AN ASSESSMENT OF THE DOMESTIC DEMAND FOR PETROLEUM PRODUCTS IN NIGERIA (1986 - 2004)

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A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTERS OF SCIENCE IN ECONOMICS, AIIMADU BELLO UNIVERSITY, ZARIA, NIGERIA.

FEBRUARY, 2007

DECLARATION

I hereby declare that this thesis is a product of my own research work, under the supervision of Dr. Olowononi, G. D. and Dr. (Mrs) Aku, P. S. It has not been presented or accepted anywhere to the best of my knowledge, for the purpose of awarding higher degree. All references are duly acknowledged at the end of this thesis.

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CERTIFICATION

This is to certify that this thesis titled "AN ASSESSMENT OF THE DOMESTIC DEMAND FOR PETROLEUM PRODUCTS (1986 – 2004)" WRITTEN BY Asaolu. Taiwo Moses meets the requirements and regulation governing the award of the degree of Master of science (Economics) of Ahmadu Bello University, Zaria. And it is hereby approved for its contribution to knowledge and literary presentation.

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DEDICATION

This thesis work is fully dedicated to God Almighty who made this research work a reality. And to my parents Mr. Asaolu. Fatiku (Late). Mrs. Marion Asaolu. Mrs. Rebecca Olukotun (Late Grandmother) and also to my wife Mrs. Asaolu Janet Olumuyiwa and my beloved daughter Miss comfort Oluwaseyi Asaolu for all their support and understanding in the course of this study.

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ABSTRACT

The contribution of petroleum industry to the Nigerian economy since 1970 has been tremendous. The oil industry is very important to the Nigerian economy, it provides, among other things, the greater part of the foreign exchange and total revenue needed for the socio-economic and political development of the country. The bulk of Nigerian crude oil is sold unrefined. When refined, the products range from petrol to heavy liquids for road tarring. The bulk of petroleum products consumption has been the premium motor spirit (PMS) or petrol, automotive gas oil (AGO) or diesel. and dual purpose kerosene (DPK) has been the main thrust of this study. The main focus of the study is to examine the trends of PMS. AGO and DPK and the factors that influence the domestic demand for petroleum products in Nigeria from 1986 2004. The study utilized the ordinary least square technique in investigating the factors that affect the domestic demand for PMS. AGO and DPK in Nigeria. Three sets of equations for each model were specified and estimated i.e. 1970 -1985 (pre-oil regulation). 1986-2004 (during oil regulation) and for the entire period of analysis 1970 - 2004. This was with a view to identify the impact of these factors on domestic demand lor PMS. AGO and DPK. Moreso. empirical investigation was carried out in Zaria from population of 100 consumers of PMS. AGO and DPK to buttress the regression result as to what factors influences their demand for the products. The findings of the regression result reveals that on the overall, price and income have no significant impact on PMS from 1970-2004. Likewise, price have no significant

impact on demand for AGO, while per capita income has significant impact on the consumption of AGO from 1970-2004. Moreso. price have no significant impact on domestic demand for DPK while per capita income reveals significant impact on the consumption of DPK from 1970 2004. The result of primary data reveals that uses of PMS. AGO and DPK have a significant impact on domestic demand for petroleum products in Nigeria couple with other composite factors such as price and uses, income and uses/revenue and uses. Therefore, to enhance effective demand for petroleum products in Nigeria, the stud) suggested among others appropriate pricing of petroleum products based on market forces, the over hauling of the refineries and more participation of indigenous marketers on the supply and effective distribution of petroleum products in Nigeria.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The structure of the Nigerian economy has undergone changes in recent times. The relative importance of some sectors as well as degree of population concentration, accentuated by increasing urbanization caused mainly by geo-political and economic developments have resulted in rising petroleum products demand, especially fuel requirements and use propensities. This is to be expected as secondary and tertiary activities gradually replace primary production and subsistence activities and use of the more efficient and convenient commercial energy expands (CBN, 2000).

Consumption of petroleum products has been on the increase in line with economic growth. This trend has also been supported by the low prices of these products. As would be expected of nations with similar economic and social characteristics like Nigeria, the bulk of consumption has been in premium Motor Spirit (PMS) or gasoline, Automotive Gas Oil (AGO) or diesel and Dual Purpose Kerosene (DPK) and bitumen asphalt. Together, they account for more than 60 percent of the total consumption of petroleum products. The PMS and AGO are the major fuels utilized in the road transportation sector as well as for small to medium sized electricity generation plants for power sources in industries. Specifically, PMS (petrol) is used in vehicles, small electricity generating plants,

drives for compressors, e.t.c. while AGO (diesel) is used largely on heavier engines. Household kerosene is mostly used in homes and industries to produce insecticides and other pest control products (Onwioduokit and Adenuga, 2000).

From the level of 13.9 million tonnes in 1981, consumption of petroleum products rose by 2.0 percent to 14.2 million tonnes in 1982 but fluctuated downwards from 1983 through 1987 to 7.7 million tonnes in 1990. It subsequently increased to 8.1 and 10.7 million tonnes in 1993, and has since maintained a downward trend to 7.9 and 7.7 million tonnes. Generally, the demand for the products is usually met by the domestic refineries. However, owing to the poor conditions of three of the four refineries, there has been shortages which had to be augmented with importation from time to time. For instance, such importation was put at 3.4 million metric tonnes in 1993, 2.9 million metric tonnes in 1994 and 2.2 million metric tonnes in 1995 (CBN, 1996).

There is no doubt that petroleum sector has made a significant impact on the Nigerian economy, especially since the early 1970s. Nigeria's oil wealth through exports of crude apart from entitling her to become a member of the Organization of Petroleum Exporting Countries (OPEC) accounts for over 90 percent of the country's foreign exchange earnings. Despite the Nigeria oil position, it does not appear to have adequate and regular supplies of refined petroleum products for domestic consumption as shortage of petroleum products used to be witnessed, in

some parts of the country, throughout the year. In some places, petrol filling stations often remain empty, except when occasional supplies arrive. Invariably, such supplies never last a whole day as they are easily exhausted by anxious queues of motorists. The situation sometimes degenerates into nation-wide shortages. Consumers of gasoline, under these circumstances, have therefore had to grapple with the problem of inadequate and irregular supplies for their various uses (Obadan, 1979)

Actually, in the towns experiencing petroleum product scarcity, the market for gasoline closely approximates to that of sellers market under undifferentiated oligopoly, but conspicuously devoid of price competition. Each seller offers perfectly substitutable grades of petroleum product and under the uniform price system for petroleum products, each grade sells for the same price per liter across the filling stations in the country (Obadan, 1979).

In the light of the foregoing, this research work focused on the factors affecting the demand for petroleum products in Nigeria. Three petroleum products have been considered for this study. They are: Premium motor spirit (PMS), automotive gas oil (AGO), and dual purpose kerosene (DPK).

1.2 STATEMENT OF THE PROBLEMS:

Petroleum products pricing and economic theory framework helps to explain the relationship between petroleum products pricing, and economic activities (growth).

Amodu (1997) highlighted that domestic petroleum products came under government control in 1973 and cost plus pricing is the bases of the administratively determined ex-refinery product prices, with the cost base largely determined by the uneconomically priced crude. Amodu then argued that government intervention has negated the efficient role of price mechanism in the petroleum product market. The manifestations of disequilibrium in this market include regular products import to supplement inefficient domestic production of refined oil by refineries that suffer from gross under-utilization of capacity.

Iwayemi (2000) emphasize that the use of pricing as an instrument for correcting the disequilibrium in the energy market and enhance the much needed improvement in the economic efficiency of the industry is glaringly absent over the years, NNPC is rarely allowed to raise prices to off-set rising cost as the need arises. This has affected private enterprises which were given fixed margins that did not allow them to engage in price competition. Government control kept oil prices low to reflect low domestic price level. Iwayemi finally attributed the

difficulties faced by the market in replacing their aging capital assets to the low distribution margin offered by the government.

The prices of petroleum products is critical to production cost and the welfare of the people. The debate on petroleum products pricing has centered on whether pump price should reflect full cost or contain elements of subsidy. It is argued that the greater the amount of subsidy the greater the burden borne by the government and the less the resources that would be available to the government for the execution of other development projects such as healthcare services, road networking and agricultural. This view was predicated on the assumption that the pricing of petroleum products should ensure supply adequacy, efficiency in distribution, viability of the firms and government capacity to generate savings (Ajanah, 2003).

On the other hand, there is a strongly held view that given the critical role played by oil in Nigeria's economy, pricing domestically consumed crude at export parity is insensitive to the plight of Nigerians, majority of whom live below the poverty level. Especially given the wide gap in wages and salaries and also the differences in the total revenue of the government of industrial and developing countries (Aremu, 1998).

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The price of petroleum products has thus become an issue of discussion in Nigeria since the commencement of the structural adjustment programme (SAP), in 1986. The problem has however taken a more serious dimension since the President Obasanjo's dispensation of civil rule. Before this period the pump price of petroleum products was not much of an issue because of the prevailing naira exchange rate. In fact naira was over valued vis-à-vis other major trading currencies. After the deregulation of the economy it became obvious that petroleum prices were lower in Nigeria than in the world market, thus leading to substantial cross border smuggling, loss of government revenue, periodic incidences of artificial scarcity and resource mis-allocation.

1.3 OBJECTIVE OF THE STUDY

The general objective of this research work is to examine factors affecting domestic demand for petroleum products in Nigeria.

The specific objectives of the study are:

a. To identify and examine the trends in the demand for petroleum products over-time.

b. To identify factors affecting the domestic demand for various categories of petroleum products.

c. To determine the impact of external factors on the domestic demand for petroleum products.

1.4 JUSTIFICATION OF THE STUDY

An important step in carrying out an econometric study is to formulate and test a model based on economic theory. This thesis attempts to demonstrate how to make use of economic theory by means of mathematical tools to formulate and test an econometric model. This will be done by investigating the factors determining the demand for petroleum products in Nigeria. It goes without saying that knowledge of these factors would be helpful in determining oil policy in Nigeria.

Most of the empirical studies at investigating the factors determining demand for petroleum products are essentially ad hoc attempts to incorporate the oil sector into a larger econometrics model of the entire economy. These shortcomings not withstanding, they all emphasized some important factors affecting demand. Essentially, it was recognized that some major determinants of demand for petroleum products were some measure of economic activities like gross domestic product (GDP) or its component particularly investment and inventories as well as seasonal dummy variable, over which Nigeria has no control.

This study intends to calculate some elasticities for the demand equation. Knowledge of such elasticities would be quite useful when formulating policy changes at least they would indicate the likely impact to expect when there is a change in any of the explanatory variables.

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1.5 HYPOTHESIS

In this study, the following hypotheses will be tested.

1. H_0: Demand for petroleum product is not price elastic.

   H_1: Demand for petroleum product is price elastic

2. H_0: Demand for petroleum product is not income elastic.

   H_1: Demand for petroleum product is income elastic

3. H_0: Demand for petroleum product is not uses elastic

   H_1: Demand for petroleum product is uses elastic.

1.6 SCOPE AND LIMITATION

The scope of this study covers a period of eighteen years i.e. from 1986 – 2004. The choice of the period is informed by the need for a sample large enough to examine the impact of oil sector on the Nigerian economy. Though the discovery, exploration and exploitation of crude oil dates to 1956 the dominance of oil as a main source of revenue in Nigeria was from 1970s up to date.

This research work is limited to factors that influence domestic demand for petroleum products in the Nigerian economy. The products under consideration are limited to PMS, AGO, and DPK. The obvious limitation of this study is the disparity of data between the CBN statistics, economic and financial review and NNPC journals and publications. To lessen the problem, the researcher resorted to the use of CBN statistical Bulletin. Unless where the researcher can not get data

on a specific variable in CBN statistical Bulletin then I shall make a substitute with the NNPC journals and publications.

1.7 ORGANIZATION OF THE WORK

This study has been organized into five chapters. Chapter one contain the background of the study, statement of the research problems, objectives, justification of the study and hypothesis. Chapter two reviews the related literatures, which include theoretical and empirical literature. Chapter three presents the research methodology and model specification. Chapter four contains result presentation, interpretation and analysis. Chapter five contains summary, conclusion and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Petroleum prices in the domestic energy market have been under government control since 1973 when the government took it over from the private oil companies in the industry (Iwayemi, 1993). The prices of petroleum products should theoretically be derived from international crude oil prices. However, this is not always the case for a number of reasons, because for socio-political reasons, government of both oil producing and consuming countries invariably intervene in the market to influence product price determination.

