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## Foreign Direct Investment for Sustainable Economic Growth in Nigeria: Factor Analytic Approach

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### ABSTRACT

Nigeria has put in place an elaborate foreign direct investment policy in order to attract foreign investors. As the largest economy in Africa, Nigeria has become a final destination for foreign investors. Currently, Nigeria is the single largest recipient of FDI in Africa. Nigeria seeks to diversify its revenue base with the active participation of MNCs and so reduce overdependence on oil. The recent crash in the international oil price has caused deep abrasion in the Nigerian economy thereby casting aspersion on the effectiveness of FDI to stimulate growth. This study focused on identifying key factors which influenced the contribution of FDI to economic growth in Nigeria. The study revealed that two potent factors namely public sector investment and marginal efficiency of capital influenced the contribution of FDI to growth in Nigeria while public sector investment was found to boost foreign capital, declining marginal efficiency of capital eroded the private capital of domestic firms which had low absorptive capacity to harness the sophisticated technology of MNCs. It was recommended, inter alia, that only a dynamic FDI policy that takes into cognizance the importance of public sector investment and marginal efficiency of capital can harness FDI to contribute maximally to growth.

**Key words:** Foreign direct investment, economic growth, public sector theory, factor analytic approach

### 1. INTRODUCTION

Nigeria has realized for long that foreign direct investment (FDI) is a vehicle for transfer of technology which contributes to growth in much larger measure than does the domestic investment. Therefore, the federal government has continued to provide special incentives in order to motivate foreign firms to set up companies in the country. Carcovic and Levine (2002) had aptly remarked that economic rationale for offering special incentives to attract FDI frequently derives from the belief that foreign investment produces externalities in the form of technology transfer and spillovers. To Kudaisi (2014) FDI has a crucial role in Africa which is bedeviled with high poverty level and extremely low savings and income.

There is a need for FDI in Nigeria for filling the gap between targeted or desired investment and locally mobilized savings, for filling the gap between targeted foreign exchange requirements and those desired from net export earning plus public foreign aid (foreign – exchange gap), for filling the gap between targeted government tax revenue and locally raised taxes, and for filling the gap among management, entrepreneurship, technology and skill. Satisfying these needs would result to larger public financial resources for enhancing growth and development. Besides, the need for FDI is pivoted on its capacity to improve total factor productivity and its potential spillover benefits.

Based on the above-stated needs, the federal government had put in place dynamic FDI policies. Major FDI policy instruments in Nigeria include the following: (i) Foreign exchange rate (nominal exchange rate), (ii) government tax (corporate tax, tax burden, tax holiday), (iii) business environment (macroeconomic uncertainty), (iv) trade protection zone (level of tariff on import), (v) private sector investment (size of the public sector in the economy), (vi) capital allowance and interest rate to attract foreign investors.

No surprise, then, that FDI inflow has increased steadily over the years. Nigeria has remained the destination of foreign investors who seek to exploit the abundant natural resources and the large market which the country affords (Tumala et al., 2011). FDI inflow which stood at ₦3,620.10million in 1980 had increased to ₦386,104.47 million in 2014. This represents a percentage increase of 10565.58. The pattern of FDI that does exist in Nigeria, as elsewhere in Sub-Saharan Africa, is often skewed toward extractive industries. This implies that the differential rate of FDI inflow into Sub-Saharan African countries has been adduced to be due to natural resources, although the size of the local market may also be a consideration (Morriset, 2000; Asiedu, 2002; Ayodele & Sotola, 2014).

In spite of the rapidly rising FDI inflow into Nigeria, the growth of the Nigerian economy has continued to remain unsustainable. Even though, it is acclaimed as the largest in Africa and the third fastest growing in the world, the Nigerian economy is still monolithic being wholly oil and import dependent. The recent slide in international oil price has caused deep cracks in the Nigerian economy and exposed its fragile nature. Naira devaluation in the face of continuing decline in international oil price and the proposed austerity measures portend the susceptibility of the Nigerian economy to external shocks. And then the quick reversal of the annual growth rate of “the third world’s fastest growing economy” from 6.8 per cent to 4.6 per cent. This has cast a serious aspersion as to whether or not FDI was effective for enhancing growth in Nigeria. Evidences abound that the fastest growing third world countries or newly industrializing nations accounted for 90 per cent of the World’s FDI (Todaro, 1992). However, the Nigerian case is different as recent studies by Oyinlola (1995) and Adelegan (2000) reported an inverse relationship between FDI and economic growth in Nigeria. Certainly, the observed inverse relationship between FDI and growth in Nigeria has raised the curiosity of researchers who now seek an answer to the pertinent question: ‘What are the factors which influence the contributions of FDI to economic growth in Nigeria?’ It is the need to provide an answer to this question which constitutes the problem of this study.

Unless the potent factors influencing the contributions of FDI to economic growth in Nigeria are isolated, the huge expenditures incurred by the federal government for attracting foreign investors would only constitute a leakage from the country’s capital base. Only by identifying such factors and integrating them into macroeconomic policy instruments can it ever be possible to harness FDI for enhancing economic growth in Nigeria. This involved a detailed analysis of inter-correlations among common determinants of FDI and growth in order to extract common and specific factors in FDI – growth nexus in Nigeria.

