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Analysis of Corruption from Productivity Growth Perspective: Implications on Economic Growth

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Abstract: **Nigeria's economy as at today is facing serious economic challenges. This study investigated the effect of corruption on economic growth from productivity perspective in Nigeria using annual aggregate data from 1980 to 2014. A Generalized Method of Moments (GMM) technique was explored. Empirical results showed mixed outcomes. First, openness to trade, law and order, national system of innovation and corruption had a long-run relationship with productivity growth. Second, while capital expenditure was vulnerable to corruption, fitted productivity growth and consumers tastes influenced economic growth positively. Corruption from this perspective reduced the efficiency of labour and capital productivity. The paper therefore recommends that government should intensify its efforts at promoting the structures that promotes productivity and at the same time check unproductive expenditure on projects.**

Keywords: **Corruption, economic growth, productivity, cointegration, capital expenditure.**

1. INTRODUCTION

Both the theoretical (Lui, 1985; Beck and Maher, 1986; Cadot, 1987; Shleifer and Vishney,1994; Alam,1995) and empirical(Mauro, 1996, 1997; Rahman et.al 1999; Ehrlich and Lui, 1999; Ndikumana, 2007; Gyimah-Brempong and Camacho,2006 and Aliyu, 2007) studies have documented the importance of corruption in the growth process. Literatures are inundated on the relationship between corruption, economic performance and growth. Early theoretical works are very scanty and focused on limited analytical issues for understanding the dynamics of corruption (Bardhan, 1997). Theoretically, the literature did not assume a definite position about the effect of corruption on economic growth. While some studies believed that corruption raise growth potentials, others were of the opinion that corruption kills growth potentials (Leff, 1964; Huntington,1968; Acemoglu, and Verdier,1988; Shleifer and Vishny, 1994)

The literatures reach no agreement about the effect of corruption on economic growth. The theoretical studies of corruption focused on micro angle of the models, analyzing individual acts of corruption and how it affects growth while the empirical papers analyzed corruption at macro level, linking the national level of corruption to the incentives of individual agents in corrupt practices. Some early authors (see for example, Leff, 1964; Huntington, 1968; Acemoglu and Verdier, 1998) argued that corruption has the potential to improve efficiency and catalyzed growth. Similarly, a large volume of studies (see Mauro, 1995, 1997, 1998; Tanzi, 1998; Kaufmann and Wei, 1999; Gupta *et al.*, 2000; Li *et al.*, 2000; Gupta *et al.*, 2001; Gupta *et al.*, 2002; Pellegrini and Gerlagh,2004) shared a contradictory view regarding corruption as growth raising agent and maintained that corruption impedes growth, and at the same time imposes constraints on the cost of doing business and creates uncertainty in decision making process.

Studies on the relationship between corruption and economic activity have tended to centre on how corruption affects investment, human capital and productivity. It should be noted that the impact of these variables on productivity growth received less attention. The principal motivation of the present work is to study whether corruption affects growth from a

productivity-based perspective. Corruption tends to decimate productive innovations. An investor who wants to gain access into the domestic market would need government permits and other associated documents, hence, become primary target of corruption. This would constrained investment and possibly has implications on long run producible inputs, thereby diverting efforts and talents to less productive activities. With the manner in which corruption is pulling down the structures that promotes investment and economic growth in Nigeria, it now becomes necessary to probe deeply the motivating factors driving corruption. Since people who are corrupt would not come out to reveal corrupt evidence, this paper, therefore analyzed the relationship between corruption and economic growth via productivity growth channel in Nigeria. This study attempted to fill a gap created by people not revealing their corrupt activities by incorporating productivity growth (productivity efficiency) into the growth framework to ascertain the level of development.

The rest of the paper is structured into five as follows: Section 2 provides a brief review of relevant literatures while Section 3 deals with the theoretical framework and methodology. Section 4 contains the estimation technique. Section 5 discusses the empirical results while section 6 gives the concluding remarks.

