Resource Management and Food Insecurity in Nigeria[1]

Eme DADA

Senior Economist
Office of the Chief Economic Adviser
Abuja, Nigeria
dadaeme@gmail.com

Abstract

International evidence suggests that managing oil wealth has proven to be a difficult challenge for many countries across the world. Examples include Ecuador, Mexico, Nigeria, and Venezuela. In Nigeria for instance, despite the huge earnings from oil Nigeria remains one of the most food insecure countries in the world with rising poverty rates. In fact, between 1970 and 2011, the poverty rate (an index of food insecurity), measured as the share of the population subsisting on less than US\$1 per day increased from close to 36 percent to about 50 percent. This translates into an increase in the number of poor from about 19 million in 1970 to a staggering 60 million in 2011. These developments, of course, coincided with the discovery of oil in Nigeria. Thus, the main focus of this study is to assess oil resource management and food insecurity in Nigeria. The paper analyses the dynamic relationship between oil prices and food insecurity in Nigeria using a VAR approach. Preliminary results of the estimation indicate that the over dependence on oil resulted in the neglect of the agricultural sector, hence decline in the production of food for the teeming population in Nigeria. The variance decomposition also shows high imports of food have contributed significantly to shocks in food supply, but not significant in determining food security There is therefore need for policies that will enhance domestic production of staple foods and reduce the over dependence on oil resource in Nigeria.

Key words: oil Resource, food insecurity, VAR, Nigeria

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1.   Introduction

International evidence suggests that resource-rich countries are characterized by slow or stagnating growth, de-industrialization, low savings, lagging human and physical capital accumulation, and stagnating or declining productivity. This is often labeled the resource curse.

This is premised on the fact that managing oil wealth has proven to be a difficult challenge for many countries across the world. Examples include Ecuador, Mexico, Nigeria, and Venezuela. In Nigeria, for instance, oil revenues have led to huge investments in capital and infrastructure in the 1970s and 1980s but productivity declined and per capita GDP remained at about the same level as 1965. In other words, accumulated oil wealth over a 35 year period of some $350 billion did not raise the standard of living but worsened the distribution of income in Nigeria. Studies show that not only Dutch disease but more importantly waste of capital resources through bad investments and corruption have resulted in this predicament (Budina *et al.*, 2007).

The paradox is that despite the huge resources from oil, Nigeria is characterized by threat of hunger, over 50 per cent of the population living on less than $1.00 per day, youth unemployment and high food imports. Hunger and malnutrition continue to plague the Nigerian economy. For instance, during the period 1970-1979, the average annual deficit in per capita daily calories intake was 24.4 per cent. It declined to 23.58 per cent within 1980-1989 and by 2006 it reached a nadir 11.34 per cent (CBN, 1993, African Development Bank, 2007). This problem has been a recurring issue in the World Bank, and recent reports show that about 50 million Nigerians or about 30 per cent of the population suffer from food insecurity. Consequently, the incomes of most families are not adequate for the basic sustenance of life.

On the whole, Nigeria has had a poor development experience. On just about every conceivable metric, Nigeria's performance since independence has been dismal. In PPP terms, Nigeria's per capita GDP was US$1,113 in 1970 and is estimated to have remained at US$1,084 in 2006. The latter figure places Nigeria amongst the 15 poorest nations in the world for which such data are available (WDI 2007).

Nigeria, unfortunately, fares much worse on measures of poverty which is a dimension of food insecurity. Between 1970 and 2006, the poverty rate, measured as the share of the population subsisting on less than US$1 per day increased from close to 36 percent to about 70 percent. This translates into an increase in the number of poor from about 19 million in 1970 to a staggering 70 million in 2006 (WDR 2007). These developments, of course, coincided with the discovery of oil in Nigeria.

Thus, the main focus of this study is to assess oil resource management and food insecurity in Nigeria. Following the introduction, the rest of the paper is organized accordingly; section 2 examines oil resource management and food insecurity in Nigeria. In the third segment, a review of related literature is presented. The model employed in the article is provided in the fourth section while the fifth segment presents and discusses the results of the estimation. The paper concludes by providing policy recommendations based on the finding.

2. Oil Resource Management in Nigeria

Prior to Nigeria's independence in 1960, agriculture was the main stay and dominant sector of the economy. It contributed about 70 per cent of Gross Domestic Product (GDP), employed about the same percentage of the working population, and accounted for about 90 per cent of foreign earnings and Federal Government revenue. However, with the discovery of oil in commercial quantity at Oloibiri in the Niger Delta in 1956, the country's fortunes have depended on the oil industry, which has effectively replaced agriculture in revenue yield. In fiscal terms, oil revenues currently account for about 80 percent of government revenues, 95 percent of export receipts and 90 percent of foreign exchange earnings (Adebipe, 2004).

The massive increase in oil revenue as an aftermath of the Middle-East war of 1973 created unprecedented, unexpected and unplanned wealth for Nigeria; then began the dramatic shift of policies from a holistic approach to benchmarking them against the state of the oil sector. This had severe implications for the management of the oil windfall. Available evidence indicates that Nigeria has performed dismally in terms of oil resource management. For instance, about the mid-1970s, during the first oil boom, public expenditure was financed mainly by proceeds from oil with moderate domestic and external borrowing. However, this period was characterized by weak institutions which were ill equipped to conceive and implement major investment projects with the required rate of return. This undermined the country's capacity to repay the loans. These credibility problems heightened negative perceptions about Nigeria's credit worthiness in the international financial market. The gross external debt stock which stood at $4.3 billion (about 6.6 per cent of the GDP) rapidly increased to about $11.2 billion by the time oil prices collapsed in the mid-1980s. There was also an incredible fall in foreign exchange earning from 10 billion to 1.23 billion between 1981 and 1983 (Budina *et al.* 2007, Adeniyi, 2008).

