Impact of Gas Production on Economic Growth in Nigeria

Eze Chikodili[1], Okoli, Uju Victoria[2], Onugha Chinwendu Benedette[3]

[1]*Department of Economics, University of Nigeria Nsukka, Enugu State, Nigeria*

[2,3] *Department of Economics, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria*

Abstract: **This study attempts to examine the impact of gas production on economic growth in Nigeria from 1985-2020. The objective of the study broadly is to determine the impact of gas production growth rate on economic growth rate in Nigeria. In a bid to ascertain the impact of gas utilization growth rate on economic growth rate in Nigeria and determine the impact of gas flared growth rate on economic growth rate in Nigeria, Secondary data were collected based on the model used in the research work, through the use of Ordinary Least Squares (OLS) as estimation technique. As required of time series data Augmented Dickey Fuller (ADF) for stationarity test, that is unit root test was conducted on the data and the variables were stationary at level form I(0), after which Johansen co-integration test was conducted and the variables were co-integrated showing evidence of long-run relationship between the dependent and independent variables. Level form I(0) stationarity indicates short run instability, as a result the study analysis is based on long run analysis. The result obtained from empirical analysis shows that there exist 47% goodness of fit between the dependent and independent variables. Economically, Growth Rate of Gas Utilized (GRGU) and Growth Rate of Gas Flared(GRGF) confirmed to a priori expectation. Statistically, GRGU and GRGF were positively significant and the overall statistical test indicates positive significant relationship. By implication GRGU and GRGF is favorable to the Nigerian economy. This study recommended that the government should set a benchmark for gas production efficiency and withdraw license from companies that failed to comply. There should be proper accountability, transparency and sell-off of compromise and Corrupt practices by adhering to economic rationalities rather than political expediencies.**

Keywords: **Augmented Dickey Fuller, Growth Rate of Gas Utilized, Growth Rate of Gas Flared, Random Effect, Economic Growth Rates**.

I. INTRODUCTION

The discovery of oil and gas in Nigeria by Royal Dutch shell in 1956 marked the start of oil and gas production in Nigeria. Shortly after commercial production of oil in 1958 by shell, other multinationals such as Chevron oil and gas company, Total Nigeria Plc, Mobil oil Nigeria Plc, Nigeria Agip Oil Company, Texaco and Pan Ocean etc were officially licensed to start oil and gas exploitation, exploration and production in Nigeria. Oil was the main target for the operators and any gas associated with oil was usually flared as there was no plan for its use as at that time (Yewende and Omowumi, 2014).

The then British Government condemned gas flaring because of its economic, environmental and health negative effects, but did not enforce policies or take positive measures to stop gas flaring. After independence, the Nigerian Government frowned at gas flaring and in bid to put an end to it, the petroleum regulations (drilling and production) was established in 1969, compelling producing companies to submit detailed plans for associated gas utilization or re-injection not later than five years from commencement of production(Yewende and Omowumi, 2014).

In furtherance, the associated gas re-injection Act was promulgated in 1979 to stop atmospheric pollution caused by gas flaring, the strength of this Act is not only the penalty incorporated in it, but it mandated all producing companies to submit a preliminary plan as at 1 January, 1984 for the viable utilization of gas as well as re-injection plan for all gas not utilized for an industry. Its second strength is the discretionary power granted to the office of minister of petroleum resources to issue certificates of exemption to companies where gas utilization or re-injection is termed inappropriate. This strength turned weakness as oil and gas producers anchored on it and obtained exemption certificates and began flaring of gas, even without obtaining exemption certificates many oil and gas companies began gas flaring, since they could easily pay the penalty which was even more cost effective compared to setting up a gas utilization project for efficient gas production (Ali and Heo, 2014).

This period marked the era of frivolous gas flaring which led to environmental degradation and in turn consistent and aggressive agitations from residence of oil and gas producing areas, Niger Delta Region in Nigeria. Oluwasola (2014) In order to halt this ugly trend, the Federal Government of Nigeria (FGN) embarked on further reforms which include; (1) Associated Gas Re-injection Act (1979), amended 1984, 1985. This Provides statutory basis for the regulation of gas flaring cum introduction of penalty for gas flaring in Nigeria. (2) Environmental Impact Assessment (EIA) Act (1992) Provides statutory basis for EIAs, as part of project development authorization process before project establishment.(3) Environmental Guidelines and Standards for the Petroleum Industry under the Department of Petroleum Resource, 1991 amended 1999, This is one of the comprehensive frameworks for environmental policy and management in the petroleum industry because it made provision for environment compensation, project allocation,

social responsibilities within the areas of operation which attracts heavy penalty for non compliance etc.