Economic growth and FDI in Nigeria have 11 common determinants including market size (MKS), infrastructure (IFR), openness (OPN), natural resources (NAT), exchange rate (EXC), private investment(PVI), federal government expenditure (FGE), inflation rate (INF), interest rate (INT), gross consumption expenditure (GCE) and electricity (ECT) . Therefore, this article related to the condensing of the intercorrelations among GDP, FDI, MKS, IFR, OPN, NAT, EXC, PVI, FGE, INF, INT, GCE and ECT in order to extract factors which influence the interrelationships among them. By constituting the identified factors into macroeconomic policy instruments, it would be possible to activate FDI as an agent of economic growth in Nigeria.

To facilitate the execution of this study, it has been organized into six sections including the running section on ‘Introduction’. Section Two deals with literature review. Section Three deals with method and procedure. Section Four deals with the results of data analysis, while Section Five deals with empirical result and discussion. Finally, Section Six deals with conclusion and policy implication.

## **2. LITERATURE REVIEW**

The review of related literature has been discussed in this section under theoretical literature and empirical literature.

### Theoretical Literature

Several FDI theories were put forth by eminent scholars. Some of these theories which are relevant to this study have been discussed hereunder.

Production Cycle Theory of Vernon which was developed by Vernon in 1966 sought to explain certain types of foreign direct investment made by U.S. companies in Western Europe after the Second World War in the manufacturing industry. Vernon (1966) had identified four stages of production including innovation, growth, maturity and decline. These four stages of production were hinged around innovation and technology. The production cycle theory has applicability in Nigeria's manufacturing sector which is characterized by lack of innovation and poor technological base.

Internalization Theory. This theory attempts to explain the growth of transactional companies and their motivation for achieving FDI. Originally this theory was put forth by Coase in 1937, reformulated by Buckley and Casson (1976) and later developed by Hennart (1982). The theory lays emphasis on two major determinants of FDI inflow- one was the removal of competition, and the other was the advantages which some firms possessed in particular activity (Hymer, 1976). The present study has included this determinants as important variables in its analysis.

Theory of Exchange Rates on Imperfect Capital Market. This is another FDI theory which sought to explain factors influencing FDI inflow. According to this theory, increase in real exchange rate tends to stimulate FDI inflow made by USD while a foreign currency appreciation has led to reduction in U.S. FDI by 25% (Cushman, 1985). The weakness of this theory is that currency risk rate theory cannot explain simultaneously FDI between countries with different currencies. However, the theory has relevance in the Nigerian situation where exchange rate policy is an important FDI policy instrument.

Assignment Theory of FDI. This theory analyzes both the volume of foreign direct investment and its composition between cross border acquisitions and Greenfield Investment (Nocke & Yeaple, 2008). According to the theory, there are two countries that can freely trade with one another. Factor price differences between countries give rise to Greenfield FDI and to cross-border acquisitions, while cross-country differences in entrepreneurial abilities give rise only to cross-border acquisitions. Thus, the assignment theory can generate two-way FDI flows even in the absence of transport costs and factor price differences. The choice of some relevant variables and their ordering in the scheme of this work conform to major propositions of this theory.

The theoretical base of this study is the modified internalization theory propounded by Dunning. Ohlin pioneered a work to identify and evaluate the significance of factors influencing both the initial act of foreign production by enterprises and the growth of such production (Dunning, 1988). Dunning had categorized MNCs into four groups: Market- seeking, efficiency-seeking, natural resources-seeking and strategic asset-seeking. The existence of different categories of MNCs had led to the emergence of various determinants of FDI. Commonly identified determinants of FDI, based on this theory include the following: Domestic market demand, natural resources, macroeconomic factors such as inflation rate and exchange rate, efficient government policy on investment, infrastructure development, policy variables like openness of the economy, etc. This has been expressed in the linear functional relationship in the form:

$$FDI = f(MKT, NAT, INF, EXC, INV, IFR, OPN, \dots)$$

where MKT is market size; NAT is natural resources; INF is inflation rate; EXC is exchange rate; INV is private investment; IFR is infrastructure; OPN is openness.

### **Empirical Literature**

Studies in this area are not entirely new. The increasing application of FDI policies to attract FDI into both developed and developing countries has aroused the interest of researchers on the efficacy of FDI for enhancing productivity and growth. Eight studies employing panel data reported unambiguously positive evidence on the aggregate and almost all of these were for developed countries: Liu et al. (2000) and Haskel et al. (2007) for UK, Damijan et al. (2001) for Romania, Castellani and Zanfei (2002) for Italy, Gorg and Strobl (2001) and Ruane and Ugur (2002) for Ireland, Keller and Yeaple (2003) for USA. Several studies using firm-level panel data found some evidences of negative effects of presence of multinationals on domestic firms on the aggregate. These include the following: Aitken and Harrison (1999) for Venezuela, and Czech Republic, Zukowska – Gagelmann (2000) for Poland, Konings (2001) for Bulgaria, Damijan et al. (2001) for seven countries in Central and Eastern Europe, Gorg and Strobl (2001) for Ireland, Lopez-Cordova and Exnesto(2002) for Mexico.