Within the decade of the 1980s, some major economic policies were put in place to reflect the huge oil earnings. These include, the recommendations of the Onosode Commission on pay structure in Government establishments that were adopted in 1981 and further increase in salaries and benefits in several public institutions whose responsibilities were considered unique and more complex than the ordinary civil service; again, a policy in pursuit of "capturing" legally the oil wealth. Second was the Economic Stabilization Act of 1982, which was the response of the Shagari's civilian administration to dwindling oil earnings and major external sector imbalances. A third policy was The Structural Adjustment Programme (1986-1988) by Babangida's military administration, with the active support of the World Bank. This was Nigeria's first bold step on wide-ranging reforms in almost all the major sectors of the economy. It recorded some significant gains for the first two years, but suffered a setback when certain aspects of it were reversed and inconsistencies (internal and sectoral) became prevalent. Again was the experimentation with Perspective Planning, in which three-year rolling plans were designed to tide the economy into long-term planning. Again this was discarded almost as soon as it was initiated.

Within the 1990s which might be described as a period of reversals and lost opportunities;[2] the series of reforms and reversals of the late 1980s took its toll on the real sector of the economy and the effects were transmitted to the financial system. This was also the period Nigeria experienced some windfall gains from the strong oil prices as a result of the Coalition Forces/Iraqi war of 1990. The experimentation with deregulation and liberalization was truncated in 1994 with the advent of the military administration led by late Abacha. The Federal Government re-regulated the economy, by capping exchange and interest rates. It was an obvious reaction to the high nominal interest rates that reached 78 per cent in commercial banks and 180 per cent in the non-bank financial services sector. These rates were themselves driven by the high rate of inflation at 44.8 per cent in 1992 and 57.2 per cent in 1993 (Adebipe, 2007; Akpan, 2009).

There was no clear economic strategy for the rest of the decade of the 1990s, and monetary policy was totally ineffective to check expansionary fiscal operations. Up until June 2003, there was no clear economic direction. Weak institutions and legal environment stymied the benefits that would have accrued from oil earnings, which had started to firm up. The entire scenario has changed in 2004, with the formal announcement and presentation of the Federal Government's economic agenda, tagged the National Economic Empowerment and Development Strategy (NEEDS). NEEDS is a medium-term strategy that seeks to implement series of reforms that was designed to lay a solid foundation for a diversified Nigerian economy by 2007. It sets specific goals in major growth indices as wealth creation, employment generation, institutional reforms and social charter.

From the turn of this century, events seem to point towards improved economic management. The external reserve position improved from $5.5 billion in 1999 to about $2.8 in 2005, while the huge gross public debt was reduced following protracted negotiations which resulted in a debt relief by the Paris club. The fiscal reforms involving saving part of the windfall appear to have contributed to the improvements. The ongoing reforms, fiscal restraint, budget preparation process, efforts to check corruption among others if sustained should enable Nigeria benefit immensely from positive oil price shocks.

On the whole, despite the significant expansion to Nigeria's economy brought about by oil, there has been little structural development; a situation which successive military administrations in Nigeria have worsened due to their inconsistency, languid enforcement, and implementation of oil policy. These have severe implications for food insecurity and livelihood of the teeming population in Nigeria. This is pursued in the ensuing section.

2.3 Food Insecurity in Nigeria

Food security is the accessibility of all people, at all times, to enough food for an active and healthy life (Reutlinger, 1987). Food security has two aspects; ensuring that adequate food supplies are available, and that households whose members suffer from under nutrition have the ability to acquire food, either by producing it themselves or by being able to purchase it (Riscopoulos *et al.* 1988). Food insecurity on the other hand, refers to deficits or shortfalls in

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[2] Nigeria has had several military administrations. These political instabilities resulted in inconsistencies in policy formulation and implementation; and have had dire consequences for economic performance.

actual per capita daily calorie intake below the minimum per calorie intake recommended by FAO and WHO for maintaining the human body-2450kcal/day (Riscopoulos *et al.* 1988; Rosen and Shapouri, 1994).

Most countries with widespread food security problems are assessed based on three indicators; low average levels of calorie consumption, large fluctuations in and low levels of food consumption, and large numbers of absolute poor. Food insecurity often results in human suffering, substantial productivity losses and a misallocation of scarce resources due to diminished work performance, lower cognitive ability and school performance, and ineffective income earning decisions (Braun *et al*. 1992)

Table 1:   Food Security Indicators in Nigeria

Year	Deficit in per calories intake (%) (1)	Export earnings(Nbillion) (2)	Per capita Income (N) (3)	Food Imports (Nm) (4)
1976	24.93	6.6	1151.7	441.7
1980	27.20	14.1	1138.9	1437.5
1985	23.0	11.7	714.2	940.6
1990	9.1	109.8	826.2	3474.5
1992	9.1	205.6	847.6	12597.2
1995	6.8	206.2	835.6	11594.0
2000	5.2	308.2	846.7	12678.2
2002	5.3	412.2	952.3	13672.5
2004	6.1	513.3	974.2	15237.4
2008	6.2	621.3	988.7	16245.5

