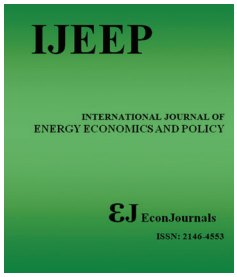

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Oil Price Fluctuation, Oil Revenue and Well-being in Nigeria

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ABSTRACT

Using annual time series data which covers the period 1981–2014 and multiple regression techniques, the study investigate the impact of oil price fluctuation and oil revenue on well-being in Nigeria. The findings suggest that oil price fluctuations have no significant impact on well-being, while oil revenue is observed to have a significant and positive impact on well-being. Notwithstanding the insignificant impact of oil price fluctuation, further investigation using Johanson cointegration test shows the existence of long run relationship in the series. This implies that, as oil prices increases/decreases, so does well-being of the people. In like manner, we also found that, as the oil revenue increases/decreases, so does the well-being of the people. In view of the findings, we suggest that government should save more at the time oil boom - that is when oil price rises above its benchmark. Furthermore, we are of the opinion that the control and management of the excess crude account should be solely delegated to Central Bank of Nigeria with no form of interference.

Keywords: Oil Price Fluctuation, Oil Revenue, Well-being, Nigeria
JEL Classifications: E39, I31

1. INTRODUCTION

As a country with population of over 180 million people, Nigeria is endowed with crude oil which ought to have been prosperous. Considering the values of the natural resources and the generated revenue, it is expected that the proceeds ought to have been sufficient enough to provide for the populace. But over-reliance of crude oil for revenue amidst the oil price fluctuations has affected the economy owing to the fact that oil price had been considered a benchmark for the nation's annual budget (Ogbonna and Appah, 2012). Prior to crude oil era, the Nigerian economy was agro based which constitute the larger proportion of her export. In this era, Nigeria's main exports include palm oil, cocoa, groundnut, cotton and rubber, which were the spine of the economy until the discovery of crude oil. Instead of diversifying the economy using the revenue generated from the crude oil, all the attention was shifted to crude oil production and exportation with huge negligence on agricultural activities, to the extent that the country import some of the agricultural produce which ordinarily should have been produced at a lower cost compared to other countries. The high importation over time has led to high price index relative to export price index, causing a huge fall in purchasing power of the disposable income of the populace thereby creating tension on the well being of the citizenry through the increase in the price of commodities. These dependents on imported goods have affected the performance of the economy. Studies such as Mordi (2006), and Bankole and Shuaibu (2013) added that over dependency in crude oil as the only source of revenue hampered the performance of the manufacturing sector. They reiterated that the external reserve and balance of payment of an oil exporting country like Nigeria only improves when international oil prices increase and if otherwise, the economy will suffers due to the corresponding fall in the country's revenue.

Therefore, in a mono-economy like Nigeria, oil price fluctuation makes it difficult to understand the direction of the economy due to its consequences on depleting the oil revenue and poor allocation and mismanagement of the said revenue. Overtime, there has been argument on why a country like Nigeria should be importing refined petroleum. While some studies (e.g., Akinleye and Ekpo, 2013) pointed importation of refined petroleum as a major cause of decline in the wellbeing of the masses that result from value addition, which makes domestic oil price higher than what it should be when produced locally, thus devaluing the purchasing power of the income of the people, others (e.g., Budina and Wijnbergen, 2008) argued it from the side of poor management of the oil revenue generated looking at the role of fiscal policy in managing the volatility of oil wealth and its implications for debt and development. But experience from the recent fall in oil prices from around $114 a barrel to below $50 in 2015, dipping further below $35 a barrel, which was further predicted to crash to $20/barrel in 2016 by IMF has shown that consistent fall in oil prices causes more damage on the well-being of citizens of oil dependent countries like Nigeria than the importation of refined petroleum and mismanagement of oil revenue (Adugbo, 2016). This experience drag the Nigerian economy into chronic recession which brought about high level of austerity, ranging from double digit inflation, high level of unemployment, low investment rate and productivity, devaluation of currency, low per-capita income, saving stagnation, high rate of debt servicing and foreign reserve depletion among others. This reduced not just the revenue accruable to Nigeria, but the inflow of foreign currency in the country.

Though, in the quest to reduce the effect of this shock, the authorities was forced to lower its oil revenue projection to N820 billion from oil exports in 2016 based on a benchmark price of $38/barrel from a projected oil earnings of N3.9 trillion predicated on a price assumption of $53/b in 2015 (Adugbo, 2016). Be that as it may, other than stabilizing the economy, the issue became worse; thereby raising a question on what the wellbeing of average Nigerian whose minimum wage is about #18,000.00 (US $ 57.2249) would be like? Considering the fact that this fall in oil prices affected both the revenue and government budget, the country gradually crave into a contemptuous aura of crisis that evidenced in poor infrastructural facilities, capacity underutilization of local refineries, high poverty and unemployment levels (Akinlo, 2012; Udoh, 2014 and Adugbo, 2016) with high level of political instability and corruption (World Bank, 2015), which invariably affect the overall performance of the economy. Directly or indirectly, this may affect the well-being of the citizens at the macro level. Against this background, the study ascertains the impact of oil price fluctuations and oil revenue on well-being of citizen in Nigeria over the period 1981–2014. The outcome of the study shows the extent of oil price fluctuations on the citizen's wellbeing, as well as and the magnitude of the effect of oil revenue on the wellbeing of the citizens in the country. The findings stipulate the significance of oil price stability and oil revenue with its implications on the well-being of the citizens. The remaining part of this paper is structured as follows. Next to section one is part two which handled the review of literature and section three discussed the research methodology, while section four present and discussed the empirical results. Finally, conclusion and policy recommendation was discussed in the fifth section.

