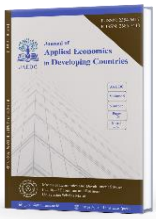

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CORRUPTION AND ECONOMIC GROWTH IN NIGERIA: DOES DATA SUPPORT "GREASE THE WHEELS" OR "SAND THE WHEELS"?

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ABSTRACT

The study investigated the relationship between corruption and economic growth in Nigeria using data from 1996 to 2020. The research employed the Fully Modified Ordinary Least Squares (FMOLS) method and Granger causality tests. The FMOLS results indicated that both gross fixed capital formation and urbanization significantly and positively influence economic growth in Nigeria, whereas the corruption index has a negative and significant effect, aligning with the "sand the wheels" theory. The Granger causality analysis showed a unidirectional relationship, where gross fixed capital formation Granger-causes GDP growth rate, and GDP growth rate Granger-causes both the corruption index and the relative corruption ranking in Nigeria. Based on these results, the study recommends that policymakers prioritise transparency and good governance by implementing e-governance initiatives to reduce bureaucratic hurdles and opportunities for corruption. Furthermore, there should be consistent monitoring and thorough evaluation of the impact of anti-corruption strategies on economic growth and development to ensure their effectiveness.

1. INTRODUCTION

Corruption is a complex phenomenon characterised by the misuse of public authority or position for personal benefit. It manifests in numerous ways, including bribery, embezzlement, nepotism, and the diversion of public resources. This issue can be observed at various scales, ranging from grand corruption involving senior officials to petty corruption involving lower-ranking bureaucrats (Obamuyi & Olayiwola, 2019). The connection between corruption and economic growth has been thoroughly examined within the realm of development economics. Scholars have investigated the intricate interactions and possible trade-offs between these two elements (Gründler & Potrafke, 2019; Heckelman & Powell, 2010; Nwankwo, 2014).

Corruption is endemic in Nigeria, permeating all levels of government and society (Ibraheem et al., 2013). Nigeria has consistently ranked poorly on the Corruption Perception Index (CPI), ranking 149 out of 180 countries in 2020. Corruption has had a considerable effect on Nigeria's economic growth, even though it ranks as one of Africa's largest economies. The nation's economic progress has been slow, and a significant portion of the population continues to experience poverty, with over 87 million Nigerians living in extreme conditions (Obamuyi & Olayiwola, 2019). Corruption has impacted multiple sectors of the Nigerian economy, such as agriculture, healthcare, education, and infrastructure development. In the education sector, corruption has led to the proliferation of fake universities and the sale of admission into tertiary institutions. In the health sector, corruption has resulted in the diversion of funds meant for healthcare delivery, leading to poor healthcare services. Corruption has affected both government, business, and civil society in Nigeria, undermining the efficient allocation of resources and discouraging investment (Farooq et al., 2013).

Corruption has profoundly influenced economic growth in Nigeria, especially by adversely affecting investment levels. The widespread presence of corruption makes investors wary of committing their resources, as it creates an environment lacking transparency, accountability, and legal safeguards for their investments (Njideka & Chukwuebuka, 2014). Consequently, Nigeria has seen a decrease in foreign direct investment (FDI), which is essential for fostering economic growth and development. Furthermore, corruption has eroded public trust in government institutions, further hampering economic development (Mathew et al., 2013). When citizens lack trust in their government or public officials, they are less inclined to participate in economic activities that depend on government support or collaboration, resulting in a slowdown of economic growth (Nwankwo, 2014). The issue of corruption in Nigeria is worsened by fragile institutions and insufficient accountability among public officials. Organizations tasked with combating corruption, such as the Economic and Financial Crimes Commission (EFCC) and the Independent Corrupt Practices and Other Related Offences Commission (ICPC), have largely fallen short in their initiatives, hindered by a lack of political will and interference from influential figures who gain from corrupt practices (Sulemana & Kpienbaareh, 2018).