Source:Column 1 FAO Statistics 2009,
*   Columns 2, 4 Central Bank of Nigeria Statistical Bulletin Various Issues*
*   Column 3, World development Indicators 2009.*

From the foregoing, Nigeria is considered a food insecure country. One of the common characteristics of food insecurity in Nigeria is poverty. As reported in Table 1, available evidence indicates that on almost every indicator, Nigeria exhibits some level of food insecurity. Deficits in per calorie intake declined from 9.1 in 1990 to 5.8 in 1995 but rose thereafter to 6.2 in 2008. In addition, food imports have been rising steadily from 1976 to 2008.

2.4   Efforts at Achieving Food Security in Nigeria

Successive governments since independence have made efforts to achieve food security in the country. In the 1960s agriculture was the main stay of the Nigerian economy. Nigeria depended on agriculture to provide infrastructure and run services until the collapse of the first republic, and the military take over of government in 1966. The broad goal of agriculture within this period was rapid attainment of food sufficiency, at least regarding the energy foods, vegetables and edible oils.

Within the decade of the 1970s the Government introduced the National Food Operation programme and the Nigerian Agriculture and Cooperative Bank which was established to fund

agriculture and assist farmers. This was followed by Operation Feed the Nation in 1976. The programme was fashioned to revolutionise agricultural sector of Nigerian economy, which was derailing from its normal contribution to the economy.

Table 2: Contribution of Agriculture to Total GDP (1965-2006)

Year	Total GDP ($m)	Agric Share of GDP	%Share of Agric in Total GDP	Total Agric Output ('000tonnes)
1965-1970	21.08	11.55	54.8	23218.0
1971-1975	31.19	12.05	38.6	24350.0
1976-1980	114.07	24.09	21.1	16852.0
1981-1985	376.43	133.23	35.4	27240.0
1986-1990	413.60	165.14	39.9	52672.0
1991-1995	496.40	159.54	32.1	87.862.0
1996-2000	626.93	154.24	24.6	93402.0
2001-2008	8345.32	246.67	25.7	104795.0

Source: CBN Statistical Bulletin and Annual Reports Various Issues, Yahaya 2000

As contained in Table 2, between 1965 and 1970 the percentage share of agriculture in total GDP was 54.8 . This dropped to 38.6 percent between 1971 and 1975 and reduced further to 21.1 percent in 1976 to 1980. In addition, eleven River Basin Development Authorities (R.B.D.A) were established to facilitate irrigation agriculture as an attempt to expand farmland. Also, farm settlements were established for cash and food crops to reduce food importation.

Government's efforts between 1981 and 1985 yielded some positive results, evidenced by the   as the contribution of agriculture to GDP which rose from 21.1per cent in 1981 to 35.4 per cent in 1985. This was the outcome of the implementation of Green Revolution Programme of Shehu Shagari Administration which complemented the R.B.D.A programme.   The Military Administration of General Badamosi Babangida in 1986 introduced the rural infrastructure development programme and established the Directorate of Food, Rood and Rural Infrastructure (DFRRI). The primary objective of the programme was to open up rural areas for effective agricultural activities and boost food production. The effort raised the contribution of agriculture to GDP to 39.9 per cent, while food production also increased considerably.

However, a downward trend was observed from 1991. This has persisted ever since. Food importation has rather been on the increase with sustained decline in domestic production. This was the period of 'essential commodity' and the beginning of massive corruption which permeated various sectors of the economy. This was the situation until 1999 when a democratic government was sworn in. During this period the Fadama development project was introduced in 1992. It however did not make sufficient impact.

The democratic government headed by President Olusegun Obasanjo initiated some policies and programmes which involved; reorganizing, restructuring, privatizing institutions and agencies and encouraging partnership to make impact (Nigerian Agricultural cooperatives and Rural development bank, NACRDB (2000); National agricultural Development Fund, NADF (2002); National Special Programme on Food security, NSPFS (2002); Commodity marketing and

Development Companies, CMDC (2003).) All these have had some positive impact on agricultural production and consequent improvement in the contribution of agriculture to total gross domestic product (see Table 2). Reported in Table 2 also is agricultural contribution to GDP. From the Table, a sharp increase in contribution from 24.6 percent between 1996 and 2000 is observed as against 42.20 percent in 2007.

In addition, recent statistics from the FAO and IFPRI survey show slight increase in per capita daily calorie intake from 2050kcal in 1971-1981 to 2430kcal in 1989-1991 and daily calorie intake between 1991 and 2004. 2800kcal in 2002-2004. Similarly, the proportion of undernourished people declined from 13 per cent in 1990-1992 to 9 per cent in 2000-2002 and 7 per cent in 2002-2004 (FAO, 2004; IFPRI 2006). Poverty level according to HDI (2008) also fell from 70.8 per cent in 2003 to 61 per cent in 2006.