2. REVIEW OF LITERATURE

2.1. Conceptual Framework

Oil price fluctuation is synonymous to oil price oscillation and volatility. Volatility is therefore viewed as the periods in which prices show wide swings for an extended time period followed by periods in which there is relative calm (Gujarati and Porter, 2009). Every economic series fluctuates either positively or negatively upward or downward but not constant overtime. The instability in oil price emanates from changes or fluctuations in either demand or supply side of the international oil market (Hamilton, 1983). This could be due to some factors such as political upheavals in the oil-rich Middle East, and the growing oil demand in Asian countries. The effect of this disturbance has overtime been felt more by oil importing countries. Nigeria for instance is a blessed nation with huge deposit of mineral resources ranging from crude oil, coal and zinc etc. But due to the mismanagement of these resources, Nigeria has resorted to importing refined petroleum products due to the collapse of local refineries in the late 1980's which has been continuous even in the present time, exposing the economy to the severity of oil price fluctuations (Obioma, 2006). On the other hand, oil revenue comprises of crude oil sales, taxes on oil exploration companies and oil rents. But the largest of them all is crude oil sales, which logically is the product of oil price and the quantities of crude oil production. Oil revenue could also be seen as the aggregate amount of revenue obtained from the sale of crude oil in an economy. Hence, in an oil producing economy like Nigeria, oil revenue is the sources of public projects finances. Therefore, it is expected that the generated revenue should be properly managed to promote economic growth and the wellbeing of the people.

The real gross domestic product (GDP) per head is used as an indicator for overall economic well-being. Output per head is a good guide to living standards. This allows for qualitative factors such as literacy or health, although these are not covered directly. An increase in the per capita real GDP shows an improvement in the overall economic well-being. However, per capita consumption is also another quantitative indicator that is used to measure well-being improvement. Pradhan (2001) noted that, in developing countries consumption is generally considered the preferred single indicator of well-being among economists. Arora (2013) lends credence to the preceding statement by noting that consumption as a measure for well-being of the people is advantageous because it is something that is directly important to consumers which are not covered in the GDP.

For oil exporting countries, falling oil prices may cause hardship through the depleting effect on revenue caused by either less in profits or even losses. Nigeria is endowed with abundant assets, most notably vast natural resources with arable land and entrepreneurial population (Gravito et al., 2016). After a record of economic growth due to major reforms and improved political system, demonstrated by a successful democratic dispensation, the economy plummeted due to the drastic fall in oil prices and

political disorder originating from insurgence attack and regional agitation for emancipation. The fall in oil prices have sent the currency (Naira) plunging, advancing long-standing widespread and abject poverty together with infrastructural decay. This has affected both the cost and standard of living of the vulnerable poor which constitute the larger part of the population. However, according to Gravito et al. (2016), 82% of the Nigerian populations are poor and lives on <$2 per day, compared with 26% in South Africa. As such, there has been increasing suffering exacerbated by high level of unemployment caused by little or no job creation due to over dependency on oil.

The over reliance on the oil and gas sector is creating major economic headwinds. Certainly, the domestic economy is quite diversified, with energy representing only 13% of GDP as shown in Figure 1. But energy constitutes the only significant export - thus, making it the country's primary source of foreign exchange, which accounts for about 70% of total government revenue. Nevertheless, the impact of oil price fluctuation is different between oil importing and exporting countries. Hence, through demand and supply transmission mechanisms, oil prices have significant impacts on economic activities. From the supply side effects, crude oil serves as the basic input to production, and a sudden increase in oil price may result to a rise in production costs of firms, resulting to lower output. Therefore, from the demand side effects, oil prices changes affects consumption and investment. Hence, consumption is affected indirectly through its positive relation with the amount of money that households have available for spending and saving after income taxes have been accounted for (i.e. disposable income). For example, oil price fall contributed to economic slump in 2015 with an estimated 2.8% GDP growth rate in Nigeria.