The study aims to examine the effect of corruption on economic growth in Nigeria and the causal relationship between the two. There are two competing theories on how corruption can impact economic growth. The "grease the wheels" theory that suggested that corruption facilitate economic growth by helping to bypass inefficient regulations, leading to increased economic activity (Bardhan, 2017; Heckelman & Powell, 2010; Mauro, 1998). The "sand the wheels" theory that argued that corruption hinders efficient production and innovation, leading to decreased economic growth. The empirical evidence generally supports the "sand the wheels" theory, particularly in countries with low investment rates and weak governance (Ades & Di Tella, 1999; Anoruo & Braha, 2005; Drury et al., 2006; Egunjobi, 2013; Gründler & Potrafke, 2019; Hall & Jones, 1999; Knack & Keefer, 1995; Krueger, 1974; Lui, 1996; Mathew et al., 2013; Mauro, 1995; Mo, 2001; Myrdal, 1989; Nwankwo, 2014; Paldam, 2001; Sachs & Warner, 1997; Tanzi & Davoodi, 1998; Treisman, 2000). This study aims to investigate whether the data for the Nigerian context will support the "grease the wheels" or the "sand the wheels" theory, providing insights into the complex relationship between corruption and economic growth in the country. While the existing literature provides valuable insights, there are several limitations and gaps in the literature. First, the empirical evidence is often based on cross-country studies (Anoruo & Braha, 2005; Obamuyi & Olayiwola, 2019; Sulemana & Kpienbaareh, 2018), which may fail to capture the nuances of within-country dynamics and the role of local institutions. More in-depth, country-specific analyses could shed light on the contextual factors that shape the corruption-growth nexus. Second, the measurement of corruption remains a challenge, as it is a multifaceted phenomenon that is difficult to quantify. The use of different corruption indices and proxies across studies may contribute to the mixed findings. Developing more robust and comprehensive measures of corruption would improve the reliability of the empirical analyses. Finally, the causal mechanisms underlying the corruption-growth relationship deserve further exploration.

2. RESEARCH METHODS

The study employed neoclassical growth theory, which posits that the rate of economic growth can be achieved through the optimal combination of three key drivers: labour, capital, and total factor productivity.

$$Y = Tf(K, L) \quad (1)$$

In this context, Y represents the total output level, T denotes total factor productivity, K represents capital stock and L denotes labour. The total differentiation of Y can be expressed as follows:

$$dY = fdT + T(f_k dK + f_L dL) \quad (2)$$

Dividing equation (2) by Y results in a decomposition that resembles the one presented by Solow (1957).

$$\frac{dY}{Y} = f\frac{dT}{Y} + Tf_k\frac{dK}{Y} + Tf_L\frac{dL}{Y} \quad (3)$$

The connection between corruption and economic growth can be better comprehended through the framework of Schumpeter's theory of economic development. This theory posits that two primary factors influence the evolution of an economy: growth and development components. The growth component pertains to how changes in the availability of production factors, such as capital and labour growth rates, affect the production function. In contrast, the development component involves the effects of social and technological changes, linked to the forces that drive total factor productivity growth within the production function. In this framework, the influence of corruption on economic growth operates through both components. Corruption impacts the availability and allocation of capital and labour, thereby affecting the growth component. Furthermore, it disrupts social and technological advancements, which impedes the development component and its role in overall economic growth. The study characterises the mechanisms as:

$$GR = f(\gamma, IY, GL) \quad (4)$$

The economic growth rate (GR) can be broken down into two main components: the growth component, which is affected by the investment-to-output ratio (IY), the growth rate of labour (GL), and the development component, driven by total factor productivity (γ). Previous research by Levine & Renelt (1992) identified four strong determinants of economic growth: the investment share in GDP, population growth rate, initial real GDP per capita, and a measure of human capital. Building on this framework, further studies indicate that the rate of productivity growth (γ) is influenced by gross fixed capital formation (investment), labour, the corruption index, relative corruption ranking, and urbanisation (Farooq et al., 2013; Ibraheem et al., 2013; Mo, 2001).

$$GDPGR = f(K, L, CPI, RCR \& U) \quad (5)$$

A simple linear model is specified below.

$$GDPGR = \beta_0 + \beta_1 K + \beta_2 L + \beta_3 CPI + \beta_4 RCR + \beta_5 U + \varepsilon \quad (6)$$

