Journal of Economics and Behavioral Studies (ISSN: 2220-6140)
Vol. 14, No. 1, pp. 50-58, March 2022

FDI and Environmental Quality-Growth Nexus in the Nigerian Economy: New Evidences from System GMM

Yinka Sabuur Hammed & Omosola Arawomo
Obafemi Awolowo University, Ile-Ife, Nigeria
yinkameds@gmail.com

Abstract: This paper examines the effect of foreign direct investment through economic activities on the environmental quality of the Nigerian economy by using annual data from 1981 to 2020. Our estimation of the simultaneous equation model was done through system GMM where we estimate the scale, technique and composition effects of foreign direct investment. Our results reveal that foreign direct investment improves economic activities through the scale effect and damages the environmental quality through technique and composition effects. The contribution of physical and human capital investment becomes more prominent in attracting direct investment inflow in the country. This however suggests that our institution should be strengthened to ensure the adoption of technology that poses little harm to the environment in the production process by the investors. Also, more investment should be made in physical and human capital in the country to attract more overseas investment.

Keywords: *FDI, Environmental Quality, GMM, Physical and Human Capital.*

1. Background to Study

Environmental pollution is an essential issue of discussion in the growth process of any economy. According to Hitam and Borham (2012), deterioration of the environment begins to have an impact on the quality of life or even a major threat to the survival of mankind as the growth process progresses. The effort of mankind in the process of making growth often results in environmental degradation. Such degradation could be pollution of air and some other forms which often pose a serious danger to human existence. In that wise, the management of the environment should be of paramount interest to any government. In addressing this, a certain percentage of budgets should be earmarked for ensuring the safety of the environment thereby helping in making further growth in the economy. It is worth noting that various economic activities in making growth progress often have a serious impact on the environment. The suggestion by the environmental Kuznets curve (hence EKC) hypothesis is that at the initial stage of growth, environmental degradation tends to be much but as time passes, the benefit from growth is further spent on the environment to put it in good shape. In this connection, the inflow of FDI into the country would imply that more investment is made in the country: the higher the inflows, the higher the investment and growth in the economy. However, as more effort is made for the growth, the possibility of various damages to the environment could arise and which raises an issue of making necessary policies. But policies are better made when there are adequate data at hand.

Several studies have looked into this area. The work of Zhu et al. (2016) which is a cross country study, Bao et al. (2010), Adejumo and Asongu (2019) and Bakhsh et al. (2017) which are country-specific are some of the examples of works in this area. However, Adejumo and Asongu (2019) and Zhu et al. (2016) found an inverse relationship between carbon emission and FDI and the work of Zhu et al (2016) further found little evidence of a U-shaped curve hypothesis. In their submission, Bao et al. (2010) and Bakhsh et al. (2017) found a direct relationship between FDI and pollution though using more measures for pollution than the other studies. Since a conclusion has not been reached on this issue, our intention, in this case, is to build on Adejumo and Asongu (2019) by following Bao et al. (2010) together with Bakhsh et al. (2017) for the specific case of Nigeria. However, resting on methodology, our study deviates from the two findings as it gives credence to the usage of system GMM which is more robust than the three-stage least square used in the previous aforementioned studies. Also, in examining the factors that determine FDI, we include human capital investment which other studies did not consider. Its inclusion is justified on the ground that human capital quality in the host country tends to strengthen the performance of FDI in the state. Examining the connection between FDI and the environment can thus be categorized into scale effect (income), technique effect (i.e. the effect of technology adopted in the production process) and composition effect (changing structure of the economy). The outcome was very much different (rest on the methodology) and gives further analysis for FDI-pollution studies in Nigeria.

Also, it is clear that efforts to improve the growth level of an economy often make the environment suffer major setbacks posing threat to the environment by various economic activities in the country. Hence, there arises the possibility that FDI inflow into the country could pose some threats to the environment. Thus, this study would precisely explore the impact of FDI inflow on the environment by taking necessary measures to capture environmental pollution which would include CO_2 emission. Also, the effort would be made to ascertain the EKC hypothesis for the case of Nigeria and which (with the use of system GMM) will provide adequate findings in this area.

