

OIL EXPORT EARNINGS INSTABILITY AND STANDARD OF LIVING NEXUS IN NIGERIA

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Abstract

This study re-examined oil export earnings instability and standard of living nexus in Nigeria for the period 1980 to 2016. We estimated an ARDL (1,1,2,1) model and obtained short and long run impacts of total oil export earnings instability due to quantity variation (TOEQV), total oil export earnings instability due to price variation (TOEPV) and total oil export earnings over time (TOE) on living standard in Nigeria. Our empirical finding does not support the popular view that standard of living is driven mainly by total oil export earnings instability due to price variation (TOEPV), rather the result indicates that in the short run, standard of living respond more to oil export earnings instability occasioned by quantity variation than to oil export earnings instability occasioned by price variation. Again, the empirical result reveals that the impact of oil export earnings instability occasioned by price variation on living standard is not significant in the long run, while living standard in Nigeria is affected negatively by oil export earnings instability occasioned by quantity variation in the long run. From this, the conclusion that variation in oil production in Nigeria is a significant driver of living standard in Nigeria emerges. Accordingly, the study recommends among other things that the Nigerian government should review its

annual benchmark oil export quantity downward so that the economy will be less susceptible to the malady associated with quantity variation. This is to allow for exigencies that could affect quantity exported; also excess revenue accruals would be better spent if it goes into the coffers of the country's sovereign wealth fund. Again, the government should make deliberate and result oriented effort towards the diversification of the nation's economy beyond lip service. Efforts in this direction should see a government that allocates more for capital expenditure, demarcating between profitable and beneficial projects and investing more in profitable ventures.

Keywords: Oil, Export, Instability, Standard of Living, Nigeria

INTRODUCTION

The idea on how to improve economic growth and development in Nigeria is about what the average learned Nigerian does know; to diversify the economy. The call to diversify Nigeria's economy as the panacea for her economic woes is so extensive that it is even heard within government circles. What then prevents government at various levels from doing the needful? Diversifying the country's economy is more of a knowledge based issue than political maneuvering, but the initiative on how to go about it does not seem like what the country's government is yet to come in touch with. Government tends not to have the plan or political will to annul the country's huge dependence on the oil sector; as disturbing as this may seem the perceived effects of the county's colossal dependence on oil on the living standard of Nigerians is more worrisome.

Oil accounts for about 75 per cent of the Nigerian government's revenue in the last couple of decades, hence defines government's level of consumption, which increases with increase in oil price. A drastic fall in oil price pitches government in a tight spot where it struggles to wriggle itself out of a wide budget deficit as it makes effort to meet recurrent expenditure, capital expenditure, foreign exchange for imports and debt servicing obligations. This scenario has played out severally and government's usual control policy response is to borrow and devalue the country's currency; a policy that has continually undermined improvements in the living standard of the masses over the years through soaring inflation rates (Apere, 2017).

The international oil industry has a well-developed market shrouded in complexities that characterize other primary commodity markets, perhaps even more complicated. The global oil market is referred to as the most important of world energy markets because of the dominant

role of oil as a source of energy. A greater part of the global oil market is based on commodity market transactions. While there are transactions that close on a given day for immediate delivery, most of these transactions are purely financial, and have nothing at all to do with delivery of product. A great deal of the transactions is for what is called futures – an agreement to sell a product at a price agreed today, at a point in the future. Originally, futures were used to mitigate the risk of price (or exchange rate changes) by allowing parties to fix prices or rates in advance for future transactions, sorting out the risk of availability and cash flow concerns for a producer operation. In recent times, many partakers in this market are out to make money, hoping that price swings will go in their favour. Consequently, the great deal of speculations that characterize the futures market (Levin Institute, 2016).

Though the global oil market is extremely volatile, Nigeria continues to depend on it massively as a source of revenue to finance government programs. Annual budgets of the country are prepared using estimated average annual oil price and projected daily output for the year. Other revenue sources remain generally unchanged or neglected; they are neither reviewed to meet the yawning needs of the masses nor overhauled in an attempt to lessen the dependence on oil sources. The trend of having budgets that rely heavily on oil proceeds exposes Nigeria to the vagaries of volatile oil market and the economic misery that come with it, including tardiness towards developing the industrial sector.

Data gathered from National Bureau of Statistics, NBS show that oil proceeds account for about 70 per cent of government's earnings and 80 per cent of the nation's foreign exchange, indicating that it will not be wrong to refer Nigeria as a mono-product economy. This makes oil the engine of the country's economy, having neglected agriculture which used to be the highest revenue earner for government before the discovery of oil in the late 1950s. As a primary commodity, oil export adds little value to the country's economy and it is price inelastic. While export of refined products stand to add more value, changes in price do not bring about expected changes in quantity demanded and supplied (National Bureau of Statistics, 2015).

Besides price instability, there are a few other factors that affect export earnings in Nigeria. Like other countries that rely heavily on primary product exports, especially in less developed economies; Nigeria continues to grapple with youth restiveness, pipeline vandalism, oil bunkering, kidnappings of oil workers, mainly the expatriates, among others in the oil rich Niger delta region. These menaces tend to hamper exploration and exploitation of oil in the country which lowers quantity of output, and unabatedly leading to quantity shocks when the shortfalls are huge.

Shocks resulting from extreme fluctuation in the price or quantity produced of primary export commodities usually bring about economic upheavals in a scale that leaves a country

worse off than it was before the plunge. Its immediate effect on the economy is the resultant shortage in revenue needed to cope up with recent increase in consumption level, which puts government in a position where it is unable to meet budgeted annual obligations and widens budget deficit. The shortage in foreign exchange leads to currency devaluation; since the country exports only one primary product and relies heavily on imported goods, inflation rate soars with the likelihood of a recession occurring.