In the logarithmic form, Equation (6) becomes:

$$GDPGR = \beta_0 + \beta_1 K + \beta_2 L + \beta_3 CPI + \beta_4 LNRCR + \beta_5 U + \varepsilon \quad (7)$$

In this context, GDPGR represents the GDP growth rate, K indicates gross fixed capital formation, L refers to the labour force participation rate, CPI stands for the corruption perception index, RCR denotes Nigeria's relative corruption rank, and U signifies urbanisation. Additionally, $ß_0$ is the intercept coefficient, while $ß_1$ to $ß_5$ are the slope coefficients that reflect the elasticities of the corresponding variables. Table 1 presents the variables, their identifiers, data sources, definitions, and measurements.

Table 1. Variables and Measurement

Variable Name	Identifier	Source of Data	Definition and Measurement
GDP Growth Rate	GDPGR	CBN, (2020)	GDP per capita (GDP per capita growth (annual %))
Capital	K	CBN, (2020)	Capital (Gross fixed capital formation (annual % growth))
Labour	L	CBN, (2020)	Labour (Labour force participation rate, total (% of total population ages 15-64) (modeled ILO estimate))
Corruption Index	CPI	Transparency International (2021)	Corruption Perception Index
Relative Corruption Rank	RCR	Transparency International (2021)	Corruption Ranking for Nigeria
Urbanisation	U	WDI, (2020)	Urbanisation (Urban population growth (annual %))

Source: Processed data (2024)

Consequently, both the fully modified ordinary least squares (FMOLS) method and Granger causality were employed to analyse the data spanning from 1996 to 2020. These methods were employed to estimate the long-run relationships between variables while addressing potential issues of non-stationarity and endogeneity. Given that the data spans several years, FMOLS helps provide robust estimates of the coefficients and accounts for any serial correlation and heteroskedasticity present in the residuals. Also, Granger causality helps identify causal relationships, which is crucial for understanding the dynamics between corruption and economic growth.

3. RESULTS AND DISCUSSION

Descriptive Statistics

Table 2 presents the descriptive statistics in order to summarise the data via mean, median, maximum, minimum, standard deviation, skewness, Kurtosis and Jarque-Bera.

Table 2. Descriptive Statistics

	GDPGR	K	L	CPI	RCR	U
Mean	2.260	2.617	30.155	20.640	123.560	4.501
Median	2.525	2.675	30.640	22.000	136.000	4.586
Maximum	12.457	40.389	33.730	28.000	152.000	4.863
Minimum	-4.168	-23.747	23.740	7.000	52.000	4.054
Std. Dev.	3.456	13.479	2.054	6.271	29.717	0.314
Skewness	0.651	0.290	-1.622	-0.698	-1.223	-0.307
Kurtosis	4.360	4.365	5.864	2.280	3.287	1.437
Jarque-Bera	3.694	2.291	19.501	2.569	6.322	2.936
Probability	0.158	0.318	0.000	0.277	0.042	0.230
Sum	56.506	65.421	753.880	516.000	3089.000	112.524
Sum Sq. Dev.	286.657	4360.907	101.258	943.760	21194.16	2.370

Note: GDPGR is GDP growth rate; K is capital; L is labour; CPI is corruption index; RCR is relative corruption rank & U is urbanisation.
Source: Processed data (2024)