2.2. Theoretical Literature

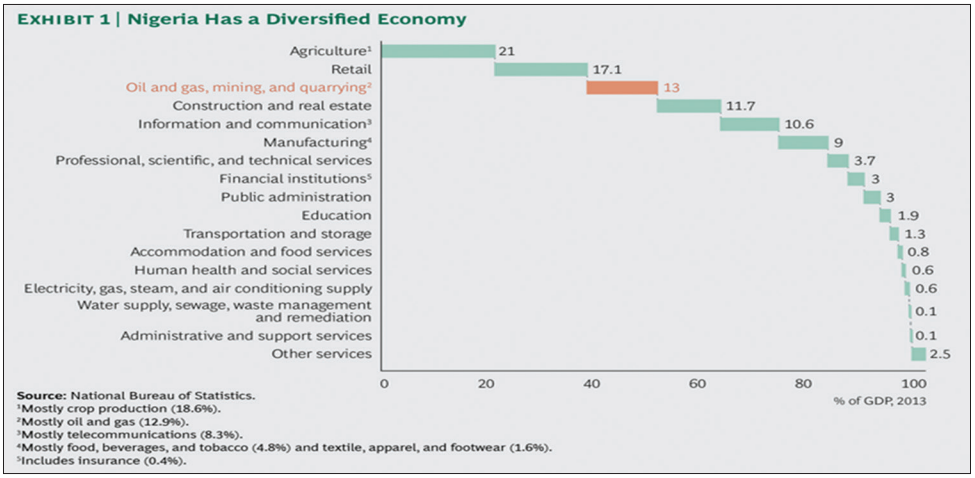
2.2.1. Dutch disease theory

The Dutch disease theory was formulated to explain the poor economic performance of the Netherlands following the discovery of North Sea oil. This theory opines that, a natural resource boom causes a country's exchange rate to appreciate, making its manufacturing export less competitive. According to Ismail (2010), the Dutch disease can be seen as the process by which a boom in a natural resource sector results in shrinking non-resource convertible. This same process increases the specialization of the natural resource sector, thereby, leaving the economy more susceptible to resource specific shocks. The effect of Dutch disease on the economy was divided by Corden and Neary (1982) into two effects, specifically, the resource movement effect and the spending effect. The resource movement effect is the aspect of which the increase in the price of the discovered resource causes the marginal product of value of the resource to increase, which consequently increases wage rate in the newly discovered resource sector. This causes the tradable sectors to shrink possibly in operation, some of which might perhaps shut down. The spending effect on the other hand can be seen as the increase in revenue accounted for by the natural resource discovered, mainly when its price dramatically increases. The huge income obtained paves way for imports to increase together with domestic absorption for both tradable and non-tradable. This phenomenon has well-being effect. Ismail (2010) extended this to mean a situation where the "disease" impedes growth of infant industries through learning by doing in the manufacturing sector. This could probably lead to loss of job if the industry shuts down leading to unemployment. The booming sector thus becomes incapable to absorb the unemployed especially in a well populated country.

2.2.2. Rent-seeking theory

This theory provides support to the resource course or Dutch disease theory. According to Black (2002), rent-seeking means spending time and money not only on the production of real goods and services but also on trying to get the government to change the rules so as to make business more profitable. This could be in form of subsidies on output, promotion of collusion or making compulsory the use of professional services. The term "rent-seeking" was introduced by Krueger (1974) which has a long history in economics dating back to the seminal work of Tullock (1967). Models of rent seeking behaviour have been at the forefront of recent attempts to explain the resource curse phenomenon. A common theme of these models is that, political institutions conducive to rent seeking underlie failures of societies to realize benefits from natural resource wealth.

Figure 1: Nigerian economy



Source: Adopted from Gravito et al. (2016), BCG analysis

To support the above, Lane and Tornell (1996); Van der Ploeg (2011) offered circumstantial instance using Venezuela and Nigeria as being consistent with the notion that rent seeking by political elites is responsible for the resource curse. According to Lane and Tornell, the oil jump of 1979–1981 induced Venezuela to increase public spending on infrastructure and industrial policy which mainly benefited political elites. This increase was so dramatic that Venezuela ran a current account deficit notwithstanding the favourable shifts in her terms of trade. This perspective suggested that the problem with natural resource abundance is not that it leads to irrational behaviour on the part of political actors but that it provides them with an opportunity to line their own pockets by engaging in rent seeking. Ross (2001) for instance argues that when government receives an unexpected and unprecedented increase in revenue from a resource boom, rational political elites will take advantage to either seize the rents created by resource booms or gain control over the right to allocate them. This is what Ross refers to as rent seeking.

2.2.3. Natural resource rent theory

The economics behind the analysis of the extractive industry is fundamentally different from that of agriculture, manufacturing and services. The rationale for this is that the extractive industry (mineral resources) are deposits (stock), thus becoming exhaustible with time (Bulearca et al., 2012). Alchian (1987) ascribes economic rent to the payment made to a factor in fixed supply. This is on the premise that a natural resource such as oil is a stock of exhaustible resources (Bulearca et al., 2012).However, considering the definition to cover any restricted variable, Arnason (2008) in the same spirit, extended the definition as the payment imputed or otherwise to a variable in fixed supply. This variable is a natural resource. Economic rent is thus deduced from the interaction of a fixed supply with a normal demand curve. Resource rents on the other hand as put by Arnason (2008) holds similar view with Alchian (1987). But the main difference is that the supply of the natural resource is not fixed. This is because the price of the resource is a function of the level of the extraction of the resource as well as other exogenous factors affecting it.

2.2.4. Theory of consumption smoothing

This theory supports the permanent income hypothesis in which individuals are not comfortable when their consumption pattern changes, and therefore, are being willing to give up some well-being to avoid such fluctuations. For this reason, ignoring income uncertainty, an optimal fiscal policy often requires that, per capita consumption levels remain constant overtime. However, with income uncertainty, the current consumption levels are equal to permanent income so that, in expectation or on average, consumption is constant overtime (Friedman, 1957). This suggests that, an increase in oil revenue should increase consumption by the annuity value of the corresponding increase in wealth. Engel and Valdes (2002) noted that, an intuition in line with consumption smoothing under income uncertainty is that, government should react differently to temporal and permanent income shocks. A temporal income shock increase consumption only by the annuity value of the positive changes of the income (positive income shock). However, a permanent income should be met by one-for-one reduction of consumption. For instance, the positive oil price shock following the invasion of Kuwait by Iraq in August 1990 was rather a temporal one. When oil price had returned to its previous levels, the rule described above can be used to spend the windfall generated by the price increase.