On the whole, despite all the improved statistic and government efforts, not less than 65 percent of Nigerians are food insecure (Mohammed, 2008). The plausible reason for this persistent food insecurity problem in Nigeria despite huge earnings from oil is the neglect of the agricultural sector, following the discovery of oil in commercial quantity. The agricultural sector contributes over 30 per cent of total annual GDP, employs about 70 per cent of the labour force and constitutes about 70 per cent of non-oil exports. More importantly, it provides the needed food for the teeming Nigerian population (Adegboye, 2004, Babatunde *et al,* 2007) Hence, the poor performance of the agricultural sector invariably implies food shortages and accessibility problems. In other words, as Babatunde *et al* (2007) point out, the poor performance of the sector directly creates supply shortages and indirectly demand shortages by denying the households access to sufficient income.

3. Resource Management

It is generally acclaimed that resources are a curse for developing countries. Traditional among explanations of poor performance in oil-rich countries is the Dutch disease, named after Holland's poor record in managing its natural gas wealth in the 1960s (Corden and Neary 1984; Van Wijnbergen 1984a, 1984b). The literature points out that spending out of oil wealth increases demand for nontradables and so draw productive resources into that sector. Because the presumption is that technological progress is faster

As Mehlum, and Torvik (2002) point out, the Asian tigers (Korea, Taiwan, Hong Kong and Singapore), are all resource-poor, while growth losers (Nigeria, Zambia, Sierra Leone, Angola, Saudi Arabia, and Venezuela), are all resource-rich. Natural resource abundance, as measured by the resource concentration of exports, tends to reduce a country's long-term growth rate (Sachs and Warner, 1995, Gylfason *et al*, 1999, Sala-i-martin, 1997, Salti, 2007). The result also holds when attention is restricted to particular resources (see for example, Olsson (2004) for the case of diamonds and Humphreys (2005) for the case of fossil fuels). Furthermore, Kronenberg (2004) notes that the curse of natural resources extends to the case of transition economies.

Looking at other outcome variables, persistent evidence of the curse is observed. Ades and Di Tella (1999) for instance show evidence of natural resources increasing corruption; Ross (1999,

2001) maintains that resource-dependent countries have a larger share of their population living in poverty and a lower score on the United Nations Human Development Index (HDI) and are less likely to be democratic; Collier and Hoeffer (2000) find that resource abundance significantly increases the risk of violent civil conflict.

This finding is not universal, however. The effect of natural resources on economic performance is reversed in Papyrakis and Gerlach (2003) when controls are included for corruption, investment, openness and terms of trade. However, the indirect effect of resources on growth using these controls as possible transmission channels is negative. Finally, Hodler (2004) notes that, the effect of natural resources on GDP and on growth is significant and negative only in ethno-linguistically fractionalized countries, and not in homogeneous ones.

Further, there are cases where natural resources appear to be a blessing. The experiences of Norway, the United States, Australia, Canada and the United Kingdom suggest that in none of these countries were natural resources a burden. Norway was Europe's poorest country in 1900, but is now one of the richest (Mehlum, Moene and Torvik, 2002). It has, since the discovery of oil and gas in the 1970s, surpassed Sweden and Denmark in terms of GDP per capita (Roed, 2002). In 2002, it stood at the top of the UN's ranking of countries by the Human Development Index (UNDP, 2002). Similarly, Alaska has experienced growth rates in personal income and employment much greater than the average rates for the US since the 1960s (Goldsmith, 2003). The Shetland Islands invested the proceeds from the signature bonus for allowing oil drills in 1973 in a public trust fund, the Shetland Islands Council Charitable Trust. Thus the level of rents is inevitably observable and veritable. The Council disburses around £15 million per year for community projects, out of a total that today stands at £150 million (Christian Aid Report, 2003).

In Nigeria, evidences exist regarding resource management and outcomes. Adebipe (2004), Odularu (2008), Van (2008), Akpan (2009). Adepibe (2004)'s work focused on the impact of oil on Nigeria's economic policy formulation from 1960 to 2000. Detailed descriptive analysis was explored. From the historical evaluation of economic policies it was evident that prior to the discovery and extraction of oil in commercial quantity, agriculture was the main stay of the Nigerian economy. However, with the advent of oil, unprecedented wealth accrued to the Nigerian government. This affected policy formulation. There were series of policy reversals which took its toll on the real sector of the economy; leading to its neglect. The author argues that the upstream sector of the oil industry in Nigeria

The findings of Odularu (2008) who analysed the relationship between the crude oil sector and Nigeria's economic performance were similar to Adebipe (2004). Using Ordinary Least Square (OLS) regression method for the period 1970 to 2005, the findings revealed that crude oil consumption and exports had contributed positively to the improvement of the Nigerian economy. A striking issue emerging from the results is the finding that despite the positive relationship between domestic consumption and export of crude oil, the coefficient of crude oil export was insignificant. Plausible reasons advanced by the author, were, misappropriation of public funds (corruption), and poor administration. The author recommended the need for urgency in diversifying the export market especially the oil market, fight corruption and the

encouragement of private sector participation in crude oil activities. A flaw observed in the analysis is the absence of some diagnostic tests on the specification to ascertain the appropriateness of the specification. Similarly, unit root tests were not conducted on the series to determine their stationarity or otherwise. In econometric analysis involving time series, this is crucial to avoid spurious regressions (Engle and Granger, 1997).

Van (2008) states that Nigeria's poor record with managing oil revenue volatility results from poor institutional framework and excessive debt over hang. The arguments flow from a framework developed in the study to analyse public debt decomposition dynamics. From the analysis, the debt overhang problem makes the capital market inaccessible at the very moment they are needed. The author concludes that fiscal policy in Nigeria should pay particular attention downside risk, if the improvements observed in the economy beginning 2004 are to be sustained.

