Global Gas Marketing Dynamics and the Nigerian Economy

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ABSTRACT

Nigeria, a member of OPEC since1971, boasts of substantial crude oil reserve of 37.1 billion barrels at the start of 2023, with a production capacity of 2.5million barrels per day. The country heavily relies on crude oil production as a cornerstone of its economy, constituting a significant source of foreign exchange. The study examined the impact of global gas marketing dynamics on the Nigeria economy. The study employed the use of descriptive statistics while hypothesis were tested using t-test statistical tool, cronbach's alpha coefficient test. Twenty (24) copies each of the structured questionnaires was distributed to three (3) gas marketing firms namely; Haris Gas, NNPC Gas, Jezco Gas and two SME'S respectively and twenty (24) copies each making a total of one-twenty (120) copies. The finding shows that global gas marketing has significantly improved the Nigeria economy, indicating that domestic gas market and export gas market have significant positive effect on the economic growth of Nigeria. The researcher recommended building a solid infrastructure for the storing, distribution and transportation of gas must be Nigeria's top priority while focusing on leveraging natural gas resources to drive economic growth. The government should make the gas pricing regime conducive for companies intending to go into gas exploration. This is to ensure gas is able to compete healthily with other alternative sources of energy.

KEYWORDS: Nigeria Oil & Gas Sector, the Economy, Marketing Dynamics, Global Gas Marketing Dynamics

INTRODUCTION

As the world population grows rapidly from about 3billion in 1960 to over 7billion in 2013, the need to meet the growing domestic energy demand has become highly imperative. World energy demand is expected to double by the year 2050. Fossil fuels like oil, natural gas and coal have led the way over other forms of energy for the past decades as the major sources of energy in use. The need to adopt environmentally cleaner fuels to meet future economic growth and prioritize alternatives to minimize the impact of increasing oil – based energy costs, has made Global demand for natural gas to expand significantly.

Although natural gas is the fastest growing source of primary energy, Nigeria's gas consumption is put at 12% of its Total Primary Energy (TPE) mix, as at 2013(EIA, 2016). But due to low domestic demand, inadequate gas infrastructure and poor incentives for gas development

in the country, the gas is not fully utilized (Adamu and Darma, 2016). This has made the country to monetize her gas through exports to Europe, Asia and other parts of the world. Nigeria's natural gas consumption has grown from 123.5 tcf to 186.6 tcf for the period 1996 to 2016 (BP Statistical Review, 2017). The sharp increase in consumption was experienced in 2005 at 183.6 tcf and is attributed to Bonny LNG plant production, mainly for exports. This has been a major revenue earner for the country (Omisakin, 2011). However, Nigerians are inattentive of the potentials of natural gas as an energy source to meet up with growing energy demand.

However, insufficient infrastructure (gas pipelines) to move the gas to an area of demand has not helped matters. Thus, investment in gas processing plants, such as (GTP) Gas to Power and (GTL) Gas to Liquid projects will stimulate its demand in the country. With increasing energy demand in Nigeria, mostly due to growing population, emergence of SMEs, low power generation, there is need to meet the demand by providing alternative energy products, increase and diversify source of government revenue, and also enhance electricity supply.

Statement of Problem

For many years, more crude oil was produced in Nigeria than any other country in Africa. Nigeria has faced unprecedented adverse economic challenges stemming from the impact of theft of large volumes of crude oil, pipeline vandalism, and minimal upstream infrastructural development. These challenges have led to sporadic supply chain disruptions and have greatly affected the country's ability to produce crude oil to its maximum potential.

Objective of the study

The broad objective of the study is to examine the impact of global gas market dynamics on Nigeria economy.

 However, the objective includes;

-   To determine whether indeed the Gas marketing has increased Government Revenue.

Research Question

The following research question will be addressed in this Study;

-   What is the impact of Gas market on the performance of Nigeria economy?

Literature Review

Literature review is an important part of a research study as it involves many activities which include identifying, reading, evaluating, describing, summarizing, discussing, citing, and

synthesizing various documents with an intention of incorporating them in the study under investigation.

This section deals with Conceptual clarification, Theoretical framework and Literatures on the subject matter. The conceptual framework guides the study and summarizes the dependent and independent variables. The theoretical framework enhances overall framework of the research and deals with the theory that this study anchored on while literature reports on the previous research done by different authors on related topic, how the research was conducted, their observations, findings and their recommendation.