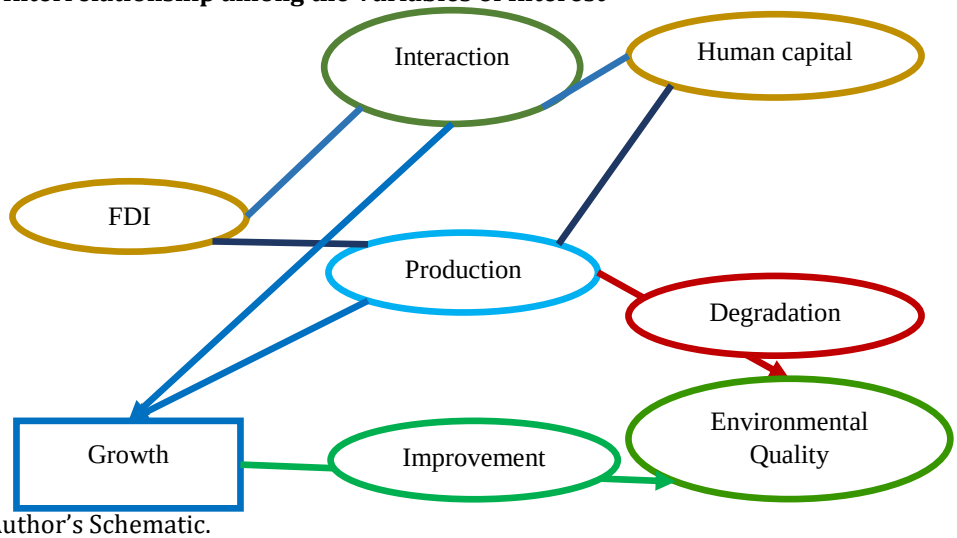
2. Theoretical Framework and Review of Literature

Theoretical Framework

Theories that explain the growth process of the economy are numerous, but the choice of its applicability to any research study will depend on the composition of variables therein. Some of these theories include endogenous and exogenous growth models. Under the endogenous theory, it is believed that the variables that bring about growth are determined in the model while the exogenous model holds that such variables are determined outside the framework of the model. In relation to this study which centres on examining the connection that exists among FDI, economic growth and environmental quality in the country, we analyze our framework based on endogenous growth theory and we lend credence to the popular EKC Hypothesis. This hypothesis holds that at the initial level of growth, economic activities tend to cause more degradation to the environment. And as the growth process improves, the demand for a cleaner environment through improved growth tends to dominate the economy. As shown in figure 1, when economic activity increases, income per capita will also increase, leading to a rise in the quest for a cleaner environment which can equally lead to having adequate capacity in allocating resources for the protection of the environment.

Basically, FDI can directly affect pollution emissions as shown through the volume of production (the scale effect), the mode of technology adopted (technique) and the structural composition of the economy (composition effect). The other effect stems from the GDP per capita channel and which resulted in increasing the physical capital of the host country. Figure 1 clearly explains our variables of interest and their interconnection. This study will analyze eight variables, namely: FDI, Human capital, capital stock, labor, carbon emission (co2), industrial output, population and GDP. In explaining the connection among these variables, the inflow of FDI is expected to lead to growth but this growth will be much improved in the presence of skilful human capital. At the same time, the role played by the human capital in this model will much similar to the growth-capital flows relationship. However, the worrisome part of this analysis can be coined in the phrase: "no free lunch". As the production process takes place, the usage of energy contributes a higher amount to the environmental quality of the economy. But with much improvement in the growth, higher demand for a cleaner environment could eventually dominate the ground which will then lead to further growth.

Figure 1: Interrelationship among the Variables of Interest



Source: Author's Schematic.

