

FDI, Economic Growth and Environmental Quality in the Nigerian Economy: New Evidences from System GMM

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Abstract

This study examines the effect of foreign direct investment through economic activities on environmental quality of Nigerian economy by using annual data from 1981 to 2020. Our estimation of simultaneous equation model was done through system GMM where we estimate scale, technique and composition effects of foreign direct investment. Our results reveal that foreign direct investment improves economic activities through scale effect and damage 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 adoption of environmental friendly technology in the production process by both local and foreign investors. Also, more investment should be made on physical and human capitals in the country to attract more foreign direct investment.

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

Background to Study

Environmental pollution is an important issue in the growth process of any economy. According to Hitam and Borham, deterioration of environment begins to have direct impact on the quality of human life or even a threat to survival of mankind as the growth process progresses. The effort of mankind in the process of making growth often results in environmental degradation [1]. Such degradation could be pollution of air and some other forms which often pose serious danger to human existence. In that wise, the management of the environment should be of a paramount interest to any government. In addressing this, some certain percentage of budgets should be earmarked for ensuring safety of environment thereby helping in making further growth in the economy.

It is worth noting that various economic activities in making growth progress often have serious effect on the environment. The environmental Kuznets curve (hence EKC) hypothesis suggests that at 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 on 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. which is a cross country study, Bao et al, Adejumo and Asongu and Bakhsh et al which are country specific are some of the examples of works in this area [2-5]. However, Adejumo and Asongu and Zhu et al. found negative relationship between carbon emission and FDI and the work of Zhu et al further found little evidence of U-shaped curve hypothesis. In their submission, Bao et al. and Bakhsh et al. found positive relationship between FDI and pollution though using more measure for pollution than the other studies. Since conclusion has not been reach on this issue, our intention in this case is to build on Adejumo and Asongu by following Bao et al. and Bakhsh et al. for specific case of Nigeria. However, rest on methodology, our study deviates from the two findings as it gives credence to the usage of system GMM which is more robust than three-stage least square used in the previous aforementioned studies [2-5]. 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 the quality of human capital in the host country tend strengthen the performance FDI in the state.

The impact of FDI on environment are thus categorised into scale effect (income), technique effect (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 on the growth level of an economy often make the environment to suffer major setback 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 measure to capture environmental pollution which would include CO2 emission. Also, effort would be made to ascertain environmental Kuznets curve hypothesis for the case of Nigeria and which (with the use of system GMM) will provide adequate findings in this area.

Theoretical Framework and Literature Review

Theoretical Framework

Theories that explain the growth process of 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 model. Under endogenous theory, it is believed that the variables that bring about growth are determined in the model while exogenous model holds that such variables are determined outside the framework of the model. In relation to this study which centres on examining the relationship between FDI, economic growth and environmental quality in the country, we analyse our framework base on endogenous growth theory and we lend credence to the popular Environmental Kuznets Curve Hypothesis. The EKC hypothesis holds that at initial level of growth, economic activities tend to cause more degradation to the environment. And as the growth process improves, the demand for cleaner environment through improved growth tends to dominate the economy.

As shown by figure 3.1, an increase in economic activity raises income per capita, leading to an increase in demand for a cleaner environment which can further lead to having adequate capacity in allocating resources for the purpose of environmental protection and pollution abatement. Basically, FDI can affect affects pollution emissions through direct way as shown through scale, technique and composition effects. The Indirect effect stems from GDP per capita channel and which resulted to increasing the physical capital of the host country. Figure 3.1 clearly explain our variables of interest and their interconnection. This study will analyse eight variables, namely: FDI, Human capital, capital stock, labour, 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 play by the human capital in this model will much similar to growth-capital flows relationship. However, the worrisome part

of this analysis can be coined in the phrase: “no free lunch”. As production process takes place, the usage of energy contributes in higher amount to the environmental quality of the economy. But with much improvement in the growth, higher demand for cleaner environment could eventually dominate the ground which will then lead to further growth.