Does the challenge of oil export earning instability in Nigeria stem from oil price variation or variation in quantity of oil produced? What are the impacts of total oil export earnings instability occasioned by quantity and price variations on living standard in Nigeria? Most researchers that embarked on related studies made emphasis on oil price in their attempts to depict export earnings instability including Gummi, Buhari and Muhammad (2017), Abdulkareem and Abdulkareem (2016), Apere (2017) and Oluwatoyin and Adegboye (2014); they stressed on price volatility as the source.

Though Hachula and Hoffmann (2014) made emphasis on quantity variation, they still considered price variation as the trigger of the fluctuation. The study therefore seeks to determine how fluctuations in Nigeria's oil export earnings affects the living standard of the average man and which between price variation and quantity variation spurs the purported effect on economic development.

Oil Price Instability and the Nigerian Economy

The random movement of oil price in the global market has become a source of concern for oil producing countries, including Nigeria. That these countries are concerned is an acknowledgement that it is a threat well perceived and analyzed and as such should not be an impediment to development, since the instrument of governance should be in the right positions to mitigate the menacing effect of price volatility.

Before the discovery of oil in commercial quantity in Nigeria, agriculture was the main stay of the economy, contributing about 70 per cent of the country's Gross Domestic Product, GDP, employed more than 50 per cent of the country's working population and accounted for about 90 per cent of the country's foreign exchange (Adedibe, 2004). With the commencement of crude oil exploration in the late 1960s came the negligence of agriculture as a revenue source and veritable economic activity with a lot of promise, and the country's huge dependence on oil revenue – a disposition which exposes the country to the vagaries of international oil market.

The fluctuation in the price of oil is believed to create a booby trap at both ends of the swing. Extremely high price increase is said to put government in position where it tends to

spend more, but just when that level of earning is considered permanent the price plunges. This now puts the government in a tough spot as effort geared towards meeting up with increased costs, where recurrent expenditure constitutes a great deal of this cost, leaves government with almost impossible choices aside from borrowing and devaluation.

Table 1: Oil price and Nigeria's oil revenue and budget deficit

Year	Average oil price (\$)	Oil Revenue (N' bl)	Budget deficit (N' bl)
1980	38.8	25.5	-1.1
1985	28.2	10.92	-3.0
1990	24.0	71.9	-22.1
1995	17.4	324.5	1.0
2000	26.1	1,591.7	-103.8
2005	52.3	4,762.4	-161.4
2010	72.2	5,396.1	-1,105.4
2015	40.8	30,249.12	-2,231.6

Source: CBN Annual Statistical Bulletin, 2015

Table 1 above shows the spot average annual oil price, Nigeria's oil revenue and budget deficit experienced volatile movements from 1980 to 2015. Oil price decreased from 38 dollars to 20 dollars and a little lower to 18 dollars from 1980 through 1990 to 2000; it then increased to 50 dollars in 2010 before falling to 40 dollars in 2015. Nigeria's oil revenue increased from 25.5 billion naira in 1980 to 71.9 billion naira in 1990; it then increased from 1,591.7 billion naira in 2000 to 5,396.1 billion naira in 2010 and increased again to 30,249 billion naira in 2015 (CBN Annual Statistical Bulletin, 2015). The country recorded surplus budget only in 1995 and 1996; these were years of immensely high oil price occasioned by the then Iranian revolution and Iraq war, which led to increase in the price of crude oil from \$ 14 dollars to \$ 35 due to a 10% drop in world oil production. Aside from the above mentioned two years of budget surplus, Nigeria recorded budget deficit in all the other years from 1980 to 2015. Available data suggest the existence of connection between oil price and budget deficit in the country, since the size of budget deficits tend to widen more in years where there are sharp drops in oil prices. Coincidences of acute drops in oil prices and huge increases in budget deficits occurred in 1986, 1993, 1994, 1998, 1999, 2009 and 2015 respectively (CBN Annual Statistical Bulletin, 2015).

Nigeria, like other less developed economies relies heavily on foreign goods. Most of the machines, electronics, clothing and even raw materials and agricultural produce used or

consumed in the country are imported. Increase in government spending during oil boom results in increase in imports while a crash in oil price leads to acute shortage in foreign exchange needed to finance these imports. Attempts to reduce demand for foreign exchange by discouraging imports often lead to devaluation of the country's currency; this invariably leads to high inflation rate, since the country's exports are price inelastic.

Table 2 below shows average annual oil price, average annual exchange rate of the naira against the United States dollars and Nigeria's per capita GDP over the years. Available data show that from 1980 to 1989, oil price decreased from an average of \$30 to \$18, it decreased further to about \$13 in 1998 and then increased to about \$55, \$90 and \$85 in 2009, 2013 and 2014 before crashing to about \$40 dollars in 2016. Over the same period, exchange rate decreased from N0.55 per US dollar in 1980 to N8.04 in 1990, N92.34 in 1999, N148.9 in 2009 and N305 in 2016. During the same period, per capita GDP decreased from \$871.15 in 1980 to \$260.05 in 1989, increased to \$299.36 in 1999, \$1, 091.97 in 1999, down to \$804.01 in 2005, up to 2,314.96 in 2010.

Table 2: Nigeria's Per Capita GDP, Naira Exchange Rate against US Dollar and Spot Average Annual Oil Price

Year	Oil Price (\$ US)	Exchange Rate (N per \$ US)	Per Capita GDP (US \$)
1980	38.8	0.55	871.15
1985	28.2	0.89	344.14
1990	24.0	8.04	321.67
1995	17.4	21.90	263.29
2000	26.1	101.70	377.50
2005	52.3	131.27	804.01
2010	72.2	150.30	2, 314.96
2015	40.8	192.44	1, 502.56
2016	36.34	305.12	1,431.23

Source: World Bank, 2016

From the foregoing, it could be deduced that oil price and per capita GDP were extremely volatile from 1980 to 2016. While oil price and per capita GDP recorded increases and decreases, exchange rate on average recorded only decreases throughout the period of the studies. Exchange rate experienced sharp decrease in 1999 and 2016, the decreases followed sharp fall in oil prices in 1998 and 2015 respectively.