These measures was weak to correct the act of gas flaring, the figure reveals the trend of gas produced, utilized and flared from 1961-2019.

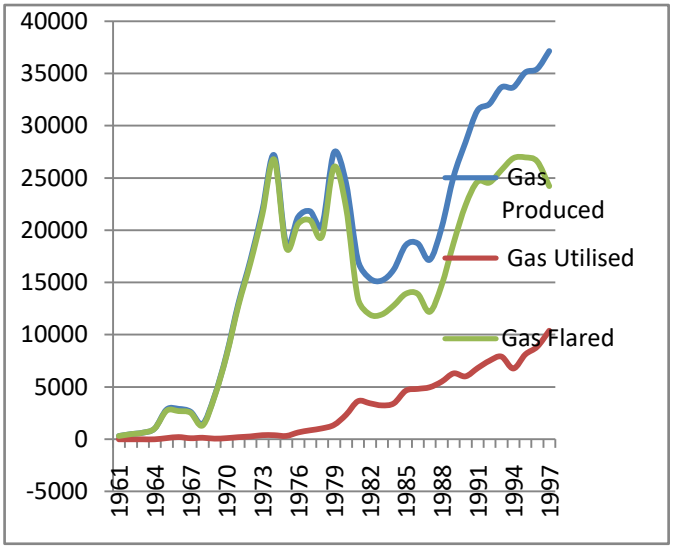

Figure 1: trend of gas produced, utilized and flared from 1961-1997
Source: Computed from NNPC Statistical Bulletin January-December, 1997.

As previous policies proved abortive, the federal Government embarked on more sensitive measures with specified projects to halt the act of gas flaring and to expand Nigerian gas market.

The new gas reforms which started between 1999 and 2012 as cited in Babalola and Yewande (2014) and Ali and Heo (2014), are;

(a) The National oil and Gas Policy (NOGP) 2004; with primary objective of separation of federal governments regulatory, policy and commercial roles in the petroleum industry by ensuring that these roles are performed by distinct and semi-autonomous institutions and/or organizations.

(b) The Downstream Gas Bill (DGB) 2005; which was designed to lay a legal foundation for the implementation of the proposed Nigerian Gas Master Plan (NGMP) and aimed at the efficient regulation of a liberalized downstream gas sector. The DGB was not enacted, but its key provision were incorporated into the petroleum industry bill (PIB) 2008 and now integral part of the PIB 2012.

(c) The Nigerian Gas Master Plan (NGMP) 2008; the NGMP seeks to establish a framework for gas infrastructure development and expansion within the domestic market in order to maintain zero gas flaring through efficient production, gas price stabilization, increase in gas consumption and natural gas development (export). To meet these objective several projects were embarked upon by the government in conjunction with the private sectors, some of which are the (i) Gas to power (GTP) projects (ii) Escravos Gas to liquid (EGTL) project (iii) liquefied natural gas (LNG) project (iv) west African gas pipeline project (v) trans-sahara pipeline project.

(d) Petroleum Industry Bill (PIB) 2012; this is the most recent of all the oil and gas reforms in Nigeria and it is still ongoing in debate in the national house of assembly. The (PIB) 2012 in summary is a document that seeks to harness existing acts, decrees, and laws including the once mentioned above into one document for the effective running of the oil and gas industry in Nigeria.

The above measures did not achieve the target of Zero gas flaring, but gas flaring only reduced as show in figure 2 below.