The extent of such intervention depends on the specific needs of the country and the level of endowments of the products in question. It has also been noted that crude oil cost is not the only cost incurred in the supply and distribution of petroleum products as other costs such as refining costs, shortage, transportation and distribution costs are involved (Daukoru, 1993). In Nigeria, it is the responsibility of the Ministry of petroleum resources to propose petroleum fuel price structure to the government which finally approves effective prices. The accepted price structure is influenced by the country's development programmes, the revenues for the producers and marketers, income and price levels in the economy, the fuel prices which the consuming public can sustain as well as other social-political considerations (Iloeje, 1993). Thus, the government determines

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the price for refined petroleum products at the pump, the price of crude oil sold to the refineries as well as the negotiated margin for distributors and marketers. Since 1973, the uniform prices of petroleum (same product price irrespectively of location) fixed by government have been adjusted (subsidy reduction) four times to narrow down the gap between domestic petroleum price and the international price of crude oil (CBN, 1996).

2.2 THEORETICAL FRAMEWORK

Demand theory have been used in the past and presents to analyze household individual, and firm consumption of one commodity or the other. In this work, elasticity theory of demand will be used to analyze the determinants and consumption of petroleum products in Nigeria and the direction that this influences take.

2.2.1 Elasticity Theory of Demand

The term 'elasticity' refers to the degree of responsiveness of a change in one variable (i.e. dependent variable) resulting from a change in another variable (i.e. independent variable). It is possible to talk of many elasticities, but the scope of this research work limits our attention to elasticities of demand.

Elasticity of demand is the degree of responsiveness of demand in response to a change in price, taste and income. The purpose of measuring demand elasticity is to discover the degree to which the quantity demanded responds to change in any

one of the factors that influence it. Therefore, in the light of this study we shall consider price elasticity of demand, income elasticity of demand, and cross elasticity of demand.

2.2.2 Price Elasticity Theory of Demand

The price elasticity of demand measures the percentage change in the quantity demanded for a particular commodity resulting from percentage change in price of the commodity over a specific period of time. The coefficient of the price elasticity of demand is always positive.

The price elasticity formula is expressed as:

$$Ep = - \frac{\%\Delta \text{ in quantity}}{\%\Delta \text{ in Price}} \quad - \quad - \quad - \quad - \quad - \quad 1$$

There are two main approaches employed in measuring the price elasticity of demand. These are arc elasticity approach and the point elasticity approach. The arc elasticity approach is used when the changes in price are large while the point elasticity approach is used when the changes in price are small (i.e. infinitesimal). Arc elasticity measures the coefficient of price elasticity between two points. It is an estimate of the average measure of elasticity. The formula is given as:

$$E_P = \frac{\frac{Q_2 - Q_1}{\frac{Q_2 + Q_1}{2}}}{\frac{P_2 - P_1}{\frac{P_2 + P_1}{2}}} = -\frac{\frac{Q_2 - Q_1}{Q_2 + Q_1}}{\frac{P_2 - P_1}{P_2 + P_1}} = -\frac{\frac{\Delta Q}{Q_2 + Q_1}}{\frac{\Delta P}{P_2 + P_1}}$$

$$= \frac{\Delta Q}{\Delta P} \times \frac{P_2 + P_1}{Q_2 + Q_1} \quad - \quad - \quad - \quad - \quad - \quad - \quad 2$$

The arc elasticity formula is applicable when the initial and new price levels are known. Therefore, the arc elasticity approach measures the elasticity of the mid-way between two points.

The conventional notation for the price elasticity formula can be expressed in a linear demand function in the form:

$$Q = a - bp \quad - \quad - \quad - \quad - \quad - \quad - \quad 3$$

Where

Q = the quantity demanded

a = constant intercept

b = the slope

The point elasticity which measure the elasticity at a particular point along the demand curve is given by the formula.

$$EP = \frac{\partial Q}{\partial P} \times \frac{P}{Q} \text{ - - - - - - - 4}$$

Table 2.1 Price elasticity: Measures, Meaning and nomenclature

Numerical measure of elasticity	Verbal description	Terminology
EP = 0	Quantity demanded does not change as price changes	Perfectly (or completely in elastic)
EP = 1	Quantity demanded changes by exactly the same percentage as does price	Unit elasticity.
O<EP<1	Quantity demanded change by a smaller percentage than does price	Inelastic
1<EP<∞	Percentage change in quantity demanded is greater than percentage change in price	Elastic
Ep = ∞	Purchasers are prepared to buy all they can obtain at the price quoted and none at all at an even slightly higher price	Perfectly (or infinitely elastic)

Source: Richard G. Lipsey: An Introduction to Positive Economics. 1971

2.2.3 Cross Elasticity Theory of Demand

Cross elasticity of demand is the degree of responsiveness in the quantity demanded for a particular commodity A in response to a change in the price of another commodity B. It measures the percentage change in the quantity purchased of one commodity as a result of a percentage change in the price of another commodity. As a point elasticity, it is expressed as:

$$E_{AB} = \frac{\partial Q_A}{\partial P_B} \times \frac{P_B}{Q_A} \quad - \quad - \quad - \quad - \quad - \quad - \quad - 5$$

The arc elasticity formula is expressed as:

$$E_{AB} = \frac{Q_2^A - Q_1^A}{Q_2^A + Q_1^A} \times \frac{P_2^B + P_1^B}{P_2^B - P_1^B}$$

$$= \frac{\Delta Q^A}{\Delta P^B} \times \frac{P^B + P^B}{Q_2^A + Q_1^A} \quad - \quad - \quad - \quad - \quad - \quad 6$$

Thus, if A is a substitute for B, coefficient of the cross elasticity is positive. For example coffee and tea are substitutes for each other, an increase in the price of coffee will increase the quantity demanded for tea. On the other hand, if A is a compliment for B, the coefficient of the cross elasticity of demand is negative. Sugar and tea are complimentary good. An increase in the price of sugar reduces the quantity demanded for tea. Hence the changes in price of sugar and quantity demanded for tea will have an indirect relationship.

The degree of substitutability or complementary of products rests on the magnitude of the coefficient of the cross elasticity. The higher the coefficient, the stronger the degree by which goods are substitute or complement each other. The range of values of the price cross elasticity of demand are expressed as:

$$0 \leq E_{AB} \leq \infty$$

If two products are not substitutes for one another, the value of cross elasticity approaches zero.

$$E_{AB} = \frac{\partial Q^A}{\partial P^B} \times \frac{P^B}{Q^A} = 0 \quad - \quad - \quad - \quad 7$$

If two products are perfect substitutes for one another, the value of cross elasticity approaches infinity.

That is:

$$E_{AB} = \frac{\partial Q^A}{\partial P^B} \times \frac{P^B}{Q^A} \rightarrow \infty \quad - \quad - \quad - \quad - \quad - \quad 8$$

If two products are close substitutes, the range of values of the cross elasticity are given as:

$$0 < E_{AB} < \infty$$

The cross elasticity has a finite and positive value

2.2.4 Income Elasticity Theory of Demand

This is the degree of responsiveness of demand in response to a change in income. As a point elasticity, it can be expressed as follow:

$$Ey = \frac{\partial Q}{\partial P} \times \frac{Y}{Q} \quad - \quad - \quad - \quad - \quad - \quad - \quad 9$$

The arc elasticity formula for income elasticity of demand is expressed as:

$$Ey = \frac{\frac{Q_2 - Q_1}{Q_2 + Q_1}}{\frac{Y_2 - Y_1}{Y_2 + Y_1}} = \frac{Q_2 - Q_1}{Q_2 + Q_1} \div \frac{Y_2 - Y_1}{Y_2 + Y_1}$$

$$= \frac{\Delta Q}{\Delta Y} \times \frac{Y_2 + Y_1}{Q_2 + Q_1} \quad - \quad - \quad - \quad - \quad 10$$

where

y = income

Thus, the coefficient of income elasticity of demand measures the percentage change in the quantity demanded as a result of a given percentage change in income. Income elasticity of demand is positive for normal goods, while it is negative for inferior goods. Normal goods are goods whose quantities demanded increase as income increases. Inferior goods are goods whose demand decreases as income increases. If the coefficient of the income elasticity for a good is

greater than unity (i.e. Ey > 1), the good is considered as a luxury. On the other hand, if the coefficient is less than unity (i.e. Ey <1), the good is considered as a necessity. Generally, the range of values of the income elasticity are:

$$0 \leq Ey \leq \infty$$

Table 2.2: Income elasticity, measures and meaning.

Numerical measure of income elasticity	Verbal description
Ey = 0	Demand for the commodity does not change as income changes
Ey = 1	Demand for the commodity rises in the same proportion as the rise in income.
Ey = ∞	A change in income leads to an infinite amount in the quantity demanded
0<Ey<1	Demand for the commodity rises less than in proportion to the rise in income
1<Ey <∞	Demand for the commodity rises more than in proportion to the rise in income

Source: Richard G. Lipsey: An Introduction to Positive Economics, 1971.
Oyeniyi T.A. Microeconomics, 1998.

2.2.5 Constant Elasticity Theory of Demand

The constant elasticity of demand function has remained the most widely used demand function in theoretical and empirical research. Its coefficients gives direct estimates of different elasticities.

The constant elasticity demand function is linear in logarithms and may be represented symbolically as:

$$\text{Log } Qdx = \log a + b \log Px + c \text{ Log } Po + d \text{Log } y \quad - \quad - \quad 11$$

Where

Qdx = quantity demanded of commodity x over a specific time period

Px = price of commodity x

Po = price of other commodity

Y = consumer's income

a = Constant intercept

b = price elasticity of demand

c = cross elasticity of demand

d = income elasticity of demand

Since we have an equation which is linear in logarithms, a change in the logarithm of a variable is equal to the proportional change of the variable.

Therefore,

$$\frac{\partial \log Qd}{\partial \log Px} = \frac{\partial Q / Q}{\frac{\partial p}{p}} = \frac{\partial Q}{\partial P} \times \frac{P}{Q} = b \quad - \quad - \quad - \quad - \quad - \quad 12$$

$$\frac{\partial \log Qd}{\partial \log Po} = \frac{\partial Q / Q}{\frac{\partial p}{po}} = \frac{\partial Qd}{\partial Po} \times \frac{Po}{Q} = c \quad - \quad - \quad - \quad - \quad - \quad - \quad 13$$

$$\frac{\partial \log Qd}{\partial \log y} = \frac{\partial Q / Q}{\frac{\partial y}{y}} = \frac{\partial Q}{\partial y} \times \frac{y}{Q} = d \quad - \quad - \quad - \quad - \quad - \quad 14$$

2.3 THEORETICAL APPROACHES TO PETROLEUM PRICING

The pricing of petroleum products has always evoked passion and controversy in the nations policy. The focus on the petroleum pricing policy includes maximizing the benefits of the oil industry through subsidized prices. For instance, since 1973, government has operated a policy of uniform pricing i.e. the same price is paid for petroleum products irrespective of location (oil and gas monthly, 1999). However, the pan-territorial pricing regime despite its equity considerations has it set backs. Therefore, this section seeks to provide a general review of the theoretical approaches to petroleum and as a whole energy pricing as studied by Odoko, Masha, Okafor and Olorunshola (2002).

2.3.1 Market Based Approach

According to Odoko, et al (2002), the market based approach to petroleum pricing is predicated on the basic economic principle of demand and supply. In this context, the price of oil like that of any normal good should be the outcome of interactions between the demand and supply of the commodity within the constraints of existing market imperfections. In the case of the principle of opportunity cost, the market world price is not determined by the cost of production. The domestic price is the border prices less freight and other charges.

The market based approach seeks to eliminate arbitrage opportunities engendered by lower domestic prices. The resultant smuggling, apart from creating losses in fiscal revenue, could constrain domestic supply. Lower domestic prices, has implication for the consumption and investment decisions of agents as it sends the wrong signals. This is because with lower domestic prices, resources are misallocated or inefficiently used (Odoko, et al 2002).

2.3.2 The Exhaustible Resource Theory

This theory is based in part on the work of Hotelling (1931), who advocated the need to price and other fossil resources in a way that recognizes the temporariness of their availability. According to Hotelling, the price becomes a cost or depletion charge which compensates for the fact that future generations are denied access to the commodity. This price may or may not be consistent with the equilibrium out come of demand and supply.

2.3.3 The Capital Replacement Approach

The capital replacement approach recognizes the need to price petroleum products in such a way as to recover the capital expended in its production and refining. At a minimum, the price is expected to be consistent with the cost of replacing capital in the production process. The foregoing analysis of petroleum pricing approaches are not mutually exclusive. It is possible for the equilibrium price in the market

based model to be consistent with that of the capital replacement model especially if prices reflect true cost and there are no divergences between international and domestic prices (Odoko, et al 2002).

2.4 Empirical Framework

The pioneer study in demand analysis was done by Schultz (1938). He estimated statistically the demand functions for wheat, sugar, corn, cotton and other agricultural commodities. In the Schultz study the problems of identification, multicollinearity, and autocorrelation were not explored.