Louzi and Abadi (2011) investigated the impact of FDI on economic growth in Jordan. The study covered the period, 1990 to 2009. The econometric framework of cointegration and error correction mechanism was employed to capture two way linkages between variables interest. They reported a finding which suggests that FDI inflows did not exert an independent influence on economic growth in Jordan. The weakness of this approach is the use of small sample which could generate misleading results.

Hassen and Anis (2012) studied the impact of foreign direct investment and economic growth in Tunisia. The study covered the period, 1975-2009. OLS technique involving stationary test, co-integration tests, and error correction models was applied for the analysis of data. Results indicate that FDI could help boost the process of long-term economic growth.

Saqib et al. (2013) investigated the impact of FDI on economic growth of Pakistan. The study covered the period, 1981 to 2010. They employed OLS technique. Augmented Dickey Fuller test was used to established co-integration of the variables. The study revealed that Pakistan's economic performance was negatively affected by foreign investment.

A few studies on impact of FDI on growth in Nigeria reported conflicting findings on the contribution of FDI to economic growth. While some studies had reported that there was negative contribution of FDI to growth in Nigeria, others found that FDI contributed positively to economic growth in Nigeria.

Studies which reported positive contribution of FDI to growth in Nigeria include: Obinna (1983), Oseghale and Amenkhienan (1987), and Ariyo (1998).

Studies which reported negative contribution of FDI to growth in Nigeria include the following: Endozien (1968), Ogiogio (1995), Oyinlola (1995), Akinlo (2004), and Jerome and Ogunkola (2004).

Oyatoye et al. (2011) carried out a study to determine the impact of FDI in Nigeria. The study spanned across 1987 to 2006. They employed OLS technique for the analysis of data. They reported a finding which indicates that there was a positive relationship between direct foreign investment and GDP in Nigeria. A major limitation of this study is the application of regression technique to small sample.

Awolusi (2012) studied the long-run equilibrium relationships among international factors and economic growth as well as the short-term impact of inward FDI, trade and domestic investment on economic growth in Nigeria. He employed a multivariate co-integration technique. He found that the variables in Nigeria had a long-run equilibrium relationships with one another.

Adeleke et al. (2014) also studied the impact of FDI on economic growth in Nigeria. The study covered the period, 1999-2013. They employed OLS technique revolving around multiple regression for the analysis of data. They found that FDI was significantly related with economic growth. An important limitation of this study is the application of multiple regression to small sample which could yield unreliable results.

### **Shortcomings of Previous Works**

From the foregoing, it is evidently clear that there are conflicting findings on the impact of FDI on economic growth in Nigeria. Positive contribution of FDI to economic growth did not come as a surprise as it stands to validate the existing theories that FDI impacts positively on growth. Prominent among these theories are: Production cycle theory by Vernon (1966), internationalization theory developed by Buckley and Casson (1976) and Hennart (1982), theory of exchange on imperfect capital market by Cushman (1985), and assignment theory of FDI developed by Nocke and Yeaple (2008).

On the contrary, the finding of negative contribution of FDI to growth is not in conformity with the existing FDI theories. Surprising, though, there were no explanations for a failure to find evidence of positive contribution of FDI to economic growth in Nigeria. This was a direct consequence of choice of econometric tool employing multiple regression in these studies that allowed for answers to the question on 'how?' only. In other words, most of these studies reported findings on how much each determinant of FDI contributed to the variance in GDP. The preferred choice of highly sophisticated statistical technique of factor analysis in the present study allowed for the extraction of potent factors lying concealed in FDI-GDP nexus in Nigeria. Therefore, the present study aimed at providing answer, not only , to the question, how? but also to the question , 'what?' That means, it sought an answer to the question on what the factors are that affected the contributions of FDI to growth in Nigeria. In this way, the present study did not only yield results to mediate among the conflicting results of earlier studies, but also isolated factors which accounted for the magnitude and direction of the contribution of FDI to growth.

### **3. METHOD AND PROCEDURE**

The method and procedure adopted for the conduct and advancement of this study have been discussed in this section.

#### **The Data**

The data for the study were sourced from Central Bank of Nigeria (CBN). The study covered the period 1981 to 2014. The variables included in the analysis are those identified as determinants of FDI in the various reviewed theoretical and empirical literature.

#### **Empirical Model**

As stated earlier, the broad objective of this article is the identification of factors which influenced the contribution of FDI to economic growth in Nigeria. The study has employed the model used by Kudaisi (2014) to investigate the determinants of FDI in West Africa. Kudaisi (2014) had adopted the model in the form :

$FDI=f(GRGDP, GDPPC, INFL, OFEXCR, GOVTPOL, OPENNESS, INFRAS, LABOUR, NATURAL)$   
where FDI is the net FDI inflows as % of GDP; GRGDP is growth rate of gross domestic product (US\$); GDPPC is the GDP per capita; OPENNESS is openness index-total trade (% of GDP) ; INFL is the annual inflation rate; OFEXCR is the official exchange rate; INFRAS is the telephone lines; LABOUR is the total labour force; GOVTPOL is government policy; NATURAL is natural resources.