Conceptual Clarification

Brief History of Nigeria Oil & Gas

Nigeria, a member of OPEC since 1971, boasts of substantial crude oil reserves of 37.1 billion barrels at the start of 2023, with a production capacity of 2.5 million barrels per day. The country heavily relies on crude oil production as a cornerstone of its economy, constituting a significant source of foreign exchange. Nigeria primarily exports light low sulphur (sweet) crude oil, with 79.63% of total exports in Q1:2023 attributed to crude oil. The Nigerian Oil and Gas industry comprises three main sectors: Upstream, Downstream, and Midstream. The Upstream sector, primarily led by international oil giants such as Shell, Chevron, and Total, accounts for over 80% of global crude oil production. Meanwhile, the Downstream and Midstream sectors are predominantly controlled by domestic companies like Ardova, Conoil, Eterna, and MRS. Noteworthy efforts, including those by the Nigerian Content Development and Monitoring Board, have resulted in a notable surge in local involvement in upstream activities.

In recent years, oil prices have fluctuated, and the effect is widespread on many aggregate measures, such as unemployment and currency depreciation in Nigeria's economy. This is partly due to the lack of diversity in Nigeria's economy and its dependency on oil revenue for its survival, economic development, and growth. Hence, as the global oil price fluctuates, this downward market pressure generates a great concern for the Nigerian economy and the leaders. This concern requires a robust, holistic perspective, looking into the Nigerian economy and ways to explore how to decrease its reliance on oil revenue and begin to expand its non-oil revenue to revitalize its overall non-oil export outlook (Olomola, 2006).

Any price variation comes with attended risk. Regnier (2007) reported that oil price fluctuations outdid several hydrocarbon commodities price variations during the 1980s, and the

trend remains. Sauter and Awerbuch (2003) examined the risk in oil investments. They reported that impending oil price streams signify a highly risky duty for hydrocarbon consumers. Whenever oil prices upsurge, economic activities are affected, resulting in income and asset value either declining or appreciating by some measure. Barsky and Kilian (2004) explain that a period of oil price escalation is associated with recessions, high inflation, low productivity, and low economic performance. However, this study does not give oil shocks a significant role in explaining macroeconomic fluctuations by challenging the notion that oil price fluctuation is exogenous in the performance of the US economy and the fact that none of the recent shocks has been associated with stagflation in the US economy as in the 1970s.

Over these periods, several oil price fluctuations reveal the divergent response of the foreign exchange market and other macroeconomic performance indicators to the oil shocks. Prominent among these are the recessions of 1973, 1981, 1990, and 2001, which all occurred around major oil shocks. At the same time, Cologni and Manera (2005) analyzed fluctuations in hydrocarbon prices, price levels, and interest rates within G-7 countries with a structural co-integrated vector auto-regression to measure the impacts of hydrocarbon price fluctuations on gross domestic products. For the selected countries, unexpected hydrocarbon price fluctuations affect interest rates, followed by tight money policy tools deployed to combat inflation resulting from the oil price shock. This impact is then transmitted to reduced output growth.

Nigeria Oil & Gas Sector

The Nigerian Oil and Gas industry comprises three main sectors: Upstream, Downstream, and Midstream. The Upstream sector, primarily led by international oil giants such as Shell, Chevron, and Total, accounts for over 80% of global crude oil production. Meanwhile, the Downstream and Midstream sectors are predominantly controlled by domestic companies like Ardova, Conoil, Eterna, and MRS. Noteworthy efforts, including those by the Nigerian Content Development and Monitoring Board, have resulted in a notable surge in local involvement in Upstream activities. Since the early days of Exploration in the Niger Delta region, Nigeria has faced challenges of crude oil theft and pipeline vandalism, leading to disruptions in production. These issues have significantly impacted Nigeria's ability to produce crude oil to its maximum potential, resulting in consecutive contractions in the sector's growth rate. Despite being the 13th largest crude oil producer in the world, Nigeria's downstream sector faces challenges including mispriced products, security concerns, and dilapidated infrastructure.