Stone (1945) also estimated statistically the demand functions for automobiles in the United States and the United Kingdom. His fundamental equation takes the form $q=aQ^{b}p^{c}\Pi^{d}e^{rt}$ - - - - - 6

where:

q = the quantity of the automobile demanded per year

Q = real disposable income per year

P= the annual average price of all the commodity

Π = the annual average price of all other commodities

t = time in years

e = the base of natural logarithms.

Stone used annual time-series data from 1929 to 1941 to estimate equation (6). He tried a number of alternatives specifications of the model, but he concluded that the following is the most desirable estimation.

$$q=1.2103Q^{4.164}p^{-2.704}e^{0.067t}$$

The model above can be expressed in a linear double log form; furthermore, each coefficient in the model is the elasticity of the demand for automobiles with respect to each independent variable. These elasticities are constant elasticities. His result indicates that the income elasticity of the demand for automobiles is 4.16 and that the price elasticity of the demand for automobiles is -2.70. therefore, stone suggested that the demand for automobiles is highly sensitive to income and automobile prices.

Another study of demand analysis by Suits (1958). He studied the demand for new automobiles in the United States from 1929 to 1956. The final formulation of the demand function, annual retail sales of new passenger automobile (R) are explained by:

a. real disposable income (Y)

b. stock of passenger cars at the beginning of the year(s)

c. The average real retail price of new passenger cars divided by the average number of month's duration of automobile credit contracts P/M. Thus, this price variable is an index of monthly payment associated with the purchase of passenger cars; and

d. A dummy variable to take account of the special conditions of the automobile market in years of severe production shortages (X).

According to Suits, the war years from 1942 to 1945 and the following years from 1946 to 1948 were omitted from the sample because of the existence of a possible disequilibrium. Like most time-series data, there may be an autocorrelation existing in the error terms. To avoid this problem all variables were measured in terms of first differences. This application reduced the relative effect of such slowly changing factors as consumer tastes or population, thus giving a better estimation of the effect of the factors included in the equation. The dummy variable was defined as 1 in 1941 and 1952; - 1 in 1953, and 0 in all other years. The equation is estimated by least squares.

$$\Delta R = 0.115 + 0.106\Delta Y - 0.507\ \Delta S - 0.234\ \Delta(P/M) - 0.827\ \Delta X \ldots\ldots 16$$
$$\qquad\qquad (0.011) \qquad (0.086) \qquad (0.088) \qquad (0.261)$$

$$\overline{R}^{\,2} = 0.85$$

Figures in parentheses are standard errors of the regression coefficients. $\overline{R}^{\,2}$ is the adjusted coefficient of determination. R and S are measured in million of cars; Y is in billions of dollars from 1947 to 1949, P/M is an index. All regression coefficients were statistically significant from 0 at the 1% level.

...MLIBRARY

Based on the regression coefficients in equation (16), Suits calculated the elasticities of demand for new cars based on the sample means. Suits estimates of the elasticity of the demand for a new car with respect to real disposable income was 0.11 the elasticity of demand for new cars with respect to the stock of cars is -0.51, and the elasticity of the demand for new cars with respect to the index of real monthly payment is -0.23.

2.4.1 Relationship Between The Demand For Gasoline And Selected Explanatory Variables.

The U.S.A. has been the scene of many attempts to estimate quantitatively the relationship between the demand for gasoline and selected explanatory variables.

Houthakker and Taylor (1966), Philips (1972) and Houthakker and Verleger (1973) for example investigated private consumer demand for gasoline. Their single-equation models, involving short run dynamic linear adjustment, identified the price of gasoline as a critical exogenous variable. Total per capita personal consumption expenditure for the year under consideration (1954) was considered important by Houthakker and Taylor. Philips, introducing the income effects and its elasticity over the long and short runs respectively, concluded that "habit formation appears to dominate the purchase of gasoline".

Ramsey et al (1975) formulated a demand model of gasoline using simultaneous equations to determine the demand by households and commercial enterprise. They identified the retail price of gasoline deflated by a consumer price index, the price index of train travel deflated by a consumer price index, the proportion of the population in the 16-24 age group and real disposable income as variables explaining about 98 percent of the private household demand for gasoline. The commercial demand for gasoline was explained by the retail price of gasoline deflated by a price index of truck freight rates, the price index of diesel fuel deflated by a price index of truck freight rates, and an index of total ton-miles demand of all freight carriers.

Variation in per capita retail sales of gasoline as an indicator of economies of price automobile transportation was examined across 134 metropolitan area of 200,000 population and above in the U.S.A. by Stewart and Bennett (1975). The per capita sale of gasoline was negatively related to city size and rate of growth, while its relationship to the proportion of the non-white population was positive. The degree of diversity of manufacturing activities and the proportion of workers using public transit were other factors identified.

Claycamp (1966) employing a regression model for estimating the dynamic pattern of sales responses to short duration price differentials, found that price differences between each site and its primary competitor produced a more than

proportionate gain in sales for the price-cut initiator. It was also discovered that demand adjusted rapidly to changed circumstances as a price difference had no carry over effect once it ceased to exist. In a work similar to Claycamp's, Robinson and Hebden (1973) developed a model to examine the relative effects of price reduction and trading stamp offers on petroleum sales in the United Kingdom. They found that trading stamps were more effective means of increasing through-put than low price. Other factors they identified as significantly affecting site-sales were site layout and the number of hours the petrol station was opened. In a work based on two household budget surveys, Cramer (1959) identified number of vehicles rather than the extent of vehicle use as a much more important variable in explaining the consumption of gasoline in the United Kingdom.

Some salient points emerge from the above review that:

a. Own price is the most important variable commonly identified as factor affecting the demand for gasoline.

b. There exists certain localized factor that may explain in part the volume of gasoline demanded in a given areas.

Thus, there is the need to take cognizance of those variables that explain the quality of gasoline demanded. Therefore, the choice of variables (Price of the

commodity, income of the consumer and exchange rate) employed in this study could explain the quantity demanded of petroleum products in Nigeria.

2.4.2 The Impact Of Urbanization On Petroleum Products Demand

Effort has been made to measure the impact of urbanization on petroleum products demand. Hoffman (1978), Kimuyu (1988) and Jones (1989) conducted studies using pooled time series cross – sectional data for selected country group. Hoffman (1978) showed that the impact of structural changes on the demand for energy was significant. The explanatory variables in his analysis included population, income and shares of major sectors in GDP. The elasticities of shares of the manufacturing, transport and electricity sectors were positive while that of agriculture was negative. The elasticity of the share of transport was insignificant. The estimated elasticities were long-term as a result of the cross-sectional dimension of data used and it is possible that the estimates were up by aggregating data from different countries and fuels.

In order to investigate the structure of commercial energy demand in Kenya, Kimuyu (1988), following Hoffman, demonstrated that changes in the relative importance of major sectors and urbanization had significant but differential effects on the consumption of different commercial fuels. The considered sectors included agriculture, manufacturing, transport and services and the fuels analyzed were petroleum products, coal and electric power sold to different categories of

consumers. Gross domestic product was not included as an explanatory variable exposing the model to possible misspecification. This form of misspecification potentially could lead to biased and inconsistent parameter estimates with spurious regression. His study under scored the significance of energy consideration in development planning, since each planning can alter the relative importance of sectors, and therefore affect energy requirements.

Using 1980 cross-sectional data for 60 countries, Jones (1989) investigated demand for energy consumption in terms of GDP, urbanization, industrial composition, population density and fuel prices. Their findings show that urbanization elasticities of energy demand vary between 0.30 and 0.45, with urbanization having a stronger impact on commercial than total energy, including traditional energy.

Al-Sahawi and Royboyd (1987) showed that the demand functions for oil, gas and coal in third world countries was based on standard utility analysis. It was assumed that the utility of consumers is a function of oil, natural gas, coal and a composite good.

2.4.3 The Impact of External Factor (Exchange Rate) on the Domestic Demand for Petroleum Products in Nigeria

The exchange rate is a relative price that measures the worth of a domestic currency in terms of another currency. It relates the purchasing power of a domestic currency in terms of the goods and services it can purchase, vis-à-vis a foreign or trading partner's currency, over a given period of time. Thus, the exchange rate reduces the relative strength of relating economies to measurable aggregates through a number of conceptual frameworks. The exchange rate is useful for macroeconomic management since it reflects the performance of both the domestic and external sectors of the economy.

Exchange rate policy is the sum total of the institutional framework and measures put in place to gravitate relative prices towards desires levels in order to stimulate the productive sectors, curtail inflation, ensure internal balance, improve the level of exports, attract direct foreign investment and other capital flows. Exchange rate policy can be defined as the framework, rules and other measure for determining and influencing the level of the exchange rate at a given point in time. The objectives of exchange rate policy include: the attainment of a stable and realistic exchange rate that would lead to allocative efficiency in the foreign exchange market, increase domestic productivity, reduce the inflationary spiral and guarantee the attainment of internal balance; and the encouragement of export activities leading to improved foreign exchange earnings, attraction of foreign

direct investment, the return of flight capital and other capital inflow that would invariably result in external balance.

2.4.3.1 Oil and the Exchange Rate

There is virtually no exchange rate system that Nigeria has not tried in order to find the "realistic" exchange value for the naira. The difficulty is simply that of Nigeria being a net importer, whose external earnings derive largely from one product-crude petroleum oil. The different exchange rate regimes in Nigeria can be classified into different epochs relating to the vagaries of international market (Adedipe, 2004).

2.4.3.2 The Post Independence Era (1960-1971)

The Nigerian pound was pegged at par to the British pound sterling (GBP), using administrative measures to sustain the parity. The devaluation of the GBP in 1967 made Nigeria to adopt the US Dollar, which was deemed better able to support Nigeria's import substitution industries that depended heavily on imported inputs. Throughout this period, the Nigerian pound was over valued, inhibiting optimal growth in agriculture and production for export. This was however, in consonance with other fundamentals such that fiscal operations were in surplus for most of these years, inflation rate average about 5 percent and there was no fear over the economy (Adedipe, 2004).

2.4.3.3 The Oil Boom Era (1972-1986)

During this period, the exchange rate mirrored movements in oil prices and the Naira remained over valued as a result of the huge increase in foreign exchange earnings. The currency was anchored to the GBP until 1972 when the GBP was floated, and then pegged to the US Dollar. In 1978 the naira anchored on a basket of 12 currencies of Nigeria's major trading partners. This was again jettisoned in 1985 and the Naira reverted to quotation against the US Dollar (Adedipe, 2004).

2.4.3.4 The Post-Sap Era (From 1986)

This marked the period of economic liberalization and market competitiveness. The naira was subjected to the managed float system, in the continuing effort to restructure the economy away from oil dependency. The policy of deregulation of the foreign exchange market in September 1986 was aimed at establishing the true exchange value of the naira, with a view of boosting non-oil exports. This was hoped to reduce the dependence on crude petroleum oil. Thus, from ₦0.8938/US$ at the end of 1985, the exchange rate weakened to ₦2.0206/US$ at the end of 1986. This deliberate policy of weakening the naira in expectation of strengthening non-oil exports was pushed further in March 1992, with a devaluation of 44.4 percent that made the rate to close that year at ₦17.2984/US$. At every turn that the naira was devalued, the non-oil export argument has been the reference but other supporting (export promotion) policies were not implemented properly (Adedipe, 2004).

2.4.3.5 Export and Import Parity of Petroleum Products

The export and import parity of petroleum products relies on the interplay of the forces of demand and supply to determine the cost of supply of the products to the market. This implies that the Nigerian consumer will be exposed to competing fuel supplies in the international market. This is based on the fact that once local demands cannot be met by local supplies, the shortfall will have to be paid for at international prices.

The supply of the petroleum products is by the domestic refineries that suffers from gross under-utilization of capacity, insufficient supply of the products and less of adequate storage facility that led to importation of petroleum products. For example importation of refined petroleum products in 1993 was 3.4 metric tones, 2.9 metric tones and 2.2 metric tones in 1994 and 1995 respectively. Since the exchange rate determine the rate of sales and purchases in international market, increase in exchange rate on the importation of petroleum products will leads to an increase in price leading to fall in the demands for the products. In 1993, 1994 and 1995 exchange rate was ₦22.0511/US$, ₦21.886//US$ and ₦21.886/US$ respectively. The domestic demand fall from 3,336,215 metric tones to 3,015,634 metric tones for PMS in 1993 to 1994, in 1995 it increases to 3,735,700 metric tones, 2,054,424 metric tones to 1,596, 269 metric tones for AGO in 1993 to 1994, 1,427,784 metric tones 1,131,057, metric tones for DPK in 1993 to 1994, 36, 262

metric tones to 20,610 metric tones for LPG in 1993 to 1994 and 144,844 metric tones to 112,172 metric tones for LBO in 1993 to 1994.