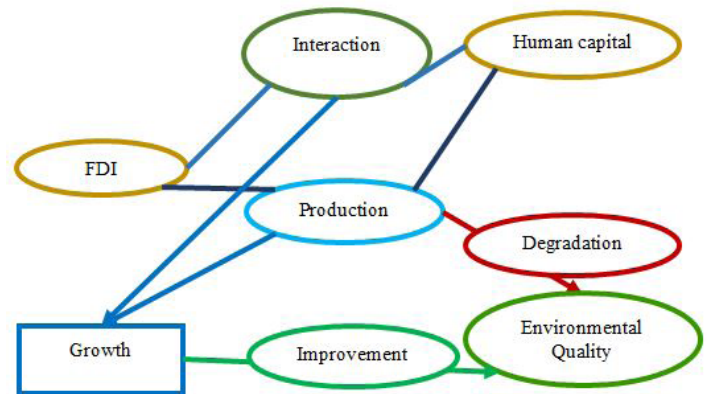


Figure 1: Interrelationship among the Variables of Interest
Source: Author’s Schematic

Literature Review

Several works have been done in examining the efficacy of human capital in enhancing growth effect of FDI on economy 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 has not been found to be much significant in relating FDI to economic growth. Other similar studies have however attributed much significance of human capital in influencing FDI in the growth process. Some literatures have also found that though FDI contribute to the growth of economy, its impact in damaging the environmental quality is much more prominent.

Agbola investigated whether human capital constraints the impact of FDI and remittances on economic growth in Ghana or not [6]. The study made use of Fully Modified OLS method with annual data from 1965 to 2008. The empirical result indicated that FDI and remittances enganges economic growth in Ghana and the growth is further improved through the presence of human capital skill base of the country. The study also found that household consumption is a key driver in stimulating and sustaining economic growth in the country. A similar study in Nigeria by Awolusi examined the long-run equilibrium relationship among the international factors and economic growth and also assessed the short run impact of inward FDI, trade and domestic investment on economic growth over the period of 1970 and 2010. The result from vector error correction model shows that variables in Nigeria model have a long-run equilibrium relationship with one another and were adjusting in the short run via three identified channels [7]. The result further

revealed a short run causal effect either running unidirectional or bidirectional among the variables for the country.

Another work by Hitam and Borhan investigate two most important benefit and cost of FDI on Malaysian context that is gross domestic growth and environmental degradation [1]. The methodology for the study was non-linear regression model with annual data from 1965 to 2010. The result indicated that environment Kuznets curve exist and FDI increases environmental degradation. For developing countries, Majeed and Ahmed had earlier evaluated the proposition that development of human capital can be instrumental in attracting FDI in development in developing countries [8]. This study was done for over a period of 1970 to 2004 with panel fixed effect method for 23 developing countries. The finding shows that the importance of market seeking motive and efficiency seeking motive in attracting FDI. It also shows that excessive government consumption and military expenditure are complementary and more significant. The impact of lending interest rate on FDI is positive because higher lending interest rates in host country means more MNCs have cost advantage of financing by home countries.

Omri et al. also investigated the causality links between CO₂ emissions, FDI and economic growth for a group of 54 countries in Europe, central Asia, Latin America and the Caribbean, the Middle East and North Africa and sub-Saharan Africa using dynamic simultaneous-equation panel estimation model [9]. The scope of the study was 21 years running from 1990 to 2011. The result provides evidence of bidirectional causality between FDI inflows and economic growth for all the panels and between FDI and CO₂ emission for all panels, except Europe and North Asian. It also indicates the existence of unidirectional causality running from CO₂ emission to economic growth with exception of the Middle East, North Africa and sub-Saharan Africa panels for which bidirectional causality between these variables cannot be rejected.

The work of Azam and Ahmed validate the endogenous growth model using ten countries in commonwealth of independent states (CIS) by examining the impact of human capital and foreign direct investment on economic growth. The data for the study was annual time series from 1993 to 2011 and the methodology was panel regression of fixed effect. The result from their findings support the hypothesis by confirming that human capital development is critical for economic growth. Also, FDI was found to have improved role in promoting growth in the region and there exist country-specific differences across CIS [10].