Efforts by the government to revitalize this sector involve removing PMS subsidies, deregulating the downstream sector, and implementing progressive regulatory and taxation frameworks through the PIA. Nigeria holds vast natural gas reserves, yet significant quantities are either flared or reinjected due to lack of infrastructure and demand constraints. Through its Gas Master Plan, the government aims to become a Liquified Natural gas (LNG) export hub in Africa, with plans to expand infrastructure, including the Ajaokuta-Kaduna-Kano pipeline, to increase natural gas exports. The PIA, enacted in 2021, aims to overhaul the petroleum sector in Nigeria. It establishes new regulatory bodies, commercializes the NNPC, and introduces a fresh tax system. The Act addresses tensions with host communities, emphasizing community development, and introduces a national grid system for land rights.

The global energy transition towards renewable sources is impacting Nigeria's oil and gas sector. Major companies are divesting from fossil fuels, prompting questions about the sector's attractiveness amid the transition. The Nigerian government has enacted long-term policies towards energy transition, with commitments to reduce emissions and ambitious plans for renewable energy generation. (Arm, 2024)

The Economy

Before the 1970s economic prosperity from the hydrocarbon upsurge, agricultural export production was the mainstay of the economy. Cocoa and livestock, specifically, credited a substantial stake in total exports and well-developed domestic and export markets (Osho, 2006). Even with this rigorous overlook for growth, combined with the Nigeria oil boom, the Nigerian economy- the world's sixth largest oil-producing country- has suffered a drastic decline in agricultural production. One of the noticeable features during the era of the oil boom was the crippling 'Dutch Disease,' where crude oil accounted for over 95 percent of its local and export revenues. This classic 'Dutch Disease' was exacerbated by every Nigerian administration, as they failed to develop other sectors of the economy. Incidentally, this failure to intelligently integrate over 40 years of the windfall from the oil and gas exports into other domestic sectors of the economy is now evident as the unemployment rate and inflation rate are astronomically near the roof. This negligence was a colossal mistake which continues to plague the country. Paradoxically, today, as the oil price slides and the oil boom begins to fade; the challenges now confronting the Nigerian economy are diverse.

To better understand the current state of the Nigerian economy, its gross domestic product was rebased with 1990 as the base year, culminating in about a 90 percent increase in the overall economy. As a result, the Nigerian economy instantly became the largest economy in Africa, with approximately $550 billion in gross domestic product eclipsing that of South Africa. However, in the past few years, according to several economic reports, especially the Financial Times, data continue to show that there has been a steady decline in Foreign Direct Investment (FDI) in Nigeria. Specifically, in the past two years, data from the Central Bank of Nigeria revealed that Nigeria's FDI has crumbled to its lowest in decades.

In classical macroeconomic theory, FDI is regarded as a significant catalyst for economic development and an essential medium of technology transfer from developed to developing countries. In the world today, the most stable economies strongly rely on FDI to spur job creation, price stability, sustainable economic growth, and a favorable balance of trade payments because it is seen as an imperative source of non-debt inflows that combines external resources and technology transfer for domestic investment, improvements in human capital, and increases the level of domestic capital formation of a nation. Moreover, several studies have shown that the decline in Nigeria's FDI is attributed to many economic freedom factors such as bad governance, mismanagement, corruption, and so on, resulting in a low index of financial freedom and a lack of stable electricity needed for industrial and business growth. Successive Nigerian governments appropriated trillions of Naira for electricity power generation required to develop other sectors of its economy to no avail. Consequently, foreign investors now perceive Nigeria as a high-risk market for investment.

THEORETICAL FRAMEWORK

The Solow-Swan model is an exogenous growth model of long run economic growth under neoclassical economics. It states that the forces of demand and supply determine the price and quantity of a commodity sold. It explains how to attain long run economic growth from population growth or labour, capital accumulation and increase in productivity technological progress. The model depicts that continuous rise in capital investment temporarily increases growth rate (Riley, 2018). In this case, the demand for natural gas will prompt the supply of natural gas especially in Nigeria. This will require huge investments in the sector, as the gas is being utilized through

electricity generation, industrialization and even exports generation, productivity will increase and national output will also increase.

EMPIRICAL REVIEW

Some empirical studies and research have been carried out on linkage between natural gas resource and economic growth in gas producing nation. Solarin & Shahbaz (2015) reinvestigate the relationship between natural gas consumption and economic growth by including foreign direct investment, capital and trade openness in Malaysia for the period of (1971–2012). The structural break unit root test is employed to investigate the stationary properties of the series. We have applied combined co-integration test to examine the relationship between the variables in the long run. ARDL bounds testing method was also employed to test for a possible long run relationship in the presence of structural breaks.