Literature Review

Several works have been done in examining the efficacy of human capital in enhancing the growth effect of FDI on economic growth. The results from such findings have been very mixed. Some outcomes of the findings upheld the notion that human capital is a transmission mechanism for knowledge sharing, technological absorption and diffusion of skill which always ensure further growth in the economy. In some other studies, human capital investment is not much significant in relating FDI to economic growth. Other similar studies have however attributed much significance to human capital in influencing FDI in the growth process. Some literature has also found that though FDI contributes to the growth of the economy, its impact on damaging the environmental quality is much more prominent. Agbola (2012) investigated connection the between FDI and remittances on economic growth in Ghana taking human capital as a constraint. He made use of the Fully Modified OLS method with annual data from 1965 to 2008. The empirical result indicated that both FDI and remittances enhance economic growth in Ghana and the growth is further improved through the presence of the quality of human capital in the country. The study also found that consumption does stimulate and sustain economic growth in the country.

A similar study in Nigeria by Awolusi (2012) examined the long-run relationship that exists between the international factors and economic growth and also assessed the short-run impact of FDI inflows, trade and local investment on economic growth over the period between 1970 and 2010. The result from the vector error correction model shows that variables in Nigeria model have a long-run relationship with one another and were adjusted in the short run via the three channels. The result further revealed a short-run causal effect among the variables for the country. Another work by Hitam and Borhan (2012) investigate the two most important benefit and cost of FDI in Malaysia which is the growth of gross domestic output and environmental damage. The methodology for the study was a non-linear regression model with annual data between 1965 and 2010. The result indicated that the environment Kuznets curve exists and FDI increases environmental damage. For developing countries, Majeed and Ahmed (2008) had earlier evaluated how the development of human capital can be effective in attracting FDI in developing nations. This study was done from 1970 to 2004 with a panel fixed effect method for 23 developing countries.

The finding shows the importance of market-seeking motive and efficiency-seeking motive in attracting FDI. It also shows that government consumption and military expenditure are complementary and significant. The interest rate has a direct impact on FDI because higher interest rates in the foreign country mean more MNCs have a cost advantage of financing from receiving countries. Omri et al. (2014) also investigated the causality among CO_2 emissions, FDI and economic growth for a group of fifty-four (54) countries in Europe, Central Asia, America, the Middle East and Africa using a dynamic simultaneous-equation panel estimation model. The scope of the study was 21 years running from 1990 to 2011. The result provides evidence of one-to-one causality between FDI inflows and economic growth for all the panels and between FDI and CO_2 emission for all panels, except Europe and North Asia. It also indicates the existence of one-directional causality running from CO_2 emission to economic growth with exception of the Middle East, and Africa panels for which one-to-one causality between these variables cannot be rejected.

The work of Azam and Ahmed (2015) validates the endogenous growth model using some countries in the commonwealth states by focussing on the impact of human capital and FDI on economic growth. Annual time-series data from 1993 to 2011 was used and the methodology was panel regression of fixed effect. The result of their findings supports the hypothesis that human capital growth is critical for economic growth. Also, FDI was found to be effective in promoting the growth in the region and there exist country-specific differences across CIS. Hussaini and Kabuga (2016) however, examine the impact of FDI and human capital on growth in Nigeria using time series data between 1980 and 2016. The result from VECM with structural break gives evidence of a long-run association between FDI, human capital development and economic growth in the country. The study also found that FDI, human capital development and level of investment have a positive connection with economic growth, while it was very weak for human capital development. The results in the short run, suggest the first and second lags of FDI, HCD and GCF are positive and significantly connected to economic growth.

A similar study in China by Fafona et al. (2018) test the long-run relationship between Chinese FDI, agriculture and economic growth in the host country with annual data from 2003 to 2015 using the pool

mean group and VECM panel granger causality model. The result indicates that Chinese FDI, domestic investment and agriculture spur economic growth contrary to some studies which found that Chinese FDI does not cause economic growth. The result further shows that there is no significant panel-VECM Granger causality from Chinese FDI to economic growth, from economic growth to Chinese FDI, from agriculture to economic growth and from economic growth to agriculture. A study in MENA countries by Abdouli and Hammami (2015) examined the impact of foreign direct investment, environmental quality and capital stock on economic growth for 17 countries in the region. The data spans from 1990 to 2012 using a dynamic panel of random and fixed effects.