However, for this study there was a slight modification of Kudaisi model to reflect the major objective of the study which is to identify factors affecting the contributions of FDI to economic growth. The adapted form of Kudaisi model is presented thus:

$$GDP=f(FDI, MKS, IFR, OPN, NAT, EXC, PVI, FGE, INF, INT, ECT, GCE)$$

where GDP is gross domestic product; FDI is foreign direct investment; MKS is market size; IFR is infrastructure; OPN is openness; NAT is natural resources; EXC is exchange rate; PVI is private investment; FGE is federal government expenditure; INF is inflation; INT is interest rate; ECT is electricity and GCE is gross consumption expenditure.

### Factor Model Specification

Common factor model was used for this study. The justification for the choice of common factor model was the application of modified internalization theory propounded by Dunning which expresses a linear functional relationship among FDI, MKT, NAT, INF, EXC, INV, IFR, OPN,.... Romer (2003) had also expressed a functional linear relationship among G, Y, POP, SCH, INV, FDI, X in the form:

$$G=f(Y, POP, SCH, INV, FDI, X).$$

where G is growth in real GDP; Y is real GDP per capita; POP is population growth rate; SCH is level of secondary school attainment; INV is ratio of gross domestic investment to GDP; FDI is ratio of foreign direct investment inflow to GDP and X is a group of variable comprising group dummies and policy variables. Common factor model is appropriate when the variables are assumed to be a linear function of a set of latent variables ( Tucker et al., 1969 ;Ford et al., 1986). This model assumes that the variance can be divided into common and unique components, with the unique variance being further divided into specific and random error variance (Rummel, 1970).

There are 13 variables-GDP(CRN), FDI, MKS, IFR, OPN, NAT, EXC, PVI, FGE, INF, INT, ECT and GCE. Factor analysis model requires that the variables included in the analysis should be linearly related to each other (Cornish, 2007). Scatterplots of pairs of variables conformed to linearity. The factor model used for this study was developed by Cornish (2007). The model had been expressed algebraically in the form:

$$X_i = \alpha_{i1}F_1 + \alpha_{i2}F_2 + \dots + \alpha_{im}F_m + e_i$$

Suppose there are p variables  $X_1, X_2, \dots, X_p$  measured on a sample of n subjects, variable i is a linear combination of m factors  $F_1, F_2, \dots, F_m$  and  $m < p$ , where  $\alpha_i$ s are the factor loadings for variable i and  $e_i$  is the part of variable  $X_i$  that cannot be explained by the factors.

Since there are 13 variables, the number of factors that could be extracted is one-third of 13 which is approximately 4. Therefore, the factor analysis model has been written in the form:

$$GDP = \alpha_{i1}F_1 + \alpha_{i2}F_2 + \alpha_{i3}F_3 + \alpha_{i4}F_4 + e_i$$

Where  $\alpha_{i1}$  is the factor loading of factor 1

$\alpha_{i2}$  is the factor loading of factor 2

$\alpha_{i3}$  is the factor loading of factor 3

$\alpha_{i4}$  is the factor loading of Factor 4

$e_i$  is the part of the criterion variable GDP that cannot be explained by the factors.

### Validation Technique

To determine the suitability of factor analysis for the study, Kaiser-Meyer-Olkin (KMO) statistic and Bartlett's test of sphericity have been computed. KMO statistic was used to ascertain whether or not the factors were comprised of sufficient number of variables while Bartlett's test (Chi-Square) was used to ascertain whether or not the variables were sufficiently correlated . KMO statistic should exceed 0.7 to

justify the application of factor analysis while Bartlett's test (Chi-Square) value should be significant at 0.05 confidence interval to infer that the variables were sufficiently correlated (Cornish, 2007).

KMO statistic (computed) = .855  
 KMO statistic (criterion) = >.700  
 Approx. Chi-Square value = 622.143  
 df = 78  
 Probability = .000

As can be seen above, KMO statistic is 0.855. Since this is greater than the criterion KMO statistic of 0.700, KMO statistic of 0.855 was considered to be significant. Again, Bartlett's test of sphericity (Chi-Square) is 622.143, df 78,  $p \leq 0.000$ . Since  $p \leq 0.05$  is greater than  $p \leq 0.000$ , Chi-Square value of 622.143 was considered to be significant. These results suggest that the factors were comprised of sufficient numbers of variables and that the variables were sufficiently correlated. This has warranted the application of factor analysis for data analysis in the present study.

### Eigenvalues for Determination of Number of Factors

Cornish (2007) had recommended that to determine the number of factors to be extracted, say  $m$ , the number of eigenvalues should be divided by 1 to obtain  $m$ . The eigenvalues have been presented in a tabular form:

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1.	9.266	71.279	71.279	9.26	71.279	71.279
2.	1.446	11.127	82.406	1.44	11.127	82.406
3.	.721	5.546	87.952			
4.	.538	4.142	92.094			
5.	.399	3.068	95.162			
6.	.267	2.050	97.212			
7.	.131	1.009	98.222			
8.	.092	.707	98.929			
9.	.055	.424	99.353			
10.	.045	.349	99.702			
11.	.016	.127	99.828			
12.	.014	.104	99.933			
13.	.009	.067	100.000			

Extraction Method: Principal Component Analysis.