2. REVIEW OF LITERATURE

2.1 Concept and Measure of Corruption:

There is no universally accepted definition of corruption, either in literature or in practice. With cultural differences across countries, an acceptable definition of corruption became more difficult. While some culture (particularly China, Japan, Korea, Singapore e.t.c) accept bribery and "tip" as corruption, others (African countries) consider it as gifts. Therefore, what is regarded in one culture as corrupt may be seen as a routine transaction in another. Whichever dimension corruption is perceived, it must yield positive expected economic outcome to its perpetrators, must have some risk of socio-legal censure associated with it and retards growth (Mauro 1997; Mo 2000; Mironov 2005; Hodge et al 2009 and Ogunlana 2015).

Systematic analysis of empirical works provides new evidence on the enquiry. A large body of empirical studies have maintained that corruption has adverse effect on economic growth through its impact on domestic investment, foreign direct investment, government spending, size of public investment, productivity and tax revenue (Rahman et al., 1999; Mauro, 1998; Svensson, 2005 and Gyimah-Brempong,2002).Countries that has good track of institutions suffered severely from corruption particularly when the structures promoting productivity are slowed down due to low productivity efficiency, inappropriate production and technology technical or technological mix e.t.c.(see Ogun,2014). The totality of theses ineptitude quickly bounced on growth. Similarly, countries with undeveloped and weak institutions suffered less from corruption spill over on growth (see Aidt et al.,2006; Méon and Weill,2010). As a result of weak institutions, it takes longer time for growth to materialized..

The believe that corruption cannot be adequately measured brought about serious empirical exposition on the enquiry. The totality of corruption cannot be captured and measured. In view of these, some international aid agencies, non-governmental organizations (such as Transparency International, consulting firms and business actors) have volunteered to carry out corruption measurement from perception point of view. However, these measurements are rather subjective and not objective in nature. However, the literature has identified four approaches of modelling corruption. These include the principal-agent problem, game theoretic (with three players: principal, agent and hidden principal), multiple indicators and multiple causes (MIMIC) and simulation (see Andvig, 1990; Laffont, 1991; Basu,1992; Mandapaka,1995; Mookherjee, 1995; Turnovsky, 1995; Bardhan, 1997; Mauro, 1997; Jain, 1998; Stapenhurst,1999 and Acemoglu,2000).These approaches has given some useful behaviour of corruption on growth. In the principal-agent problem, the principal delegates authority to the agents with some discretionary powers attached, to act in the name of the principal. The agent may therefore choose to explore the discretion attached to him to cause undue administrative delays in order to attract bribes for personal benefits to the detriment of the principal. The fundamental question which may likely generate debate centres around the intention of the principal and the agents. Do the principal connived with the agent to fix bribe payment? In the game theoretic model, the conditions that are necessary and conducive for corruption are specified, for it to result into growth. This approach ignores government involvement and emphasizes on transactions among the players in the market. The game is firmly rooted in the strategic moves used by players in order to maximize their gains. This model has been proven to be one-sided game. It only occur by chance in continuing relationships. MIMIC modelling of corruption allows for simultaneous interaction between multiple explanatory variables and multiple

indicators of the hidden economy (see Schneider 1997; Giles 1999, Salisu 2000). Simulation approach to corruption showed the strength of the cause-effect relationship between corruption and growth, but could not detect unstable equilibrium (see Chakrabarti 2000; Situngkir 2003).

