one period GDP(-1) with short run gross fixed capital formation (Δgfcf). In the contemporaneous period, GDP posed a t-statistic of 105.4840. This suggests a highly significant and positive response of GFCF to variations in GDP in the short run perspective.

Table 4: Estimated Short Run Coefficients of The ARDL
ARDL (1, 1, 1, 1, 1, 1, 1) Dependent Variable Δgfcf based on Akaike Information Criterion

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ΔGFCF(-1)	1.057136	0.103068	10.25672	0.0000
ΔFDI	-0.000193	4.97E-06	-38.82407	0.0000
ΔFDI(-1)	0.000207	1.89E-05	10.93951	0.0000
ΔOPN	-0.000383	4.34E-06	-88.12703	0.0000
ΔOPN(-1)	0.000400	3.85E-05	10.39090	0.0000
ΔTSV	0.262431	0.009688	27.08718	0.0000
ΔTSV(-1)	-0.278117	0.030877	-9.007135	0.0000
ΔGDP	0.000815	7.72E-06	105.4840	0.0000
ΔGDP(-1)	-0.000868	8.48E-05	-10.23366	0.0000
ΔGCXP	0.816849	0.012157	67.19040	0.0000
ΔGCXP(-1)	-0.865965	0.084372	-10.26361	0.0000
ECM(-1)	-1.056896	0.103327	-10.22863	0.0000
C	-458.0513	853.0530	-0.536955	0.5959

Model Criteria

R^2 = 0.99.99	Adjusted R^2 = 99.98	F-Statistic = 22.011
Prob (F-Statistic) = 0.000000	D-W.Stat = 1.953824	AIC = 9.777002

Source: Authors' computation

Contrary to the above exhilarating result, gross domestic product lag once, GDP(-1), encumbered growth in capital stock formation. This is corroborated by the t-statistic of -10.23366. With this result, an inconceivable relationship has been found between gross domestic product lagged one period and gross fixed capital formation in the short run stance.

A negative coefficient of 0.000868 and a significant t- value of -10.23366 at 5% level of significant are reported. It is therefore, inferred that a one unit growth in GDP after one lag constrained Δgfcf by 0.086 unit in the short run.

Government capital expenditure in the contemporaneous period positively and significantly related with gross fixed capital formation. GCXP yielded a coefficient of 0.816849. The implication is that for every one billion Naira committed to capital projects by the Federal government resulted in approximately N900,000,000 growth in capital formation. Furthermore, it is daunting to note that past values of government expenditure on capital projects, i.e. ΔGCXP(-1) significantly constrained capital formation. This is affirmed by the t-statistic equal to -10.26361. This unpleasant result could be deduced that the implementation of government capital budgetary provision lacked fiscal discipline. Furthermore, government capital expenditure appears to be inadequate in promoting GFCF growth in Nigeria.

The error correction mechanism has an estimated t-statistic value of -10.22863 and a coefficient of -1.056896, and both are correctly signed. These results infer that the model is significant and well behaved in explaining the problem under investigation. The result also connotes that the speed of correction from the previous years' disequilibria in Δgfcf are corrected to the contemporary year's equilibrium at a significant speed of -10.22863. Moreover, it could be authenticated that the variables selected for the study have jointly elicited variation in GFCF. Further diagnostic investigation in the short run dynamic model reveals that the coefficient of determination, that is, the adjusted R-square is approximately 99.9%. This symbolizes that about 99% of variation in Δgfcf is explained by the set of the explanatory variables and is very satisfactory at 5% level of significance. The model produced the Durbin-Watson statistic equal to 1.95. This suggests that the model is free of both positive and negative auto-correlation. The significance of the model is explained by the F-statistic which reports 22.011. This result typically symbolizes that the model is significant in explaining the problem the study sought to investigate. Furthermore, the F-statistic of 22.011 infers that the variables of study mutually determined variation in gross fixed capital formation. The significance of the F-statistic is further corroborated by the prob(F-statistic)

equal to 0.000000. Therefore, we can conclude that the dynamic ARDL model is a perfect fit to solving the problem under consideration.