As can be seen above, the number of eigenvalues equals 2 which when divided by 1 yields 2. Thus, accordingly only two factors could be extracted in this analysis.

### Evaluation Criteria

Data were analyzed using factor analysis. The main focus of factor analysis was to determine the nature of the factor structure of FDI – growth nexus in Nigeria. The principal axes method was applied for the factorization of the inter-correlation matrix. This method is also known as the method of principal factor solution.

To keep the number of independent dimensions to the essential minimum, extraction of factors was restricted to only those values of the correlation coefficients equal to or greater than unity. Furthermore a conservative rule of thumb for considering a factor as real is as follows: No attempt is made to take decision on the significance of unrotated loadings, e.g., as obtained from the Centroid method or the method of Principal Axes (Nunnally, 1967). Thus, following this principle, the Varimax rotation of the matrix was carried out.



By rotating the factors slightly in a clockwise direction, the strength of the relationship between the factors and the variables clustered near each other was increased (Pophan, 1967; Kline, 1994). Rotation improves the meaningfulness, reliability and reproducibility of factors (Weiss,1976; Ford et al., 1986).

Interpretation of results was based on the new values of factor loadings obtained through the use of ‘Orthogonal Rotation’ formula expressed in the form of  $X_1 = X \cos\theta + y \sin\theta$ . Factor loadings which were equal to or greater than  $\pm 0.300$  were considered to be significant (Frick et al., 1959; Guilford, 1959; Flescher & Erwin, 1963; Nunnally, 1967; Rummel, 1970). For the sake of elaborate discussion, however, loadings of  $\pm 0.250$  or little below were also included. Ford et al. (1986) had suggested the inclusion of factor loading  $\geq 0.400$ . Factor loadings of the criterion variable were given for all factors disregarding the level of significance so as to ascertain whether or not the factors represented correlates of GDP. The process of factor extraction was discontinued when the number of factors ( $m$ =number of eigenvalues  $2/1$ ,i.e.,2)(Cornish,2007). Extracting too many factors may present undesirable error variance but extracting too few factors might leave out valuable common variance (Yong & Pearce, 2013).

#### 4. RESULTS

The results of data analysis have been presented in tables and discussed under the following subheadings:

- Factor structure of FDI – GDP nexus
- Varimax (rotated) factor structure of FDI-GDP nexus
- Factors affecting the contributions of FDI to growth

##### Factor Structure of FDI-GDP Nexus in Nigeria

The original factor structure of inter-correlations among the common determinants of FDI and GDP in Nigeria has been presented in Table 1.

Table 1. Principal Axes (Original) Factor Matrix for FDI – GDP Nexus

S/No	Variable Codes	Factor1	Factor2	$h^2$
1	FDI	0.972	0.019	0.945
2	MKS	0.910	0.150	0.828
3	IFR	0.850	0.275	0.799
4	OPN	0.657	0.262	0.500
5	NAT	0.967	-0.044	0.937
6	EXC	0.938	-0.001	0.881
7	GDP	0.974	0.099	0.958
8	PVI	0.832	-0.027	0.693
9	FGE	0.983	-0.027	0.967
10	INF	-0.380	0.710	0.679
11	INT	-0.167	0.885	0.811
12	ECT	0.928	0.027	0.862
13	GCE	0.940	-0.014	0.884

NB: Factor loadings are rounded to three decimal places.

Table 1 represents original principal component factor matrix. The last column reveals the communalities ( $h^2$ ). On the whole, factor analysis led to the extraction of two factors.

#### Varimax (Rotated) Factor Structure of FDI – GDP Nexus

Orthogonal rotation of the principal axis (original) factor matrix has yielded new values for the factor loadings. The results have been presented in Table 2.

Table 2. Varimax (Rotated) Factor Matrix for FDI – GDP Nexus

S/No	Variable Codes	Factor1	Factor2	$h^2$	$u^2=(1-h^2)$
1	FDI	0.949	-0.212	0.945	0.055
2	MKS	0.894	-0.166	0.828	0.172
3	IFR	0.888	0.101	0.799	0.201
4	OPN	0.696	0.126	0.500	0.500
5	NAT	0.939	-0.236	0.937	0.063
6	EXC	0.920	-0.188	0.881	0.119
7	GDP	0.974	-0.097	0.958	0.042
8	PVI	0.810	-0.192	0.693	0.307
9	FGE	0.958	-0.222	0.967	0.033
10	INF	-0.231	0.772	0.679	0.351
11	INT	0.012	0.900	0.811	0.189
12	ECT	0.915	0.158	0.862	0.138
13	GCE	0.918	-0.200	0.884	0.116
Sum of squares		8.96	1.76		
Percentage of total variance		71.28	11.13		
Percentage of common variance		71.28	82.41		

Table 2 shows the Varimax factor loadings along with communalities and uniqueness of variables. The total variance of any variable comprises of common variance ( $h^2$ ) as well as specific variance and error variance. Now since it is usually difficult to separate specific variance from error variance, both are always combined and denoted by unique variance ( $U^2$ ). This has been revealed in the last column of this table. At the end of each column of the factor, the eigenvalues (sum of squares, percentages of total variance and common variance) contributed by the factor were entered.