Before 1993 to 1995 most especially, 1970-1985 there was a significant increased in the consumption of petroleum products in Nigeria the reason was that domestic currency (naira) was over valued vis-à-vis foreign or trading partner's currency (Dollar). For instance, the value of naira to a dollar ranges from ₦0.7143/US$ in 1970 through ₦0.8938/US$ in 1985. The naira was over valued during this period as a result of the huge increase in foreign exchange earnings from the sales (Export) of crude oil and it products that led to increase in domestic consumption during this period.

As from 1986 to 2003 exchange rate weakened to ₦2.0206/US$ and ₦129.2230/US$. Within this period, domestic demand for petroleum products falls and begin to rise for all the products under consideration. For instance, in 1986 3,597,356 metric tones, 1,854,275 metric tones, 1,928,190 metric tones, 88,717 metric tones, and 146,936 metric tones of PMS, AGO, DPK, LPG and LBO were demanded and later increases to 6,586,614 metric tones, 2,042,744 metric tones for PMS and AGO (see appendix 4). The figure in the domestic demand for PMS and AGO in 2003 did not actually indicates increase in demand for the products for that year because in 1981 demands for PMS and AGO was 6,573,007 metric tones and 3,131, 634 metric tones respectively.

Therefore, as the value of the domestic currency (naira) begins to depreciate in value vis-à-vis foreign currency (Dollar) then relative strength of the domestic economy reduces. An increase in exchange rate for the sales (exports) and purchases (imports) of petroleum products will leads to an increase in price of the product hence a fall in demand.

Current literature on demand for petroleum products in Nigeria and elsewhere were summarized below:

TABLE 2.3: SUMMARY OF EMPIRICAL STUDIES

STUDY	COUNTRY/PERIOD	PROBLEMS	METHODOLOGY (ECONOMETRIC MODEL ESTIMATION TECHNIQUES)	RESULTS
Al-Sahawi & Royboyd (1987)	Third world countries	That utility of a consumer is a function of oil. natural gas. coal and composite good.	Standard utility analysis.	The result shows that the demand functions for oil. gas and coal in the third world countries was based on standard utility analysis.
Claycamp (1966)	United States of America (USA)	The dynamic pattern of sales responses to short duration price differentials.	Regression model	His result shows that price differences between each site and its primary competitor produce a more that proportionate gain in sales for the price-cut initiator. He also discovered that demand adjusted rapidly to changes in circumstances as a price difference had no carry over effect once it ceased to exist.

Table 2.3 continued

Claycamp. Robinson and Hebden (1973)	United Kingdom	The relative effects of price reduction and trading stamp offers on petrol sales	Regression model.	They found that trading stamps are more effective means of increasing through-put than low price. Other factors they identified as significantly affecting site-sales were site layout and the number of hours the petrol station is open.
Hoffman (1978)	Selected country groups	Economic and technical time series variables in estimating the price elasticity of finding new oil reserves	Using pooled time series cross-sectional data.	It shows that. the impact of structural changes on the demand for energy was significant. The elasticities of the shares of the manufacturing. transport and electricity sectors were positive while that of agriculture was negative. The elasticity of the share of transport was insignificant.

Table 2.3 continued

Houthakker and Taylor (1966). Philips (1972), Houthakker and Verleger (1973)	United States of America	Private consumer demand for gasoline	Singe-equation models: involving short run dynamic linear adjustment.	The price of gasoline was identified as a critical exogenous variable. Houthakker and Taylor considered total per capita personal consumption expenditure important variable in private consumer demand for gasoline. To philips, habit formation appears to dominate the purchase of gasoline.
Jones (1989)	60 Countries	Energy consumption in terms of GDP, urbanization, industrial composition, population density and fuel prices.	Using 1980 cross-sectional data	His findings shows that urbanization had a stronger impact on commercial than total energy, including traditional energy.

Table 2.3 continued

Kimuyu (1988)	Kenya	To investigate the structure of commercial energy demand in Kenya.	Simple Regression Analysis: OLS	That change in the relative importance of major sectors and urbanization had significant but different effects on the consumption of different commercial fuels. The considered sectors include manufacturing, transport and services, and the fuel analyzed were petroleum products, coal and electricity sold to different categories of consumers.
Onwioduokit & Adenuga (2000)	Nigeria (1970 – 1996)	The relative importance of some sectors as well as levels/degrees of population concentration, accentuated by increasing urbanization caused mainly by geo-political cum - economic developments, have resulted in rising petroleum products demand in Nigeria.	Ordinary least Square (OLS) method.	The empirical findings of the study reveals that urbanization has a positive impact on the consumption of liquefied petroleum gas (cooking gas). The transfer of an increasingly large proportion of the population, as well as changes in the relative importance of the major sectors of the economy, have definite impacts on the consumption of petroleum products in Nigeria.

Table 2.3 continued

Ramsey et al (1975)	United States	The demand for gasoline by households and commercial enterprises.	Demand model: Using simultaneous equations.	They identified the retail prices of gasoline deflated by a consumer price index, the price index of train travel deflated by a consumer price index, the proportion of the population in the 16 – 24 age group and real disposable income as variables explaining about 98 per cent of the private household demand for gasoline. The commercial demand for gasoline was explained by the retail price of gasoline deflated by a price index of truck freight rates, the price index of diesel fuel deflated by a price index of truck freight rates, and an index of total ton-miles demanded of all freight carriers.
Stewart and Bennett (1974).	United States of America.	Variation in per capita retail sales of gasoline as an indicator of economies of private automobile transportation	Regression analysis.	The per capita sale of gasoline was negatively related to city size and rate of growth, while its relationship to the proportion of the non-white population was positive. The degree of diversity of manufacturing activities and the proportion of workers using public transit were other factors identified.

A good number of other authors have equally addressed petroleum industry of the Nigerian economy. Ikporukpo (1978) presents an article on "the structure of demand for gasoline in Nigeria". From the review, it is observed that not much emphasis is placed on examining the trends and factors affecting domestic demand for petroleum products in Nigeria and how the domestically pricing of these products will enhance economic efficiency of the industry

It is against this background that the researcher intends to fill the vacuum created in the literature by embarking on the study of the domestic demand for petroleum products in Nigeria at the aggregate level that would make use of econometric methods of analysis.

2.5 AN OVERVIEW OF PETROLEUM INDUSTRY IN NIGERIA

2.5.1 The Emergence and Development of The Petroleum Industry in Nigeria

According to Olaloku (1987), the search for petroleum in Nigeria started as early as 1937, but discovery did not come until 1956 and commercial production only began in December 1957, managed by a consortium of Royal Dutch Shell and British petroleum – commonly known as Shell BP. Until 1955 it was the only company that had a licence to search for oil in any part of the country. Thereafter, other foreign firms, mainly US, had penetrated the industry, with Gulf oil, Mobil oil, Texaco (all US), ELF (French) and AGIP (Italian) forming the only viable competitors to Shell-BP's monopoly of the oil industry. Despite the presence of these firms (and others not named – mainly Japanese and Germany) as well as participated of the Nigerian state in the oil industry through the Nigerian National Petroleum Corporation (NNPC), Shell BP was nationalized in 1978 and renamed African Petroleum still controls more than 50 percent of the Nigerian crude output.

In 1956 the first successful exploration of oil was drilled at Oloibiri by Shell – BP, an event that was followed by rapid progress in exploration. "In 1958, production was only 5.134 barrel per day (bpd) from the well at Oloibiri in River state. However, it was intensified" (NNPC, 1995).

Between 1958 and 1977, Nigerian crude output increased more than 75-fold, from 10.14 mb/year (average 1973 – 1977 thereafter declining to about 56 percent of that output in 1985). Output seems to have expanded in absolute size consistently until 1977 with minor fluctuations, the dynamics of this expansion shows long-run declining trend. In contrast, crude oil export maintained a relatively low rate of growth, bordering on stagnation from the 1960's up to 1972. This gives evidence of exploitative nature of oil extraction in the pre-1973 days when foreign firms exercised unchallenged rights to extract crude and set export prices. After 1973, the dynamics of export prices had picked up. As from 1980, both output and export prices growth had exhibited negative trends, on the average. Nigerian crude export prices attained their Peak in 1980 ($44.4 per barrel) thereafter, it came down to $31.5 per barrel by the end of 1983, and yet further down to $18 per barrel in 1985. The 1998 budget was based on a figure of $17 per barrel. That price had shipped to $12 by October and was down to $11 in the first quarter of 1999. Afterwards the price picked up again between $30 and $35 per barrel (CBN, 2000).

It was between the periods of 1970 – 1972 that indigenous participation by government came to the scene when the Nigerian National Oil Corporation (NNOC) was formed by Decree No. 18 of 1971 to explore and prospect for petroleum, purchase petroleum and its products and by-products and to treat, process, mine and market petroleum and its products and by-products. Thus

before NNOC, the exploration and production of oil in Nigeria was under the control of foreign oil company. The NNOC was replaced in 1977 with the NNPC to combine the commercial function of NNOC and former ministry of petroleum resources (CBN, 2001).

Through the NNPC, the government now has the majority equity interest in the operation of oil producing companies and controlling equity shares in some oil marketing companies. The level of government interest in oil service companies has also grown since NNPC came into being. The importance of these joint venture activities apart from the control it conferred on government through NNPC is the additional revenue that the nation can realise by participating directly in the exploration of the resources. Thus, government maintained joint venture with these oil companies as shown in the table below:

TABLE 2.4: NNPC JOINT VENTURE

PARTNERS IN THE JOINT VENTURE	PERCENTAGE OF PARTICIPATION	
	NNPC/GOVT	COMPANIES
NNPC/SPDC/ELF/AGIP	55	Shell 30, Elf 10, Agip 5
NNPC/TEXACO/CHEVRON	60	Chevron 20, Texaco 20,
NNPC/AGIP/PHILLIPS	60	Agip 20, Phillips 20
NNPC/MOBIL	60	Mobil 40
NNPC/CHEVRON	60	Chevron 40
NNPC/ELF	60	Elf 40
NNPC/PANOCEAN	60	Panocean 40

Source: CBN Proceedings of the Tenth Annual Conference of the Zonal research unit 2001

This historical overview will not be complete without a brief discussion on the refineries activities and its subsidiaries outlet. The nation has four refineries with a refining capacity of 445,000 bpd of crude oil. The first two refineries has capacity of 60,000 bpd facilities build in Port Harcourt by Shell – BP in 1963 and 125,000 bpd plant in warri commissioned in 1978. The third refinery 100,000 bpd plant located in Kaduna to serve the huge and expanding demand of the Northern State. It has a lubricating plant lobe section which process heavy and parafine crude oil imported from Venezuela in Saudi Arabia. The fourth refineries and the most technologically advanced is a 150,000 bpd plant located in Port-Harcourt and

produces lead fuel gasoline for the export market as well as other petroleum products for internal use (Oremade, 1986).

Thus, to broaden the base and extend its function beyond the primary aim of monitoring oil production, NNPC has established a number of subsidiaries as follows:

i. Petrochemical, Nigeria Gas Company (NGC)

ii. Pipelines and Products Marketing Company (PPMC)

iii. Nigerian Petroleum Development Company Ltd (NPDC)

iv. Hydson Nigeria Ltd.

v. Integrated Data Services Ltd. (IDSL)

vi. National Engineering and Technical Company Ltd (NETCO)

vii. Nigerian Liquefied Natural Gas (NLNG)

viii. National Petroleum Investment Management Services (NAPIMS)

All these are divided into upstream and downstream activities. These had led to development of new products which help growth in other sectors of the economy (NNPC, 1987).

2.5.2 Petroleum Industry and the Nigerian Economic Development

Exploration and exploitation of crude oil had led to a significant transformation of the Nigerian economy. There is a tremendous metamorphosis in the structure of the economy, the social life and the political administration.

Oremade (1986) observed that from the initial trickle of 1958, crude oil has by 1972 already contributed 80 percent of Nigerian's export by value. He went further to assert that by 1958, petroleum made its appearance on the list of exports to the tune of only about 1 million pound. By 1962, it has overtaken all other mineral put together by more than 100 percent. The early 1970's witnessed an almost unprecedented growth in crude oil production. For instance, there was 389 million barrel in 1970, 589 million barrel in 1971, 556 million barrel in 1972, 751 million barrel in 1973 and 823 million barrel in 1974.

Oil has been the predominant source of revenue and foreign exchange earner for the past three decades, accounting for over 90 percent of the total revenue of the nation. Petroleum has both direct and indirect effects on the overall level of economic activities but its impact is felt more in urban sector where oil revenue has been used to stimulate a construction boom, massive social infrastructural development and a thriving private participation in commerce (Oremade, 1986).

The impact of petroleum on the Nigerian economy is felt specifically through direct contribution to the national income and output (GDP), the generation of employment and manpower development, the creation of benefit to the economy from government expenditure on social programmes such as health and education. Furthermore, Nigerian's membership of OPEC carries some influence on her relative power position in the continent of Africa (CBN, 1994).