2.3. Reviews of Related Empirical Studies

Given that most oil producing countries depends on oil as a major source of revenue, fluctuations in oil price is capable of distort planning process as these countries - particularly Nigeria, uses oil price as a benchmark for budget planning. Budina and Van Wijnbergen (2008) examined the management of oil revenue in Nigeria. The study focused on the role of fiscal policy in managing the volatility of oil wealth and its implications for debt and development. By nature, their work was a descriptive study; using the lessons from poor management of oil wealth in Nigeria (from different international sources like IMF and World Bank) to derive a framework that could be used to assess fiscal sustainability and vulnerability to debt overhang problems. The work further affirmed that, oil price fiscal rule recently adopted in Nigeria and argued that, it is not robust against plausible downside risks. Furthermore, Bakare and Fawehinmi (2010) evaluated the extent to which oil revenues has affected standard of living in Nigeria. The study used annual data for the period 1975–2008 and using per capita income as a surrogate for living standard. The ordinary least square (OLS) estimation technique on a multiple regression model was utilized and the result showed a significant and negative relationship between oil revenues and standard of living in Nigeria.

An empirical investigation on the impact of petroleum revenue on the economy of Nigeria for the period 1970–2009 was examined by Ogbonna and Ebimobowei (2012). The study combined primary and secondary data so as to achieve their key objective, which is to examine the relationship and effects of petroleum revenue on the Nigerian economy. Data were analysed using Pearson product correlation coefficient, OLS and descriptive statistics. The result revealed that, oil revenue affects GDP per capita of the country positively, but not significant. While on the contrary, oil revenue tends to have a negative effect on inflation. This suggests that oil revenue benefits few highly placed individuals in Nigeria as a result of its insignificant effect on per capita GDP. In a similar way, Baghebo and Atima (2013) examined the impact of petroleum on economic growth of the Nigeria economy. This was estimated using the OLS for the period of 1980–2011. In the course of their study, they established long-run and short run relationships and found out that, oil revenue statistically and negatively impacts on economic growth. Abdul-Rahmoh et al. (2013) empirically examined the effects of petroleum profit tax in Nigeria. The study used OLS estimation technique to analyse the data covering the period 1970–2010 on the abundance of petroleum and its associated income. The study found that income from a nation's natural resource such as the petroleum profit tax has a positive significant influence on economic growth and development.

An examination of the consequences of oil price volatility on the growth of the Nigerian economy using quarterly data ranging from 1970 to 2010 was undertaken by Oriakhi and Iyoha (2013). The study focused on the relationship between oil price changes and selected macroeconomic variables with emphasis on real

GDP. Empirical results from variance autoregressive (VAR) model affirmed that, oil price volatility granger causes real GDP. Oil price volatility impacts on economic growth through other variables in the economy such as real government expenditure and real exchange rate. This suggests that, oil price at the prevailing exchange rate determines the level of government spending. Madueme and Nwosu (2010) examined oil price shocks and macroeconomic variables in Nigeria using annual data from 1970 to 2008. The study used the generalized autoregressive conditional heteroscedasticity model. The study found out that, capital expenditure and oil prices exert positive signs which indicates that, within the period under review, oil prices spurs economic growth. However, shocks on oil prices create fear of destabilizing the economy. This is because the economy relies on oil as her main stay. Similarly, Alley et al. (2014) appraised oil price shocks and Nigerian economic growth over the period 1981–2012. Estimation results from general method of moment reveals that, oil price shocks shows a negative and inconsequential impact on economic growth, while oil price itself has a positive relationship and a significant impact on economic growth. This conforms to conventional wisdom that oil rich countries benefits from oil price increase.

In a study by ThankGod and Maxwell (2013) on the effects of oil price shocks on monetary policy in Nigeria, using annual time series data for the period 1970–2010, the study revealed a long run relationship involving oil prices, inflation rate, Treasury bill rate, real exchange rate and interest rate in Nigeria in which oil price impact on inflation. In a similar study by Ijirshar (2015) on the relationship between oil revenue and industrial growth in Nigeria, the evidence show that oil revenue has a positive significant impact on industrial growth and the economy in the long run despite the mismanagement of oil revenue as identified in literature evidenced by its insignificant relationship with industrial growth in the short run. In the quest to establish the relationships between oil revenue, public spending and economic growth, Aregbeyen and Kolawole (2015) used the OLS techniques, under cointegration, vector error correction model (VECM) and granger causality on an annual time series over the period from 1980 to 2012. Findings from the study brought to bear that oil revenue granger causes government spending and economic growth. Although, there was no causality between governments spending and growth within the period under study. In addition, Ademola et al. (2015) also studied the relationship between government expenditure, oil revenue and economic growth in Nigeria. A simple regression model with the OLS estimator was used on an annual data from 1980 to 2010. The result for the study reveals that fluctuation in crude oil prices exerts significant impact on inflation. More importantly, oil revenue was found to show positive significant influence on real output at 7% P-value. Although not high enough, the researchers attributed the weak performance of the oil sector to economic growth on the high level of corruption in the country.