2.2 Empirical Literature:

The exact channels through which corruption affects economic growth remain unresolved empirically. However, the literature has identified a number of channels, which appears to be empirically more prominent in linking corruption to economic growth. These channels include investment, tax revenue, school enrolment, life expectancy, inflation and aid, human capital accumulation, labour productivity, and political instability. For example, Ndikumana (2007) provides a detailed taxonomy of these channels and their implications for pro-poor growth. Baliamoune-Lutz and Ndikumana (2007) used the Arellano Bond GMM technique to analyze the impact of corruption on growth using the investment channel. Their findings show that corruption discourages private investment by raising indirect production cost and at the same time create uncertainty over future returns from capital. Dreher and Herzfeld (2005) used a number of these channels to analyze the behavior of corruption on growth using cross-section data for 71 countries in Africa, Latin America, Eastern Europe and Asia over a period of twenty six(26) years, from 1975 to 2001. Findings from the result show that only investments, inflation, aid and public expenditure are significant in the estimation. Mo (2001) estimated a direct and indirect effect of corruption on economic growth using long-term growth rates of per capita GDP from 1970 to 1985. The study identifies three transmission channels namely, investment, human capital and political stability. Regression analysis suggests that one unit increase in the corruption index reduces the growth rate by about 0.55 percentage point. However, the direct effect of corruption becomes insignificant in both ordinary least squares (OLS) and two-stage least squares (2SLS) estimation after controlling other variables.

More recently, economic growth approach now dominates corruption literature as a veritable technique of analysis. The main limitation of this approach lies in using the correct index of corruption for estimation. Most of the indexes of corruption that have been used (See Murphy 1993, Mauro 1995, Knack 1995, Mandapaka 1995 and Bardhan 1997) were based on surveys. These indexes reflect either the general perception of the people on the level of corruption present in the country or the expertise perception, and they failed to reflect correct economic interpretation. The literature converged in their findings showing a fragile negative relationship between corruption and economic growth. In sum, there were empirical regularities in the literature that corruption discourages investment, alters the composition of government spending, decimated productivity growth, reduces the effectiveness of foreign aid through diversion of funds, creates loss of tax revenues and monetary problems leading to adverse budgetary consequences.(see Brunetti 1997; Wei 1997; Alesina 1999 and Murphy 1993).

3. THEORETICAL FRAMEWORK AND METHODOLOGY

The neoclassical growth framework was explored to investigate the relationship between corruption and economic growth using productivity growth as point of reference. The neoclassical model assumed that output and growth are influenced by corruption. If any of the components of the production function suffers any quality loss due to corruption, this would have effect on long run growth and steady state of output. This study relies on the work of Mankiw, Romer and Weil (1992) as fulcrum which support the model used in this study. For clearer understanding, the work of Solow(1957) is expanded by including corruption as one of the input in the production function. Government expenditure is included in the production function as it proxied corruption base in government(where large funds are committed to unproductive projects). The functional form of the production function is Cobb-Douglas and is expressed as:

$$Y_t = K_t^{\alpha} H_t^{\beta} [G_t(\rho) L_t]^{1-\alpha-\beta} \quad (1)$$

where:

Y_t = aggregate level of real output

K_t = level of physical capital

H_t = level of human capital

L_t = labour employed

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G_t = level of government expenditure

ρ = level of corruption

$G'(\rho) < 0$, $0 < \alpha < 1$, $0 < \beta < 1$ and $\alpha + \beta < 1$. These conditions ensure that the production function exhibits constant returns to scale and diminishing return to factors. If we remove corruption term from equation 1, we would arrive at the neoclassical results. The growth rate of output can be increased and sustained if the economy's stock of investment on physical capital increases persistently and at the same, ensures that population growth, capital depreciation rate on capital and initial level of output per worker decreases over time. The steady state equations are given as:

$$\frac{\mathrm{dK}}{\mathrm{dt}} = s_k Yt - \delta_k K_t \quad (2)$$

$$\frac{\mathrm{dH}}{\mathrm{dt}} = s_H Yt - \delta_H H_t \quad (3)$$

where s_k , s_H , δ_H , δ_k represents shares of income apportioned to capital and human investment, and depreciation rate of physical capital and human capital. Population is defined as:

$L_t = L_0 e^{nt}$. It is assumed that population growth remains constant over time so that : $\frac{\mathrm{dL}}{\mathrm{dt}} \Big/ L_t = n$. This implies that the labour force is growing at the rate of *n*. The steady state equation is written as:

$$\ln \frac{Y_t}{L_t} = \ln G_0 + gt + \left(\frac{\alpha}{1-\alpha-\beta}\right) \ln\left(\frac{S_k}{n+\delta_k+g}\right) + \left(\frac{\beta}{1-\alpha-\beta}\right) \ln\left(\frac{S_H}{n+\delta_H+g}\right) + Gt_\rho \quad (4)$$