Oil Production Instability in Nigeria

The inconsistency in Nigeria's export earnings, like other mono-product less developed countries has been attributed to price instability alone (Abdulkareem & Abdulhakeem, 2016). Variation in the quantity produced and supplied is also capable of tilting a stable international market of a particular product in a certain direction. As a matter of fact, variation in quantity of oil produced is one factor whose fluctuation could produce a ripple effect that could make oil price to somersault aimlessly. The international oil market is a highly efficient near perfect market; it is comprised of producers, dealers, brokers, consumers, on-the-spot and future dealers and lots of investors with purely money making interest. Production levels are usually at equilibrium with levels of demand, with lots of future purchases made to hedge against likely price hikes or for speculative purposes. Thus, a slight decrease in expected production levels could bring about an unusual increase in price (Levin Institute, 2016).

Quantity of crude oil produced tends to be more stable when compared with its price at the international market, unlike price; instability in volume produced is not easily predictable. The instability results from unforeseen occurrences in oil producing countries, events like natural disaster, international sanctions, socio-political crisis and internal unrests are capable of altering a country's oil production and supply trend. International sanctions usually come in the form of trade ban, where trade transactions with countries in question are restricted. Iraq, Iran, Nigeria, Russia and other oil producing countries have been victims of international sanctions in the past. Natural disasters like earth quakes, hurricanes and flooding and political tensions between oil producing countries or with other countries are all capable of disrupting international oil supply, with the attendant oil price fluctuation effect.

Nigeria has had its fair share of upheavals and continues to grapple with domestic crisis. From protracted years of military rule and its sequacious undemocratic tenets which attracted the country sanctions from the United States following the nullification of the June 12, 1993 presidential election, to the tribal and religious conflicts between the constituent ethnic nationalities in the country, the insurgency and youth restiveness in different parts of the country; all pose threat to oil production. Youth restiveness in the oil rich Niger Delta region tends to have direct bearing on quantity of crude oil produced, as oil installations and major oil companies' employees are usually the main targets of these agitating youths. The agitation is spurred by their claims of dearth of social amenities amidst extremely high unemployment rate, exacerbated by the environmental degradation activities of international oil companies which affect their sources of livelihood (Hinshaw & Kent, 2016).

The country's federally collected revenue allocation system is such that it is shared between the federal government and the states, leaving out oil producing communities; while

the policy framework put in place to bring needed development projects to these communities are marred by corruption. The violent tactics of these youths stems from their somewhat hapless disposition, as their local leaders who engage government and other stake holders in the oil industry over their plight tend to mellow down when their palms are greased or turn a blind eye when contractors awarded contracts to provide social amenities carry out shady jobs after they have been granted personal favour (Ibaba, 2008).

The annual budget of Nigeria's federal government and indeed that of other tiers of government depend a great deal on expected oil revenue. The projected average annual oil price in the international market and average annual quantity of production determine the benchmark used in budget preparation; it defines the size of the budget and budget deficit. Table 3 below shows quantity of Nigeria's annual crude oil production, oil revenue, exchange rate against the US dollar and per capita GDP. It could be deduced that the quantity of oil export has been unstable over the years. Quantity produced experienced a consistent drop from 1981 to 1983, dropped again in 1987, 1993, 1999, 2002, 2003, 2009 and 2016 respectively.

Table 3: Nigeria's Crude Oil Production, Oil Revenue, Exchange Rate and Per Capita GDP

Year	Oil Production (mls of brl)	Oil Revenue (N' bl)	Exchange Rate (N per \$ US)	Per Capita GDP (US \$)
1980	656.3	13.44	0.55	871.15
1985	486.6	10.92	0.89	344.14
1990	548.2	71.9	8.04	321.67
1995	616.9	324.55	21.90	263.29
2000	688.1	1,591.68	101.70	377.50
2005	743.5	4,762.40	131.27	804.01
2010	790.3	5,396.09	150.30	2, 314.96
2015	741.4	30249.12	192.44	1,502.56
2016	640	23232	305.12	1431.23

Source: World Bank, 2016

Oil export contributes about 75 per cent of Nigeria's foreign exchange, and affects to a large extent the country's exchange rate stability. Most of the devaluations of the country's currency occurred as a result of acute decrease in oil revenue spurred by plunge in oil price or decrease in quantity produced. Devaluation of the country's currency coincided with decline in quantity of oil export with its attendant drop in total oil revenue in 1987, 2003, 2009 and 2016 respectively. Conversely, the country's currency appreciated marginally, albeit concurrently with increase in

quantity of oil export with its attendant increase in total oil revenue from 1995 – 1998 and 2005 – 2007. Within the period under review, the country recorded increases in budget deficits which coincided with decreases in quantity of crude oil exported in 1981 and 2002.

Nigeria's Excess Crude Oil Account

The excess crude oil account is the account used by the Nigerian government to save oil revenue in excess of the expected amount as defined by the benchmarked price and quantity. The excess crude account was established in 2004 with the primary objective of protecting the country's planned budgets against shortfalls due to volatile crude oil prices. Before 2004, the country used to spend almost every dime it makes from the sales of oil, even if it were way above budget benchmarked rates. The idea behind the excess crude oil account was to shield the Nigerian economy from the hazardous effects of price and quantity shocks, from internal or external sources and to save for future generations. The country's sovereign wealth fund is managed by Nigeria Sovereign Investment Authority by investing the funds. The wealth fund commenced operation in October, 2012 and is divided into three major divisions:

- (i) Stabilization Fund
- (ii) Future Generations Fund
- (iii) Nigeria Infrastructure Fund

The stabilization fund is intended to safeguard against budget deficits. It would be a last resort from which government may withdraw annually to meet shortfalls in the budget brought about by falls in oil prices or other budgetary constraints. The future generations fund will be used to build an inter-generational savings base by investing in longer term assets that generate returns to accumulate wealth for future generations of Nigerians. The infrastructure fund is expected to be used in bridging the nation's infrastructure gap by investing in the development of critical facilities across the country. About 10 per cent of the fund is set to be invested in agriculture and regional government-sponsored development projects that will promote economic development in untapped sectors or regions in Nigeria (The Guardian, 2012).