Focusing on studies outside Nigeria, Eltony and Al-Awadi (2001) investigated the impact of oil price fluctuations on the macroeconomic variables of Kuwait. Using quarterly data for seven key macroeconomic variables for the country from 1984q1 to 1998q4, the VAR model, VECM and structural VAR model was applied to achieve the objective of the study. The variables used are oil price, oil revenue, government development expenditure, government current expenditure, consumer price index, money demand and value of goods and services. The result shows a high degree of interrelation between major macroeconomic variables. Also highlighted is the causality running from oil prices and oil revenue, and government development and current expenditure, towards other variables. The impact of oil price shocks on the economy of Azerbaijan was examined by Babayev (2010) using the quarterly data 1999Q1–2009Q4. Empirical findings from VAR model deduced that, as a result of high dependence on oil revenues, the fluctuations in oil price have a significant impact on the economy. Despite the economy being volatile to external shocks, oil price shocks left government expenditure unaffected. Oil price shocks was also found to granger cause inflation, exert a positive impact on it and played a significant role it its variation. From an empirical front, oil price fluctuations were found to deter potential growth in the economy which is consistent with the findings of Alley et al. (2014). However, oil price fluctuations was found to instigate growth in studies like Madueme and Nwosu (2010); Babayev (2010).

In addition, studies such as Aremo et al. (2012), Ogbonna and Ebimbowei (2012), Abdul-Rahmoh et al. (2013), Riman et al. (2013), Ijirshar (2015), Aregbeyen and Kolawole (2015) and Ademola et al (2015) show a positive relationship between oil price fluctuation and economic growth. On the contrary, a negative tie was unravelled by the study of Baghebo and Atima (2013). In spite of the numerous empirical works reviewed on the impacts/effects of oil price fluctuation and oil revenue on macroeconomic variables in Nigeria including the ones identified above, only Bakare and Fawehinmi (2010) examined the influence of the oil sector on living standard (well-being) in Nigeria but it failed to consider per capita income as the proxy for living standard (well-being) mostly used by researchers to surrogates economic growth. Thus, this study will add to empirical discourse by exploring other indicators of economic well-being such as per capita consumption which has been ignored by previous studies. This constitutes a gap in literature which the study intends to fill.

3. RESEARCH METHODOLOGY

This study adopted time series analysis technique - multiple regression method. The estimation technique began by affirming the valid descriptive properties of the variables in respect to their mean, median, standard deviation, minimum, maximum, Jarque-Bera and the Skewness. The descriptive statistics laid the basis for pre-testing the time series characteristics of the data using the augmented dickey fuller (ADF) test since most economic variables have been shown to be non-stationary. This test was then followed by cointegration test to establish if the dependent variable (well-being) is cointegrated with the explanatory variables. In this regard, we applied the Johansen cointegration test which was confirmed by checking the stationarity of the residuals from the model. Once estimation of the related long-run multipliers is fulfilled, the short-run dynamic coefficients are investigated using ECM. Following the OLS assumptions, other tests such as autocorrelation, heteroskedasticity, normality, Ramsey specification test (RESET),

stability test using the cumulative sum of the recursive residuals (CUSUM) tests were carried out to affirm the validity of the residual. The study covered the period 1981–2014 (a total of 34 observations) in line with the availability of data. Most of the data were drawn from CBN Statistical Bulletin, (2015) as well as World Bank (2015) development indicators data. Following Engel and Valdes (2002), this paper first establishes the cointegration between well-being (*Wt*) and oil price fluctuations (*OPFt*). Furthermore, the impact of oil price fluctuations and oil revenue on well-being of the citizen was estimated using OLS. Hence, well-being (*Wt*) in this study becomes a function of oil price fluctuation and oil revenue respectively shown in eqn. (3.1) and (3.2) specified below:

$$Wt=f(dOPF_t) \tag{3.1}$$

$$W_t=f(OR_t) \tag{3.2}$$

W_t denotes well-being. It is measured as the sum of private and government consumption divided by GDP at the current period. $dOPF_t$ represents oil price fluctuation, measured as the first difference of oil price at the current period, while OR_t signifies oil revenue. This is the revenue gotten from the sale of crude oil. Thus, introducing other control variables into the functions as contained in (3.1) and (3.2), we have (3.3) and (3.4) shown below:

$$W_t=f(dOPF_t,EXR_t,INF_{t-1},Yd_t) \tag{3.3}$$

$$W_t=f(OR_t,EXR_t,INF_{t-1},Yd_t) \tag{3.4}$$

EXR_t denote the nominal exchange rate while $INFt_{-1}$ means lag period of inflation which is measured as the growth rate of the consumer price index. Yd_t stands for the disposable income, measures as the difference between national income - that is the aggregate output (Y) and tax, while other variables are as defined above. The functions as contained in (3.3) and (3.4) can be structured in a natural log and estimable form as established in models 1and 2 respectively indicated in eqns. (3.5) and (3.6) below:

3.1. Model 1: Well-being and Oil Price Fluctuation

$$\ln W_t=\alpha+\theta_1\ln dOPF_t+\theta_2\ln EXR_t+\theta_3\ln INF_{t-N}+\theta_4\ln Yd_t+\mu_{t1} \tag{3.5}$$

3.2. Model 2: Well-being and Oil Revenue

$$\ln W_t=\beta+\beta_1\ln OR_t+\beta_2\ln EXR_t+\beta_3\ln INF_{t-N}+\beta_4\ln Yd_t+\mu_{t2} \tag{3.6}$$

From equations (3.5) and (3.6), *ln* represents the natural log form of the variables. α and β are the intercept of models respectively. θ_1, θ_2, θ_3 and θ_4, as well as β_1, β_2, β_3 and β_4 are the parameter estimates of the control variables, while μ_{t1} *and* μ_{t2} explains the residual or error terms of models respectively. The residuals are assumed to be normally distributed and white noise. Therefore, the cointegrating model is specified as;

$$\Delta\mu_t=\delta\mu_{t-1}+\gamma_i\sum_{i-1}^{k}\Delta\mu_{t-1}+\varepsilon_t \tag{3.7}$$

Δ; is the first difference operator. μ_t; Is defined as the errors generated from cointegrating-regression, while μ_{t-1} is one period lag of the co-integrating error term and k described the number of lag used. Hence, ε_t is assumed to be normally distributed and white noise. The adopted ECM for the models take the following form expressed in Model 3 and 4 indicated in equations. (3.8) and (3.9) respectively below.