Hussaini and Kabuga however, examine the impact of foreign direct investment (FDI) and human capital development on growth in Nigeria using annual time series data between 1980 and 2016 [11]. The result from VECM with structural break gives evidence of long-run relationship between FDI, human capital development and economic growth in the country. The study also found that the long run vectors of FDI, human capital development and gross capital formation (GCF) have positive connection with economic

growth, while it was very weak for human capital development. In the short run the result suggests first and second lags of FDI, HCD and GCF are positive and significantly related to economic growth. In Ethiopia, Addis Yimer investigated the macroeconomic, political and institutional determinants of FDI inflows for the period of 1970 to 2013 using ARDL [12]. The result finds that political and institutional factors are crucial both in the long and the short run in FDI inflows to the country. On the macroeconomic side, the size of the country, availability of natural resources, openness to trade and depreciation in the nominal exchange rate are found to have positive effect on FDI inflows to the country. Also, macroeconomic instability is found to affect FDI inflows negatively. A similar study in China by Fafona et al. test the long run relationship between Chinese FDI, agriculture and economic growth in host country with annual data from 2003 to 2015 using 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 studied which found that Chinese FDI does not cause economic growth [13]. 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 examined the impact of foreign direct investment, environmental quality and capital stock on economic growth for 17 countries in the region [14]. The data spans from 1990 to 2012 using dynamic panel of random and fixed effect. The empirical results show that the increase in FDI inflows and capital stock enhance the economic growth process in MENA countries. On the other hand, the findings demonstrated that economic growth in MENA countries react negatively to the environmental degradation. Also, the work of Zhu et al investigated the impact of FDI, economic growth and energy consumption on carbon emissions in five selected member countries in the Association of South East Asian Nation (ASEANS-5) which are Indonesia, Malaysia, the Philippine, Singapore and Thailand [2]. The data was annual time series from 1981 to 2011 and the methodology was panel quintile regression model. The result shows the effect of FDI on carbon emission is negative, except at the 5th quintile and become significant at higher quintile. Energy consumption increases carbon emission, with the strongest effect occurring at higher quintile. Among the high-emission countries, greater economic growth and population size appear to reduce emissions. However, little evidence was found in support of an inverted U-shaped curve in the countries under study. It was further shown that a higher level of trade openness can mitigate the increase in carbon emission, especially in low- and high-emission nations.

A similar study by Bakhsh et al. 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 for the period of 1980 to 2014 [5]. The

study used 3SLS methodology and the result shows that increase in economic growth leads to more pollution emissions. Scale effect shows that stock of capital and labour has positive effect on the economic growth of Pakistan while pollution has negative effect on growth. On capital accumulation effect, economic growth and foreign direct investment have positive and significant effect on stock of capital. Also economic growth declines as pollution crosses 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 quintile 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 impact from 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 analyse the interactive effect between corruption and FDI on environmental pollution through the application of spatial econometric model to the panel data of China's 29 provinces from 1994 to 2015 with comparative effect between Eastern part, central and Western regions [15]. According to their findings, FDI inflows reduce environmental quality, while such impact on environment with the presence of corruption leads to inflow of low quality FDI. With this it weakens the spill-over effect of FDI and thus leads to further environmental pollution.

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 labour. Assuming a Cobb-Douglas production function, the production at time t is given by

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

This notation is standard; Y is output, K is capital, L is labour and A is the level of technology. L and A are assumed to grow exogenously. In this model, the central prediction is concerned on the impact of saving and population growth on real income. However, Mankiw et al. modified this model by adding human capital such that the total savings from output Y is now invested and shared between physical and human capital [16]. The modified model is as follows:

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

Where FDI is the foreign direct investment flows which is 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 much role 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 the composition effects (Bakhsh et al., 2017). Thus, we categorize pollution emission into the following three effects:

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

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 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, PE is pollution emissions. δ_0 is constant, δ_1 to δ_5 are the parameters to be estimated, ε_t is white noise error term.