The Nigeria's oil induced wealth was vividly reflected in its national development plans and its budgetary plans. The direct impact of petroleum is on the volume of the national income as revealed by the phenomenal rise in the federal government budget from 1961 through 1980 to date. For instance, in the 1961- 1962 financial year, the federal government budget was just ₦10 million which rose to barely ₦20 million in 1964 – 1965. The oil export became substantial, moving from 5,000 bpd in 1958 to 418,000 bpd in 1966 and later to 1 million bpd in 1973. Consequently, the federal government budget in 1979 – 1980 had moved up to ₦13.81 billion while in 1983 austerity budget stood at 10.6 billion (Asiodu, 1995).

The effect of petroleum is also substantial on the size and contents of the country's development plans. Quite apart from the colonial development plan of 1946 – 1956 and the first national development plan 1962 – 1968 which were financed majorly by revenue from agriculture, the other development plans were based solidly on petro-naira. For instance, the 1970 – 1974 reconstruction plan was ₦32

million with production soaring steadily and with seemingly limitless price increase. The third national development plan 1975 – 1980, which was originally costed at ₦33 billion, was revised upwards to ₦45 billion. The fourth development plan 1981 – 1985, was put at ₦82 billion. It was calculated at a daily crude oil production of 2.1 billion barrels for sale at ₦40.00 per barrel. Asiodu (1995), opined that unlike the other plan which assumed 50 percent dependence on foreign financing, the 1975 – 1980 plan assumed nearly 100 percent financing from national saving to be make possible by oil taxation. The dependence of government expenditure from the proceeds of oil persists. Consequently, the fate of oil determines the fate of both sectoral performance and overall Nigerian economy (World Bank-Report, 1974).

The petroleum industry is capital and equipment intensive. Because of its nature, it employs relatively small numbers of people compared with it financial importance. But its effects on employment generation is tremendous. It has created opportunities for petroleum refining and marketing, petrochemical industries, oil transportation and many other related activities that employ thousands of Nigerians (CBN, 2000).

In the area of manpower development, an institution called the petroleum institute has been established in Warri, Delta State, for the training and promotion of the skilled needed in various aspects of petroleum technology. Many institutions have

also been established by the oil industry for the training of immediate skilled manpower, while scholarships have been awarded to many qualified Nigerians for the pursuit of higher and relevant courses in the universities and polytechnics for the development of courses and faculties that are relevant to the petroleum industry (CBN, 2000).

Moreso, the government has effectively utilized the financial resources generated by the petroleum industry for the provision of infrastructures. Such immense infrastructural developments in education, water resources, telecommunication, ports, harbours, roads and so on, could not have been taken place without the revenue generated from the oil sector. These infrastructural developments have created facilities for a rapidly expanding level of economic development (CBN, 2000).

2.5.3 The Historical Perspective of Petroleum Subsidy in Nigeria

The pressure of international competition, the spread of the capitalist behavioural mode, loss aversion, financial deregulation revolution and the IMF-World Bank – supported Structural Adjustment Programme (SAP), have led to a resurgence in price regulation and hence the substantial reduction or even total withdrawal of government subsidies, particularly in developing nations experiencing fundamental disequilibrium in their internal and external balances. And Nigeria is not left out of this 'disease' (Anyanwu, 1993)

The concept, 'subsidy', has been defined by various authors and also from various perspectives-producers, consumers, and government angles. One of such definitions is that subsidy is a payment to individuals or businesses by a government for which it receives no products or services in return (The McGraw-Hill Dictionary of Modern Economics, 1973; 496 – 497).

It is also defined as a payment made by the government (or possibly by private individuals) which forms a wedge between the price consumers pay and the costs incurred by producers, such that price is less than marginal cost (Pearce, 1983: 373).

Again, the Encyclopedia Britannica 1181:753) sees subsidy as 'a direct or indirect government payment, economic concessions or special privileges granted to private firms, households or other governmental units in order to promote public objectives'.

In general, a subsidy is a transfer from government to consumers, which makes the price they face at the market place lower than the true market price of the commodity. Subsidies can either be delivered directly to consumers, or indirectly through the lowering of costs of production (CBN: contemporary Economic Policy Issues, 2002).

From the foregoing, therefore, petroleum subsidy can be rightly seen as the difference between production cost and the domestic price of the product, reflecting an implicit rather than an explicit subsidy.

There was no petroleum subsidy on petroleum pricing in Nigeria before 1973 when the oil companies determined retail prices. A subsidy of 33.7 per cent was introduced in 1973 when the federal government fixed retail prices of domestic oil consumption at $1.9/bbl. The subsidy increased to 83 percent by 1974 following the 1973/74 oil price increases at the world market. This was due to the fact that domestic price of oil was not adjusted. In 1978, the subsidy was reduced to only 2 percent following oil price reviews. Then, the price of crude oil to the domestic refinery was increased to $13.80/bbl. In 1980 the subsidy rose to 65.5 percent following the hike in crude oil price to $40/bbl at the world market, unaccompanied by a review of the domestic prices. In 1982 the then civilian administration increased the retail pump price of PMS from 15.30 kobo per litre to 20.00 kobo per litre (Anyanwu, 1993).

Thus by 1985, according to NNPC calculation using 1982 consumption level, the subsidies of 4.00 kobo per litre, remained on PMS, DPK, AGO and fuel oil respectively (NNPC, 1986).

Following Nigeria's request for an IMF loan of about $2.3b (a three-year extended facility) in 1983, removal of petroleum subsidy was one of the three major (and fourteen minor) pre-conditions (alias conditionality). Though, Nigeria rejected the loan late in 1985 as a result of public resentment (through a national debate), but the 1986 Federal budget adopted most of the IMF prescriptions and Incorporated them in the IMF – world bank – supported structural adjustment programme and the removal of petroleum subsidy was one of such measures. In fact, in 1986 budget speech to the nation, president Babangida announced the withdrawal of petroleum subsidy to the tune of 80 percent hence crude oil began to be sold to domestic refiners at $20.58 per barrel. But within a matter of days from the commencement of the 1986 fiscal year, the world oil market suffered serious collapsed, and to date the average OPEC price for crude petroleum has been well below $20.00 per barrel. Consequently, from January 1986, the situation in Nigeria changed from one of implicit subsidy to that of an implicit tax on the domestic consumption of crude oil (Obi, 1987).

Again, in April 1988, further withdrawals were made by the NNPC causing mass students protest. The increases in the prices of petroleum products announced in April (effective April 10, 1988) ranged between 6.3 percent (from 39.5k to 42.0k per litre) for gasoline and 415.8 per cent for petroleum waxes. The increase were based on NNPC's new pricing policy which was determined by the price of crude oil stipulated by OPEC, the exchange rate of the naira and bank interest rates as

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they affect the corporations business. The price review of the products was stated as first step towards the realization of what the NNPC called import parity of the products (CBN, 1988).

During his 1989 budget speech, president Babangida announced a two tier pricing system of gasoline purportedly designed to assist low income group commuters and users of motorcycles as well as to reduce inflation. In effect, the price of petrol used by private (non-commercial) vehicle operators in the country was increased again from 42.00 kobo to 60.00 kobo per litre, representing a 43 percent increase. This increase did not affect commercial vehicle operators and motorcyclists. It was also stated that there was need for the adoption of realistic pricing policies, especially for gas and petroleum products to ensure equitable distribution of burden of development among various social classes. The prices were unified at 60.00kobo per litre shortly after owing to observed but obviously anticipated but deliberately ignored abuses for impending exploitation by the government, a situation that raises the question of credibility of government policies, rational expectations and consequent ineffectiveness of activist government policies (Babangida, 1990).

TABLE 2.5: PETROLEUM PRICES FOR NIGERIAN CONSUMPTION, 1973 – 1990 (IN KOBO PER LITRE)

	1973-78	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Liquefied petroleum per kilogram	N/A	32.32	32.32	32.32	32.32	32.32	32.32	40.00	40.00	40.00	40.00	40.00	80.00
Dual purpose kerosene (Household)	8.10	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	15.00	15.00	40.00
Automotive oil	8.80	11.00	11.00	11.00	11.00	11.00	11.00	11.00	29.50	29.50	35.00	35.00	50.00
High pour fuel oil	-	2.30	2.30	2.30	2.30	2.30	2.30	2.30	19.00	19.00	30.00	30.00	50.00
Low pour oil	2.60	5.43	5.43	5.43	5.43	5.43	5.43	5.43	19.00	19.00	19.00	19.00	50.00
Premium sprit	9.5	15.30	15.30	15.30	20.00	20.00	20.00	20.00	39.50	39.50	42.00	42.00/60.00	60.00
Aviation turbine kerosene	N/A	10.50	10.50	10.50	10.50	10.50	10.50	10.50	30.00	30.00	113.60	113.60	113.60

Source: (a) Evan, J and Todd, J., Nigeria: Draft Public Sector Pricing Subsidy, World Bank Mission.

(b) Federal Government Budget of 1990

TABLE 2.6 NIGERIAN PETROLEUM PRICES AS PERCENTAGE OF WORLD PRICES 1980 – 1988

	1980	1981	1982	1983	1984	1985	1986 1-3	1986 Qtrs 4	1987	April 1988
Gasoline	72.8	64.6	77.5	88.3	92.5	77.8	184.6	65.9	49.3	72.4
Kerosene	52.7	48.8	46.2	49.6	49.7	42.1	52.0	16.2	14.1	26.8
Gas oil	62.5	57.1	53.6	57.8	56.8	48.4	161.4	60.3	43.4	62.5
Low pour fuel oil	53.7	44.6	55.1	42.1	36.8	36.5	192.1	60.4	38.3	N/A
High pour fuel oil	22.7	118.9	19.1	17.8	15.6	15.5	192.1	60.1	42.1	85.3
Aviation turbine kerosene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	203.0

Source: Evans, J. and Todd, J., Nigeria: Draft Public Sector Pricing Study, World Bank Mission.

Table 2.5 shows petroleum prices for Nigerian consumption 1973 to 1990 (in kobo per litre) while table 2.6 shows Nigerian petroleum prices as percentage of world prices, 1980 to 1988.

Based on figures in table 2.6 and world prices of petroleum products the federal government gave the level of subsidy in 1989 as: gas (72 percent), petrol (68 percent), kerosene (91 percent) diesel oil (78 percent) and fuel oil (80 percent) for 1990, the corresponding subsidies were given as: gas (45 percent), petrol (69 percent), kerosene (77 percent), diesel oil (70 percent), and fuel oil (74 percent). Expectations of further price increases have been created in the minds of Nigerians and sellers are alert to exploit such increases for profiteering. Also, as the controversy rages, comparative figures of petroleum prices in Nigeria and its neighbour were given to buttress arguments for price hikes. For example; in 1987 we were told that while gasoline, diesel oil and household kerosene cost 39.5 kobo, 29.50 kobo and 10.50kobo respectively in Nigeria, the same products cost 236 kobo, 125 kobo, 115 kobo respectively in Cameroon, 268 kobo, 248 kobo, 196 kobo respectively in Niger, 380 kobo, 380 kobo, 320kobo respectively in Chad, and 420 kobo, 330 kobo, 270 kobo, respectively in Cote d'Ivore, and 234 kobo, 187 kobo and 140.30 kobo respectively in Benin (Anyanwu 1993).

A comparative analysis was also made of prices in some oil-producing and exporting countries as shown in table 2.7 below.

TABLE 2.7 COMPARATIVE PRICES OF SOME PETROLEUM PRODUCTS IN SELECTED OIL-PRODUCING AND EXPORTING COUNTRIES (1987) – KOBO PER LITRE.

Country	Gasoline	Diesel	Kerosene
Nigeria	39.5	29.5	10.5
Venezuela	69.0	20.3	29.0
Indonesia	173.0	87.0	65.0
Gabon	190.0	194.0	186.0
Kuwait	72.0	57.5	29.0
United kingdom	276.5	246.0	-

Source: NNPC, Annual Statistical Bulletin, Lagos, 1986.

Unfortunately, such figures do not give a correct picture of the economies of the countries concerned. Most Nigerian neighbours hardly have crude oil in abundance as in Nigeria. In fact, they all import to satisfy their petroleum needs. As for other countries such economic indices as per capita income, GDP, rate of inflation, cost of other service (health, education, electricity and housing) make comparisons untenable as table 2.8 depicts

For Nigeria, most of these indices and others have even worsened over the years. For instance, the inflation rate climbed from 10.2 percent in 1987 to 38.3 per cent and 40.9 per cent in 1988 and 1989 respectively (Anyanwu, 1993).