Natural gas consumption, foreign direct investment, capital formation and trade openness have positive influence on economic growth in Malaysia. The results support the presence of feedback hypothesis between natural gas consumption and economic growth, foreign direct investment and economic growth, and natural gas consumption and foreign direct investment. Masih (2018) examined the short-run and long-run relationship between economic growth, energy consumption, financial development, capital formation and population by using data set of Malaysia for the period (1971–2014). The Auto Regressive Distributed Lag (ARDL) bounds testing approach to test the long run relationship among the variables, while short run dynamics were investigated using the Vector Error Correction Model (VECM). Variance Decomposition (VDC) technique was used to provide Granger causal relationship among the variables. The findings suggest that energy consumption is influenced by economic growth and financial development, both in the short and the long run, while the population–energy relationship only holds in the long run.

The findings suggest that energy consumption is influenced by economic growth and financial development, both in the short and the long run, while the population–energy relationship only holds in the long run. Adamu & Darma (2016) found co-integration and positive and significant long run relationship between gas consumption and real economic growth between 1981 and 2013 in Nigeria, using ARDL bound co-integration test. They found that a persistent 1% increase in domestic gas consumption in the long run causes 2.89%mincreases in real economic

growth in the country. And if flaring is stopped and more investment in infrastructure in the industry is made, the gas sector will be a dominant one in the economy, hence actualizing the significant link between gas consumption and economic growth.

Binta yahya (2018) examined the impact of gas pricing and demand on output (GDP) in Nigeria. The interactions between gas demand, gas price and GDP were investigated using the structural vector auto-regressive (SVAR) model. Time series monthly data were collected from 1996 -2016 on gas demand, gas supply, gas retail price, petrol retail price and GDP. The result indicated that gas price has a significant impact on gas demand and gas demand also determines gas pricing; and that gas demand has a significant impact on GDP. Furthermore, the impulse response showed the response of GDP to gas demand to be negative, but positive to gas supply petroleum retail price and gas retail price. The variance decomposition showed that petroleum retail contributed more to changes in GDP followed by gas demand, then gas supply, while gas price contributed least. Findings Suggests that the government should invest in gas infrastructure and enact proper monetization and utilization policies that will encourage foreign and local investors so as encourage supply and increase revenue earnings for the government.

Ngwu and Ofoegbu (2024) evaluated the effect of gas utilization on economic growth of Nigeria from 1999 to 2021, using data sourced from Nigerian National Petroleum Corporation (NNPC) and the Organization of the Petroleum Exporting Countries (OPEC) and the Annual Statistical Bulletins. The population of this study comprised of eleven gas production and utilization companies included in Nigerian National Petroleum Corporation annual statistical bulletin as at 2021. The study adopted ex-post facto research design. The descriptive statistical techniques such as mean, standard deviation, skewness and kurtosis using statistical package for social sciences (EViews 13.0) in which annual time series data from 1999 till 2021 were used. Pearson Correlation test was performed to show the associations between the independent and dependent variables, however, the multiple regression model was adopted. It investigates its relationship as a function of Domestic Gas Market (DGM) and Export Gas Market (EGM). The regression coefficients for Domestic Gas Market (0.469745) and Export Gas Market (0.367948) indicated positive impacts on GDP. Moreover, the correlation analysis highlighted strong positive correlations between GDP and both Domestic Gas Market (0.86399) and Export Gas Market (0.82387). These results echo the intricate relationship between energy dynamics and economic growth, where increases in Domestic Gas Market and Export Gas Market coincide with GDP

growth at 5% level of significance. Hence, we conclude based on the study findings that Domestic Gas Market and Export Gas Market have significant positive effect on the economic growth of Nigeria.

RESEARCH METHODOLOGY

Research methodology is defined as the systematic process or procedure designed for generating, collecting, and analyzing the data required for solving a specified problem. This chapter discusses the ways and means through which the study was carried out. It also presents the research Area of Study, Source of Data, Sampling Technique. Method of Data Collection, Method of Data Analysis, Other areas covered are; Reliability of Instrument Validity of Instrument and Limitations of the Study was adopted for the study.

AREA OF STUDY

The area of the study covers three (5) different Gas marketing sectors namely;
Haris Gas, Jezco Gas station, NNPC Gas station, and two (2) different retail SME's in Awka Metropolis, Anambra state. These formed the population for the study.