The empirical results show that the increase in FDI inflows and capital stock enhances the economic growth process in MENA countries. On the other hand, the findings demonstrated that economic growth in MENA countries reacts negatively to environmental degradation. A similar study by Bakhsh et al. (2017) examines the impact of foreign direct investment on environmental pollution and economic growth and also finds the determinants of FDI inflows in Pakistan using annual data series from 1980 to 2014. The study used the 3SLS methodology and the result shows that an increase in economic growth leads to more pollution emissions.

Scale effect shows that stock of capital and labor has a positive effect on the economic growth of Pakistan while pollution has a negative effect on growth. On capital accumulation effect, economic growth and foreign direct investment have a positive and significant effect on the stock of capital. Also, economic growth declines as pollution cross a certain limit. Foreign direct investment is also found to be positively related to pollution. In another study, Li, Dong, Huang and Failler (2019) investigate the impact of FDI on environmental performance through a panel quantile regression model. The data scope runs from 1990 through 2014. Their evaluation was based on environmental performance in 40 countries. Their findings show that FDI has little significance on environmental performance. It further shows that the impact of FDI varies from developed to developing countries, in which heterogeneity of outcome exist for the sample size in the various region sampled. Also, the work of Wang, Wang and Sun (2020) analyzes the interactive effect between corruption and FDI on environmental pollution through the application of a spatial econometric model to the panel data of China's 29 provinces from 1994 to 2015 with a comparative effect between Eastern part, central and western regions. According to their findings, FDI inflows reduce environmental quality, while such an impact on the environment with the presence of corruption leads to an inflow of low-quality FDI. With this, it weakens the spill-over effect of FDI and thus leads to further environmental pollution.

3. Methodology

Model Specification and Estimation: In the original Solow growth model, the rates of savings, population growth and technological progress are assumed to be exogenous, with two inputs, namely, capital and labor. Assuming a Cobb-Douglas production function, the production at time t is given by

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha} \qquad where\ 0 < \alpha < 1 \qquad 3.1$$

Where Y is output, K is capital, L is labor and A is the level of technology. L and A are assumed to grow exogenously. In this model, the central prediction is concerned with the impact of saving and population growth on real income. However, Mankiw et al. (1992) modified this model by adding human capital such that the total savings from output Y are now invested and shared between physical and human capital. The modified model is as follows:

$$Y_t = K_t^{\alpha}(H_t, FDI_t)^{\beta}(A_t L_t)^{1-\alpha-\beta} \qquad 3.2$$

Where FDI is the foreign direct investment flows that are being aided by the available level of human capital (H) in the economy and all other variables are as defined before. The belief, concerning this model, is that human capital investment plays many roles in the growth process of the economy.

Following the equation model in the theoretical framework adopted by this study and after incorporating relevant variables in the model, the following system equations will be estimated by this study. The effect of FDI on the environment of the host country could be of the following channels: scale effect (Gross Domestic Product), technique and composition effects (Bakhsh et al., 2017). Thus, we categorize pollution emission into the following three effects:

$$PE = RGDP + TE + CE \qquad 3.3$$

In this equation, the scale effect is measured through physical capital stock K, composition effect, through the ratio of industrial output to GDP and technique effect through the ratio of total pollution to industrial output. In studying the scale effect of foreign direct investment, we are going to analyze how a foreign direct investment will affect economic growth by enhancing domestic physical capital accumulation. This effect can be examined by estimating the following equation:

$$RGDP = \delta_0 + \delta_1 FDI + \delta_2 K + \delta_3 H + \delta_4 PE + \varepsilon_t \quad 3.4$$

From equation 2, GDP is real GDP, FDI is foreign direct investment, K is stock of capital, H is human capital, and PE is pollution emissions. δ_0 is constant, δ_1 to δ_5 are the parameters to be estimated, ε_t is a white noise error term.