Coefficient of pollution emission is expected to have negative sign because of its effect and its recovery cost from the damage. According to Cole et al. FDI directly affects the economic growth while Zhang et al. hold that it indirectly increases the physical capital stock in the country [17, 18]. This indirect effect of foreign direct investment 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, one period lagged value of GDP is used to show the level with which the economic growth and its environmental imbalance affect the accumulation of capital. 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 measures as 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, 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 cleaner and better environment. To examine this effect (i.e. the composition effect), we will estimate 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 composition effect which is 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 higher capital stock would cause industrial output to rise. Also, change in the level of economic activities is expected to reflect industrialization process of the economy and the demand for cleaner environment. The incorporation of the variable H is to explain the contribution of human capital in boosting the industrial activities.

Factors influencing FDI are numerous and could be time and country specific. In that wise, we will establish these factors by estimating the 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 endogenous problem and to estimate self-accumulation of FDI. The variable H is introduced in the model to show the impact of human capital in the FDI while PE is the amount of pollution emission determining the impact of decision to invest in Nigeria. Thus, equations 3.4 to 3.8 will be estimated. Equation 3.4 and 3.5 are

for scale effect 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 stage least square, three stage least square, system GMM among others. But it is generally known that GMM is more efficient as it ensures application of weighing matrix that is more robust to heteroscedasticity and contemporaneous correlation of unknown form. Thus, our estimation is done using GMM-Time series (HAC) whose robustness extends to autocorrelation of unknown form. For easy interpretation, all our variables were in log form before estimation.

Data: Sources and Measurement of Variables

Sources of Data

The study makes use of secondary data. The data for the study were sources 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

Results and Discussion of Findings

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

Scale Effect of FDI

The result for the scale effect is illustrated in table 6.1. According to the statistics therein, both physical and human capital contribute positively to the economic growth, though that of physical capital

is not significant. Possibly, its insignificance could be arising from the nature of the Nigeria economy which is still developing where attention to capital building is not prominent. The direct effect 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 weak impact of capital stock in the country. On the pollution emission, its impact on the economic growth was significant and positive. It contributes about 0.31% to

growth, implying that technological adoptions by the multinationals in the country are becoming environmental friendly. This was in line with Bao and Bakhsh et al The effect of previous growth on physical capital accumulation was positive and significant in Nigeria [$\alpha = 0.181$, p-value (0.01)] [3, 5]. Table 5.1 and 5.2 shows that GMM model behaves better than the OLS (see the value of adjusted R²). This possibly raises an issue of presence of endogeneity problem in the model which has been solved using system GMM

Table: 2 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 5.3 shows the technique effect of FDI on host country. Our result indicates positive relationship between pollution emission and flow of FDI in the country. This shows that marginal pollution damage rises with a higher FDI. According statistic 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 refusal of foreign investor to following 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: 3 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 5.4. 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 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 labour affects industrial output share in a negative and significant manner, sug-

gesting 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 valued-added product and services. It can be further argued that increase in per capita income leads to generation or more pollution whose negative impact is reflected in industrial composition.

Table: 4 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 5.5, the results of the determinants of FDI in the country are illustrated. First, self-accumulation effect of FDI is found as effect of previous FDI is significantly positive. According to our result, a 1% change in the previous FDI in Nigeria will increase current FDI by 0.79%. Also, the contribution of human capital development on 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, associated parameter of pollution emission is found to be negative and significant. This suggests the possibility of various efforts by the government to ensure clearer environment which might necessitate higher cost of production for the multinationals and incidentally affects FDI inflows.

Table: 5 FDI Determinants

Variables	FDI	
	GMM	OLS
Constant	9.199 (0.00)	17.04 (0.07)**
FDIt-1	0.789 (0.00)*	0.407 (0.02)*
H	2.210 (0.00)*	4.752 (0.03)*
PEt-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.*

Conclusion, Recommendation 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 environmental 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 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 capital-labour ratio is not large enough to command higher share for industrial sector from 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 coun-

try 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 adoption of environmental friendly technology. Also, government and various economic stake holders should make effort to invest in both physical and human capitals given their importance in driving growth and attracting foreign investment.

The policy implication arising from the study give rise to the fact that more consideration should be energised at ensuring free flow of FDI into the country and in doing this attention should be directed to environmental protection. Also, industrial activities should be placed on adequate control to such extent that will not constitute a threat to environmental condition of the people.

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