Concerns over the capacity of Nigeria's Sovereign Wealth Fund to shield the economy from oil price and quantity shocks have been raised in the wake of the sliding of the country's economy into recession in 2016. It was due to the plunge of oil price in the international market and exacerbated by activities of the Niger Delta militants which disrupted oil production within the same period. It could be argued though, that the Sovereign Wealth Fund is still at its nascent stage and not much has been saved since government started spending out of it instead of saving, shortly after it commenced operation in 2012 due to fall in oil price in late

2014. Nevertheless, the huge drop in revenue, wide budget deficit and retarded economic growth would definitely not have been that bad if the country had only oil price fall to grapple with.

In view of the foregoing, the perceived relationships between the data sets do not provide the premise for making conclusions. Thus, the study has been embarked upon to employ proven methods to determine if variations in crude oil export earnings affect the living standard of the average Nigerian. The study also seeks to ascertain which, between price variation and quantity variation brings about this perceived effect and how.

LITERATURE REVIEW

There are theories that come close to giving shine to the obscurity and intricacies that characterize international trade and the general welfare of the citizenry. Virtually all existing theories suggest the existence of benefits for the participating countries; though they differ on accruable benefit to the exporting countries and the global economy. It is difficult to say if Nigeria is better off by participating in international trade, given its disposition.

The mercantilist trade theory is considered to have extreme nationalistic tendencies and highlights on the welfare of a country as absolutely the ultimate cause for embarking on external trade, thus posits that it has to be done in ways that should achieve this singular aim. It encourages regulation, restrictions and total control in an effort to attain favourable balance of payments; through tariffs, quotas and other tools of protectionism. Following the criticism that trailed the mercantilist theory, Adam Smith came up with the absolute advantage theory. The theory argues in favour of foreign trade, stating its potentials in improving the fortunes of countries around the world. It stresses that when countries concentrate more on sectors where they have absolute advantage or could produce more efficiently than other nations, it will lead to specialization which brings about increase in global output. In an attempt to correct the position of the absolute advantage theory that suggests that external trade arises from difference in absolute advantage, David Ricardo came up with the comparative advantage theory. The theory suggests the possibility of a beneficial trade between two countries producing almost similar goods, even if one country was more efficient in the production of both commodities, provided the degree of its superiority over the other country is not identical for both commodities.

The two major loopholes in the Ricardian theory were addressed by Eli Hecksher and Bertil Ohlin in their Hecksher-Ohlin trade theory; what factors determine comparative advantage and what effect does foreign trade have on factor income in the trading countries? The theory underscores the differences in relative factor endowment and factor prices between nations as determinants of trade and considers the sources of factor endowments as the determinants of a

nation's comparative advantage. The theory also asserts that trade increases total world output, with all countries gaining from it; it enables countries to secure capital and consumption of goods from other parts of the world, thereby stimulating economic growth.

Empirical works that are related to export earnings instability abound in the literature, though studies analyzing export instability and economic development in Nigeria are extremely scarce. One of the earliest studies on impact of export instability on the Nigerian economy was carried out by Obadan (1983). He used multivariate analytical framework to examine whether or not fluctuations in Nigeria's export earnings have adverse effects on the economy. Findings of the study revealed that export instability is highly detrimental to the country's economic wellbeing.

Toeing almost a similar lane, Rashid, Ullah and Zaman (2012) analyzed the hypothesis that export instability affects economic growth in SAARC region countries (Pakistan, India, Sri-Lanka and Nepal) using Ordinary Least Squares (OLS) technique. Their findings revealed that export instability has deleterious effects on the economic growth of the four countries.

From a multi-country point of view, Hachula and Hoffmann (2014) analyzed the impact of commodity price volatility on real economic activity in commodity exporting countries using structural vector autoregressions with multivariate GARCH-Mean errors, while export structures of the different countries were captured by building country specific commodity price indices. They found a significant negative impact of commodity price volatility on real output for oil exports, while impulse response analysis shows that the increase in volatility that accompanies a commodity price shock negatively affects the response of real output. For countries relying on mineral and food exports, point estimates are predominantly statistically significant.

Oluwatoyin and Adegboye (2014) assessed the impact of oil price shock and real exchange rate instability on real economic growth in Nigeria using Ordinary Least Squares (OLS) and Granger techniques. Variables used include real gross domestic product, exchange rate variability and oil price shock. The findings of the study showed that oil price shock and appreciation in the level of exchange rate exert positive impact on real economic growth in Nigeria.

Approaching the subject from a micro point of view and laying huge emphasis on output volatility, Cede, Chiriacescu, Harasztosi, Lalinsky and Merikull (2015) investigated whether diversification at the firm level lowers the output volatility of the firms, using the Ordinary Least Squares (OLS) technique. From the results of their analysis they found that export diversification has a statistically significant and economically large positive effect on output volatility.

Abayomi, Adam and Alumbugu (2015) examined the economic impact of oil exportation on economic growth in Nigeria using Ordinary Least Squares (OLS) and Impulse response techniques. From the results of their analyses, they deduced that there exists a long run relationship between real gross domestic product (RGDP) and labour, domestic consumption of crude oil, crude oil export, and total production of crude oil, while RGDP responds positively to a one time standard deviation innovation shock from itself which represents the highest response compared to other explanatory variables.