Coefficient of pollution emission is expected to have a negative sign because of its effect and its recovery cost from the damage. According to Cole et al. (2011), FDI directly affects economic growth while Zhang et al. (2004) hold that it indirectly increases the physical capital stock in the country. This indirect effect of FDI on economic growth forms the following equation:

$$PK = \beta_0 + \beta_1 FDI + \beta_2 GDP_{t-1} + \varepsilon_t \quad 3.5$$

In this equation, the lagged value of GDP is used to show the level with which economic growth and its environmental imbalance affect capital accumulation. FDI is believed to influence the stock of capital of an economy. For technique effect, we are going to estimate the following equation:

$$TE = \alpha_0 + \alpha_1 FDI + \alpha_2 PD + \alpha_3 GDP + \varepsilon_t \quad 3.6$$

TE is measured as a ratio between pollution emission per unit of industrial output and every other variable remained as defined before while PD is population density. As a matter of consequence, the technique effect will increase the damage cost and the process of recovering that cost will negatively affect output. However, in this case, an increase in economic activities (GDP) raises per capita income, which will eventually lead to higher demand for a cleaner and better environment.

To examine this effect (i.e. the composition effect), we will estimate the foregoing equation:

$$CE = \gamma_0 + \gamma_1 FDI + \gamma_2 PK + \gamma_3 GDP + \gamma_4 H + \varepsilon_t \quad 3.7$$

Where CE is the composition effect which is the ratio of industrial output to GDP and H is the level of available human capital. The relationship between industrial output and physical capital is expected to be positive as the higher capital stock would cause industrial output to rise. Also, change in the level of economic activities is expected to reflect the industrialization process of the economy and the demand for a cleaner environment. The incorporation of the variable H is to explain the contribution of human capital in boosting industrial activities. Factors influencing FDI are numerous and could be time and country-specific. In that wise, we will establish these factors by estimating equation 3.6 below to show the determinant of FDI via the Nigerian economy.

$$FDI = \varphi_0 + \varphi_1 FDI_{t-1} + \varphi_2 H + \varphi_3 POL_{t-1} + \varepsilon_t \quad 3.8$$

One period lag value of FDI is used in the equation to avoid the endogenous problem and to estimate the self-accumulation of FDI. The variable H is introduced in the model to show the impact of human capital on the FDI while PE is the amount of pollution emission determining the impact of the decision to invest in Nigeria. Thus, equations 3.4 to 3.8 will be estimated.

Equations 3.4 and 3.5 are for scale effects while equations 3.6 and 3.7 are for technique and composition effects respectively. Equation 3.8 is to estimate the determinants of FDI in the Economy. However, estimation of system equations of this nature requires that we follow the usual rank and order conditions. Examining the equations further and avoiding the endogeneity problem requires that the estimation is done through either two stages least square, three-stage least square, or system GMM among others. But it is generally known that GMM is more efficient as it ensures the application of a weighing matrix that is more robust to heteroscedasticity of unknown form. Thus, our estimation is done using the GMM Time-series (HAC) whose robustness extends to the autocorrelation of unknown forms. For easy interpretation, all our variables were in log form before estimation.

Data Sources and Variable Measurement

Data Sources: The study makes use of secondary data. The data for the study were sourced from various data banks which will include the Central bank of Nigeria bulletin, Nigeria Bureau of Statistics, NBC, World Development Indicator, WDI, and the Penn world Data bank. The scope of the study spans from 1981 to 2020. This period is adjudged to incorporate major policies of the Nigerian economy which hitherto involved those made to ensure foreign participation as a way to boost the economy.

Measurement of Variables

Table 1: Description and Measurement of Variables

S/N	Variable	Description	Sources
1	FDI	Foreign direct investment inflows	WDI
2	L	Labour employed	Penn world Tables
3	POP	Population	Penn world Tables
4	H	Human Capital	Penn world Tables
5	EMO	CO_2 Emission	Penn world Tables
6	GDPPC	Gross Domestic Product Per Capita	CBN
7	IO	Industrial Output	CBN
8	PC	Physical Capital	Penn world tables

Source: Author's Compilation.

4. Results and Discussion of Findings

This section will present the result of our GMM and OLS estimations.