Using a VAR methodology, Akpan (2009) investigated oil price shocks and Nigeria's macro economy for the period 1970 to 2007. The study pointed out the asymmetric effects of oil price shocks; for instance, positive as well as negative oil price shocks significantly increased inflation and also directly increased real national income through higher export earnings, though part of this gain was seen to be offset by losses from lower demand for exports generally due to the economic recession suffered by trading partners. The findings of the work further showed a strong positive relationship between positive oil price changes and real government expenditures. Unexpectedly, the result identified a marginal impact of oil price fluctuations on industrial output growth. Furthermore, the "Dutch Disease" syndrome was observed through significant real effective exchange rate appreciation. The result confirmed the neglect of the agricultural sector following the advent of oil observed by previous works (see Adepibe, 2004, Odularu, 2008)

3.1 Food Security

The literature is replete with studies on food security especially in developing countries. Clover (2003), Smith (2007), Babatunde *et al. (*2007), Swaminathan (2008), Oriola (2009), Fayeye and Ola (2007) are some of the works that have examined food security in developing countries. The authors argue that domestic policies in many developing countries have contributed very marginally to food security especially in Africa, and that, despite the growing global food production, hunger, malnutrition and famine are prevalent in many developing countries. Oriola (2009) states that Nigeria's case is particularly worrisome owing to the abundant natural resources endowed the country. Clover (2003) in particular examined food security in Sub-Saharan Africa. He acknowledges that 840billion people worldwide are malnourished, the highest percentage of these being in Africa. Clover argues that actions and plans to address food security have continued to fall short, while food insecurity remains a thorny issue. To him, this failure can be attributed to faulty analysis and actions. He suggests going beyond conventional, orthodox wisdom to work more strategically in developing and implementing effective international, national and regional policies as a way out.

Fayeye and Ola (2007) further stress the fact that Sub-Saharan Africa is ravaged by poverty and severe malnutrition with 30 of the 45 countries having low or critically low level of food security between 1991 and 2003. The authors observe that food availability in the sub-continent which

stood at 2100kcal/person/day within the same period is the poorest in the world. From their analysis it is evident that improvement in food production in SSA will boost per capita GDP, raise purchasing power and access to improved therapeutic prophylactic health management. Their major conclusion is that research is needed on new technologies that are output-driven, ecologically friendly, acceptable and affordable to the resource farmers. Finally, good governance and stable polity they argue will provide an essential and enabling environment for food security in Sub-Saharan Africa.

Sudan's case with food insecurity appears quite peculiar within the sub-Saharan African region owing to the persistent political instabilities the country has faced since its independence in 1956. Hence, Smith (2007)'s investigation of food crisis in Sudan. The study is a detailed analysis of the historical evolution of Sudan in terms of policies and programmes affecting especially peasant framers. His important contribution rests on the observation that Sudan's poor domestic policy has caused excessive strife and suffering in the lives of peasant farmers, thus, resulting in persistent hunger and malnutrition. The author further argues that to add insult to injury, subsistence farmers are plagued by violence, genocide, drought, floods, tsetse flies, and poor infrastructure, with a government that does little to nothing to assist them. Despite international assistance, the civil unrests puts peasant farmers and the entire population especially the poor at a great disadvantage. He concludes that if tranquility can be established in this unstable area, the nation's economy could easily climb to unprecedented heights. With an already growing economy and an aspiration for national harmony, Sudan has the potential to rise above the distress it is so accustomed to and present itself as an example for other sub-Saharan countries to follow.

The case of India as presented by Swaminathan (2001) shows that the first 60 years of the 20th century in India, the capacity to achieve a balance between human numbers and the production of food grains and other agricultural commodities was marked by a sense of despair. This, the author presents gave way to optimism with the introduction of the green revolution. He however notes that there are certain constraints which India and other developing countries face in the search for food security. These are damage to the ecology, mismatch between production and post harvest technologies. Other constraints which are external are global threats to agricultural destiny of India and indeed other developing countries include, unequal trade bargain inherent in the WTO agreement of 1994,   rapid expansion of proprietary science and potential adverse changes in temperature, precipitation, among others. The paper argues that overcoming the external threats to agriculture will require the United States and other industrialised countries providing adequate support for research at the international level and revising the agreement on agriculture of the WTO in a manner that trade becomes a powerful tool for poverty eradication.

The findings of Oriola (2009) corroborate Smith (2007). Oriola (2009)'s work focuses on Nigeria. The specific issues raised in the article were; (i) describing a framework for understanding the relationship between irrigation system, food production and poverty and (ii) examining past efforts at attaining food sufficiency along side current trends in food security in Nigeria. Analytical and qualitative techniques were employed. From the findings, despite the huge investments in the agricultural sector and lofty projects implemented by successive

governments in Nigeria, food security remained a major challenge. He however noted that following recent economic reforms, domestic production of food had improved marginally. He concludes that there is urgent need to explore the natural endowments; soil and water resource and reform in irrigation agricultural system which should stimulate wider growth in food production, hence reduce food insecurity and poverty as a whole.