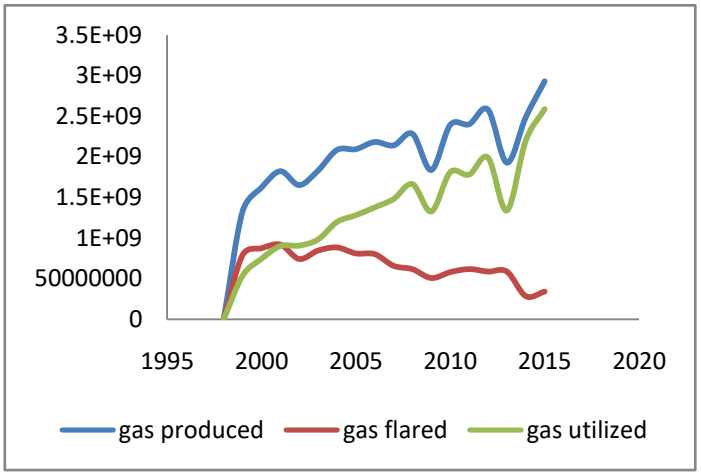

Figure 2: Aggregate trend of gas produced, utilized and flared from 1998-2015
Source: Computed from NNPC Statistical Bulletin.

Statement of Problem

From literatures reviewed study connecting to Nigerian gas industry focus more on gas production and environmental degradation; energy consumption and economic growth; gas pricing and economic growth. Only the study conducted by Ikechukwu and Mukalia and Mohammed and Ashem (2013) focused on gas production and economic growth in Nigeria. Ikechukwu el at (2013) affirmed that gas flaring has reduced tremendously yet only gas utilization has positive impact in Nigerian economy. The study by Ikechukwu el at (2013) did not examine the rate at which gas utilization and flaring changes from one period to the other and its effect on Nigerian economy. This gap identified is the issue this study seeks to address. In order to bank on this task this study will put into consideration growth rate of gas utilization and growth rate of gas flared and regress against economic growth rate. This is unlike previous study that considered normal aggregate economic growth. This study will consider real aggregate economic growth as dependent variable.

Objectives of the study

The objectives stated below are stated in broad and in specific objective.

1. To determine the impact of gas production growth rate on economic growth rate in Nigeria.
2. To determine the impact of gas utilization growth rate on economic growth rate in Nigeria.
3. To determine the impact of gas flaring growth rate on economic growth rate in Nigeria.

II. LITERATURE REVIEW

Theoretical review

Pareto optimality; Optimality theory cited in Jihngan, (2008) which was propounded by Vilfredo in 1906 posits that production is efficient when it is not possible to reallocate resources to produce more of some goods without producing less of some other goods. He added that production is efficient if it is possible to reallocate resources such that production of some output increases without reducing the production of some goods. By implication, efficiency in production requires increase in output resulting from efficient allocation of resources. In furtherance, he added that, the use of resources by firms for production of a good or goods is efficient when it produces any given output at the minimum possible cost or for a given cost outlay. According to Pareto there are three allocative rules for demonstrating efficiency in production under perfect competition. First relates to the optimum allocation of factors (labour and capital). It requires that the marginal rate of technical substitution (MRTS) between any two factors must be the same for any two firms using these factors to produce the same product and this is simply stated as ${}_{A}MRTS_{LK} = {}_{B}MRTS_{LK} = P_L/P_K$. Second rule states that the marginal productivity of any factor in producing a particular product must be the same for all firms. On the other hand, it means that a firm under perfect competition will employ a factor of production up to the point at which its marginal product value (MPV) equals to her marginal physical product (MPP) multiplied by the price of the product. That is ${}_{A}MPP_{XL} = {}_{B}MPP_{XL} = P_L/P_X$. Rule three for efficiency in production requires that the marginal rate of transformation (MRT) between any two products must be the same for any two firms that produce both. This condition requires that if there are two firms A and B, and both produce two products X and Y, then ${}_{A}MRT_{XY} = {}_{B}MRT_{XY}$.

(a) Meade's Neoclassical Model of Economic Growth: Meade in 1961 constructed a neo-classical model of economic growth which is designed to show the simplest path to economic growth (economic growth rate) through growth rates of input factors. Meade constructed his model around the following equation.

$$Y = F(K,L,N,t) \quad (2.1),$$

where, Y is the net output, K the existing stock of capital, L the labour force, N land and natural resources and t is time, signifying technical progress. Assuming the amount of N to be fixed, net output can increase in any one period with the growth in K, L and t. this relationship is shown as

$$\Delta Y = q\Delta K + r\Delta L + \Delta t^{i} \quad (2.2),$$

Where Δ in each case represents an increase (change) and q and r represents the incremental product of capital and labour respectively. The increase (changes) over the years in the rate of annual net output (ΔY) is equal to the increase in the stock of capital (ΔK) multiplied by q plus the increase in the amount of labour (ΔL) multiplied by r plus the increase in the rate of technical progress. The annual proportionate growth rate of output is;

$$\Delta Y/Y = qK/Y * \Delta K/K + rL/Y * \Delta L/L + \Delta t^{i}/Y \quad (2.3),$$

Where ΔY/Y is the proportionate growth rate of output, ΔK/K and ΔL/L are the proportionate growth rate of capital and labour respectively, qK/Y and rL/Y is the proportional marginal product of capital and labour respectively, $\Delta t^{i}/Y$ is the proportional growth rate of technical progress during a year. The equation 2.3 above shows that growth rate of output (which can serve as a proxy to economic growth) depend on the weighed sum of the three other growth rates (Jhingan, 2008).