TABLE 2.8: COMPARATIVE BASIC INDICATORS IN SELECTED OIL – PRODUCING EXPORTING COUNTRIES

	GNP per capital dollar average growth rate		GDP 1980-85	Average annual inflation rate
Country	1985	1965-85	Growth rate (%)	1980 – 85(%)
Nigeria	800	2.2	-3.4	11.4
Venezuela	3,080	0.5	-1.6	10.7
Indonesia	530	4.8	3.5	10.7
Libya	7,170	-1.3	-1.6	-0.3
Kuwait	14,480	-0.3	0.3	-3.4
United Kingdom	8,460	1.6	4.9	6.4

Source: World Bank, World Development Report 1987

2.5.4 Arguments for The Petroleum 'Subsidy' Removal or Price Increased

One of the most important arguments (though less emphasized by government officials and NNPC) is that the removal of petroleum subsidy is the easiest way to bail out a cash – strapped federal government. It was estimated that the government would reap about ₦6.8 billion yearly once the removal was withdrawn. This extra revenue is needed given falling oil revenue from the international market, rising public debt, uncompleted projects (such as Escravas gas pipeline and Etakpe iron ore project), and the fall in non-oil receipts (Anyanwu, 1990).

The second reason for the price increases is to check or stop illegal bunkering. In most cases, Nigerian Navy Officials deny the existence of illegal bunkering they know of, there is fear that Nigeria does not have control over the activities of the mother vessels which usually fuel fishing trawlers and other vessels in the open sea. The logic, thus, is that if "subsidy" is removed, prices of the product would become highly competitive with what obtains elsewhere in the world (Akinrinade et al, 1987).

The third argument for the oil price increases is to check or stop the smuggling of petroleum products into neighbouring countries. In 1987, the NNPC stated that a truck load of petroleum (of 30,000 litres) bought at ₦9,885.00 in Nigeria are sold, for example, in one of the countries to the north of Nigeria would fetch between

N90,000.00 and ₦110,400.00. The corporation also surmised that such smuggling activities contributed to local scarcity of such products hence if prices increase, it would become less profitable to smuggle, and scarcity would be reduced (NNPC, 1987).

The fourth argument is that subsidies create distortions in the consumption of petroleum products. That is, subsidies discourage consumers from being cost conscious. In other words, the government's intention is to curb waste and probably reduce the average daily consumption of 300,000 to 290,000 barrels. Some people argued that 'subsidy' removal will lead to reduction in domestic consumption of these products and conserve surplus for export and hence boost Nigeria's foreign exchange earnings. But to Anyanwu, it is a naïve argument for it is a reflection of ignorance of the economics of Nigeria membership of OPEC and quota allocations (Anyanwu, 1987).

Another plank of the campaign is adulteration of kerosene and other petroleum products which has become a lucrative business but which is very dangerous to household and car owners because of explosions that may result form such mixtures, and the consequent engine-knocks. However, both adulteration and smuggling give an indication of the failure of the federal government to police Nigeria's borders and NNPC's inspectorate division inability to monitor the oil sector effectively (Anyanwu, 1990).

According to Anyanwu, increases in petroleum products prices would ensure a free flow of traffic as it would curb those Nigerians who are in the habit of putting a chain of cars on the road. However, those Nigerians who are rich enough to put a chain of cars on the road are most likely to be the ones still able to afford to buy fuel at any price.

Another argument for further price increases in petroleum products is that the continued existence of these 'subsidies' led to the lopsided development of the nation's energy system. It was argued that subsidy on petroleum does not make the LPG and natural gas competitive and attractive to consumers hence the under – development of gas.

The price increases were also meant to be a cost recovery strategy for commercialized NNPC. In other words, it is expected to boost its revenue and survival as a commercialized entity (Anyanwu, 1990).

2.55 The Effects of 'Subsidy' Removal

The arguments against petroleum price increases include consequent rise in transportation cost and inflation, social justice since the whole nation will be suffering for the illegal acts of a few (through smuggling, bunkering and adulteration) coupled with not-too-effective law enforcement agents, social

detonation, tendency towards misdirected public expenditures, and consequent structural distortions in the economy (Council of the Nigerian Economic Society, 1987; Obi, 1987; and Usoro, 1987; Anyanwu, 1987; Nwogu et al, 1988; Phillips and Osayinwese, 1977).

At each period of the oil price increase, transport fares escalated and in some cases by more than 100 percent. These had spill over effects on other sectors of the economy, including significant increases in the prices of general consumer goods. For example, the Central Bank of Nigeria's January 1989 report had it that the consumer price index for fuel and light rose by 20.6 and 27.1 percent over its levels of the corresponding period of 1988. The increase, according to the report was traceable to demand pressure on fire wood and kerosene, following the rise in prices of petroleum products. The same is true for other commodities as reflected in the inflation rate of 38.3 percent in 1988 and 47.5 percent in 1989. The rising cost of living has lowered living standards, increased sufferings and lots of commuters while hunger and starvation are the other of the day without adequate food to eat in a period of naira squeeze and non rising wages, death becomes rampant they argued (Obi et al, 1987).

In most cases, long-run savings and investment climate become bleak while national income (growth) fell. Then, unemployment problem, which the

government is making effort to reduce, is aggravating and further complicating the task of economic management.

Petroleum price increase have also called to question the social justice instance of the government since such price hikes had resulted in huge profits for transporters and distributors at the expense of commuters and consumers whose income rather than rise fell in real terms (Anyanwu, 1987b).

The petroleum price increases also resulted in mass destruction of human capital and property. Following the April 1988 oil price increases, students in Nigeria tertiary institutions protested consequent upon which the police unleased mayhem on them resulting in substantial loss of lives and property including vehicles, buildings, equipment and other valuables. The frequent and brutal police killings of students and other citizens during such protests constitute loss of human capital in the form of potentially high skilled labour. Apart from the loss and grief to parents these help to set us backwards technologically apart from retarding economic growth and development (Anyanwu, 1986).

The consumption of most of the petroleum products fell during each of the price increases. For example, during the first half of 1989, the consumption of liquefied petroleum gas declined by 4.7 percent, aviation turbine kerosene by 30.3 percent, automotive gas oil (diesel) by 7.8 percent, high pour fuel oil by 38.7 percent and

low pour fuel oil by 23.3 percent. The fall in the consumption of diesel or automotive oil, for example, reflected in the reduction of transportation services in major towns and cities, despite government intervention through mass road transit programme (CBN, 1989).

Production cost also rose in both the private and public sectors of the economy. Apart from the inflationary effect, it worsened the unemployment solution as most small-scale firms went under. Rise in production costs was also reflected in the fall in industrial capacity utilization from an average of 40.7 percent in 1988 to 31 percent in 1989.

Another effect is the deleterious impact on funa and flora. Due to the hike in kerosene price in particular, there had been a tremendous and mass switch from kerosene usage as a source of energy or cooking fuel to the use of firewood. The first obvious consequence is increased or large scale deforestation such as relentless loss of woodland will undermine the economic and environmental health of the country. The ecological consequences entail real economic and social costs too. The lot of rural villagers are being worsened while the national economy is being undermined, plant and animal species extinguished, and the earths climate established (Anyanwu, 1990b).

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Another saddening aspect is that the destruction of forest trees consequent upon fuel price hike along with burning of fossil fuels, uncontrolled release of effluents from industrial and agricultural processes, result in the release of large quantities of greenhouse gases into the atmosphere. Such gases trap the own-energy radiation emitted from the earth's surface and raise global temperatures. These greenhouse gas emissions have dire consequences, a 'doomsday scenario'. The result of the build up of these gases include worldwide rise in sea level, wide scale flooding increase of salt water intrusion into aquifers, inundating vital wetlands, destruction of commercially important spawning grounds increase in storm damage to lagoons, and coral reefs decreased biological diversity among marine organisms, high incidence of lung diseases, eye irritation, poor visibility, gastro intestinal cancers and other illnesses and increased harmful chemicals in drinking water and food supplies (Mintzer, 1988).

In spite of the above, one positive consequence for the government is increased revenue from the petroleum prices increases sweetened by the naira depreciation at the foreign exchange market which increased the absolute naira volume of foreign exchange earning.

2.5.6 DEREGULATION OF THE PETROLEUM INDUSTRY IN NIGERIA

Deregulation of the oil sector first started in 1979; during president Carter of the U.S.A. He phased out crude oil price by October 1981, in order to allow oil prices

to be determined by market forces and to encourage conservation of energy. It later became a wide spread topic of political debate in the 1980s as impatience with apparently inefficient performance of the public enterprises and regulated industry grew in both Europe and the U.S.A. (Pera, 1989).

Dereguiation which has been an issue under contention in Nigeria for over two decades was one of the conditionalities of the international monetary fund (IMF) for offering Nigeria loan. The IMF advocated for the removal of subsidy on petroleum products stressing that it existence encourages local wasteful consumption and it has deprived the government additional revenue not only from increased exports but also from domestic sales.

Braide (2003) who studied the modes of deregulation in the downstream sector of the Nigerian petroleum industry is of the view that public opinion about deregulation in Nigeria covers a wide spectrum, and cuts across all sides of the argument. Some Nigerians hold the view that deregulation cannot be complete, whether in the downstream sector of the petroleum industry or in any other sector of the economy. Deregulation is seen as desirable in freeing government of its concurrent control, an involvement in the business of refining, importation, and distribution of refined petroleum products in the Nigerian market. In their opinion, the deregulation of the petroleum industry in Nigeria should be implemented in phases, so as to enable the successful process of deregulation

which includes the reform of all sectors of the economy, financial, educational, health and public sector reforms. The focal areas of the reforms being mainly fiscal policy and management, monetary policy, exchange rate management, liberalization of foreign trade and management of external debt among others.

According to Kupolukun (2004), all over the world, reasons for reforming the public utilities or enterprises vary from country to country, depending on the objective, peculiarity and circumstance that the country finds itself. The issue of reforming our downstream sector, such as refining and distribution of petroleum products has been on for quite some time. It has however, become more compelling in the last few years given the trauma of petroleum products scarcity the nation had continuously witnessed. Equally compelling is the need to develop the gas sector which has the potential of doubling the nation's revenue but has not received focused attention till now.

Oshiomhole (2000) studied the review of petroleum products supply and distribution. This report is driven by facts arising from a wide range of consultations with stakeholders and experts in the industry, memoranda from the public, visits to facilities involved in the supply and distribution of petroleum products, namely the Atlas Cove facility, which is Nigeria's main ocean receiving terminal and all four refineries in Nigeria. In his opinion, complete re-orientation of the economy is usually expected following a deregulatory process. He also

advocated for occasional market interventions to check excess on the part of market participants. Another school of thought strongly believes that the petroleum industry in Nigeria must not be liberalized, or deregulated, or privatized completely for whatever reasons, and that the status – quo should remain, may be with some minor functioning made "here and there", to improve efficiency as appropriate, "in the overall national interest". This is essentially the position implied by the Nigeria Labour Congress (NLC).

The NLC, however, believed in its report that there are serious problems of supply of petroleum products attributed to the neglect of domestic refineries. Thus if the refineries are not effectively repaired and the supply problems persists, there will be exorbitant import parity prices for products while the refineries are idle and wasting. Indeed price deregulation without local supply will only further encourage import and virtually seal all hopes of reviving the refineries and gainful utilizing the vast assets therein. Also, on the other hand, there were calls for deregulation of the sector in order to ensure constant supply and efficiency in distribution and marketing (Oshimhole, 2000).

Garba (1996) postulated that deregulation of the petroleum sector would likely bring about collusive oligopoly of the oil companies negotiating with the government for product prices they considered adequate incentive. This simply would replace a regime of public control with one of private control. And a shift

from one control regime to the other defeats the essence of deregulation in theory and practice. Garba then entrenched that the essence of deregulation is competition. "Competition does not thrive under any form of price control or anti competition formulations like those imposed on the industry".

Garba, postulated further by quoting the president in one of his press briefings as suggesting that the envisaged price increase could be validly termed as tax. He analyzed that, taxing consumers and sharing the tax with major oil companies was neither compatible with good governance or deregulation. None of the western countries, whose standard of governance and economic achievement, the Nigerian government claims to be aspiring to, would accept a situation that unduly increases the burden of tax on her consumers, to create rent for foreigners. Garba thus concluded by stating that to an extent:

a. Uniform pricing of 1973 remain, and

b. Nigeria should have an anti-collusion legislation.

This reform would not enhance competition or efficiency. Moreover, with foreign control of refineries, repatriation of profits and the involvement of foreign employees and consultants, operating cost and transfer will rise and hence, worsen the current account balance.

2.5.7 Global Trend of the Deregulation of The Downstream Sector of the Petroleum Industry

Taking a developing country like India, Oluleye (2004) is of the view that a strong similarity could be observed between the government policy of India and that of the Nigerian government. Sequel to the deregulation of the Indian petroleum sector (downstream) in 1998, government set up a regulatory body that monitors the activities of players in the sector. The regulatory body co-ordinates with the government and interacts with the oil companies, consumers, and oil industry associates. The regulator brings to the attention of the government policy changes required to safeguard the national and consumers interest, product specification, security stocks, supply – demand scenario, e.t.c.