#### Factors Affecting the Contribution of FDI to Economic Growth

Table 2 was further split into two sub-tables (Tables 2.1 and 2.2) to facilitate discussion on the significant factor loadings of each of the rotated factors.

##### Factor 1

Significant factor loadings of Factor 1 are shown in Table 2.1 for sake of convenience of discussion of results. As has been explained earlier, the Varimax rotation of the original factor matrix

involving the determinants of FDI and GDP was carried out and the Varimax rotated version presented in Table 2.1.

Table2.1. Varimax Factor 1

S/No	Description of Variable	Code	Factor Loading
9	Federal Government Expenditure	FGE	0.958
1	Foreign Direct Investment	FDI	0.949
5	Natural Resources	NAT	0.939
6	Exchange Rate	EXC	0.920
13	Gross Consumption Expenditure	GCE	0.918
12	Electricity	ECT	0.915
2	Market Size	MKS	0.894
3	Infrastructures	IFR	0.888
8	Private Investment	PVI	0.810
4	Openness	OPN	0.696
10	Inflation	INF	-0.231
7	Gross Domestic Product	GDP (CRN)	0.974

As can be seen in Table 2.1, the criterion variable GDP was clustered with dimensions of FGE, NAT, GCE, ECT, MKS, IFR, and OPN in descending order of their placement on the positive pole. This factor represented mainly different dimensions of public sector in conjunction with FDI, EXC, PVI and GDP. This result indicates that certain common elements were shared by public sector variables, FDI, EXC, PVI and GDP so as to account for a common factor. In the light of the significant loadings on public sector variables in Varimax Factor 1, Factor 1 has been aptly identified as public sector investment. The constellation of public sector variables in Factor 1 PSI implies that FGE, NAT, GCE, ECT, MKS, IFR and OPN were correlates and predictors of PSI. This is supported by Kline's (1994) assertion that factor loadings are very similar to regression weights in multiple regression analysis, and they represent the strength of the correlation between the variable and the factor.

The extent of common factor variance contributed by Varimax Factor 1 was found to be 71.28 per cent while its contribution to the total variance was also 71.28 per cent.

Very high positive loadings on FDI (0.949) and GDP (0.974) imply that this Factor 1 i.e., PSI had positive valence for FDI and GDP. In other words, public sector investment boosted the contribution of FDI to economic growth in Nigeria.

Factor 2.

Table 2.2 presents the significant loadings of Factor 2 in descending order.

Table 2.2. Varimax Factor 2.

S/No	Description of Variable	Code	Factor Loading
11	Interest rate	INT	0.900
10	Inflation rate	INF	0.772
5	Natural resources	NAT	0.236
9	Federal government expenditure	FGE	0.222
1	Foreign direct investment	FDI	-0.212
7	Gross domestic product	GDP (CRN)	-0.097

As can be seen in Table 2.2, Factor 2 had its highest loading on INT (0.900) followed by INF (0.772). Significant positive loadings on INT and INF imply that as Factor 2 increased, INT and INF also increased. Since INT (price of capital) is the important determinant of saving (capital good) which is positively related with it, Factor 2 is essentially a factor of capital good.

Now, consider that S (supply of capital) is equal to I (demand for capital). Based on this principle, there is usually a tendency for price of capital (INT) to rise whenever demand for capital (Investment) exceed supply of capital (Saving). Usually, rise in price of capital (INT) is accompanied by rise in cost of production which, in turn, translates to a decline in marginal efficiency of capital (MEC). Thus, Factor 2 has been most conveniently identified as MEC.

This is corroborated further by the axiom:  $S = I \Rightarrow AS = AD$ . The decline in MEC is reflected in decline in AS which falls below AD thereby causing a rise in general price level which, if steady and sustained, constitutes inflation. Negative nonsignificant loadings on FDI (-0.212) and GDP (-0.097) imply that MEC had negative valence for FDI and GDP. In other words, Factor 2, i.e., MEC inhibited the contribution of FDI to economic growth in Nigeria.

The common factor variance accounted for by this factor was 11.13 per cent which is 11.13 per cent of the total variance explained by the two factors.

On the whole, factors 1 and 2 had explained the variance in GDP upto 82.41 per cent leaving out only 17.59 per cent of unexplained variance. Thus, the two-factor solution stands justified.

Diagrammatic Presentation of Factors

For sake of clarity, Factors 1 and 2 have been presented diagrammatically in Figs. 1 and 2 below.