Looking at equation (4), it shows that the steady state output per worker is an increasing function of initial government expenditure and its growth rate, physical and human savings and government expenditure. The growth rate of output per worker can be obtained by differentiating the steady state level with respect to time and it yields:

$$lny_t - lny_0 = \left(1 - e^{-\lambda t}\right)\{lnG_0 + gt - \left[\frac{\alpha+\beta}{1-\alpha-\beta} \ln(n+\delta+g) + \frac{\alpha}{1-\alpha-\beta} lnS_k + \frac{\beta}{1-\alpha-\beta} lnS_H + G_t\rho\right\} - \left(1 - e^{\lambda t}\right) lny_0 \quad (5)$$

Corruption enters the model through government capital expenditure. We therefore need to extend government capital expenditure function to accommodate corruption.

$$G_t\rho = {G_t}^* e^{\gamma\rho} \quad (6)$$

$$where\ 0 \le \rho \le 1, and\ {G_t}^* = G_0 e^{gt} \quad (7)$$

The parameter ρ indicate corruption index. γ measures the intensity of corruption on government expenditure. From equation (7), the growth rate of government expenditure ${G^*}_t$ is g. We assume that: $\frac{dG_t}{d\rho} < 0, and\ \frac{d^2G_t}{d\rho^2} > 0$. It is observed from equation (6) that if corruption term is not included [if (ρ) = 0 and (γ = 0)], then ${G_t}^* = G_t$. Intuitively, a higher value of γ increases the effect of corruption but when the value of γ is approaching zero, taking all other factors constant, corruption function approaches unity and output is maximized.

Expressing equations (1),(2) and (3) in their intensive form, we have:

$${y_t}^* = e^{-\gamma\rho} {k_t}^{*\alpha} {h_t}^{*\beta} \quad (8)$$

$$\frac{dk_t^*}{dt} = s_k y_t^* - (n + \delta_k + g)k_t^* \quad (9)$$

$$\frac{dh_t^*}{dt} = s_h y_t^* - (n + \delta_k + g)h_t^* \quad (10)$$

where:

$y = \frac{Y}{L}, k = \frac{K}{L}, h = \frac{H}{l}, {y_t}^* = \frac{y_t}{{G_t}^*}$ (output/worker/government expenditure),

${k_t}^* = \frac{k_t}{{G_t}^*}$ (physical capital/worker/government expenditure) and

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$h_t^* = \frac{h_t}{G_t^*}$ (human capital/worker/government expenditure).

At the steady state, equations (8),(9) and (10) are set equal to zero. We now have three equations in three unknowns. Therefore, the steady state levels of physical and human capital gives:

$$k_t^* = [\frac{s_k}{(n+\delta_k+g)}]^{\frac{(1-\beta)}{(1-\alpha-\beta)}} [\frac{S_H}{(n+\delta_H+g)}]^{\frac{\beta)}{(1-\alpha-\beta)}} e^{-\gamma\rho} \quad (11)$$

$$h_t^* = [\frac{s_k}{(n+\delta_k+g)}]^{\frac{\alpha}{(1-\alpha-\beta)}} [\frac{S_H}{(n+\delta_H+g)}]^{\frac{1-\alpha)}{(1-\alpha-\beta)}} e^{-\gamma\rho} \quad (12)$$

By substituting equations (11) and (12) into equation (8) in a steady state equation for output per worker yields:

$$y_t^* = [\frac{s_k}{(n+\delta_k+g)}]^{\frac{\alpha}{(1-\alpha-\beta)}} [\frac{S_H}{(n+\delta_H+g)}]^{\frac{\beta)}{(1-\alpha-\beta)}} e^{-\gamma\rho} \quad (13)$$