Babatunde *et al* (2007) is another detailed work on food insecurity in Nigeria. The study utilized a three-stage random sampling technique to obtain a sample of 94 farm households and a cross sectional data in year 2005. Descriptive analysis was carried out to describe the socio-economic characteristics of the households. Econometric tools were used to determine factors affecting the food security status of household. Using the recommended calorie required approach; the study revealed that 36 per cent and 64 per cent of the households were food secure and food insecure respectively. The Shortfall/Surplus index showed that the food secure households exceeded the recommended calorie intake by 42 per cent, while the food insecure households fell short of the recommended calorie intake by 38 per cent. A logit regression model made up of eight regressors was specified. Household income, household size, educational status of household's head and quantity of food obtained from own production were found to determine the food security status of farming households in the study area. It is concluded that the design of food security strategies should be multi-dimensional such that would focus on and address the identified determinants in order to achieve the target set by the Millennium Development Goals.

In an earlier work, Ukoha (1997) examined the link between food insecurity and poverty in Nigeria. A single equation model was explored, with data series from 1976 to 1994. The theoretical framework employed was based on the Keynesian absolute income hypothesis along side Hazell (1989) and Braun *et al* (1992)'s specifications. From the results, adequate domestic food production was considered to be the major determinant of food security. The author recommended the need to focus on policies that will enhance domestic production of agricultural outputs. Specifically, the author emphasized the need for increased access of farmers' extension services and ensuring reasonable and stable supply of agricultural inputs as the forward. However, the estimation technique employed was fraught with various shortcomings. The author assumed away the time series properties of the variables. This leads to spurious results, thus, making the findings somewhat unreliable. In addition, the number of observations and frequency of the series makes room for very small degrees of freedom. The results should therefore be treated with caution.

The literature review presents consistent arguments regarding the food insecurity situation in developing countries and Nigeria in particular. The current study draws from and overlaps previous works in the subject but defines its scope somewhat differently. Oil revenue is included as a factor influencing food insecurity in Nigeria. This captures the heavy dependence on oil proceeds as the major revenue earner for Nigeria. The import is to investigate the extent to which oil proceeds have contributed in alleviating food insecurity.

4. Data, Transformations and Methodology

The study employs observations for the period 1970 to 2007. This period is chosen to capture the first and second oil booms of the 1970s and mid-2000s respectively. Data for the analysis are annual series and are obtained from the World Development Indicators (WDI) CD Rom 2007 and Central Bank of Nigeria (CBN) Statistical Bulletin Various issues. The series were transformed to quarterly series using the E-views software. Quarterly series are preferred as it increases the data points and provides greater degrees of freedom. The variables in the models are deflated by consumer price index in order to obtain their real values. Hence, these variables enter the behavioural equations in real form. All variables are in logarithmic terms. The variables in the model are; real oil revenue, per capita income, food insecurity, food imports and real agricultural output.

5. Model Specification

The model specification is based on the assumption that fluctuations in a country's capacity to import food (which is a function of export earnings, world prices and debt-service obligations, among other variables) also contribute to global food availability. Another important determinant of food insecurity provided in economic theory is the real per capita income which stems from the Keynesian absolute income hypothesis (Hazell, 1989; Braun *et al*, 1992).

Thus, to investigate the response of food insecurity innovations to oil revenue, an unrestricted Vector Autoregressive (VAR) model is explored. The VAR model provides a multivariate framework where changes in a particular variable (oil price) are related to changes in its own lags and to changes in other variables and the lags of those variables. The VAR treats all variables as endogenous and does not impose *a priori* restrictions on structural relationships. Since the VAR expresses the dependent variables in terms of predetermined lagged variables, it is a reduced-form model. Once the VAR has been estimated, the relative importance of a variable in generating variations in its own value and in the value of other variables can be assessed (Forecast Error Variance Decomposition (VDC)). VDC assesses the relative importance of oil shocks in the volatility of other variables in the system. The dynamic response of macroeconomic variables to innovations in a particular variable can also be traced out using the simulated responses of the estimated VAR system (Impulse Response Functions (IRF)). Thus, the IRF enables the determination of the dynamic effects of oil revenue on agricultural output and food security in the economy. The unrestricted VAR model of order p is presented in equation (1)

$$y_t = A_1 y_t + \ldots + A_p y_{t-p} + B z_t + \varepsilon_t \qquad (1)$$

Where yt is a vector of endogenous variables, zt is a vector of exogenous variables, Ai and B are coefficient matrices and p is the lag length. The innovation process et is an unobservable zero-mean white noise process with a time invariant positive-definitive variance –covariance matrix. The VAR system can be transformed into its moving average representation in order to analyse

the system's response to real oil revenue, that is: $y_t = \mu \sum_{i=0}^{\infty} \gamma_i \varepsilon_{t-1}$

$$(2)$$

Where γ_0 is the identity matrix, μ is the mean of the process. The moving average representation is used to obtain the forecast error variance decomposition and impulse response function.

In the restricted VAR models, the vector of endogenous variables, according to our first Cholesky ordering, consists of real export earnings which is proxied by real oil revenue (roilrev,), food insecurity (fins), real agricultural output (ragrp), per capita income (pinc), and real food imports (rfimp):

$$y_t = [roilr, rfins, ragrop, p\operatorname{in}c, rfimp] \qquad (3)$$

The innovations of current and past one-step ahead forecast errors are orthogonalised using Cholesky decomposition so that the resulting covariance matrix is diagonal. This assumes that the first variable in a pre-specified ordering has an immediate impact on all variables in the system, excluding the first variable and so on. In fact, pre-specified ordering of variables is important and can change the dynamics of a VAR system. The vector of exogenous variables is given by:

$$z_t = [cons\tan t, D1, D2, D3, D4, D5] \qquad (3)$$

Where D1-D5 refers to all other important exogenous variables during the period 1970-2006.