Table 2 presents descriptive statistics for six variables: GDPGR, K, L, CPI, RCR, and U. The mean of GDPGR is 2.260, indicating that on average, the economy is growing at a rate of 2.26%. The median, which is 2.525, is higher than the mean, suggesting that the distribution of GDP growth rates is slightly skewed to the left. The maximum GDP growth rate is 12.457, while the minimum is -4.168. The standard deviation of GDPGR is 3.456, suggesting that the growth rates exhibit significant volatility. The mean value of K, which represents capital, is 2.617, while the median is 2.675. The maximum value is 40.389, and the minimum value is -23.747. The standard deviation is quite high at 13.479, indicating that the distribution of capital is quite dispersed. The mean value of L, which represents labour, is 30.155, while the median is 30.640. The standard deviation is relatively low at 2.054, suggesting that the distribution of labour is relatively concentrated around the mean. The CPI has an average value of 20.640 and a median of 22.000. The CPI distribution exhibits negative skewness, reflected in a skewness value of -1.622. Additionally, the distribution is leptokurtic, with a kurtosis value of 5.864. The Jarque-Bera test indicates that the distribution of CPI is not normal, with a probability value of 0.000. The RCR has an average value of 123.560 and a median value of 136.000. The distribution of RCR is also negatively skewed, with a skewness value of -1.223. Its kurtosis value is 3.287, suggesting that the distribution is moderately leptokurtic. The Jarque-Bera test reveals that the RCR distribution is not normal, as indicated by a probability value of 0.042. Additionally, U has a mean of 4.501 and a median of 4.586. The standard deviation is relatively low at 0.314, indicating that the distribution of urbanisation is fairly concentrated around the mean.

Correlation Matrix

Table 3 gives the correction analysis which provides a systematic way to understand the strength and direction of the relationships between pairs of variables in the dataset.

Table 3. Correlation Matrix

	GDPGR	K	L	CPI	RCR	U
GDPGR	1					
K	0.099	1				
L	-0.126	-0.060	1			
CPI	-0.109	0.018	-0.239	1		
RCR	-0.263	0.164	-0.115	0.645	1	
U	0.708	-0.080	-0.163	0.228	0.600	1

Note: GDPGR is GDP growth rate; K is capital; L is labour; CPI is corruption index; RCR is relative corruption rank & U is urbanisation.
Source: Processed data (2024)

Table 3 presents the pairwise correlation matrix for the six variables: GDPGR, K, L, CPI, RCR, and U. The correlation between GDPGR and K is 0.099, reflecting a weak positive relationship. In contrast, the correlation between GDPGR and L is -0.126, indicating a weak negative relationship. The correlation between GDPGR and CPI is -0.109, suggesting a weak negative association between GDP growth and the corruption index. Additionally, the correlation between GDPGR and RCR is -0.263, which points to a moderate negative correlation, implying that higher levels of corruption and its rankings are linked to lower GDP growth rates. Conversely, the correlation between GDPGR and U is 0.708, indicating a strong positive relationship, suggesting that increased urbanisation is associated with higher GDP growth rates.

Unit Root Test

Table 4 presents the unit root test which is a statistical test used to determine whether a time series variable is non-stationary and possesses a unit root. Non-stationarity means that the statistical properties of the series, such as mean and variance, change over time, which can complicate analysis and forecasting.

Table 4. Unit Root Test

Variables	Augmented Dickey Fuller (ADF) Test		Phillip Perron (PP) Test		Order of Integration
	Level	First Difference	Level	First Difference	
D(GDPGR)	-2.742106	-6.695556**	-2.742106	-6.695556**	I(1)
D(K)	-1.690612	-5.753611**	-1.690612	-5.753611**	I(1)
D(L)	-2.930692	-3.311160**	-2.930692	-3.311160**	I(1)
D(CPI)	-2.417923	-6.132096**	-2.417923	-6.132096**	I(1)
D(RCR)	-2.464611	-4.403929**	-2.464611	-4.403929**	I(1)
D(U)	-1.466361	-4.426653**	-1.466361	-4.426653**	I(1)

Note: GDPGR is GDP growth rate; K is capital; L is labour; CPI is corruption index; RCR is relative corruption rank & U is urbanisation. Also ** mean significant level at 5%.
Source: Processed data (2024)

The findings in Table 4 show that all variables are non-stationary in their original levels, as the ADF and PP statistics fall below the critical values at the 5% significance level. However, after first differencing, all variables become stationary, with the ADF and PP statistics exceeding the critical values. This indicates that all variables are integrated of order 1, or I(1), meaning they possess a unit root and are non-stationary in their levels but stationary in their first differences. Consequently, first differencing is required to render the variables stationary and appropriate for statistical analysis.