Scale Effect of FDI: The result for the scale effect is illustrated in table 1. According to the statistics therein, both physical and human capital contribute positively to economic growth, though that of physical capital is not significant. Possibly, its insignificance could be arising from the nature of the Nigerian economy which is still developing where attention to the capital building is not prominent. The direct impact of FDI on growth was found to be positive and significant. As shown in the table, a 1% change in FDI will raise economic growth by 0.283% which is much lower when compared to the impact of human capital.

Table 2: Scale Effect

Variables	RGDP	
	GMM	OLS
Constant	3.017 (0.00)*	11.54 (0.00)*
FDI	0.283 (0.00)*	0.041 (0.17)
K	0.003 (0.52)	-0.026 (0.28)
H	1.076 (0.00)*	3.423 (0.00)*
PE	0.307 (0.00)*	-0.062 (0.69)
Adj-R^2	*0.89*	*0.97*

P-Values are in parentheses. *Shows 1% sig. However, the indirect effect of FDI can be measured through its effect on capital stock which is the multiplication of the coefficient of capital stock in equation 5.4 and of FDI 5.5. This gives 0.001188 (0.003 x 0.396). In total, the impact of FDI on growth is found by summing up the direct and indirect effect which is 0.284. This figure is still not significantly different from the parameter of the direct effect-an indication of the weak impact of capital stock in the country. The pollution emission and its impact on economic growth were significant and positive. It contributes about 0.31% to growth, implying that technological adoptions by multinationals in the country are becoming environmentally friendly. This was in line with Bao et al. (2010) and Bakhsh et al. (2017). The effect of previous growth on physical capital accumulation was positive and significant in Nigeria [α = 0.181, p-value (0.01)]. Table 2 and 3 shows that the GMM model behaves better than the OLS (see the value of adjusted R^2). This possibly raises an issue of the presence of an endogeneity problem in the model which has been solved using system GMM.

Table 3: Capital Stock Effect

Variables	Capital Stock, K	
	GMM	OLS
Constant	3.906 (0.05)**	4.386 (0.31)
FDI	0.396 (0.00)*	0.379 (0.09)***
GDP PC	0.181 (0.01)**	0.144 (0.27)
Adj-R^2	*0.39*	*0.40*

P-values are in parentheses. *, ** and *** show 1, 5 and 10% of sig.

Technique Effect: The result in table 4 shows the technique effect of FDI on the host country. Our result indicates a positive relationship between pollution emission and the flow of FDI in the country. This shows that marginal pollution damage rises with a higher FDI. According to statistics therein, a 1% increase in FDI will increase the pollution per unit of industrial output by 1.73%. This is very enormous damage indeed. This significant effect is attributed by Bakhsh et al. (2017) to the refusal of foreign investors to follow appropriate strategies for pollution abatement. The parameter of population density was positive and significant in its effect on pollution per unit of industrial output. This indicates that as population density rises, pollution emission becomes relatively larger and this might necessitate strict pollution regulation measures by the government authority. The impact of GDP per capita was negative and significant, indicating lower marginal pollution damage from rising GDP per capita. This suggests that people are becoming aware of the damages of the pollution and are making effort to control it. On this ground, it could be said (as put by Bao et al., 2010) that the country is 'over the hump' of the EKC.

Table 4: Technique Effect

Variables	Tech	
	GMM	OLS
Constant	-89.70 (0.00)*	-6.547 (0.04)**
FDI	1.726 (0.00)*	-0.035 (0.45)
PD	12.97 (0.00)*	1.642 (0.02)**
GDP PC	-3.587 (0.00)*	-1.115 (0.00)*
Adj-R^2	*0.45*	*0.99*

P-values are in parentheses. * and ** show 1 and 5% of sig.