SOURCES OF DATA

The researcher employed the use of both the primary and secondary sources of data. Primary sources of data are firsthand information. The data is generated by the researcher for the purpose of the study, primary data collected for this study are questionnaires given to the enterprises under study to elicit responses. While that of the secondary data are facts that the researcher collected from already existing sources. The secondary sources from which data were generated are newspapers, textbooks, magazines, journals, published research work, memo-graphs.

SAMPLING TECHNIQUES

The simple random sampling technique is employed, giving each member of the population an equal chance. A sample size of 120 persons was selected at random, using Bourley (1998) proportional allocation formula, it was distributed as follows: Haris Gas (24) Jesco Gas (24) NNPC Gas (24) and two retail SME's (48). A total of 120 questionnaires with responses was used for data analysis. A pre-test was conducted and outcome yield "t" = 0.71 indicating a high degree of consistency and reliability. The instrument was 20- term survey questionnaire with a 3 Likert scale response options of AGREE (A), DISAGREE (D) and INDIFFERENT (ID). The questionnaire

was structured in line with the research objectives, questions and hypothesis of the study. The Cronbach's Alpha coefficient was used to confirm formulated hypotheses.

METHOD OF DATA COLLECTION

The data for the main study was collected by the use of Questionnaires. The questionnaire titled **"GLOBAL GAS MARKET DYNAMICS AND THE NIGERIAN ECONOMY"** and a cover letter explaining the purpose of the survey were personally administered to financial regulatory management board officials. The respondents were allowed a three weeks period to fill out the questionnaires. After two weeks the researcher sent a reminder to all the respondents. The questionnaires were collected after three weeks.

METHOD OF DATA ANALYSIS

The data collected through the administration of questionnaires would be presented using frequency distribution tables and processed using a statistical method of analysis called T-test. The decision rule with using the test is that, if the calculated value of the T-test is greater than the tabulated value the null hypothesis is rejected. T-test has the formula.

Hypothesis 1

H_o; Global Gas Marketing has no impact on Nigeria Economy.

H_1; Global Gas Marketing has impact on Nigeria Economy.

Here, using table 4 to answer to test hypothesis. We apply the formula stated below;

$$T = \frac{X - \mu}{\frac{s}{\sqrt{N}}}$$

Where $\overline{X}$ = mean of the Frequency

μ = standard deviation

N = no. of questionnaires returned

The degree of freedom used in this test is **N-1**

The Cronbach's Alpha co-efficient will be used to test the questionnaires to ensure the consistency of the research instrument. The Cronbach's Alpha is 0.71.

If the cronbach's alpha is 0.7 or above 0.7 then it is said to be reliable statistically and the researcher can rely on the research instrument.

Table 1: Reliability Statistics

Cronbach's Alpha	No. of items
0.71	**20**

Sources: Computerized results from SPSS (2014)

Table 2: Analysis of Respondents

Questionnaire	Respondents	%
Returned	101	84.2
Not returned	19	15.8
Total	120	100

Source: Research Survey, (2024).

Table 2 shows that out of 120 questionnaires that were administered 101 questionnaires which are represented by 84.2% were returned to the researcher and 19 represented by 15.8% were not.

Table 3: has global gas marketing impacted the Nigeria Economy

Variables	Fq	%	valid %	cumulative%
Agree	56	55.4	55.4	55.4
Indifferent	30	29.7	29.7	29.7
Disagree	15	14.9	14.9	14.9
Total	101	100	100	100

Source: Research Survey, (2024).

Table 4: One- sample Statistics

N	$\bar{X}$	Std. Deviation	Std. Error mean
101	1.59	.737	.073

Source: Computerized results from SPSS

Table 5: One- sample test

		Test value = 0			
T	df	sig. (2 tailed)	mean Diff	95%	CI Difference
21.729	100	.000	1.594	1.45	1.74

Key: CI means confidence interval.

Source: Computerized results from SPSS (2014).

Table 3 indicates that 55.4% agreed that gas marketing has impacted the Nigeria Economy, 29.7% were indifferent and 14.9% disagreed.

The one-sample statistics shown in Table 4 tell us that we have 101 observations represented by N, the mean number is 1.34 and the standard deviation is 0.737. The standard error of sampling mean is 0.073.