In the ordering of the variables, real oil revenue is ranked as a largely exogenous variable, especially for the case of the Nigerian economy. Although Nigeria is one of the major suppliers of crude oil to the global markets, its production and export quota are predetermined by the OPEC criteria, domestic consumption and investment in oil fields. In addition, demand for crude oil is largely determined by global economic growth, energy intensity within industrialized economies, speculator operations in oil markets, the policy of key oil consumers on strategic petroleum reserves, among others. Hence, oil revenue is regarded as exogenous for the Nigerian economy. It is expected that significant shocks in oil markets affect contemporaneously the other key macro economic variables in the system.

The second variable in the ordering is food insecurity which is measured by deficits in per capita daily calorie intake and is expressed as a function of total domestic output of food, per capita income and food imports which are the third, fourth and fifth variables. The variables in the models are deflated by consumer price index in order to obtain their real values. Hence, these variables enter the behavioural equations in real form. In addition, all the variables except those with negative values were transformed into natural logarithms

6.   Empirical results

This section presents the empirical results of the analysis beginning with the time series properties of the variables used for the estimation. This is meant to ascertain the appropriateness of the specification and determine the underlying properties of the data generating process. Following this, the empirical results are presented.

6.1 Unit Root Results

The analysis is based on time series data. This therefore requires some specific approaches to the analysis. It is generally known that the econometric estimation of a model based on time series data demands that the series be stationary as non-stationary series usually result in misleading inferences. Engle and Granger (1987) provide a standard technique to deal with this problem. This involves testing the variables of an equation for stationarity. The estimation therefore begins by conducting stationarity test to ascertain the stationarity or otherwise of the variables and the appropriateness of the specification for VAR estimation. Thus, both the Augmented Dickey and Fuller (1979) and the Phillips and Perron (1988) tests are employed. The ADF- tests and PP-tests are reported in Table 3. The results show that the variables expressed in logs are non-stationary. When all variables are first differenced, there is evidence that all variables are stationary. Since the variables in the model follow an I (1) process, the second step is to test if a long run relationship (cointegration) exists among the variables. To test this, the Johansen maximum-likelihood approach[3] is employed. Harris (1995) raises the issue of intercept and trend being included in the short- and/or long- run model. To ascertain this, all five deterministic trend models considered Johansen (1995) were adopted. The number of cointegrating relations from all five models, on the basis of trace statistics and the maximal eigenvalue statistics using critical values from Osterwald –lenum (1992) at 5% level, are summarized in Table 3

Table 3: Unit Root Test

Variable	ADF				PP			
	Without Trend		With Trend		Without Trend		With Trend	
	Level	First Diff	Level	First Diff	Level	First Diff	level	First Diff
rgdpi	-0.66	-4.52***	-2.10	-6.23***	-0.91	-16.63***	-2.01	-18.6***
rgdp	-2.75*	-4.15***	-2.26	-6.35***	-2.11*	-15.45***	-2.03	-15.6***
reex	-1.31	-10.69***	-2.11	-11.7***	-1.34	-11.23***	-3.83	-11.5***
inf	-3.16**	-6.42***	-3.11*	-8.36***	-3.30	-8.76***	-2.03	-9.12***
rgex	-1.25	-17.13***	-1.42	-17.3***	-1.23*	-35.8***	-4.62*	-42.61***
rms	-0.58	-7.42***	-2.35	-7.5***	-0.76	-30.7***	-8.72**	-27.34***
rimp	-2.05	-13.14***	-1.75	-8.65***	-8.53***	-25.6***	-8.66***	-30.31***
roilp	-8.77***	-11.04***	-6.88***	-16.4***	-7.82***	-25.7***	-9.5**	-27.65***

Source: Compiled by authors from unit root tests.
*Note: *, **, *** represent significance at 10, 5 and 1 per cent respectively.*

Table 4: Cointegration Results

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[3] See Johansen (1991, 1995) for details.

Maximal eigenvalue statistic			Trace Statistic		
Rank	H+	H	Rank	H+	H
r=0	127.44***	122.13***	r=0	141.34***	121.41***
r=1	86.98***	81.12***	r≤1	121.23***	85.23***
r=2	35.93	27.87	r≤2	43.10	22.18
r=3	6.56	11.35	r≤3	6.78	8.56
r=4	0.73	2.63	r≤4	0.59	1.79

Note *** indicates 1 per cent confidence level.
Source: Compiled by author.

The results of the maximal eigenvalues and trace test statistics for the two models are presented in Table 4. The procedure adopted to determine the number of cointegrating vectors begins with the hypothesis that there are no cointegrating vectors and with trends, H+. A rejection of the hypothesis would lead to testing the alternative hypothesis of no cointegrating vectors, and no trend, H. The testing procedure continues until the hypothesis cannot be rejected.