According to Oluleye, in African countries like Cameroon, government policy reforms and liberalization between 1989 and 1994 had limited the states role in price setting and reduced state intervention in petroleum markets. Government subsidies for commercial fuel were also eliminated. In other African countries like Ghana, deregulation of the petroleum sub-sector included the termination, in 1996, of the oil import monopoly and the exclusive supply of locally refined products to oil marketing companies by the state owned Ghana National Petroleum Corporation (GNPC). In 1998, prices were changed from "cost plus to import parity". The sector remains dominated by state – owned enterprises.

Oluleye further emphasized that in developed economies like that of Canada, the Products Pricing Commission (PPC) was charged with the objective of ensuring that consumers are treated fairly in the petroleum products market. The PPC adopted an Automatic Pricing Mechanism (APM) to set the maximum allowable price each month based on the world – wide price of fuel and the strength of the Canadian Dollar (exchange rate).

This pro-active pricing response of PPC resulted in a smoothing of the price so that volatility is reduced and the problems of price racketing and price stickiness are not encountered. Other countries like Thailand, New Zealand and Japan have also recently deregulated their respective oil industries. Since the deregulation of downstream petroleum sector, the prices of petroleum products have become competitive and supply shortage eliminated in these countries (Oluleye.2004).

The Nigerian government from the experiences shared above is not alone in attempting to harness and invigorate its downstream sector; just as it has done for the upstream sector.

2.5.8 Benefits of Deregulation of the Downstream Sector

Deregulation as proposed by the government and its proponents, is a situation where the government would seize to control the refineries, depots, pipeline networks, due to governments poor handling over the years. As far as provision of

government funds for that sector of petroleum industry is concerned, under this system, the refineries, depots and pipeline network will operate as profit centres.

According to Ajala (2001), deregulation will bring about appropriate pricing which will go a long way in solving problems like smuggling and diversion which leads to scarcity, wasteful consumption, product adulteration, environmental and other hazards, own investment and expansion. In his analysis he compares Nigeria's petroleum products prices with that of other countries.

According to president Obasanjo (2000) in a speech he gave on deregulation, he stressed that low prices of petroleum products encourages wasteful consumption and inefficient utilization. In real terms, our domestic need is about 270,000 bpd, but at present, we consume an excess of 360,000 bpd. If the correct pricing system was adopted, the extra 90,000 bpd would be conserved either for export to earn the much needed foreign exchange or it could be added to the much talked about strategic reserve. Consumption growth rate rose from (2 percent to 18 percent). At this rate, Nigeria would be dependent mainly on imported fuel for domestic consumption in about ten years from now.

Environmental and other hazards are among the fall out of uneconomically priced petroleum products. Okunmiyide (1998), solicited for deregulation because the existing oil marketing companies are operating on a survival basis with little or no margins left to keep maintenance at its optimum. Consequently, the operational

integrity of facilities are compromised and safety standards are generally low while funds are unavailable for the necessary environmental pollution control programmes. Teriba (1972) cited an instance of the industry not being able to switch to the internationally more accepted fuel despite the environmental and health appeal of the programme. Therefore, the question that readily comes to mind is "is cheap oil economically and environmentally sustainable in an oil dependent Nigeria"?

Asiodu (1991), a reputable political economic analyst argued that removing subsidy and using its proceeds to finance special infrastructural projects, for example, food processing and storage in support of agriculture in the rural sector, rather than continue in the present situation where the bulk of the benefit from large petroleum subsidy goes to vehicle owners and cross border petrol dealers as well as those who are aiding and abetting them. Asiodu concluded that the removal of oil subsidy and privatization of the industry would enhance development.

Ugochukwu (1997), postulated that, should deregulation sales through, the billions of naira saved from the removal of subsidy would then be diverted to the depressed sectors of the economy as education, health, road network and agriculture which would be of immense benefits to all Nigerians.

Biose (1998) postulated that deregulation would bring about the inflow of foreign exchange arising from foreign investment in the sector, which increased from 12 percent to 27.5percent from 1986 to 1992 and except for 1988, 1989 and 1992, real interest rate became positive since the mid – 1980 with an abrupt increase in 1987 after liberalization. Other benefits includes:

(a) **Efficiency in the Downstream Sector:** Kupolokun (2004) emphasized that deregulation would lead to competition among marketers. NNPC monopoly product supply will be broken. Also, the survival of the corporation will be guaranteed under a deregulated regime as it will not continue to subsidize prices. The downstream sector reform is therefore expected to reform NNPC to be able to fulfill the objectives for which it was established.

(b) **Increase in Revenue to Government** At present, government sells 445,000 barrels of crude oil to NNPC for refining at international price (Kupolokun, 2004). This has increased the revenue going to government. This amount could be used for economic development and poverty alleviation progammes of the government.

(c) **Abundant Fuel Supply:** Deregulation of the market implies that a regime of trade liberalization will be in place whereby petroleum products can be

imported and exported. This will ensure abundant petroleum products in the economy and eliminate long queues at fuel station.

(d) Private sector participation: Deregulation is very critical to private sector participation in refining because it ensures commercial viability of products supply thereby enhancing profitability which is the major business attraction. The number of marketers and retail stations are likely to increase, with their positive impacts on business expansion as well as employment generation. Instead of divesting from the industry, marketers are most likely to invest more.

(e) Maintenance of Refining and Distribution Assets: One of the major problems in the past was lack of funds for the rehabilitation and maintenance of the refineries and distribution facilities. This was as a result of the poor margins received by NNPC on the products manufactured. In a deregulated market, appropriate prices will be charged for products. Part of the proceeds will be used for plant rehabilitation and maintenance which will ensure that capacity utilization is increased and products made available at all times (Kupolokun, 2004).

(f) Smuggling: The wide disparity in petroleum products prices between this country and her neighbours was responsible for the high rate of smuggling of petroleum products. A deregulated petroleum products market will ensure that the price gap is closed and smuggling becomes unattractive (Kupolokun, 2004).

2.5.9 The Effect of Oil on Nigeria's Economic Policy Formulation

Economic policy is the action statement of the government pertaining to particular sectors of the economy, describing the intended objectives and how to achieve them ordinarily, the object of economic policy is to improve the welfare of the people, either in the short run or the long-run. However, there is always a trade-off in the benefits of economic policies, requiring that economic realities dictate policy priorities. Indeed, this is the essence of evidenced based policy formulation advocacy (Adedipe, 2004).

The formulation of an economic policy involved the collection, arrangement, analysis, summary and interpretation of economic data. The quality of data input into policy formulation then becomes critical to evolving policies that will impact the macro-economy in the most desired sectors for maximum benefit to the economy where National, State or Local Government, under the federal structure Nigeria operates.

At this point, there is the need to examine how economic policy formulation have been impacted (perhaps induced) by petroleum oil in Nigeria. The major economic policies since Nigeria gained political independence would be examined vis- a-vis the state of the oil sector. This should provide adequate basis for making

a few specific recommendations on how to improve the sector and reduce the dependency.

2.5.9.1Oil and Economic Policies in the 1960s

The nationalistic fervour that followed the attainment of independence in 1960 made Nigeria to evolve a seven-year first National Development Plan (1962 – 1968). The focus of that plan was to industrialize the economy quickly through the import substitution strategy. The implementation of this plan was chequered because of the political instability that eventually led to the civil war of 1967 to 1970. Most of the economic policies of the 1960s were targeted at prosecuting the civil war successfully. Agriculture was at that time the mainstay of the Nigerian economy. Oil accounted for only 0.3 percent of the GDP (CBN,2000) and was quite insignificant in foreign exchange earnings. This scenario was to change massively in the 1970s (Adedipe, 2004).

2.5.9.2 Oil and Economic Policies in the 1970s

The disruptions to economic activities by the civil war gave way to broad economic policies for reconciliation and reconstruction. This meant huge investment in infrastructure by the federal military government created a strong centre and this has remained a major determinant of the nature of economic policies. As Nigeria gradually settled into normal economic activities, the first major economic policy of the 1970s was introduced. This was the Udoji

commission's comprehensive review and evaluation of jobs in the public service, which led to new pay and benefits structure, representing the first policy impact of the oil wealth. This changed the psyche and consumption habit of the average Nigerian, considered prospectus and able to afford most of the good things of life.

This was followed by indigenization Decree in 1974 and 1977, the latter more comprehensive far-reaching. The policy sought to put the commanding heights of the Nigerian economy in the hands of Nigerians within the context of nationalism. Several foreign investors divested from Nigeria, not by choice, but because of the policy that made it impossible for them to own certain ventures 100 percent or not more than 60 percent or 40 percent as the case may be (CBN, 2001). It was in the process of implementing this policy that oil became a major revenue earner and the policy fundamentals changed (Adedipe, 2004).

As oil revenue ballooned in 1973/1974, the Nigerian Government embarked on several ambitious and expensive projects, having little or no economic value. There was no concrete economic programme that would do any of the two important growth triggers in Nigeria:

1. Unleash the entrepreneurial energy of the typical resilient Nigerian;
2. Small and Medium Scale Enterprises (SMEs) in the non-oil sector.

By 1978, there was a down turned in oil earnings as crude oil prices dipped in the international markets and the first major economic policy, labeled Belt Tightening,

was introduced by Obasanjo's military government. Following closely in 1979, Nigeria resorted to the international capital markets to raise external loans (commonly referred to as the "Jumbo loans") to fund development projects that were hard to place (Adedipe 2004).

2.5.9.3 Oil and Economic policies in the 1980s

There were three major economic policies in the 1980s, namely:

1. The recommendations of the Onosode commission on pay structure in government parastatals were adopted in 1981 and further increase salaries and benefits in several public institutions where responsibilities were considered unique and more complex than the ordinary civil service. Again, a policy in pursuit of "capturing" legally the oil wealth.
2. The Economic Stabilization Act of 1982, which was the response of the Shagari's civilian administration to dwindling oil earnings and major external sector imbalance.
3. 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.

4. 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.

Each of these policies was reactive to developments in the international oil markets, which was depressed for much of that period and had only occasional spikes (Adedipe, 2004).

2.6.9.4 Oil and Economic Policies in the 1990s

This decade might be described as a period of reversals and lost opportunities. 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 wind fall 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 percent in commercial banks and 180 percent p.a. in the non bank-financial services sector. These rates were themselves driven by the high rate of inflation at 44.8 percent in 1992 and 57.2 percent in 1993 (CBN, 2003).

There was no clear economic strategy for the rest of the decade, and monetary policy was totally ineffective to check expansionary fiscal operations (Adedipe, 2004).

2.5.9.5 Oil and Economic Policies in the 2000s

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 would lay a solid foundation for a diversified Nigerian economy by 2007. It sets specific goal in major growth indices as wealth creation, employment generation, institutional reforms and social charter (Adedipe, 2004).

2.5.9.6 Oil and the External Sector Policies

The over-dependence on petroleum oil is more vivid in the external sector trends. The penchant for imports reflects in the current account balances, whose oil component expanded by an annual average of 57.7 percent during 1971 to 1980, 43 percent in 1981 to 1990 and 40.3 percent in 1991 to 1998 (CBN, 2003).

The current account balance grew with the oil revenue trend, reflecting import expansion as oil earning grew. In 1982, reflecting the crash in oil earnings and the tight rein on international trade through the stabilization. Act implementation, current account balances dropped by 22.7 percent in 1982 and further by 14.6 percent in 1983. The advent of the Buhari military administration enforced fiscal discipline in the public sector but soon gave way to the Babangida military government whose softening of trade policies resulted in current account balance growth by 22.8 percent (Adedipe, 2004).

The external debt scenario was not different. Nigeria's debt capacity expanded with oil earnings and its future prospects credits of all kinds were extended to Nigerian government and commercial enterprises, some under government guarantee. These culminated in burgeoning debt burden that was sustained by a combination of factors:

1. High propensity to consume imports - Nigeria is reputed to be a major market for the productions of certain global companies.
2. Strong cash flow from crude oil sale that boosted confidence of creditors in Nigeria's capacity to service credit facilities and repay.
3. Fiscal indiscipline coupled with corruption, resulting in diversion and squandering of most of the funds borrowed.
4. Capitalization of interest payments that were past due.
5. Debt rescheduling that multiplies the debt burden eventually.