Empirical literatures

In a study by Akinsola and Adeoye **(**2017) where the relationship between air pollution, energy consumption and economic growth from 1980-2010 was investigated, The air pollution and energy consumption was disaggregated into coal, oil and natural gas respectively. Granger causality was deployed to test for relationship, while ECM was used for short-run analysis, the result reveals that economic growth granger causes air pollution without feedback and that oil consumption have significant impact on economic growth, while coal and gas consumption have no impact.

Ikechukwu el at (2019) this study examined the effect of gas production, utilization and flaring on Economic growth of Nigeria. They adopted OLS technique of analysis, the explanatory variables are gas produced, gas utilized, gas flared, gross fixed capital and total labour force and the dependent variable is GDP. The economic findings of the study revealed that gas produced and gas flared is negatively related to economic growth. While gas utilized is positively related to economic growth. The statistical results both individual and in overall shows that all the variables were statistically significant. The study concluded by recommending that for gas produced, gas utilized, gas flared to positively stimulate economic growth, there is need to invest more on infrastructure in the industry, and review the regulatory framework guiding operations of the oil and gas industry.

Awan (2019) this study examined the relationship between environmental pollution and sustainable economic development in Nigeria. The study adopted historical approach, the study maintained that Environmental pollution is one of the major problems faced by every country as a result of economic, commercial activities, production and utilization of natural resources in other to provide for the increasing population thereby creating uncontrollable pollution. Since every country is trying to increase economic growth to alleviate living standard of their people which is quit frustrating to sustainable development as the next generation maybe compromised by the activities of the present generation. The study therefore recommends that judicious use of natural resources is an imperative need for sustainable economic development.

Babatope and Taiwo and Patrick (2012) this study examines the impact of energy consumption on economic performance in Nigeria from 1980-2010. Energy consumption was disaggregated into coal, oil and gas consumption, Augmented Dickey Fuller and two stage Engel-Granger was used for unit root and co-integration tests respectively. Error Correction mechanism (ECM) was deployed for short-run equilibrium. The observed result indicates that except oil, coal and gas consumption have not contributed significantly to economic performance in Nigeria.

III. METHODOLOGY

Theoretical framework

The theoretical framework for this study was drawn from Meade's Neoclassical Model of Economic Growth and was modified where necessary. Meade constructed his model around the following equation. $Y = F(K,L,N,t)$ (1),

All thing been equal as stated in the theoretical literature review. Meade concluded that;

the annual growth rate of output is;

$$\Delta Y/Y = qK/Y * \Delta K/K + rL/Y * \Delta L/L + \Delta t^i/Y \quad (2),$$

Where

$\Delta Y/Y$ is the proportionate growth rate of output, $\Delta K/K$ and $\Delta L/L$ are the proportionate growth rate of capital and labour respectively, qK/Y and rL/Y is the proportional marginal product of capital and labour respectively, $\Delta t^i/Y$ is the proportional growth rate of technical progress during a year. As stated earlier in the review of other theoretical issues this theory satisfies some aspect of this study but did not satisfy all therefore the structure of this theory was adopted while the variable constructs was adjusted to fit into this study. Equation (2) was restated as;

$$Y = f(GU, GF) \quad (3),$$

Where Y = Economic growth, GU = gas utilized, GF = gas flared utilization. Assuming that gas gas production increases, the Economic Growth will increase in any one period. This relationship is shown as;

$$\Delta Y = \Delta GU + \Delta GF \quad (4),$$

Where Δ in each case represents an increase (change) in the variables above, the increase (changes) over the years in Economic Growth (ΔY) is equal to the increase in the stock of gas produced. The annual Economic growth rate is;

$$\Delta Y/Y = \Delta GU/GU + \Delta GF/GF \quad (5),$$

Where $\Delta Y/Y$ is Economic growth rate (EGR), $\Delta GU/GU$ is the Growth Rate of Gas Utilized (GRGU) and $\Delta GF/GF$ is the Growth rate of Gas Flared (GRGF). Therefore, the empirical model will be specified as;