Recall that $y_t^* = Y_t/(G_t^*, L_t)$. Substituting this into equation (13) and multiplying by G_t^* and taking natural logs yields:

$$\ln\left(\frac{Y_t}{L_t}\right) = \ln(G_0) + gt + \left(\frac{\alpha}{1-\alpha-\beta}\right)\ln\left(\frac{s_k}{n+\delta_k+g}\right) + \left(\frac{\beta}{1-\alpha-\beta}\right)\ln\left(\frac{s_H}{n+\delta_H+g}\right) - \gamma\rho \quad (14)$$

If physical and human capital depreciates at the same rate (δ), equation (14) now becomes:

$$\ln\left(\frac{Y_t}{L_t}\right) = \ln(G_0) + gt - \left(\frac{\alpha+\beta}{1-\alpha-\beta}\right)\ln(n+\delta+g) + \left(\frac{\alpha}{1-\alpha-\beta}\right)\ln(s_k) + \left(\frac{\beta}{1-\alpha-\beta}\right)\ln(s_H) - \gamma\rho \quad (15)$$

We observed from equation (15) that the steady state of output per worker is increasing in initial level of government expenditure, G_0, trend term (gt) and its growth, physical and capital investment rates. The rate of investment in physical and human capital influences the steady state output per worker. Equation (11) and (12) can be used to explain this. Higher level of investment increases physical and human capital per worker. It should be noted that depreciation of capital and corruption reduces output per worker. γ determines the intensity of corruption. A positive value of γ implies that corruption stifles output and a negative value implies an improvement in output.

The model employed in this study draws on the works of Mankiw, Romer andWeil (1992). They gave the basic approach of assessing the effect of corruption on growth and how it affects efficiency through resource misallocation via capital expenditure. For the purpose of this study, we would be using factor productivity approach to investigate the impact of corruption on economic growth. Two empirical models were specified for this study. This include productivity and growth equations. This study posited that corruption affects economic growth through productivity channel. Following this, productivity is therefore expressed as a multi factor inputs, specified in Cobb-Douglas production form:

$$Y_t = AK_t^{\alpha}L_t^{1-\alpha} \quad (16)$$

Adapting equation (16) as the basis of linearization, we have :

$$PGRT_t = \gamma_0 + \gamma_1 OPEN_t + \gamma_2 NSI_t + \gamma_3 LAWOR_t + \gamma_4 PARMK_t + \gamma_5 REXR_t + \gamma_6 RIR_t + \gamma_7 COR_t + \varepsilon_t \quad (17)$$

The growth equation can be expressed as:

$$RGDP_t = \alpha_0 + \alpha_1 PGRTST_t + \alpha_2 GE_t + \alpha_3 TRGD_t + \varepsilon_t \quad (18)$$

Where: PGRT = Fitted Productivity growth; OPENS = Openness to trade; NSI = National System of Innovation; LAWOR = Law and Order; PARMK = Parallel Market Exchange Rate Premium; REXR = Real Exchange Rate; RIR = Real Interest Rate; COR = Corruption Index; RGDP = Real GDP; PGRTST = Productivity Growth; GE = Capital Expenditure ; TRGD = Tastes of Consumer

The neoclassical theory used the framework of equation (16) to obtain the total factor productivity (TFP) growth in the form of a residual. Barro(1990) also used the framework to estimate the relationship between corruption and economic growth in Nigeria. The modifications made is the inclusion of corruption index , parallel market exchange rate premium, real exchange rate , law and order, and real interest rate into productivity equation. The inclusion of openness to trade is justified on the ground that countries that are more open to foreign markets tends to have better productivity outcomes. This specification found support in the works of Baily and Gersbach(1995),Tybout(1996) and Miller &Upadhyay(2000). National innovation system(R&D) has been hypothesized to facilitate knowledge spillovers capable of enhancing

productivity efficiency. Stable macroeconomic environment with good culture of law and order facilitate innovation and diffusion of ideas which could promote productivity. It is on the basis of this that we have included national innovation system and variable capturing law and order into the productivity equation to ascertain their degree of influence. Real exchange rate and real interest rates are financial variables which directly and indirectly affects productivity through variations in their rates. The introduction of these variables is meant to explain the short run effect of corruption on productivity. The inclusion of parallel market exchange rate premium and corruption index into the productivity equation is justified on the ground that both variables are proxies for corrupt practices and may affect productivity.