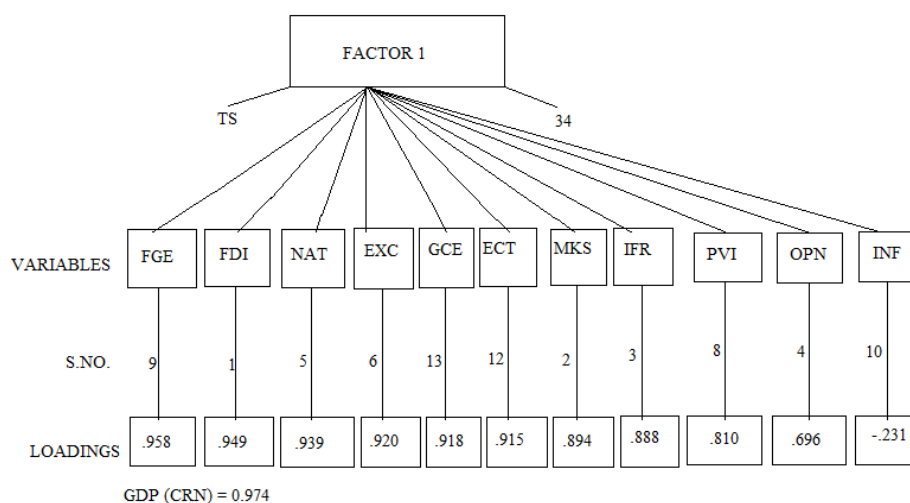


Fig. 1. Factor 1: Public Sector Investment

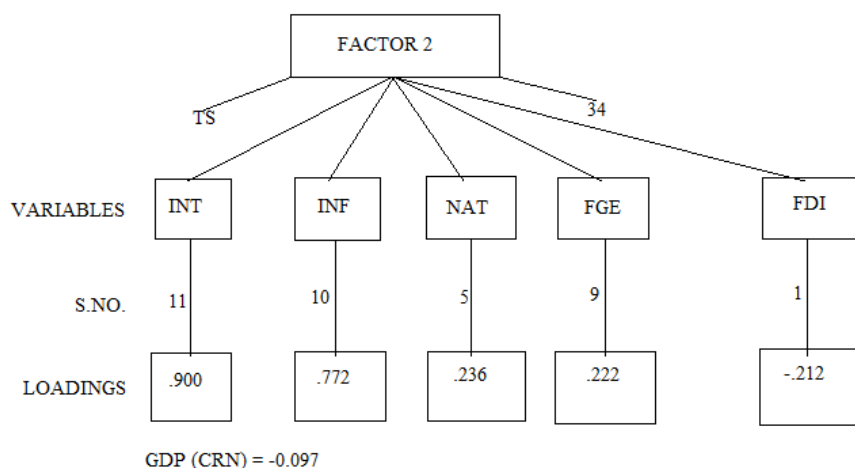


Fig. 2. Factor 2: Marginal Efficiency of Capital.

### Modal Summary

The results of factor analysis have been summarized in the expression as follows:

$$GDP = 0.974PSI - 0.097MEC$$

where PSI is public sector investment

MEC is marginal efficiency of capital

## 5. EMPIRICAL RESULT AND DISCUSSION.

The results of factor analysis have been summarized and discussed in this section.

Empirical Result.

The major findings which have crystallized from this study include the following:

1. Two factors influencing the contributions of FDI to economic growth in Nigeria are public sector investment and marginal efficiency of capital.
2. Public sector investment boosted the FDI to contribute positively to economic growth in Nigeria.
3. Declining marginal efficiency of capital inhibited the contributions of FDI to growth of domestic firms due to their low absorptive capacity to harness sophisticated foreign technology.
4. Public sector investment comprises of a constellation of FGE, NAT, GCE, ECT, MKS, IFR, and OPN .
5. Marginal efficiency of capital comprises of a constellation of INT and INF.

### Discussion

To integrate the present study into the existing economic literature, the major findings have been discussed in this section.

One important finding of the study is that public sector investment and marginal efficiency of capital were potent factors influencing the contribution of FDI to economic growth in Nigeria. While the isolation of public sector investment as an active variable in FDI – growth nexus in Nigeria has come as a surprise, that of marginal efficiency of capital came much in expectation. The result on potency of public sector investment is surprising because Nigeria has, with the introduction of structural adjustment programme (SAP) in 1986, embarked on privatization of public enterprises due to their poor performance and low returns to investment. This has reduced drastically government expenditures in the public sector. However, a possible explanation for the emergence of public sector investment as a potent factor affecting FDI is that for over a decade, the federal government has incurred huge expenditures for the improvement of quality of infrastructures in a bid to attract foreign investors. It is a well-known fact that there is a positive correlation between availability and quality of infrastructures and FDI inflow. Aside from direct expenditures on infrastructures, the federal government also incurred miscellaneous expenditures on the implementation of FDI policy. Usually huge costs are associated with adjustments in exchange rates, interest rates, tax rates, etc. made by the government to ensure a high rate of productive investment for the foreign investors. Both the direct cost and the associated cost of improving the business environment for productive activities constitute a source of public sector investment. With respect to marginal efficiency of capital, there is nothing surprising about its emergence as a potent factor influencing FDI in Nigeria. Certainly the nurturance of viable economic environment through bloated public sector investment and effective implementation of FDI policy had enhanced the productivity of foreign capital while at the same time eroding the marginal efficiency of capital of domestic firms. The dearth of studies adopting factor analysis to isolate factors which influence the contributions of FDI to economic growth is what has made this finding a new addition to knowledge.