Empirical model specification

$$EGR = f(GRGU, GRGF)$$

$$EGR = ß_0 + ß_1 GRGU + ß_2 GRGF + \mu_i \quad (6)$$

$ß_1 > 0; ß_2 > 0.$

Where $ß_0$, $ß_1$ and $ß_2$ are parameter to be estimated and μ_i = error term

EGR = Economic Growth Rate.

GRGU = Growth Rate of Gas Utilized.

GRGF = Growth rate of Gas Flared.

Definition of variables/justification of model.

Economic Growth Rate (EGR) refers to the percentage change (negative or positive) in size of a nation's output within a specific time period. EGR is a measure of change and/or changes in a nation's output from one period to another in percentage terms, the change and/or changes can be negative or positive. EGR is measured as; present EG minus past EG divided by past EG multiplied by 100. Where EG = Economic Growth.

Growth Rate of Gas Utilized (GRGU) measures the size or changes in gas utilization in percentage terms, the changes can be negative or positive. GRGU is measured as; present GU minus past GU divided by past GU multiplied by 100.

Growth rate of Gas Flared (GRGF) measures the size or changes in gas flared in percentage terms the changes can be negative or positive. GRGF is measured as; present GF minus past GF divided by past GF multiplied by 100.

This model is justified on the grounds that change and/or changes in gas utilization and gas flared influences Economic growth. For instance, increase in gas utilization and decrease in gas flaring will lead to increase in gas consumption and economic growth.

Estimation technique and procedure

The estimation technique employed in this study is the Ordinary Least Squares (OLS). The procedures will include preliminary test such as unit root test, co-integration test and

Error Correction test. The technique of analysis was multiple regression analysis.

Unit root test

Unit root test is a test to determine the suitability of the variables for a time series regression, this test is necessary because most economic time series have proved empirically to be non-stationary in nature. In other to achieve this Augmented Dickey-Fuller (ADF) will be adopted, which is specified below;

$$\Delta Y_t = \beta_0 + \beta_2 t + \psi Y_{t-1} + \alpha_1 \sum_{i=1}^{p} \Delta Y_{t-1} + \varepsilon_t \quad (7)$$

Augmented engle-granger (aeg) co-integretion test

After establishing the existence of non unit root (stationarity) and their order of integration identified, if the variables are integrated in the same order say I(0) and I(0) and/or I(I) and I(I)then the presence of co-integration is established as well as their linear combination (Enders, 1995). Equation below represents the stationarity and co-integration tests.

$$\Delta Y_t = \alpha_1 \Delta Y_{t-1} + x_t \psi + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-1} + \beta_p \Delta Y_{t-p} + \varepsilon_t \quad (8)$$

Once the existence of a long run co-integration relationship has been established, the pump price of petroleum products growth rate and manufacturing output growth rate will be specified as:

$$EGR = \beta_0 + \beta_1 \sum_{i=1}^{p} (GRGU)_t + \beta_2 \sum_{i=1}^{p} (GRGF)_t + u_t \quad (9)$$

Error correction mechanism (ecm).

In the short run there may be disequilibrium. Therefore the error term in the above equation was treated as equilibrium error. To correct this disequilibrium the Error Correction Mechanism (ECM) was used. Finally, we obtain the short run parameters by estimating an error correction model associated with the equilibrium error estimates. This is specified as follows:

$$EGR = \alpha_0 + \alpha_1 \sum_{i=1}^{p} (GRGU)_t + \alpha_2 \sum_{i=1}^{p} (GRGF) \alpha_3 u_{t-1} + \alpha_4 ECM \quad (10)$$

Where equation (10) is the ECM equation which indicates the speed of adjustment of variables that were in disequilibrium state into equilibrium and short-run result was used for this study analysis.

Evaluation of estimates

The results from the model was examined based on economic criteria, statistical criteria and econometric criteria.

Economic criteria

Here the empirical results was evaluated in order to verify if the variables under study meet the necessary apriori signs.