Johansen Co-integration Test

Table 5 gives the Johansen co-integration test which is a statistical method used to determine the existence and number of co-integrating relationships among multiple time series variables. It is particularly useful in econometrics when dealing with non-stationary data that may be integrated of the same order (typically I(1)).

Table 5. Johansen Unrestricted Co-integration Rank Test

Hypothesized No. of CE(s)	Trace Statistic	Max-Eigen Statistic
None *	146.3836**	62.20047**
At most 1 *	84.18317**	35.59585**
At most 2 *	48.58731**	25.20834
At most 3	23.37898	12.46902
At most 4	10.90996	9.810694
At most 5	1.099261	1.099261

Note: GDPGR is GDP growth rate; K is capital; L is labour; CPI is corruption index; RCR is relative corruption rank & U is urbanisation. Also ** mean significant level at 5%.
Source: Processed data (2024)

Table 5 results show that at the 5% significance level, the maximum number of co-integrating relationships is 3 for trace test and 2 for maximum eigenvalue. As a result, the variables in the model are co-integrated up to two or three dimensions, indicating the presence of two or three long-term relationships among them.

Fully Modified Ordinary Least Squares

Table 6 presents FMOLS test which is a statistical estimation technique used primarily in the context of time series data that may be non-stationary and co-integrated. FMOLS is particularly useful for estimating long-run relationships between variables while addressing issues related to endogeneity and serial correlation.

Table 6. FMOLS Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
K	0.045591	0.022817	1.998105	0.0410**
L	0.017273	0.147493	0.117112	0.9081
CPI	-0.215890	0.067217	-2.724116	0.0181**
RCR	-0.018882	0.017345	-1.088624	0.2070
U	9.263795	1.254950	7.381806	0.0000**
C	-35.45465	7.451730	-4.757909	0.0002**
R-squared	0.619816	Mean dependent var		2.459845
Adjusted R-squared	0.514209	S.D. dependent var		3.379953
S.E. of regression	2.355784	Sum squared resid		99.89489
Long-run variance	1.966426			

Note: GDPGR is GDP growth rate; K is capital; L is labour; CPI is corruption index; RCR is relative corruption rank & U is urbanisation. Also ** mean significant level at 5%.
Source: Processed data (2024)

Table 6 indicates that the model has an R-squared value of 0.62, which means it explains about 62% of the variation in GDP growth rate. The adjusted R-squared of 0.51 implies that the model fits the data well. Among the independent variables, capital (K) has a positive and significant coefficient of 0.045, suggesting that a 1% increase in capital leads to a 0.045% increase in GDP growth rate. In contrast, the corruption perception index (CPI) exhibits a negative and significant coefficient of -0.216, indicating that a 1% rise in corruption results in a 0.216% decline in GDP growth rate. The negative and significant coefficient of the corruption perception index (CPI) suggests that increasing corruption in Nigeria has serious economic implications. As corruption increases, resources may be misallocated, leading to inefficiencies and lower overall productivity. Also, corruption can deter both domestic and foreign investment. Investors are often wary of corrupt environments, which can lead to lower levels of capital inflow and hinder development projects. Furthermore, corruption often exacerbates social inequalities, as resources are concentrated among a small elite. This can lead to social unrest and undermine the broader economic stability necessary for growth. Therefore, the negative impact of corruption on GDP growth underscores the importance of addressing corruption not only as a moral issue but as a critical factor for economic development in Nigeria. These findings align with the "sand the wheels theory" of corruption, which asserts that corruption impedes efficient production and innovation, thereby stifling economic growth. The significant negative impact of corruption on GDP growth reinforces this theoretical perspective (Ades & Di Tella, 1999; Gründler & Potrafke, 2019; Hall & Jones, 1999; Knack & Keefer, 1995; Krueger, 1974; Lui, 1996; Mathew et al., 2013; Mo, 2001; Myrdal, 1989; Nwankwo, 2014; Paldam, 2001; Treisman, 2000).