Bakare and Oyelekan (2015) investigated the impact of export earnings instability on economic growth in Nigeria using the Ordinary Least Squares (OLS) and Granger Causality Techniques. They found that oil and non-oil exports have significant impact on economic growth, while oil and non-oil sectors granger cause GDP.

In an effort to provide analytical insight on modeling macro and oil price volatility in Nigeria, Abdulkareem and Abdulhakeem (2016) employed GARCH model and its variants (GARCH, EGARCH and TGARCH) in carrying out this assessment. Variables employed in the study include real gross domestic product, interest rate, exchange rate and oil price. The findings of their study revealed that all the macroeconomic variables considered are highly volatile and oil price is a major source of macroeconomic volatility in Nigeria, suggesting that the country's economy is vulnerable to both internal and external shocks.

In an effort to get a firmer understanding of how export instability works, Okonkwo and Douglas (2016) investigated the main causes of export instability in Nigeria, noting the likely adverse effects fluctuations in export volume and price could have on balance of payments, national income, investment and economic growth. Using Ordinary Least Squares (OLS) estimation technique, they found that there exists positive relationship between oil export instability and export instability in Nigeria.

Having noticed the recent shock in global crude oil prices in 2014 with its glaring adverse effects in different spheres of the Nigerian economy, Nwanna and Eyedayi (2016) investigated the impact of crude oil price volatility on economic growth in Nigeria using Ordinary Least Squares (OLS) technique. Findings of the study revealed that there is a positive and significant relationship between oil price and economic growth.

In another light, Gummi, Buhari, and Muhammad (2017) examined the relationship between oil price and economic growth in Nigeria using non-probability sampling method and Granger causality technique. The variables of the study include real gross domestic product, oil price, foreign direct investment, total exports, economic openness and human capital. The findings of the study revealed that there is no long run relationship among the variables.

However, Granger causality test indicates a significant positive unidirectional causality running from oil price to total exports in Nigeria.

In almost a similar vein, Apere (2017) investigated the relationship between inflation and oil price fluctuations in Nigeria using Vector Autoregressive (VAR) model. The findings of the study reveals that the response of inflation to oil price fluctuations is such that as oil price falls, inflation also falls and a stable and positive oil price results in a stable negative inflation rate. Thus, inflation and oil price fluctuation share negative relationship.

RESEARCH METHODOLOGY

Theoretical Framework and Model Specification

The study is based on the Hecksher-Ohlin trade theory. It attempts to verify the nature and level of validity of traditional factor endowment theory in the Nigerian economy, if it is anywhere close to been brought to bear. The theory is derived from a number of explicit and implicit assumptions that in many ways tend to be contrary to the reality of contemporary international economic relations (Todaro & Smith, 2001).

In an effort to fill up existing loopholes in the Ricardian comparative trade theory, Eli Hecksher and Bertil Ohlin brought to the fore factors that determine comparative advantage and the effect of foreign trade on factor income in the trading nations. According to the duo, the sources, differences in relative factor endowments and factor prices between nations determine a nation's comparative advantage and all countries gain from trade.

Most related studies carried out by researchers like Obadan (1983), Hachula and Hoffmann (2014), Apere (2017) and Oluwatoyin and Adegboye (2014) made emphasis on price volatility as the source of export earnings instability. Though Hachula and Hoffmann (2014) highlighted on quantity variation, they still considered price variation as the trigger of the fluctuation. This study considers both price variation and quantity variation as likely sources of export earnings instability, with the aim of unraveling which of them instigates hazardous volatility and how they affect economic development in Nigeria. Drawing from the theoretical framework and in line with previous empirical studies, especially that of Rashid, Ullah and Zaman (2012), we postulate a simple standard of living function of the form:

$$RGDPC_t = X\beta + \mu_t \quad (3.1)$$

Where;

RGDPC is the real per capita income at time t, which is the ratio of real GDP to population and measures the standard of living. X is the matrix of explanatory variables comprising of total oil export earnings instability occasioned by quantity variation (TOEQV), total oil export earnings instability occasioned by price variation (TOEPV) and total oil export earnings over time (TOE).

While TOEQV and TOEPV capture the instability in oil export earnings in the model, TOE serves as a control variable in the model. β is the matrix of coefficients and μ_t is the error term at time t.

Expanding equation (3.1) and expressing the variables in their logarithmic form, we obtain the base line model below:

$$\begin{matrix} >0 & & >0 & & >0 \\ \text{LRGDPC} = & \beta_0 + \beta_1 \text{LTOEQV}_t + \beta_2 \text{LTOEPV}_t + \beta_3 \text{LTOE}_t + \mu_t \end{matrix} \quad (3.2)$$

Where: L is the natural logarithm. The variables as expressed in their logarithmic form in order to standardize them and then interpret the estimates as elasticities. All things being equal, we expect all the partial derivatives to be positive, since increase in revenue is expected to raise standard of living.

Equation (3.2) asserts that real per capita income (RGDPC) depends on total oil export earnings instability occasion by quantity variation (TOEQV), total oil export earnings instability occasioned by price variation (TOEPV) and total oil export earnings over time (TOE). But, the relationship between standard of living and these indicators may not be instantaneous. Thus, rendering the model dynamic we obtain the estimable equation in log linear form:

$$\text{LRGDPC}_t = \theta_0 + \theta_1 \text{LTOEQV}_{t-j} + \theta_2 \text{LTOEPV}_{t-j} + \theta_3 \text{LTOE}_{t-j} + \epsilon_t \quad (3.3)$$

Where: LTOEQV_{t-j} , LTOEPV_{t-j} and LTOE_{t-j} (for $j = 1, 2, \dots, k$) are lagged of the series.