Statistical criteria

The statistical criteria took into account of the following; coefficient of determination (R^2), p-value or t-test and Prob(F-stat) or F-test of significance. A test of significance is a procedure by which sample results are used to verify the true nature of the null hypothesis (H_0). p-value or t-test for individual statistical significance of the variables and Prob(F-stat) or F-test for the overall statistical significance.

Coefficient of multiple determinations (R^2).

Coefficient of multiple determinations empirically measures the goodness of fit between the dependent variable and independent variables.

Student t-test of significance

Student t-test of significance measures the individual significance level of the independent variables. In this study the t-test followed the conventional (5% two tail test at n-k df) approach to t-statistic to measure whether the independent variables under study are statistically significant or not. Decision rule: Reject H_0 if t-cal > t-tab at the chosen level of significant and accept H_0 if otherwise.

F-test of significance

This is employed in order to test the overall Significance of the entire regression model with V_1 = K-1 and V_2 = n-k degree of freedom. Decision Rule: Reject H_0 if f-cal > f-tab (V_1/V_2) d.f and accept H_0 if otherwise

Econometric criteria

The second order test is based on the satisfaction of econometric batteries of test such as;

Autocorrelation test

Autocorrelation test is employed to test if there is presence of serial autocorrelation in the model specified. The Durbin-Watson value (computed and tabulated) is used to ascertain whether or not there exist the presences of autocorrelation.

Decision rule;

Reject H_0 of no positive autocorrelation If $0 < d < dL$.

No decision on H_0 of No positive autocorrelation If $4 \leq d \leq du$.

Reject H_0 of no negative autocorrelation If $4\text{-}dL < d < 4$

No decision on H_0 If $4\text{-}du \leq d4\text{-}dL$.

Do not reject H_0 of No autocorrelation, positive or negative If $du < d < 4\text{-}d$.

Test of research objectives/hypotheses

First Objective/hypothesis

To determine the impact of gas production growth rate on economic growth rate in Nigeria. H_{01}; There is no significant relationship between growth rates of gas production and economic growth rate in Nigeria. The empirical F-test was used to validate the stated objective and hypothesis.

Second Objective/hypothesis

To determine the impact of gas utilization growth rate on economic growth rate in Nigeria, H_{02}; there is no significant relationship between growth rates of gas utilization and economic growth rate in Nigeria. The empirical t-test was used to validate the stated objective and hypothesis.

Third Objective/Hypothesi: To determine the impact of gas flaring growth rate on economic growth rate in Nigeria, H_{02}; there is no significant relationship between growth rates of gas flared and economic growth rate in Nigeria. The empirical t-test was used to validate the stated objective and hypothesis.

Nature and sources of data.

Data was generated from Central Bank of Nigeria (CBN) Statistical Bulletin, National Bureau of Statistics (NBS) and Nigerian National Petroleum Corporation (NNPC) Statistical Bulletin.

IV. DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

Data presentation

Data analysis

In order to capture the objectives of this study and justify the hypotheses the below procedures was observed and analyzed.

Unit root test for stationarity.

The Augmented Dickey Fuller (ADF) was used to compare with the critical values.

The hypothesis is formulated thus,

H_0: p = 1(non stationary); H_1: p< 1(stationary)

Decision Rule; Reject H_0 if /ADF-stat/ > / Critical value/ at chosen level of significance, and Accept H_0 if otherwise.

Table 4.1

Variables	ORDER OF DIFFERENCE	Maxlag	ADF-stat	Critical value @ 5%	Decision	Remarks
EGR	D(EGR)	8	-5.808548	-2.963972	Reject H_0	stationary @ order 0
GRGU	D(GRGU)	8	-5.477214	-2.977972	Reject H_0	stationary @ order 0
GRGF	D(GRGF)	8	-5.477226	-2.934021	Reject H_0	stationary @ order 0

Source; Author's computation

Johansen cointegretion test

Since the variables are integrated at level form I(0) then the presence of co-integration is established as well as their linear combination.

Table 4.2

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.587195	37.16208	29.79707	0.0000
At most 1 *	0.325912	11.50349	15.49471	0.0012
At most 2 *	0.002275	0.066036	3.841466	0.0006

Trace test indicates 1cointegration eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
Source; Author's computation

Conclusion; Since the variables are integrated at level form I(0) then we conclude that variables are co-integrated implying that there exist a short run instability among the variables under study. Therefore the study analysis was based on long-run observation.