Another important finding of the study is that public sector investment boosted FDI to contribute positively to economic growth in Nigeria. This finding has come much in expectation. After all, the primary objective of FDI policies in Nigeria is to create conducive business environment for the MNCs through the provision of basic infrastructure and other incentive to attract foreign investors. Certainly, huge government expenditures incurred on the implementation of various FDI policies had resulted to high rate of productive investment of foreign capital. Obinna (1983), Oseghale and Amenikhienan (1987) and Ariyo (1998) had also reported that FDI contributed positively to economic growth in Nigeria. In

other words, public sector investment had enhanced the efficiency of foreign capital which in turn had contributed to the country's GDP. To the extent, there is a dearth of research evidence on the prevalence of this latent factor, PSI, this finding constitutes a worthy contribution.

Moreover, there is the finding that declining MEC inhibited the contribution of FDI to growth of domestic firms due to their low absorptive capacity to harness sophisticated foreign technology. Again, this finding did not come as expected. One would expect that PSI which had activated FDI to contribute positively to economic growth would have also enhanced marginal efficiency of private capital of domestic firms to generate benefit spillover. However the negative spillover effects of FDI in the Nigerian economy can be explained in three ways. Firstly, foreign investment was made mainly in extractive industries with low participation by domestic firms. Secondly, the Nigeria's labour force was unskilled and therefore, not suitable for employment in the multi-national companies. Thirdly, there was lack of quality infrastructure which compelled the multinational companies to opt for highly sophisticated technology which was not compatible with local technology. With low participation of domestic firms and unskilled labour force it was almost impossible to harness the foreign technology toward enhancing the productivity of domestic firms. Easterly and Fischer (1995) had reported that the declining marginal product of capital was found to account for the declining growth rate of Soviet economy for the period 1950-1987. Girma and Holger (2002) had also found that there was weak evidence of a negative spillover effect on wage growth in UK.

Still, there is the finding that public sector investment comprises of a constellation of public sector variables including FGE, NAT, GCE, ECT, MKS, IFR and OPN . High loadings on these variables serve as an indication that these variables contributed significantly to the variance in public sector investment. The result has established the validity of FDI policy in Nigeria. This has not come as a surprise considering that these public sector variables are determinants of FDI. Kudaisi (2014) had also reported that the major determinants of FDI in West Africa are natural resource, labour availability, GDP per capita, and market size .

Furthermore, there is the finding that marginal efficiency of capital comprises of a constellation of monetary variables including INT and INF. This is not surprising. It is an established fact that FDI discourages domestic saving in the recipient country. Certainly a reduction in saving leads to higher interest rate which acts as disincentive to investment and ultimately results to constriction in supply. Incidentally, inflation is a natural consequence of a fall in supply in the face of constant or increasing demand.

## **Conclusion**

The major inference warranted by this study is that public sector investment and marginal efficiency of capital were potent factors influencing the contribution of FDI to economic growth in Nigeria. Perhaps, what is startling about the results of this study is the increasing marginal efficiency of foreign capital and the declining marginal efficiency of domestic private capital. This has resulted from huge expenditures incurred annually by the federal government for attracting foreign investors and the neglect of the country's public enterprises which are usually privatized in their dysfunctional state, to curb wasteful expenditures. Consequently, the productive capacity of domestic firms is not sufficient to absorb sophisticated foreign technology. Hence, the declining marginal efficiency of private capital of domestic firms.

Certainly, through skillful manipulations, public sector investment and marginal efficiency of capital would activate FDI to contribute maximally to growth with augmented positive spillover effects. No doubt, an important feature of this study is the emergence of certain generalizations on the efficacy of

public sector investment as foreign capital activator and marginal efficiency of capital as domestic private capital inhibitor which, in essence, crystallized into 'public sector theory'.

### **Policy Implication**

The findings of this study have clear policy implication for both developed and developing countries.

First, given that public sector investment and marginal efficiency of capital were two potent factors affecting the contributions of FDI to growth, the next priority is arguably the provision of basic infrastructures and the improvement of the quality of the existing ones to enhance the productivity of foreign capital and the marginal efficiency of domestic private capital.

Second, is the need to channel foreign capitals to diverse sectors of the economy through increased public sector investment in these sectors. This would create incentives to foreign investors to venture into sectors other than the extractive sector for diversification of the economy.

Third, the continued implementation of FDI policy is extremely important factor in public sector development. The experience in Nigeria shows that the productivity of foreign capital and its marginal efficiency were rising while the productivity and marginal efficiency of capital of domestic firms were declining. As a result, the capacity of private sector to expand is reduced and its absorptive capacity eroded. A viable policy prescription to soothe the negative impact of implementation of FDI policy on domestic firms is downward adjustment of lending rate in domestic credit market.

Fourth is to formulate a dynamic foreign direct investment policy- a need often highlighted by lack of clear policy objectives. A constellation of public sector dimensions including FGE, NAT, GCE, ECT, MKS, IFR and OPN which constitute public sector investment and a constellation of monetary variables –INT and INF in marginal efficiency of capital have paved the way to consider these dimensions as active ingredients of a dynamic FDI policy.

Fifth, positive significant loading on INT and INF in marginal efficiency of capital imply that interest rate and inflation rate contributed significantly to the variance in marginal efficiency of capital. There is then the need to adjust frequently the structure of credit market of FDI in recipient country in order to render it responsive to the changes in its internal structure caused by capital gain on account of FDI influx. This would involve application of moral suasion to induce MNCs to list in the stock market of FDI recipient country.

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