Expressing equation (3.3) explicitly in ARDL form, we obtain the following equation.

$$\begin{aligned} \Delta \text{LRGDPC}_t = & \alpha_0 + \alpha_1 \text{LRGDPC}_t + \alpha_2 \text{LTOEQV}_t + \alpha_3 \text{LTOEPV}_t + \alpha_4 \text{LTOE}_t + \sum_{i=0}^k \alpha_6 \Delta \text{LRGDPC}_{t-i} + \\ & \sum_{i=0}^k \alpha_7 \Delta \text{LTOEQV}_{t-i} + \sum_{i=0}^k \alpha_8 \Delta \text{LTOEPV}_{t-i} + \sum_{i=0}^k \alpha_9 \Delta \text{LTOE}_{t-i} + U_t \end{aligned} \quad (3.4)$$

Computation of Export Earnings Instability

In an effort to compute oil export earnings instability, the study toed the line of the United Nations Secretariat in its 1952 study; "Instability in Export Markets of Underdeveloped Countries" as emulated by Okonkwo and Douglas (2016). The method requires the estimation of the absolute year to year difference in values and expressing it as a percentage of the largest two annual values and averaging the percentages. This study makes adjustment on total export earnings, which is the product of price and quantity, such that fluctuations in price and quantity are depicted. Hence, to capture price variation, total export earnings become a product of indexed annual price values and a constant quantity, while the product of indexed annual

production quantity and a constant price capture quantity variation. The mean values of annual oil prices and oil production quantity over the period of the study were used as constant values to compute indexed values.

Essentially, total earning is simply the product of price and quantity per time. However, this does not capture the effect of either change in quantity or price on total earnings such that price or quantity are kept constant. We argue that oil export earnings instability may stem either from quantity or price variation. Hence, we approach oil export earnings instability from this direction. Mathematically, oil export earnings due to quantity variation and oil export earnings due to price variation can be expressed respectively as:

TOEQV = $\left\{\frac{Q_1}{Q_0} \times 100\right\}$ X constant price (= base year price), and TOEPV = $\left\{\frac{P_1}{P_0} \times 100\right\}$ X constant quantity (= base year quantity).

Where the expressions $\frac{Q_1}{Q_0}$ and $\frac{P_1}{P_0}$ are quantity and price indices respectively

Estimation Technique

Firstly, the time series properties of the variables are investigated in an attempt to assess the order of integration. The data set are subjected to stationarity test using the Augmented Dickey Fuller (ADF) unit root test. The ADF test is based on the null hypothesis that a unit root exist in the time series. The Augmented Dickey Fuller (ADF) unit root test is used despite the existence of other stationarity test techniques because it is reliable and robust and eliminates the presence of autocorrelation in the model. It is given as:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{j=1}^m \alpha_j \Delta Y_{t-1} + U_t$$

If the variables are found to be integrated of the same order, then, co-integration test is carried out to assess the existence of long run relationship among the variables. The Autoregressive Distributed Lag (ARDL) approach proposed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001) is used to carry out the test. In the event that the variables of the models are co-integrated, an error correction model (ECM) is estimated to provide the short run impact of these variables on standard of living. The error correction model will provide the short-run equilibrium among variables of the models and speed with which the error terms adjust to return to equilibrium. We also estimated the long run impact of oil export earnings instability on standard of living. However before testing for long run relationship among the variables, we estimated an unrestricted auto-regressive distributed lag (ARDL) where the variables are allowed to enter the model at various lag length. The Akaike info criterion (AIC) is used in selecting the model with appropriate lag.

Sources of Data

The model was estimated using annual time series data spanning from 1980 to 2016 for Nigeria. We chose the year 1980 as the start date is hinged on the fact that crude oil produced before 1980, were a lot lesser than average and generally unstable, in consonance with what obtains in many new ventures. Data on quantity of production in years preceding 1980 could give a poor reflection of the deductions the study seeks. The data set was sourced from the CBN Annual Report and Statement of Accounts, CBN Statistical Bulletin and the National Bureau of Statistics Annual Abstract of Statistics World Economic Outlook (WEO).

ANALYSIS AND DISCUSSION OF FINDINGS

Summary Statistics

First, we present the summary statistics of all the variables used in the analysis. We look at the behaviour of the individual variables per time. Specifically, the individual variable's mean values, standard deviation, and the maximum and minimum values are examined, and the results are shown in Table 4.

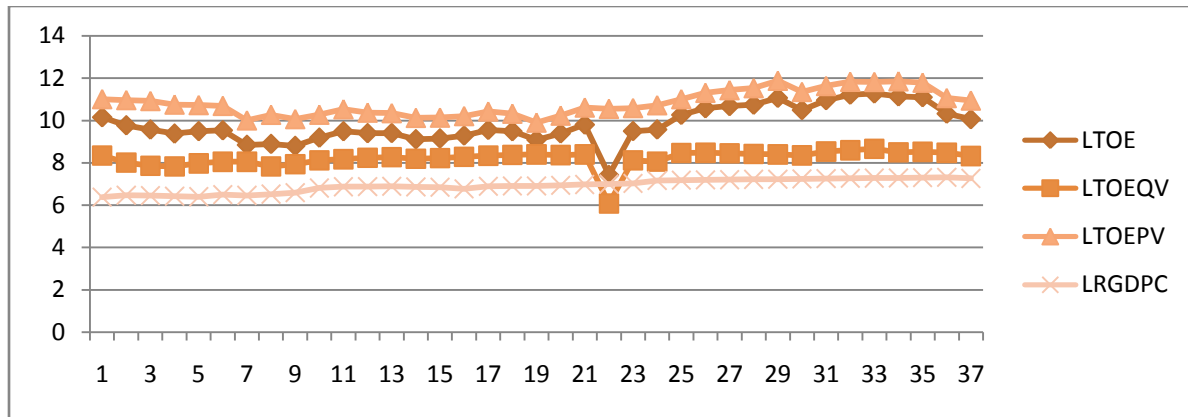
Table 4: Descriptive Statistics for the Variables (1980 – 2016)