3.3. Model 3: Error Correction of Well-being and Oil Price Fluctuation Model

$$\ln W_t=\eta+\eta_1\ln dOPF_t+\eta_2\ln EXR_t+\eta_3\ln INF_{t-1}+\eta_4\ln Yd_t+\varpi ECM_{t-1}+l_t \tag{3.8}$$

3.4.Model 4: Error Correction of Well-being and Oil Revenue Model

$$\ln W_t=\psi+\psi_1\ln dOPF_t+\psi_2\ln EXR_t+\psi_3\ln INF_{t-1}+\psi_4\ln Yd_t+\lambda ECM_{t-1}+\varepsilon_t \tag{3.9}$$

ECM_{t-1} explained one period lag of the residual term from the long-run relationship - that is in the presence of cointegration. Thus, ϖ and λ $\varpi and \lambda$ are the convergence speed of the *ECM* to equilibrium after long run shocks, while η_1, η_2, η_3 and η_4, and ψ_1, ψ_2, ψ_3, and ψ_4, designates the parameters for the explanatory variables in equations (3.8) and (3.9) respectively. The error term (residuals) l_t and ε_t are assumed to be normally distributed and white noise. Thus, ln remain as defined above.

4. PRESENTATION AND DISCUSSION OF EMPIRICAL RESULTS

This section discussed all the diagnostic tests results following the OLS assumptions such as autocorrelation test, serial correlation test, cointegration test, heteroscedasticity test, multicollinearity test, normality test, specification test and stationarity test. We also present and discussed the summary of descriptive statistics under this section. The results on the confirmatory test on the long run relationship between oil price fluctuation, oil revenue and well-being using vector error correction were presented and also discussed in this section.

4.1. Descriptive Statistics

Time series data and multiple regression techniques are employed in the analysis. This study traces the impact of oil price fluctuation and oil revenue on well-being (W) of the people in Nigeria. To ascertain the behaviour of all the selected data, we first present the summary of the selected data as shown on Table 1. The validity of the variables in this research are supported by the mean, Median, Skewness and as well as the minimum and maximum.

The value of the mean and median of the variables from Table 1 are not too far from each other. This is an indication of no extreme projection and hence, making the variables standard for analysis. The value of standard deviation of each variable is a cursory advancing towards normal distribution. Moreover, the skewness, Kurtosis and Standard deviation statistics denotes that the differences in the variables are not too significant. This analysis indicated that, the control variables meant to influence economic well-being in Nigeria over the period 1981 to 2014 can be significant after being normalized.

4.2. Unit Root Test

Using ADF test, the time series data is subjected to unit root tests to ascertain whether the variable are non-stationary and possesses a unit root. If there is the presence of a unit root, the null hypothesis will be accepted and if otherwise, we accept the alternative hypothesis and reject the null hypothesis. Hence, the null hypothesis is rejected if ADF statistics value exceeds the Mackinnon critical value at 5% significance level.

The ADF lag length was automatically selected by the Schwarz Information Criteria. Given the decision rule above, the summary of the unit root tests presented on Table 2 shows that all the series are integrated of order one, suggesting that the series follow the I(1) process. Since the dependent variables and all the independent variables are integrated of the same order, we suspect cointegration (Gujarati and Porter, 2009).

In addition, we carried out post diagnostic tests such as serial correlation and Heteroskedasticity by conducting Breusch-Godfrey LM test and Breusch-Pagan-Godfrey test respectively. We further check for the specification error and the distribution of the error term by conducting Ramsey RESET test and Jarque-Bera test respectively. Thus, the results for the tests are presented in Table 3.

The post-diagnostic test results revealed that, the null hypotheses of no serial correlation, no misspecification error, no heteroscedasticity and normally distributed error term cannot be rejected. Thus, this model is viable and robust in satisfying the assumption of the classical linear regression model. The robustness tests of the model revealed that, Breusch-Godfrey serial correlation LM test, heteroscedasticity test, Ramsey RESET specification test and Jarque-Bera normality test had correct functional form and the model's residuals were serially unrelated, normally distributed and homoscedastic. In addition, following the results of the unit root tests, we further the investigation by checking if the series in each model drift together in the long run. This is obtained by generating residuals of each models and subjecting them to a unit root tests. From the results we suspected cointegration problem in both models which happen to be consistent with the results in the unit rood tests presented above. More so, the regression results are presented in Table 4.

4.3. Estimation of the Models

The regression results of Model 1 and 2 are presented in Table 4. After the discussion, we proceed to the analysis of error correction mechanism.