The second column in Table 5 gives us the calculated t-test value of 21.729, the third column tells us that this t-test has 100 degrees of freedom (101-1 = 100), the fourth column tells us the two tailed significance (the 2-tailed P-value) and the fifth column shows a difference of 1.594 using the table of critical t-values to determine critical t with 100 degrees of freedom, level of significance (α) at 5% one-tailed, the critical t is 1.660.

Decision

Here we determine if we can reject the null hypothesis or not. The decision rule is that if the one-tailed critical t-value is less than calculated t and the means are in the right order, then we reject null hypothesis (H_o). From the Table 5 the critical is 1.660 (from the table of critical t-values) and the calculated or observed t is 21.729 (from the one-sample test obtained from SPSS) so we reject null hypothesis (Ho) and accept alternative hypothesis H_1. Hence there is a significant improvement in the success and efficiency of the Nigeria marketing system.

FINDINGS

Oil and Gas sector in Nigeria has contributed massively to government revenue and foreign exchange earnings as result of natural gas resources which are being utilized within the country

and abroad. The results shows that global gas marketing with (Cri-t ‹ Cal-t; 1.660 ‹ 21.729) has significantly improved the Nigeria economy which is in agreement with Ngwu & Ofoegbu (2024) whose study and findings indicates that Domestic Gas Market and Export Gas Market have significant positive effect on the economic growth of Nigeria.

CONCLUSION

Nigeria's economy is undeniably intertwined with its oil and gas sector. The country's heavy reliance on oil exports has made it highly susceptible to the volatile nature of global energy markets. Consequently, global oil and gas price fluctuations profoundly and directly impact Nigeria's economic performance and stability. The revenue volatility stemming from these price fluctuations poses significant challenges for Nigeria. The nation's ability to fund crucial public services, infrastructure projects, and social welfare programs is contingent upon the health of its oil and gas sector. This vulnerability calls for fundamentally reevaluating Nigeria's economic structure and a concerted effort to diversify revenue sources.

RECOMMENDATIONS

Based on the result of the study, the following recommendations are made;

- Recommend that it is critical to make smart investments in domestic gas infrastructure and liquefied natural gas infrastructures.
- Building a solid infrastructure for the storing, distribution and transportation of gas must be Nigeria's top priority while focusing on leveraging natural gas resources to drive economic growth.
- A Research committee should be set up to come up with realistic plans of exploring local markets for natural gas.
- Assessment of Nigeria's unconventional gas resources should be done, to determine a concrete unconventional hydrocarbon reserves in the country. It is believed Nigeria's gas reserves are under-estimated.
- The government should make the gas pricing regime conducive for companies intending to go into gas exploration. This is to ensure gas is able to compete healthily with other alternative sources of energy.
- Efforts should be made in realizing the Nigeria Gas Master plan laid down since 2008.
- Preferential tax treatment for firms into local gas utilization will encourage investments in Petrochemicals, GTL, and so on.

REFERENCES

Adamu, A., & Darma, R. (2016). Inland Natural Gas Consumption and Real Economic Growth in Nigeria: ARDL Cointegration Test. 2222-1700.

Awerbuch, S. (2003). A note: The Implications of Fossil Price Volatility and Other Market Risks on Electricity Generating Costs and Energy Security. *Renewable Energy World*, *6*(2), 53–61.

Arm, (2024). Nigeria Oil and Gas Sector Report. www.arm.com.ng

Ngwu, R.N. and Ofoegbu, G.N (2024). Effect of Gas Utilization on Economic Growth of Nigeria. *International Journal of Mechanical Engineering and Technology 15 (3): 48-61*

Olomola, A, (2006). Oil Price Shock and Aggregate Economic Activity in Nigeria. *African Economic and Business Review*, *4*(2), 48–61.

Omisakin, O. A. (2011). Natural Gas Pricing: International Experience and Policy Options for Nigeria. USAEE. www.usaee.org.

Osho, G. (2006). Determination of Optimal Factor Inputs and Subsidies of Livestock Production in Nigeria. *European Journal of Economics, Finance and Administrative Sciences*, 5, 188–193.

Regnier, E. (2007). Oil and energy price volatility. *Energy Economics*, *29*(3), 405–427.

Riley, G. (2018). Understanding the Solow Economic Growth Model. Retrievedfrom tutor2u: https://www.tutor2u.net