Variable	N	Mean	Max.	Min.	Std. Dev.	Skewness
RGDPC	37	1063.80	1502.56	591.71	305.43	-0.09
TOEPV	37	59841.92	144414.7	19983.88	38744.21	1.07
TOEQV	37	3865.50	5731.34	434.91	1010.94	-0.93
TOE	37	25409.16	78205.52	1663.55	21696.32	1.20

Table 4 shows the summary statistics of the variables employed in the analysis. The average real per capita income in Nigeria between 1980 and 2016 is about \$1,066.80, while the mean values of total oil export earnings instability due to quantity variation (TOEQV), total oil export earnings instability due to price variation (TOEPV) and total oil export earnings over time (TOE) are \$3, 865.50; \$59841.92 and \$25409 respectively, between 1980 and 2016. Evidently, mean total oil export earnings instability due to price variation (TOEPV) is greater than the mean total oil export earnings instability due to quantity variation (TOEQV) This is expected since OPEC member countries are restricted from supplying crude oil in excess of assigned quota, so OPEC member countries neither have control over supplies nor over price. The result also shows the maximum, minimum, standard deviation as well as the skewness of the series.

We also looked at the growth rate of this series over time by plotting their logarithmic values. This is necessary in order to get a glimpse of the growth rate of these variables. This result is shown in the figure below.

Figure 1: Co-movement of the series over time



Source: Authors using data from CBN Statistical Bulletin, 2016

The figure above shows that some variables have been trending upward while some have been fluctuating over time

Unit Root Test

The result of the unit root test using the ADF approach is presented in table 5.

Table 5: Summary of ADF unit root results

Variable	Level		First Difference	
	intercept	intercept + trend	intercept	intercept + trend
LRGDPC	-1.4193	-1.7681	-12.5285***	-12.5814***
LTOEQV	-2.8388	-3.3463	-10.0363***	-9.9985***
LTOEPV	-1.3706	-2.0550	-12.0001***	-11.9685***
LTOE	-1.4713	-2.3944	-9.0272***	-8.9998***

	Critical values			
	Level		First Difference	
	Intercept	Intercept + Trend	Intercept	Intercept + Trend
1%	-3.4752	-4.0217	-3.4755	-4.0221
5%	-2.8811	-3.4407	-2.8813	-3.4409

*** denotes statistical significance at 1% significant level.

Table above summarizes the results of ADF unit root test. The results reveal that the variables, real GDP per capita (RGDPC), total oil export earnings due to quantity variation (TOEQV), total oil export earnings due to price variation (TOEPV) and total oil export earnings over time (TOE) are all I(1) process, that is, they are difference stationary at 1% level of significance.

Given this result, we then test the possibility of long run equilibrium among these variables over time. This test is conducted using the ARDL Bound testing approach to Cointegration proposed by Pesaran and Shin (1999) and Pesaran et al. (2001). This technique has a number of features that many researchers feel give it some advantages over the approach suggested by Engel-Granger (1987) and the maximum likelihood based approach proposed by Johansen and Juselius (1990) and Johansen (1991).

Cointegration Test

The study adopts the ARDL Bound Testing approach proposed by Pesaran and Shin (1999) and Pesaran et al. (2001). The result is shown below.

Table 6: Summary of ARDL cointegration test

$$\text{Equation: } LRGDPC = f(LTOEQV, LTOEPV, LTOE)$$

Null hypothesis: No long-run relationships exist

Significant level	I(0) bound	I(1) bound	remark
10%	3.17	4.14	significant
5%	3.79	4.85	significant
2.5%	4.41	5.52	not significant
1%	5.15	6.36	not significant
F-Statistic = 4.93		K = 3	

In table 6, we test for the possibility of long run relationship among the variables (LRGDPC, LTOEQV, LTOEPV and LTOE). The results reveal that the null hypothesis of no long run relationship is rejected at both 10% and 5% level of significance, since the f-statistic is greater than the upper critical values in both cases, however, the null hypothesis of no long run relationship cannot be rejected at 2.5% and 1% significant level.

Given the existence of a long run relationship among the variables at 5% significant level, we then estimate an error correction model to account for short run dynamics of the models and also a static model to also account for the long run impact of total oil export earnings due to quantity variation (TOEQV), total oil export earnings due to price variation

(TOEPV) and total oil export earnings over time (TOE) on real GDP per capita (RGDPC) over a period of 37 years. The results are shown below.

Table 7: Short and long run coefficients

Variable	Coefficient	t-stat.	P-value
Short-run impacts			
D(LTOEQV)	0.6511***	4.1232	0.0001
D(LTOEQV(-1))	0.0537**	3.1022	0.0234
D(LTOEPV)	0.58177***	4.6996	0.0010
D(LTOE)	0.03244**	2.4532	0.0311
CointEq(-1)	-0.1821***	-4.2172	0.0023
Long-run impacts			
LTOEQV	-4.6883**	-2.2102	0.0445
LTOEPV	0.0332	0.0207	0.9836
LTOE	0.1234	0.0221	0.7213
Constant	46.8485	0.2875	0.7758
R-squared = 0.97		F-stat = 184.8 (0.0000) DW = 1.79	

Note: *** and ** denote significant at 1% and 5% significant level respectively

In table 7, we present the short-run and long-run impacts of oil export earnings instability on standard of living in Nigeria. The result suggests that in the short run, all the variables exert positive and significant impact on standard of living in Nigeria. The result indicates that the impact of total oil export earnings due to quantity variation (TOEQV) on standard of living lingers up to two periods (in this case two years), while the impacts of total oil export earnings due to price variation (TOEPV) and total export earnings over time (TOE) on standard of living neutralize after the first period.