From the results of the first model as shown in Table 4, the coefficient of determination (R^2) reveals that the explanatory variables explain about 96% of the changes in well-being. Oil price fluctuations (*lndOPF*) observed to be negative but not statistically significant at 5% level. This means that, an increase in oil price fluctuations is not statistically different from zero and thus has no impact on the well-being of the citizens. In like manner, exchange rate (*lnEXR*) and disposable income (*lnYD*) are positive and statistically significant. Therefore, 1% increase in *lnEXR* (depreciation), on the average could increase well-being by 0.67%, holding the influences of other variables constant. Similarly, 1% increase in *lnYD*, could lead to increase in well-being of the citizens by 16.5%. This finding is consistent with the work of Abdul-Rahamoh et al. (2013). Furthermore, we discovered that the impact of the previous period of inflation (*INF (−1)*) on well-being is not statistically different from zero and thus has no impact on well-being. The estimated results in model 2 also show that the explanatory variables explain about 98% of the variations in the wee-being of the citizens. It was observed that oil revenue

Table 1: Summary of results of descriptive statistic

Variables	W	YD	DOPF	OR	INF(−1)	EXR
Mean	0.010912	38. 7453	25.4496	36.3029	13.0490	70.94806
Median	0.008180	36.7884	25.0550	36.6665	13.8759	80.98395
Maximum	0.036649	83.9865	91.4800	75.5226	72.8355	14.94028
Minimum	0.000176	18.3563	11.9100	72.5300	5.38222	0.636900
SD	0.011864	20.3072	21.4346	26.1299	18.3135	58.48547
Skewness	0.834784	0.92632	1.21509	1.07484	1.48321	−0.018060
Kurtosis	2.321472	2.47058	3.29743	2.53400	3.93514	1.270620
Jarque-Bera	4.330476	4.95005	7.99228	6.45097	12.8989	3.989415
Probability	0.00723	0.08416	0.00839	0.03974	0.00158	0.036053
Sum	0.349197	12.3985	10.7039	61.7693	67.3569	22.2234
Sum squared deviation	0.004363	1.28000	14.2429	2.12000	10.3969	10.6037
Observations	34	34	34	34	34	34

SD: Standard deviation

Table 2: Summary of unit root test results

Variables	At level		First difference		Order of integration
	ADF t-stat	Critical value	ADF t-stat	Critical value	
lnW	1.925788	−1.951887	−2.446699	−1.951687	I (1)
lndOPF	−0.153765	−1.952066	−7.677745	−1.952066	I (1)
lnDOR	−0.973873	−2.954021	−4.929430	−1.951687	I (1)
INF(−1)	−1.799331	−1.9511687	−5.260871	−1.952066	I (1)
lnEXR	−2.038719	−2.954021	−3.973702	−1.951687	I (1)
lnYD	−2.263952	−3.552973	−3.078298	−1.951687	I (1)

NB: Critical value is based at 5% significant level. ADF: Augmented dickey fuller

Table 3: Post diagnostic test results

LM-diagnostic test	Model 1		Model 2	
	Chi-stat (χ^2)	Prob. value	Chi-stat (χ^2)	Prob. value
Serial correlation LM test (F-statistic)	2.612414	0.0941	1.348715	0.2785
Heteroskedasticity test (F-statistic)	0.312218	0.9011	0.754665	0.5904
Ramsey RESET test (F-statistic)	0.025119	0.8753	1.487286	0.2340
Normality test (Jarque-Bera)	0.32544	0.84983	1.327385	0.51495

Table 4: Estimated results (dependent variables lnW)

Variables	Model 1			Model 2		
	Coefficient	t-statistic	Prob. value	Coefficient	t-statistic	Prob. value
Constant	−2.600610	−2.109673	0.0440	3.075297	1.489356	0.1476
lndOPF	−0.035882	−0.988978	0.3311			
lnOR				0.798075	3.617343	0.0012
lnEXR	0.672038	9.586775	0.0000	−0.027719	−0.156913	0.8764
INF(−1)	0.003903	0.690039	0.4958	0.002523	0.703800	0.4874
lnYD	1.650300	6.751507	0.0000	0.290959	0.614837	0.5436
R2	0.958460			0.976989		
DW	1.198158			1.073196		
Wald F-statistic		164.2490			659.8038	
Prob. (Wald F-statistic)		0.000000			0.000000	

NB: Critical value is based at 5% significant level

is positive and statistically at 5% significant level. This implies that 1% increase in oil revenue will increase well-being by 79%, cetris-paribus. This finding supported the work of Ogbonna and Ebimobowei (2012) which concluded that oil revenue promotes the welfare of the people. In like manner, we noticed a deviation from the work of Bakare and Fawehinmi (2010) which shows negative relationship between oil revenue and living standard in Nigeria. Other control variables in this model such as disposable income (*lnYD*) and the lag of inflation (*INF (−1)*) were all observed to be positively related but do not have any significant impact on the well-being of the people. Also, exchange rate affects the well-being of the citizens negatively, though not statistically significant.

4.4. Error Correction Results

Thus error correction shows the estimate of the speed at which the dependent variable (well-being denoted as *Wt*) returns to equilibrium after a change in other variables. This relates to the fact that last-periods deviation from a long-run equilibrium (i.e. the error*)*, influences its short-run dynamics.

From Table 5, after correcting for the cointegration problem envisaged in post estimation test, it was observed that in the short run, oil price fluctuation (*D(lndOPF*)) is negatively related to well-being. The statistically significant of the influence of oil price fluctuation on the well-being show the need to address oil price volatility in Nigeria. This is because, a percentage increases in oil price fluctuations reduces well-being of the citizens by 4%, cetris-paribus. This finding is in conformity with the study of Alley et al. (2014), while contravening the works of Ademola et al. (2015); and Jimenez-Rodriguez and Sanchez (2014). In like manner, a positive relationship exists between oil revenue and well-being. Though, there relationship is insignificant. Consequently, the coefficient of the lagged ECM (−1) are all negative and statistically significant. The statistical significance of these results substantiates the presence of long-run relationship in the models. Hence, about 24% of the disequilibrium in the models will be adjusted in the short-run.