However, fitted observed productivity growth, government expenditure and tastes of consumers are included into the growth equation to account for long run effect of corruption on economic growth.

Equation 17 and 18 captures the direct and indirect effect of corruption on productivity and economic growth in Nigeria. We expect equations 17 and 18 to have the following signs: $\gamma_1, \gamma_2, \gamma_3 > 0, \gamma_6, \gamma_7 < 0, \gamma_4, \gamma_5 <> 0$ *and* $\alpha_1, \alpha_2, \alpha_3 > 0$.

From the foregoing, we can estimate equations (17) and (18) to ascertain the relationship between corruption and economic growth in Nigeria.

4. ESTIMATION TECHNIQUE

The time series properties of the data were examined by conducting the tests for stationarity followed by cointegration tests. Following this, the system estimation was performed using the

Generalised Method of Moments (GMM) technique. The GMM estimation is informed based on the fact it produces unbiased estimation even with lagged dependent variables as instruments. GMM reduces the situation of biased results due to correlation between the error term and the lagged endogenous variables. Through GMM technique, we can obtain a consistent parameter estimates even when measurement error is detected.

4.1 Data and Sources:

The data employed for this analysis is from 1980 to 2014. They were obtained from the Central Bank of Nigeria(CBN), *Statistical Bulletin*, various issues, Federal Office of Statistics, *Annual Abstract of Statistics*, various issues, Nigerian Labour Statistics (2010), United Nations Conference on Trade and Development (UNCTAD), *Handbook of Statistics*, International Monetary Fund, *International Financial Statistics*, various issues, World Bank Development indicator online and Transparency International website.

4.2 Time Series Properties of the Variables:

4.2.1 Stationarity Test for Productivity Growth:

The importance of tests for stationarity of variables is rooted on the fact that regression involving non-stationary variables leads to misleading inferences since the estimated coefficients would be biased and inconsistent. When all or some of the variables are not stationary, it is important to carry out appropriate transformation (differencing) to make them stationary. The Dickey Fuller class of tests and the Phillips-Perron unit root tests for stationarity were used to test for variable stationarity. Table 1 show the result of the unit root tests. Akaike information criterion is used to determine the duration of delays in both tests.

Table 1: Results of Unit Root Tests Based on Augmented Dickey-Fuller and Phillips-Perron (Constant, Time trend included)

Variable	ADF-Statistic	ADF Critical Value	PP-Statistic	PP Critical Value	Conclusion
PGRT	-3.3781	-4.2967	-2.9639	-4.2846	No Unit Root
OPENS	-5.5863	-4.3098	-9.7387	-4.2967	Unit Root
NSI	-8.5658	-4.2967	-22.6021	-4.2967	Unit Root
LAWOR	-7.3238	-4.2967	-7.2380	-4.2967	Unit Root
PARMK	-5.6931	-4.3240	-17.4225	-4.3098	Unit Root
REXR	-5.6718	-4.3098	-6.6918	-4.2967	Unit Root
RIR	-5.8313	-4.3098	-15.6729	-4.2967	Unit Root
COR	-5.3780	-4.3098	-12.2192	-4.2967	Unit Root

Source: Underlying data from Unit Root test

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The unit root tests show that all the variables are stationary after first difference. In order to determine how to model the short-run dynamics of the productivity, it is therefore important to carry out test for cointegration.

4.2.2 Stationarity Test for Growth:

Stationarity of the time series for economic growth variables in the model was established using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. The results of the ADF and PP tests are reported in Table 2. All the variables were found to be nonstationary in levels but stationary after differencing them once.