The findings regarding the negative impact of the corruption perception index (CPI) on GDP growth in Nigeria align closely with previous studies discussed in the document. For instance, Mauro (1995) highlights how corruption adversely affects economic growth by misallocating resources and reducing overall efficiency. This is echoed in Egunjobi (2013), who provides an econometric analysis specifically showing how corruption hampers Nigeria's economic performance. Furthermore, the negative coefficient of -0.216 for CPI aligns with Anoruo and Braha (2005), who also explore the detrimental effects of corruption on economic growth across Africa. They emphasise that increased corruption can deter both domestic and foreign investment, a point that resonates with the findings in the current study. The reluctance of investors to engage in corrupt environments is a critical factor that can lead to diminished capital inflows, as supported by the work of Drury et al. (2006), which discusses the interplay between corruption, democracy, and economic growth. Additionally, the exacerbation of social inequalities due to corruption, as noted in the current findings, is consistent with the theories presented by Tanzi and Davoodi (1998) and Sachs and Warner (1997), which argue that corruption leads to wealth concentration among elites, fostering social unrest and undermining economic stability.

Additionally, urbanisation (U) has a positive and significant coefficient of 9.264, implying that a 1% increase in urbanisation can enhance GDP growth rate by 9.264%. The positive effects of capital and urbanisation on growth highlight the importance of investment and urban development in driving economic performance in Nigeria.

Granger Causality Test

Table 7 gives the pairwise Granger causality test which is a valuable tools for analysing predictive relationships between time series variables.

Table 7. Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
K does not Granger Cause GDPGR	23	5.20171	0.0092**
GDPGR does not Granger Cause K		0.71233	0.5038
L does not Granger Cause GDPGR	23	2.17854	0.1421
GDPGR does not Granger Cause L		1.05767	0.3679
CPI does not Granger Cause GDPGR	23	1.58948	0.2314
GDPGR does not Granger Cause CPI		4.55191	0.0089**
RCR does not Granger Cause GDPGR	23	0.50513	0.6117
GDPGR does not Granger Cause RCR		0.65265	0.0026**
U does not Granger Cause GDPGR	23	14.5475	0.0002**
GDPGR does not Granger Cause U		1.51773	0.2460

Source: Processed data (2024)

According to the Pairwise Granger Causality test results shown in Table 7, capital (K) has a Granger causal effect on GDP growth rate (GDPGR) at the 5% significance level. However, GDPGR does not Granger cause K. There is no evidence of Granger causality between labor (L) and GDPGR in either direction. The corruption perception index (CPI) does not Granger cause GDPGR, but GDPGR does Granger cause CPI at the 5% significance level. Similarly, the relative corruption rank (RCR) does not Granger cause GDPGR; however, GDPGR Granger causes RCR at the 5% significance level. Urbanisation (U) Granger causes GDPGR at the 5% significance level, but GDPGR does not Granger cause U. In summary, the key Granger causality relationships are capital (K) Granger causes GDP growth rate (GDPGR) and GDP growth rate (GDPGR) Granger causes corruption index (CPI) and relative corruption rank (RCR) as well as urbanisation (U) Granger causes GDP growth rate (GDPGR). These findings indicate a unidirectional causal relationship flowing from capital, urbanisation, and economic growth to corruption, rather than the reverse. This suggests that investment, urban development, and overall economic performance are key factors influencing changes in Nigeria's corruption landscape.

4. CONCLUSION

The study concluded that gross fixed capital formation, corruption index and urbanisation are statistically significant in determine economic growth in Nigeria while labour force participation and relative corruption rank are statistically insignificant. Also, there was a unidirectional relationship between GDP growth rate, gross fixed capital formation, corruption index, relative corruption rank in Nigeria and urbanisation. Drawing from the study's findings, it is recommended that policymakers enhance the effectiveness of anti-corruption institutions and enforcement mechanisms. Additionally, promoting transparency and good governance through the implementation of e-governance initiatives can help minimise bureaucratic obstacles and reduce opportunities for corruption. Regular monitoring and thorough evaluation of the effects of anti-corruption measures on economic growth and development should also be prioritised. Establish robust data collection and analysis systems to track the progress and effectiveness of anti-corruption initiatives. The country should foster international cooperation by collaborating with international organisations and partner countries to share best practices and lessons learned in combating corruption. Seek technical and financial assistance from international partners to support anti-corruption efforts.

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