A unit fall in total oil export earnings due to quantity variation in the current and previous period [TOEQV and TOEQV(-1)] will cause current living standard to decline by about 0.66 units and 0.05 units respectively. Similarly, a unit fall in total oil export earnings due to price variation (TOEPV) and total export earnings over time (TOE) in the current period will bring down the current living standard by about 0.58 units and 0.03 units respectively. Our result reveals that living standard in Nigeria responds more to oil export earnings instability that is occasioned by quantity variation compared to that of oil export earnings instability occasioned by price variation, especially in the current period. This result appears to be in tandem with reality in Nigeria. When the Nigerian economy slipped into recession in the second quarter of 2016 the

managers of the economy attributed it to the steep fall in price of crude oil in the international oil market, which acted in tandem with drop in oil production (following attacks on the oil infrastructures in the Niger Delta region).

Again, steep falls in the quantity of crude oil produced and exported lead to huge decreases in government revenue, which compels government to borrow and devalue the country's currency in an effort to meet its financial obligations. Currency devaluation leads to high inflation rate, since imported goods become more expensive. For a country that depends a great deal on imported goods, the average man finds himself affording a lot lesser than he used to. This has been the state of the Nigerian economy, since the discovery of oil in commercial quantity.

The coefficient of the error term is negatively and statistically significant; this further indicates that the variables share long run relationship. The size of the estimate shows that about 18.2% of any disequilibrium in the model is corrected within one year. The general F-value suggests that all the partial coefficients are not simultaneously equal to zero and hence statistically significant at 1% critical value. At 97 percent, the R-square obtained is satisfactorily high, implying that total oil export earnings instability due to quantity and price variations alongside total oil export over time account for major changes in living standard in Nigeria.

The long run estimate is somewhat different from the short run result. In the long run, the impact of total oil export earnings due to quantity variation is inimical to living standard in Nigeria. The result indicates that the continuous rise in oil output over time has negatively impacted living standard in Nigeria. This negative impact may stem from the abandonment of other sectors of the economy and the over dependence on oil as a major foreign exchange earner in Nigeria. It also shows that the long run impact of total oil export earnings due to price variation on living standard is positive but insignificant. This result implies that total oil export earnings due to price variation has not significantly engendered welfare over the period, this could be due to the debilitating effect of the Dutch disease and corruption.

CONCLUSION AND POLICY RECOMMENDATIONS

This study re-examined oil export earnings instability and standard of living nexus in Nigeria for the period 1980 to 2016. We estimated an ARDL (1,1,2,1) model and obtained short and long run impacts of total oil export earnings instability due to quantity variation (TOEQV), total oil export earnings instability due to price variation (TOEPV) and total oil export earnings over time (TOE) on living standard in Nigeria. Our empirical finding does not support the popular view that standard of living is driven mainly by total oil export earnings instability due to price variation (TOEPV), rather the result indicates that in the short run, standard of living responds more to oil

export earnings instability occasioned by quantity variation than to oil export earnings instability occasioned by price variation. Again, the empirical result reveals that the impact of oil export earnings instability occasioned by price variation on living standard is not significant in the long, while living standard in Nigeria is affected negatively by oil export earnings instability occasioned by quantity variation in the long run. From this, the conclusion that variation in oil production in Nigeria is a significant driver of living standard in Nigeria emerges.

As stated in the introduction, diversification of Nigeria's economy is about the most popular panacea to the country's economic challenges, especially as it pertains to government's dwindling/unstable oil revenue, but how to bring these lofty thoughts to fruition remains elusive. In that guise, government can make it happen through the following ways:

Import the informal sector into the formal sector. Nigeria has a very large informal sector; it is the sector of the economy that its economic activities are neither captured nor taxed by the relevant government agencies. Economic activities in the informal sector in Nigeria are almost the size of activities in the formal sector, if not larger. Bringing this hidden sector into the main stream economy will boost government revenue and improve living standard, since employees in this sector will then be paid the stipulated minimum wage at least and oil earnings will constitute only a small fraction of the total government revenue.

Aside from the loophole created by the informal sector which makes effective tax collection far from certain, taxation in Nigeria is bedeviled by other challenges including tax evasion, tax avoidance, high cost of collection and non-remittance of tax receipt among others. With effective tax collection, oil proceeds will comprise only a small proportion of total government revenue, making the economy immune to fluctuations in oil revenue proceeds. Also, government should invest in profitable ventures which will boost revenue and at the same time create sustainable jobs for the teeming unemployed.

Accordingly, the study recommends first, that the Nigerian government should review its annual benchmark oil export quantity downward so that the economy will be less susceptible to the malady associated with quantity variation. This is to allow for exigencies that could affect quantity exported; also, excess revenue accruals would be better spent if it goes into the coffers of the country's sovereign wealth fund. Second, the government should make deliberate and result oriented effort towards the diversification of the nation's economy beyond lip service. Efforts in this direction should see a government that allocates more for capital expenditure, demarcating between profitable and beneficial projects and investing more in profitable ventures. Third, government should review the structural anomalies that put all the tiers of government at a disadvantage when it comes to taxation. Hence, it should come up with revenue mobilization and allocation modalities that are in tune with modern realities and depict

true federalism. Finally, a workable new revenue mobilization and allocation mechanism should provide the platform where communities also partake in the sharing of revenue proceeds from their localities, this is a sure way to enhance standard of living outside oil proceeds and placate permanently the agitated youth, especially those in the Niger Delta region. This will indeed reduce the dependence of non-oil producing communities on revenue proceeds from oil.

In conclusion, this study re-examined the issue of oil export earnings instability and standard of living nexus in Nigeria for the period 1980 to 2016. Further studies in this line would be a huge contribution to the literature if it bothers on "revenue mobilization and allocation methods fir enhanced welfare in a resource endowed country like Nigeria". It should make emphasis on how existing revenue mobilization and allocation procedures make resource endowed countries vulnerable to shocks and suggest methods that will forestall re-occurrence. From another light, studies on how Sovereign Wealth Fund could be effectively used to mitigate or nip on the bud economic challenges that stem from price/quantity shocks will also be a huge addition to the stock of knowledge in this line.

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