Data estimation procedure

The results below are based on long run computation of the model specified in the method of study and will be used to capture the objectives of this study. The long-run estimation procedure follows thus;

Table 4.3: Dependent Variable Mogr

VARIABLES	COEEFICIENT	STD.ERROR	T-STAT	PROBABILITY
C	0.257650	0.060429	4.263683	0.0002
GRGU	0.138417	0.094594	4.463274	0.0045
GRGF	0.243984	0.166737	2.463281	0.0545

Source; Author's computation

R^2 = 0.47; R^{-2} = 0.28; D-W = 1.82; F-test = 2.09; Prob(F-statistic) = 0.02

The empirical result shows that a unit increase in GRGU will increase EGR by 13 units, and a unit increase in GRGF was increase EGR by 24 units.

Evaluation of Results and test of Hypotheses

Here the empirical results was evaluated in order to verify if the variables under study meet the necessary criteria for a good regression model. The evaluation was base on the following,

Economic criteria (a priori signs)

Table 4.4

Variables	Coefficient	Expected signs	Obtained signs	Conclusion
GRGU	0.138417	Positive	Positive	Conforms to a priori
GRGF	0.243984	Positive	Positive	Conforms to a priori

Source; Author's computation

Statistical (first order) test.

The coefficient of multiple determinations (R^2).

From the empirical analysis, it was observed that the coefficient of determination value is **0.47**, and this implies that about 47% of the fluctuations in Economic Growth Rate (EGR) are caused by the regressors such as GRGU and GRGF.

Student t-test of significance

Table 4.5

VARIABLES	Prob.	DECISION	Conclusion
GRGU	0.0045	REJECT H_O	Statistically Significant.
GRGF	0.0545	REJECT H_O	Statistically Significant.

Source; Author's computation

F-test of significance

Table 4.6

F-tab; Prob(F-statistic)	Decision	Conclusion
0.02	REJECT H_O	Statistically Significant.

Source; Author's computation

Econometric criteria (Second order test)

The second order test is based on the satisfaction of econometric batteries of test below are; *Autocorrelation test*

From the table, dL = 1.297 and du = 1.570 while d = 1.82

Since 4-1.570 $\leq$ 1.82 (4) -1.297 there was decision on H_0.

Evaluation of research objectives/hypotheses

First Objective/hypothesis

From the empirical F-test, it shows that there is a positive significant relationship between gas production growth rate and economic growth rate in Nigeria.

Second Objective/hypothesis

From the empirical t-test, it shows that there is a positive significant relationship between gas utilization growth rate and economic growth rate in Nigeria.

Third Objective/Hypothesis

From the empirical t-test, it shows that there is a positive significant relationship between gas flaring growth rate and economic growth rate in Nigeria.

V. DISCUSSION OF FINDINGS

Firstly, from economic point of view GRGU and GRGF conformed to a priori expectation. Secondly, t-test and F-test results revealed that individually and in overall gas production variables are all positively and statistically significant. By implication growth rates of gas production are sensitive to economic growth rate in Nigeria.

VI. CONCLUSION

From economic view point GRGU and GRGF conform to a priori expectation meaning that economically GRGU and GRGF have positive significant impact on economic growth rate in Nigeria. From statistical stand point both at individual and in overall levels GRGU and GRGF are positively significant on economic growth rate in Nigeria.

This study examined the impact of gas production on Nigerian economic growth from 1985 to 2020. Enshrined in the body of this work are theories that have been instituted by scholars connecting production growth rate and economic growth rate. Empirical findings have also been inputted in this work to further give a more robust outlook to the research. It is important to note that growth rate of gas utilization and gas flared has serious influence on economic growth rate in Nigeria.

VII. RECOMMENDATIONS

The recommendations are as follows; the government should set a benchmark for gas production efficiency and withdraw license from companies that failed to comply. There should be proper accountability, transparency and sell-off of compromise and Corrupt practices by adhering to economic rationalities rather than political expediencies.

CONTRIBUTION TO KNOWLEDGE

This study has shown that growth rates of gas utilization and gas flared have positive impact on economic growth rate. By implication what Nigeria is suffering from is the inability to benchmark gas production domestically.

AGENDA/SUGGESTION FOR FURTHER STUDIES

Further studies in this direction are required, mainly studies that will develop model or models to capture gas production in more robust manner.

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