4.5. Johansen Cointegration Test

From the analyses of this study, there is the existence of long run relationship between the choice variables. In view of this, we extended our investigation into ascertaining the number of cointegrating equations in the models and to re-affirm if truly the cointegration evidenced in the earlier discussions holds. Johansen test operates on the basis of the null hypothesis which states that "H0: there is no cointegrating equation." However, the decision rule is to reject the null hypothesis if the probability value is <5% or otherwise do no reject (Table 6).

Looking at the trace statistic, Eigen value and probability value of both models, we found the evidence of cointegration. Thus, there is evidence of two cointegrating equations in each of the models. Since the probability values of the models are <5%, the null hypothesis of no cointegrating equation is rejected; otherwise the alternative hypothesis is accepted. This results, confirms the evidence of cointegration found in this study. Therefore, the existence of long run relationship between oil price fluctuation, oil revenue and well-being of the citizen in Nigeria is valid.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study investigates the impact of oil price fluctuations, oil revenue on well-being in Nigeria over the period 1981–2014. Using multiple regression techniques in the estimation, it was observed that oil price fluctuations have no significant impact on well-being. But after controlling for the error correction - that is integrating the error correction mechanism in the model, we observed significant negative relationship between oil price fluctuation and well-being. In like manner, we also found a positive and significant relationship between oil revenue and well-being but after correcting the cointegration error, the relationship becomes insignificant. However, this findings show that oil price fluctuation

Table 5: ECM (dependent variableis d (lnW)

Variables	Model 1			Model 2		
	Coefficient	t-statistic	Prob. value	Coefficient	t-statistic	Prob. value
Constant	0.183212	2.771050	0.0102	0.159880	2.616177	0.0146
D (lndOPF)	−0.043598	−3.72845	0.0009			
D (lnOR)				0.182284	1.581419	0.1259
D (lnEXR)	−0.039167	−0.399486	0.6928	−0.074834	−0.697021	0.4920
D (INF(−1))	0.001988	1.896895	0.0690	−0.002314	−2.439470	0.0218
D (lnYD)	0.048561	0.156771	0.8766	−0.158768	−0.381086	0.7062
ECM(−1)	−0.238816	−0.065170	0.0011	−0.238816	−3.664503	0.0011
R^2	0.247178			0.276536		
DW	1.710604			1.826756		
Wald F-statistic		8.176831			7.973322	
Prob. (Wald F-statistic)		0.000096			0.000115	

NB: Critical value is based at 5% significant level. ECM: Error correction model

Table 6: Johansen cointegration results

Number of cointegrating equations	None*	At most 1*	At most 2	At most 3
Model 1				
Eigen value	0.660047	0.620972	0.387295	0.273602
Trace stat.	92.52678	59.07943	29.00497	13.81896
Critical value (5%)	69.81889	47.85613	29.79707	15.49471
Probability	0.0003	0.0031	0.0615	0.0880
Model 2				
Eigen value	0.672257	0.532281	0.400202	0.272707
Trace stat.	87.90408	53.32279	29.76630	13.92026
Critical value	69.81889	47.85613	29.79707	15.49471
Probability	0.0009	0.0140	0.0504	0.0852

NB: Critical value is based at 5% level of significance

has a long run implication on the well-being. As is widely known, Nigeria is world's sixth largest exporter of oil because of her mineral resource endowment. During the last three decades, Nigeria earned over $300 billion from oil exports but with little to show in terms of economic growth. Even in the presence of the resources endowment, Nigeria is ranked one of the poorest in the world looking at indicators such as per capita income, human development index, health and education statistics, and physical infrastructure facilities.

Though, in recent time, as an oil producing nation, Nigeria has been faced with successive oil price fall which has affected her foreign exchange earnings. Since Nigeria main sources of revenue generation is crude oil, fluctuation in oil prices has affection the oil revenue and other sectors of the economy. Given the above background, from the error correction and Johanson cointegration results (Tables 5 and 6); there is a long run relationship between oil price fluctuation and well-being. Also, the significant and positive relationship between oil revenue and well-being in Nigeria according to our findings shows the relevance of oil price appreciation. Thus, an increase in oil price fluctuation - consistent fall in oil price has a strong implication on reducing the well-being of people in Nigeria through its effect on oil revenue. The implication is that a rise in oil prices could lead to a rise in oil revenue and other sectors of the economy (that is, if the revenue is allocated efficiently to diversify the economy), especially for oil exporting countries like Nigeria. Hence, oil revenue is indeed an important component of economic growth of the recipient nations that translate to the improvement in the well-being which could only be possible by investing the revenue from the oil sector into the non-oil sectors to promote employment and productivity.

Given the findings of this paper, we recommend for youth empowerment policies that could help reduce the rate of pipe line vandalization to boost crude oil production in the country. In addition, we suggest that government should save more at the time oil boom - that is when oil price rises above its benchmark and invest the proceeds in other sectors of the economy particularly agricultural and manufacturing sector. This could create more job opportunities and thus help in improving the per-capita income of people vis-a-vis improves people's welfare. Furthermore, we are of the opinion that the control and management of the excess crude account should be solely delegated to Central Bank of Nigeria with no form of interference.

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