The result of the test statistics indicate that the hypothesis of no cointegration among the variables can be rejected for Nigeria the results reveal that at least two cointegrating vectors exist among the variables of interest. Considering the existence of long-term equilibrium relationships among non-stationary variables in the system the analysis employs an unrestricted VAR system in levels. The optimal lag length is 4. In addition, since the variables are cointegrated, the equations of the VAR also include the lagged values of the variables in levels to capture their long-run relationships.

6.2   Variance Decomposition
This section discusses the results of the variance decomposition.

Table 5: Variance Decomposition of roilp

Quarter	roilr	rfins	ragrop	pinc	rfimp
variance decomposition for rfins					
1	12.16	91.27	0.01	0.02	0.02
4	6.64	87.15	7.94	3.71	6.72
8	5.47	65.42	11.21	2.36	6.68
12	4.98	58.56	25.05	2.75	7.81
variance decomposition for ragrop					
1	0.01	6.31	95.34	0.01	0.02
4	2.51	8.05	81.51	5.23	7.05
8	3.21	10.54	76.56	5.12	6.51
12	6.08	18.47	82.13	4.04	5.24
variance decomposition for pinc					
1	2.43	2.45	0.01	97.27	0.01
4	2.01	8.18	4.45	87.57	1.24
8	1.85	7.21	20.65	55.56	7.04
12	1.34	8.34	23.69	45.71	10.62
variance decomposition for rfimp					
1	49.21	2.93	0.23	1.24	95.12
4	42.13	4.76	0.34	4.64	87.23
8	34.02	4.18	0.43	5.07	71.24
12	33.06	3.67	0.78	5.86	72.81

Variance decomposition for roilr					
1	75.23	1.76	4.80	1.46	0.01
4	65.87	3.23	3.23	8.23	8.67
8	67.78	3.78	2.34	13.24	13.23
12	72.46	3.98	2.35	14.23	15.34

Author's compilation from estimations

The results are summarized in Table 5. Following Table 5, an analysis of the variance decomposition is provided. The essence of the variance decomposition is to measure the proportion of forecast error variance in one variable explained by innovations in it and the other variables. But it should be noted that the VAR was estimated with the sets of contemporaneous structural restrictions specified in the equations. First, the result of the likelihood ratio test on the adequacy of the identifying restrictions on the model was 28.56.

6.3   Discussion of Results/ Policy Implications

The variance decomposition suggests that oil revenue accounted for about 12 per cent of shocks to food insecurity in the 1st quarter, declining in effects to 5 per cent in the 8th quarter and further to 4 per cent in the 12th quarter. Food imports contribute 6 per cent in the 4th quarter rising marginally to about 7 per cent in the 12th quarter. An immediate conclusion that can be drawn from the finding is that oil revenue and food imports play a negligible role in alleviating food insecurity. The policy implication arising from this is that greater benefits in terms of increase in the standard of living of populace would be derived if the oil resources committed to food imports are employed in alternative sources of national food security-domestic food production.

The response of food insecurity to a one standard deviation shock to oil revenue was not significantly different form zero. Specifically, only 1.76 per cent of variations in food insecurity were as a result of oil revenue in the first quarter, rising marginally through the 4th up to the 12th quarter. The inference is drawn that oil revenue has not contributed significantly to the reduction of food insecurity in Nigeria. The result also confirms Nigeria's poor experience with managing oil revenue and is in tandem with the findings of some previous studies (see Ukoha, 1997, Oriola, 2007, Van 2008, Akpan, 2009). A plausible explanation for this finding is the persistent balance of payments problem experienced in Nigeria over the years. Mismanagement of oil proceeds and embezzlement of public funds resulted in unsustainable debts, thus, the export earnings could not sustain huge food imports. Consequently, food insecurity persisted. The immediate conclusion of this finding is that a significant proportion of the huge oil revenue earned by the Nigerian government over the years has not been channeled into food production; hence, its insignificance in determining food security. It further verifies the neglect of the agricultural sector which is the main source of food, following the advent of oil. This further strengthens the fact that rather than import food, more resources (oil proceeds) should be channeled into domestic food production.

A striking feature of the results is that real domestic food production proxied by real agricultural output is the most important variable explaining food insecurity in Nigeria. From the result about 85.2 per cent of the food problem in Nigeria would be solved by promoting domestic food

production. This implies that self-reliance in food production is the best policy option for the nation in the quest for food security.

The per capita income does not explain food insecurity in Nigeria. The reason is not far fetched. Nigeria is ranked one of the poorest countries in the world. Hence, the income accruing to households is unable to provide the needed daily food intake. This calls for improvement in incomes of both consumers and producers.

Evidently, the results propose broad based policies that would assuage food insecurity in Nigeria. The policies should be geared towards increased domestic production of food, increased income and proper use of the oil proceeds accruing to Nigerian government.

7. Conclusion

The focus of this research was to examine resource management and food insecurity in Nigeria. Historical developments have shown that oil resource has been mismanaged in Nigeria over the years. Hence, despite the huge revenue received from oil, Nigeria remains a largely food insecure country with poor performance based on other social indicators. Corruption, fiscal imprudence, huge debts and policy inconsistencies are some of the major factors responsible for this dismal performance in Nigeria. If Nigeria is to break free from this vicious cycle, there is need for broad based reforms which should increase per capita income, enhance domestic production of food and diversify the revenue base. More so, the policies suggested should be implemented as a package and not piecemeal. On the whole, if the ongoing reforms are sustained, Nigeria remains on the path to progress with the hope of decrease in the number of households that are food insecure.

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