Conclusion and Suggestions for Policy

This study was structured to investigate the empirical nexus between foreign direct investment and gross fixed capital formation in Nigeria between 1981 and 2022. In the study, the researchers also employed other control variables in the investigation. Such variables include openness of the economy (OPN), total national savings (TSV), real gross domestic product (GDP), and government capital expenditure (GCXP). Based on the findings in this study, it is established that foreign direct investment constrained capital stock formation in the long run spectrum as well as in the contemporaneous short run perspective. These differing results provoke conflicting views about the rationalization for policy makers' penchant for increased inflow of foreign direct investment. It is further realized that past values of FDI significantly supported growth in capital formation in the short run prospect. Thus, it could be established that institutional framework necessary to direct foreign direct investors to invest in preferred sector(s) with high multiplier to galvanize growth in gross fixed capital formation are either not adequately strong or non-existing. Policy inconsistency enunciated to regulate the flow of foreign capital may account for paradoxical reports regarding the relationship between FDI with gross fixed capital formation at different time dimensions.

It is also observed that openness of the economy in the contemporaneous year deterred growth in gross fixed capital formation. Notwithstanding the above report, openness of the economy lagged once OPN(-1) significantly supported growth in GFCF. This incongruous posture may be attributed to policy summersault and inappropriate sequencing of the liberalization and monitoring process. Examining the long run relationships between the set of independent variables and the dependent variable, apart from the gross domestic product, all other independent variables were not significant in the promotion of gross fixed capital formation.

Therefore, arising from the above conclusion, the following recommendations are put forward for policy:

- That effective institutional framework be put in place to direct foreign investors to invest in preferred sector(s) of absolute economic importance, such as manufacturing, service and agricultural sectors,

though with high gestation periods. Foreign investors should not just exercise the latitude of allocating their entire investment portfolio to oil and gas, as well as construction sectors to amass rapid returns, without involvement of relevant authority.

- That policies aimed at strengthening the rhythm of growth in gross domestic product be emphasized, since domestic output possesses the capacity to significantly influence growth in gross fixed capital formation.
- That government needs to consciously and objectively reconsider the policy on liberalization of the economy for inflow of foreign capital, investment, and human capital, as well as goods and services. Targets need to be established, results monitored and sequential process of openness of the economy adopted to ensure that liberalization of the economy significantly benefits the country.
- To perk up upon the current miserly savings disposition in the country, employers of labour and the governments at various levels should reconsider an improved and living wage to enhance savings and to promote investment in gross fixed capital formation.
- That governments need to promote fiscal discipline in the implementation of annual budgetary allocation on capital expenditure as well as ensuring that allocation for capital expenditure are adequate.

References:

Ahmad, N., Hdia, M., Li, H., Wang, J and Tian, X. (2018). Foreign direct investment, domesticinvestment and economic growth in China: Does foreign investment crowd-in or crowd- out domestic investment. Economics Bulletin 38 (3): 1279–1291.

Al-Sadig, A. (2012). The effects of foreign direct investment on private domestic investment: evidence from developing countries. Empirical Economics 44 (3): 1267–1275.

Apergis, N., Katrakilidis, C. P. and Tabakis, N. M. (2006). Dynamic linkages between FDI inflows and domestic investment: A panel co-integration approach. Atlantic Economic Journal 34: 385–394.

Beddies, C. (1999). Investment, capital accumulation and growth: Some evidence from Gambia: 1964-1998. IMF Working Paper 99/117, August.

Budang, N. A., and T. A. Hakim (2020). Does foreign direct investment crowd in or crowd domestic investment? Evidence from panel cointegration analysis. Academic Research in Economics and Management Sciences, 9 (1): 50–65.

Chakraborty, C. & amp;Nunnenkamp. P. (2008). Economic reforms, FDI, and economic growth in India: A sector level analysis. World Development 36 (7), 1192–1212

Clark, J.M. (1917). Business Acceleration and The Law of Demand: A Technical Factor in Economic Cycle. Journal of Political Economy, 25, 217-235.