Composition Effect: The composition effect is illustrated in table 5. In the case of FDI, its contribution to the share of industrial output in the overall economy is negative and significant. This is due to more pollution damage emanating from an increase in FDI. Thus, the cost is much more effectual than the benefit arising from the share of industrial output in the economy. Also, capital per unit of labor affects industrial output share in a negative and significant manner, suggesting inadequacy of capital stock in the industrialization process of the economy. The GDP per capita was negative and significant. This implies that as per capita income increases, the industrial composition tends to change toward developing clearer and more value-added products and services. It can be further argued that an increase in per capita income leads to generation or more pollution whose negative impact is reflected in industrial composition.

Table 5: Composition Effect

Variables	Comp	
	GMM	OLS
Constant	0.603 (0.02)**	-1.324 (0.02)**
FDI	-0.044 (0.00)*	0.039 (0.20)
GDP PC	-0.024 (0.00)*	-0.082 (0.00)*
K/L	-0.093 (0.00)*	-0.052 (0.02)**
Adj-R^2	*0.47*	*0.65*

P-values are in parentheses. * and ** show 1 and 5 % of sig.

Determinants of FDI Inflows in Nigeria: In table 6, the results of the determinants of FDI in the country are illustrated. First, the self-accumulation effect of FDI is found as a significantly positive effect of previous FDI. According to our result, a 1% change in the previous FDI in Nigeria will increase the current FDI by 0.79%.

Also, the contribution of human capital development to FDI is found to be significant and positive. This goes to explain that the presence of human capital in the country tends to attract more FDI inflows. Also, an associated parameter of pollution emission is found to be negative and significant. This suggests the possibility of various efforts by the government to ensure a clearer environment which might necessitate a higher cost of production for the multinationals and incidentally affects FDI inflows.

Table 6: FDI Determinants

Variables	**FDI**	
	GMM	**OLS**
Constant	9.199 (0.00)	17.04 (0.07)**
FDI_{t-1}	0.789 (0.00)*	0.407 (0.02)*
H	2.210 (0.00)*	4.752 (0.03)*
PE_{t-1}	-0.521 (0.00)	-0.592 (0.49)*
Adj-R^2	*0.72*	*0.76*

P-values are in parentheses. *, and ** show 1 and 5% of sig.

5. Conclusion, Recommendations and Policy Implications

This study investigates environmental pollution arising from FDI inflows in the country through scale, technique and composition effects. Our findings are very striking and give further evidence on FDI-Pollution analysis in the country. Our result shows that physical and human capital contributes positively to the economic activities and both direct and indirect impact of FDI was found to be significant and positive on growth. As for the pollution, its effect was positive indicating that entry of FDI in the country is becoming more environmentally friendly. Also, the various economic activities in the country contribute positively to the stock of capital which further intensifies the impact of FDI on growth. On the technique effect, the marginal damage arising from FDI inflows becomes larger as FDI increases. The damage becomes more prominent from rising population density though the effect of per capita income suggests that people are becoming aware of maintaining a cleaner environment. Our findings from industrial composition suggest that environmental damage arising from FDI inflow into the industrial sector is significant. The result further reveals that the capital-labor ratio is not large enough to command a higher share for the industrial sector than the whole economic activities in the country.

On the determinant of FDI, both self-accumulation of FDI and human capital investment attract FDI inflows in the country while the possible cost arising from strict environmental management measures of the host country dispels it. Our observation from the forgoing suggests that FDI inflows contribute to economic improvement through scale effect (output) and to rising pollution emission through technique and composition effects. We thus suggest that the institutional structure of the country should be made to encourage FDI inflows and regulate the activities of the multinationals and local firms toward the adoption of environmentally friendly technology. Also, government and various economic stakeholders should make effort to invest in both physical and human capital given their importance in driving growth and attracting foreign investment. The policy implication arising from the study gives rise to the fact that more consideration should be energized to ensuring the free flow of FDI into the country and in doing this attention should be directed to environmental protection. Also, industrial activities should be placed under adequate control to such an extent that will not constitute a threat to the environmental condition of the people.

References

Abdouli, M. & Hammami, S. (2015). The impact of FDI inflows and environmental quality on economic growth: an empirical study for the MENA countries. J Knowl, Econ; Faculty of Economics and Management of Sfax, Sfax, Tunisia. https://doi.org/10.1007/s13132-015-0323-y

Akintoye, V., Adejumo. & Asongu, A. (2019). Foreign direct investment, domestic investment and green growth in Nigeria: any spill-over? European Xtramile Contre of African Studies, 19(working paper/078).