Table 2: Results of Unit Root Tests Based on Augmented Dickey-Fuller and Phillips-Perron (Constant, Time trend included)

Variable	ADF-Statistic	ADF Critical Value	PP-Statistic	PP Critical Value	Conclusion
RGDP	-3.5723	-4.3098	-10.7459	-4.2967	Unit Root
PGRTST	-5.0387	-4.3098	-11.4798	-4.2967	Unit Root
GE	-5.8087	-4.2967	-5.7852	-4.2967	Unit Root
TRGD	-5.6643	-4.3098	-11.8843	-4.2967	Unit Root

Source: Underlying data from Unit Root test

4.3 Co-integration Test Results:

4.3.1 Co-integration Test for Productivity Equation:

The result of the cointegration condition is presented in Table 3. From the cointegration table, the trace test indicated two (2) cointegrating equations at 5% level of significance while the maximum eigenvalue statistic indicated no cointegrating equation at 5% level of significance. The normalized cointegrating equation points to a positive influence of national system of innovation(NSI) and law and order (LAWOR) on productivity, with negative correlation between openness to trade (OPENS) and corruption (COR) on productivity.

Table 3: Johansen Maximum Likelihood Cointegration Test Results for Productivity

Panel A: Maximum Eigenvalue and Trace Tests for Productivity

Hypothesized No. of CE(s)	Eigenvalues	Trace Statistic	5 Per cent Critical Value	Max-Eigen Statistic	5 Per cent Critical Value
None	0.597	59.90*	47.85	27.25	27.58
At most 1	0.526	31.65*	29.80	22.41*	21.13
At most 2	0.258	9.247	15.49	8.959	14.26
At most 3	0.010	0.288	3.841	0.288	3.841

Panel B: Normalized Cointegrating Coefficients of Productivity Equation

PGRT = -2.349OPENS + 0.090NSI + 0.008LAWOR - 0.845COR

(0.467) (0.036) (0.024) (0.077)

Note: * indicates rejection of the null hypothesis at 5% significance level.

t-statistics are in the parentheses below the coefficients

Source: Computed from E-View 7.0 by the Author.

4.3.2 Co-integration Test for Growth Equation:

We report both the trace statistics and maximum eigenvalue statistics and their critical values at 5% level of significance. The Johansen cointegration results based on the trace and maximum eigenvalue statistics are presented in Table 4. The trace test statistic showed that there two(2) cointegrating equations at 5% level of significance. The max-eigen value statistics indicated no cointegrating equation. As shown by the cointegrating equation which normalized the coefficient of economic growth, the estimates of fitted productivity growth, capital expenditure (GE) and tastes of consumers (TRGD) negatively influenced economic growth. Productivity growth in the context of Nigerian economy however negates our apriori expectation.

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Table 4: Johansen Maximum Likelihood Cointegration Test Results for Growth

Panel A: Maximum Eigenvalue and Trace Tests for Growth					
Hypothesized No. of CE(s)	Eigenvalues	Trace Statistic	5 Per cent Critical Value	Max-Eigen Statistic	5 Per cent Critical Value
None	0.597	58.90*	47.85	27.25	27.58
At most 1	0.526	31.65*	29.80	22.41*	21.13
At most 2	0.258	9.247	15.49	8.959	14.26
At most 3	0.010	0.288	3.841	0.288	3.841
Panel B: Normalized Cointegrating Coefficients of Growth Equation					
RGDP = -0.089PGRTST - 1.007GE - 0.860TRGD					
(0.179) (0.077) (0.140)					
Note: * indicates rejection of the null hypothesis at 5% significance level.					
t-statistics are in the parentheses below the coefficients					

Source: Computed from E-View 7.0 by the Author.

4.4 System Estimation Results:

Following the existence of cointegrating relations among the equations, the system was estimated using a Generalised Method of Moments (GMM) technique. The results are contained in Table 5.The results for each equation are presented below.