Djokoto, J. G. (2021). Foreign direct investment into agriculture: Does it crowd-out domestic investment? Agrekon 60 (2): 176–191.

Emako, E., Nuru, S. & Menza, M. (2023). The effect of foreign direct investment on capital accumulation in developing countries, Development Studies Research, 10 (1), 1 - 15

Eregha, P. B. (2012). The dynamic linkages between foreign direct investment and domestic investment in ECOWAS countries: A panel co-integration analysis. Africa Development Review 24 (3): 208–220.

Fahinde, C., A. Abodohoui, M. Mohiuddin, and Z. Su. (2015). External financial inflows and domestic investment in the economies of WAEMU: Crowding-out versus crowding-in effects. The Journal of Developing Areas, 49 (3): 229–248.

Ghura, D. (1997). Private investment and endogenous growth: Evidence from Cameroon. IMF Working Paper97/165, December.

Ghura, D. and Hadji M. T. (1996). Growth in Sub- Saharan Africa Ⅱ, Staff Papers, International Monetary Fund, 43, September.

Imoughele, L. E. (2020). External financing and industrial sector output in a deregulated economy: Econometric evidence from Nigeria. Journal of Economics and Allied Research, 4(2), 141-160.

Jorgenson, D. (1963). Capital theory and Investment Behavior. American Economic Review, 53, 247-259

Karimi, M. S. & Zulkornain, Y. (2009). FDI and economic growth in Malaysia. Munich Personal RePEc Archive, MPRA Paper 14999. Retrieved from http://mpra.ub.uni- muenchen.de/14999/

Misun, J. and Tomsik, V. (2002). Does Foreign Direct Investment Crowd in or Crowd Out Domestic Investment? Eastern European Economics 40 (2):38-56. DOI:10.1080/00128775.2002.11041015.

Nyiwul, L., and Koirala, N. P. (2022). The role of foreign direct investments in agriculture, forestry and fishing in developing countries. Future Business Journal 8 (1): 44 - 53

Olowe, O. O (2022). Foreign direct investment and capital formation: Policy implications towards achieving pro-poor growth in Nigeria. Journal of Economics and Allied Research, 7(1): 2536-7447

Omorokunwa, O. G., and Ajao, M. G. (2019). Fiscal Policy and Public-Private Investment in Nigeria. Amity Journal of Finance, 4(1), 16-29.

Onakoya, A. B., Tella, S. A. & Osoba, A. M. (2012). Investment in telecommunications infrastructure and Nigerian economic growth. Submitted for publication to British Journal of Management and Economic, www.sciencedomain.org .

Pesaran, H.M; Shin, Y; and Smith, R. J. (2001). Bound Testing Approach to the Analysis of Level Relationship. Journal of Applied Econometrics,16,289-326. https://doi.org/10.1002/jae.616

Pesaran, H. M. & Shin, Y. (1999). An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis in Econometric and Economic Theory in the 20th Century. In S. Strom (ed), The Regnar FrischContinental Symposium (pp.371-413). New York: Cambridge University Press

Polloni-Silva, E., Moralles, H. F., Rebelatto, D. A. N & Hartmann, D. (2021). Are foreign companies a blessing or a curse for local development in Brazil? It depends on the home country or host region's institutions. Growth and Change, 52 (2): 933–962.

Soe, T. M. (2020). Economic Effects of Inward Foreign Direct Investment in Myanmar. Bulletin of Applied Economics, 7 (2): 175–190.

Türkcan, B., Duman, A. and Yetkiner, I. H.(2008).How does FDI and economic growth affect each other? The OECD case. International conference on emerging economic issues in a globalizing world, Izmir, 2008 Retrieved from eco.ieu.edu.tr/wp-content/proceedings/2008/0802.pdf

Ugochukwu, U. S., Judith, M. N. & Onyeanu, E (2014). The impact of foreign direct investment on capital formation in Nigeria: A co-Integration approach. International Journal of Economics, Finance and Management Sciences, 2(2): 188-196.