Ali, N., Phoungthong, K., Techato, K., Ali, W., Abbas, S., Dhanraj, J. A. & Khan, A. (2022). FDI, Green Innovation and Environmental Quality Nexus: New Insights from BRICS Economies. *Sustainability*, 14(2181), 1–

17.

Awolusi O. D. (2012). Foreign direct investment and economic growth in Nigeria: a vector error correction modeling. *Journal of Research in Economics and International Finance*, 2(3), 58–69.

Azam, M. & Ahmed, A. M. (2015). Role of human capital and foreign direct investment in promoting economic growth. *International Journal of Social Economics*, 42(2), 98–111.

Bao, Q., Chen, Y. & Song, L. (2011). Foreign direct investment and environmental pollution in China: a simultaneous equations estimation. Environment and Development Economics, 71–92.

Cole, M. A., Elliott, R. J. R. & Zhang, J. (2011). Growth, foreign direct investment, and the environment: evidence from Chinese cities. *J. Reg. S. C.*, 51(4), 121e138.

Evans, E., Opoku, O., Adams, S. & Adewale, O. (2021). The foreign direct investment-environment nexus : Does emission disaggregation matter ? *Energy Reports*, 7, 778–787.

Frank Wogbe Agbola. (2013). Does human capital constrain the impact of foreign direct investment and remittances on economic growth in Ghana? *Applied Economics*, 45(19), 2853 2862.

Hitam, M. & Borhan, H. (2012). FDI, growth and the environment: impact on quality of life in Malaysia. *Procedia-Social and Behavioural Science*, 50, 333–342.

Hussaini, M. & Kabuga, N. A. (2016). Foreign direct investment and economic growth in Nigeria: a vector error correction modeling. *Bayero Journal of Social and Management Studies*, 9(2), 58–69.

Kankou Hadia Fofana. (2018). Dynamic Relationship between Chinese FDI, Agricultural and Economic Growth in West Africa: An Application of the Pool Mean Group Model. J. Phys.: Conf. Ser., 1060(012066).

Khuda Bakhsh, Sobia Rose, M. F. A. & Ahmad, N. (2017). Economic growth, CO2 emissions, renewable waste and FDI relation in Pakistan: New evidence from 3SLS, Journal of environmental management. *Journal of Environmental Management*, 196, 627–632.

Li, K., Gong, W. C. & Choi, B. R. (2021). The Influence of Trade and Foreign Direct Investment on Green Total Factor Productivity: Evidence from China and Korea *. *Journal of Korea Trade*, 25(2), 95–110.

Majeed M. T. & Ahmed, E. (2008). Human capital development and FDI in developing countries. *journal of Economic Cooperation*, 129(3), 79–104.

Mankiw, N., Romer, D. & Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107, 407–437.

Omri, A., Nguyen, D. K. & Rault, C. (2014). Causal interactions between CO2 emissions, FDI, and economic growth: evidence from dynamic simultaneous-equation models. *IEcon. Model*, 42(2), 382-389.

Wang, S., Wang, H. & Sun, Q. (2020). The Impact of Foreign Direct Investment on Environmental Pollution in China : Corruption Matters. *Environmental Research and Public Health*, 17(6477), 1–20.

Yimer, A. (2017). Macroeconomic, political and institutional determinants of FDI inflows to Ethiopia: an ARDL approach. *Africa Business Research, Addis Ababa University, Addis Ababa, Ethiopia*, 7(354), 9.

Zhang, J., Wuand, G. & Zhang, J. (2004). Estimation on China's regional physical capital stock. *Econ. Res*, 10, 35-45.

Zhu, H., Duan, L., Guo, Y. & Yu, K. (2016). The effects of FDI, economic growth and energy consumption on carbon emission in ASEAN-5: evidence from panel quantile regression. *Journal of Economic Modelling*, 58, 237–248.