Table 5: Estimation of Results

1. Productivity Equation
$PGRT = 0.945 + 1.371OPENS - 0.061NSI - 0.036LAWOR + 0.038PARMK + 0.051REXR$
T-STAT. (2.902) (2.800)* (-1.439) (-1.296) (0.629) (1.731)*
$-0.257RIR - 0.545COR$
(-2.380)** (-5.088)**
$R^2 = 0.86$, $D.W = 0.76$
INSTRUMENTS = OPENS, NSI, LAWOR, PARMK, REXR, RIR & COR
2. Growth Equation
$RGDP = -0.784 + 0.540PGRTST - 0.714GE + 0.232TRGD$
T-STAT (-7.333)** (4.518)** (-6.379)** (3.722)**
$R^2 = 0.94$, $D.W = 1.53$
INSTRUMENTS = PGRTST, GE, &TRGD

Note: * , **, represent significance at 1% and 5% respectively

Source : From System Estimations

5. DISCUSSION OF RESULTS

The interpretation begins with the result of the productivity equation. The result demonstrates that openness to trade, parallel market exchange rate premium and real exchange rate positively influenced productivity growth, while national system of innovation, law and order, real interest rates and corruption influenced productivity growth negatively. The most striking feature of the finding is the relationship between corruption and productivity growth. The negative sign on the coefficient of corruption variable implies that corruption has detrimental effect on production efficiency, impacting on marginal productivities and also diverting labour's attention to rent-seeking behaviour. In the short-run, corruption affected the productivity efficiency, neutralizing the effect of knowledge components of factors, and turning negative the externality from human capital. In the long run, diminishing productivity returns retards economic growth. However, ineffective law and order and inappropriate innovation system has the tendency of pulling down the structures that mould productivity growth in Nigeria. With an explanatory power of 86%, it can be said that the exogenous variables fitted reasonably well. This demonstrates that Nigeria‘s productivity growth has been directly affected by trade openness and monetary variables (such as parallel market exchange rate premium and real exchange rates).

From the growth equation, it is evident that fitted productivity growth and consumers tastes show the expected positive sign. Economic growth could be sustained when the structures upholding productivity growth are stimulated. As tastes for consumer goods and services broadens, productivity efficiency and capacity correspondingly widens and in the end promotes economic growth. Capital expenditure did not support economic growth. This result is justified on the ground that capital expenditure is vulnerable to corruption especially where the scope and cost of projects cannot be ascertained. This tend to motivate public officers to corner larger chunk of the components of capital expenditure for personal gains. This result is consistent with the findings of Mauro(1996), Tanzi and Davoodi(1997) relating corrupt practices to capital expenditure manipulation. The coefficients of determination (R^2) accounts for the overall effect of explanatory variables on the dependent variable in all the models. The R^2 is 94%. Overall, from the empirical analysis, it was found that productivity growth and consumers' tastes drives economic growth. Capital expenditure on the other hand slows down growth.

6. CONCLUSIONS AND RECOMMENDATIONS

The primary objective of this study is to critically analyze the relationship between corruption and growth in Nigeria from productivity perspective from 1980 to 2011. To achieve this broad objective, various models that have been used to analyze corruption were identified. Basically, we observed that corruption is a clandestine activity that is perpetrated away from the glare of publicity. Getting data for such act remains a difficult task as no public officer would volunteer to give evidence of corrupt profile. As a result of this, we explored the productivity channel to explain the effect of corruption on economic growth in Nigeria. An endogenous growth model was used to estimate the relationship between corruption and economic growth, reconditioned to suite Nigeria's environment.

First, the normalized cointegrating equation for productivity growth suggests that openness to trade, law and order and national system of innovation promotes growth positively. For the normalized cointegrating equation for growth, fitted productivity growth, capital expenditure and consumers tastes affected growth negatively.

Second, from the system estimation, openness to trade, parallel market exchange rate premium and real exchange rates affected productivity growth positively while national system of innovation, law and order, real interest rates and corruption affected productivity growth negatively. On the other hand, productivity growth and consumers tastes influence growth positively while capital expenditure reduces growth. This paper suggests that growth in productivity could be sustained and enhanced in an atmosphere devoid of corruption.

Corruption from this perspective reduces the efficiency of labour and capital. The empirical result showed that capital expenditure is vulnerable to corrupt practices.

The paper recommends that the government should intensify its efforts at promoting the structures that promotes productivity and at the same time check unproductive expenditure on capital projects.

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