The efforts at repayment and debt servicing have been insufficient to bring a drop in the debt stock, which ranged from $27.09 billion to $33.36 billion during 1991 to 2003. This observation made president Obasanjo to remark recently that Nigeria's commitment to debt obligations over the years has not brought about a reduction in the debt stock and its cost implications. However, this has to do more with lack of external support in debt reduction, than with the punitive capitalization of unfulfilled interest obligations (Adedipe, 2004).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 SOURCES OF DATA

The data employed in this study has been mainly from both primary and secondary sources. With primary sources, data were got through the administration of structured questionnaires in Zaria (Kaduna State). The respondents were classified according to their consumption of petroleum products e.t.c. Data from secondary sources were got from CBN publications of different years, such as: Annual Report and Statement of Accounts, Economic and Financial Review, Statistical Bulletins. Also other sources include Bi – Annual Report Journal gathered from NNPC, FOS, Magazines, Textbook, Nigerian Economic Society (NES) Annual Conference Papers and Paper Presentation on Related Issue.

3.2 TECHNIQUES OF ANALYSIS

Both descriptive and inferential statistics of analysis will be used to analyse the data. With descriptive statistics, percentages, graphs and tables will be used and with analytical tools, multiple regression models will be employed to examine the variation in the domestic demand for petroleum products, factors affecting domestic demand for petroleum products such as price, price of substitute and compliments, per capita income, exchange rate and government policies.

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3.3 MODEL SPECIFICATION

Because of the complete domination of the Nigerian economy by petroleum industry since the oil boom, it is generally believed that economic growth in Nigeria is dependent on the consumption of crude oil and its products. Demand for petroleum products will rise as the economy grow. However, demand will fall as price increases. Demand will also fall as the naira exchange rate increases. An empirical test of this hypothesis will be undertaken by ascertaining the effect of products determinants on quantity demanded.

Let us considered a simple relationship where the quantity demanded for petroleum products depends on the price of the products, consumers income, price of cars and other generating plant, price of substitute commodity e.g. electricity, government policy and exchange rate. Symbolically, we may hypothesize that:

1. For PMS, AGO and DPK (1970 – 1985)

$$D_dPMS = a_0 + a_1 \ln PPMS + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln D_{1t} + e_t \quad - \quad - \quad - \quad - \quad - \quad 17$$

N = 1970 – 1985.

$$D_dAGO = a_0 + a_1 \ln PAGO + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln D_{1t} + e_t \quad - \quad - \quad - \quad - \quad - \quad 18$$

N = 1970 – 1985

$$D_dDPK = a_0 + a_1 \ln PDPK + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln D_{1t} + e_t \quad - \quad - \quad - \quad - \quad - \quad 19$$

N = 1970 – 1985

2. For PMS, AGO and DPK (1986 – 2004)

$$D_dPMS = a_0 + a_1 \ln PPMS + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln D_{11} + e_t \quad - \quad - \quad - \quad - \quad - \quad 20$$
$$N = 1986 - 2004$$

$$D_dAGO = a_0 + a_1 \ln PAGO + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln D_{11} + e_t \quad - \quad - \quad - \quad - \quad - \quad 21$$
$$N = 1986 - 2004$$

$$D_dDPK = a_0 + a_1 \ln PDPK + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln D_{11} + e_t \quad - \quad - \quad - \quad - \quad - \quad 22$$
$$N = 1986 - 2004$$

3. For PMS, AGO and DPK (1970 – 2004)

$$D_dPMS = a_0 + a_1 \ln PPMS + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln GOP + a_7 \ln D_{11} + e_t \quad - \quad - \quad - \quad - \quad 23$$
$$N = 1970 - 2004$$

$$D_dAGO = a_0 + a_1 \ln PAGO + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln GOP + a_7 \ln D_{11} + e_t \quad - \quad - \quad - \quad - \quad 24$$
$$N = 1970 - 2004$$

$$D_dDPK = a_0 + a_1 \ln PDPK + a_2 \ln PGDP + a_3 \ln IMP + a_4 \ln ELE + a_5 \ln EXR + a_6 \ln GOP + a_7 \ln D_{11} + e_t \quad - \quad - \quad - \quad - \quad 25$$
$$N = 1970 - 2004$$

Where

D_dPMS = Domestic Demand for Premium Motor Spirit (Petrol)

D_dAGO = Domestic Demand for Automotive Gas Oil (Diesel)

D_dDPK = Domestic Demand for Dual Purpose Kerosene (Household)

PPMS = Domestic price of petrol in naira/kobo

PAGO = Domestic Price of diesel in naira/kobo

PDPK = Domestic price of kerosene in naira/kobo

PGDP	=	Per Capita Income in naira/kobo
IMP	=	Price of Import of machineries
ELE	=	Consumption of Electricity
EXR	=	Exchange rate in naira/dollar
GOP	=	Government Policies
D_{1i}	=	Dummy for federal government activities or policy which carries the value of zero(0) during the period of oil price regulation and one (1) during the period of oil price deregulation.
a_0-a_6	=	are the coefficient of elasticities/parameters to be estimated.
e_i	=	is the stochastic error term.

A-Priori-expectation

It is expected from equation (17-25) above that independent variable (prices of PMS, AGO, and DPK, will be negatively related to the dependent variable (D_dPMS, D_dAGO and D_dDPK). It is also expected that as income increases, consumption of this products will also increase. That is, positive relationship is expected between income and quantity demanded for petroleum products. It is also expected that exchange rate {EXR} will not be statistically significant in explaining the quantity demanded for petroleum product in Nigeria.

3.4 ESTIMATION METHOD

The regression method of ordinary least square was used to estimate the regression coefficients. The OLS method has been chosen because its computational procedure is fairly simple and it is also an essential component of most other

estimation techniques that produces best least variance and unbiased estimate (BLUE) of the parameters compared to other linear estimators. The error term (e_t) was included so as to capture the effects of those variables that were not included in the model or which could not be quantified. The software used to compute the results of this research were SPSS and Eviews.

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CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 INTRODUCTION

This Chapter empirically investigated the factors affecting domestic demand for three categories of petroleum products, Premium Motor Spirit (PMS), Automotive Gas Oil (AGO) and Dual Purpose Kerosene (DPK). The factors believed to influence domestic demand for petroleum products in Nigeria are price of the products, per capita income, import of machineries, consumption of electricity (kilowatt), exchange rate and government policy. These set of explanatory variables have been regressed against each of the demand for different type of the petroleum products under consideration in Nigeria. Multiple regressions have been formulated each for the category of the petroleum products demand. The estimated coefficients which are in log-linear form would serve as direct elasticities of response. The signs of the explanatory coefficients would tell us the relationships between these exogenous variables and the dependent variable. For the purpose of analysis, the regression of the variables are divided into periods, 1970-1985, 1986-2004 and 1970 – 2004.

4.2 THE EMPIRICAL MODELS

The empirical model for the three categories of petroleum products are presented and analyzed below.

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4.2.1 Empirical Model for PMS, AGO and DPK (1970 – 1985)

$$D_dPMS = 5533790 + 280883.8LPPMS - 2.1E+09LPGDP$$
$$(1.90) \quad (-0.50)$$
$$+ 750.998LIMP - 328.464LELE - 8,251.864LEXR \ldots\ldots\ldots\ldots 26$$
$$(2.85) \quad (-0.63) \quad (-0.88)$$
$$R^2 = 0.90 \; R^2 \text{ Adj}=0.81 \; DW = 2.55 \quad F = 10.242 \; N = 1970 - 1985$$

$$D_dAGO = 1264334 + 115632.4LPAGO - 2.2E+09LPGDP$$
$$(1.36) \quad (-2.72)$$
$$+ 348.295LIMP + 220.934LELE - 699040LEXR \ldots\ldots\ldots\ldots 27$$
$$(6.17) \quad (2.56) \quad (-0.33)$$
$$R^2 = 0.98 \; R^2 \text{ Adj} = 0.96 \quad DW = 2.45 \quad F = 60.315 \quad N = 1970 - 1985$$

$$D_dDPK = 3,397.629+323.684.6LPDPK - 7.0E+08LPGDP$$
$$(3.34) \quad (-0.55)$$
$$+ 206.395LIMP + 5.798LELE + 1,342.499LEXR \ldots\ldots\ldots\ldots 28$$
$$(2.57) \quad (0.05) \quad (0.76)$$
$$R^2 = .91 \quad R^2\text{Adj} = 0.86 \quad DW=2.80 \quad F = 17.184 \quad N = 1970 - 1985$$

The above models manifested statistical goodness of fit and they confirm to a-priori expectations. From equation 26 about 81 percent of changes in domestic demand for PMS is explained by the explanatory variables in the model. There is also the absence of serial correlation as revealed by DW statistic. The values in parentheses are t-values. The domestic price (PPMS) was significant at 10 percent probability level, per capital income (PGDP) was not significant with negative sign. Electricity was not significant with negative sign. Import of capital items variable was significant at 1 percent probability level and positive. Exchange rate was not significant with negative sign.

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The significance of domestic price of PMS was expected but the positive sign of the estimated coefficient does not agree with economic theory. However, this result is not unexpected. Other factors like uses of the demand for the commodity has overshadowed the price effect. In Nigeria, people do not border much about the continuous price increase of PMS by the federal government. People have been patronizing the black market of these products even though black market price is far higher. Moreso, the significance of import of capital items like cars and other transport machinery and the positive sign of the coefficient conform with the demand theory. An increase in import of cars, transport and other machinery that make use of PMS will increase domestic demand for PMS.

In equation (27) the domestic price (PAGO) was not significant though the estimated coefficient is positive. The per capita income was significant at 1 percent probability level. Electricity was significant at 1 percent. Import of capital items was also significant at 1 percent probability level. Exchange rate was not significant with negative sign.

The significance of the domestic per capita income was expected and the negative sign of the estimated coefficient agree with economic theory. This implies that as income increases domestic demands for AGO decreases. This justifies the empirical result of the primary investigation that income does not play much significant role in demand for AGO but the uses of the product and other

composite factors. The significance of the import items and the positive estimated coefficient of the explanatory variable holds the same explanation with the significance of import items in equation (26). The significance of electricity was expected but the positive sign of the estimated coefficient do not conform with demand theory.

In equation (28) the domestic price (PDPK) was significant at 1 percent probability level. Per capita income was not significant with negative sign. Electricity was not significant even at 10 percent probability level. Import of capital items was significant at 1 percent probability level. Exchange rate was not significant.

The significance of domestic price (PDPK) was expected but the positive sign of the estimated coefficient does not agree with economic theory as it is explained in equation (26) for PMS. Nevertheless, factors like uses of kerosene and the expectation of future rise in price could lead to increase in demand even at higher prices. The significance of import and the positive sign of the estimated coefficient could be explained by the fact that increase in import demand for capital items that make use of kerosene, will increase demand for DPK hence, a positive relationship between import and domestic demand for DPK.

The next sets of regression equations shows the factors influencing domestic demand for PMS, AGO and DPK for the period of 1986 – 2004.

4.2.2 Empirical Model for PMS, AGO and DPK (1986 – 2004)

$$D_dPMS = 1982233 + 7656.505LPMS - 1.4E+09LPGDP + 0.393LIMP + 283.501LELE + 15415.391LEXR \quad - \quad - \quad 29$$
$$\qquad\qquad\qquad\qquad (0.98) \qquad\qquad (-0.80)$$
$$\qquad\qquad\qquad\qquad (0.14) \qquad\qquad (1.69) \qquad\qquad (2.09)$$

$R^2 = 0.86$ R^2 Adj = 0.80 DW = 2.09 F = 14.432 N = 1986 – 2004

$$D_dAGO = 1188002 - 7267.383LPAGO + 8.6E+08LPGDP - 0.474\ LIMP - 16.654LELE + 4200.827LEXR \quad - \quad - \quad 30$$
$$\qquad\qquad\qquad\qquad (-1.17) \qquad\qquad (0.77)$$
$$\qquad\qquad\qquad\qquad (-0.26) \qquad\qquad (-0.15) \qquad\qquad (0.87)$$

$R^2 = 0.36$, R^2 Adj = 0.09 DW = 1.623 F = 1.355 N = 1986 – 2004

$$D_dDPK = 2372817 + 3733.154LPDPK - 6.8E+08LPGDP - 2.899\ LIMP - 30.698LELE + 8907.473LEXR \quad - \quad - \quad 31$$
$$\qquad\qquad\qquad\qquad (0.49) \qquad\qquad (2.04)$$
$$\qquad\qquad\qquad\qquad (-1.78) \qquad\qquad (-0.31) \qquad\qquad (2.04)$$

$R^2 = 0.42$ R^2 Adj = 0.17 DW = 1.463 F = 1.713 N = 1986 – 2004.

Equation (29) above manifested statistical goodness of fit and confirm with a-priori expectations. Equation (29) shows that about 80 percents of changes in domestic demand for PMS was explained by the explanatory variables in the models. The domestic price (PPMS) was not significant with positive sign. Electricity was not significant at 1 percent, 5 percent nor 10 percent probability levels though the estimated coefficient was positive. Import of capital items was also not significant but the estimated coefficient was positive. Exchange rate was significant at 5 percent probability level. The significance of exchange rate was

not expected. the estimated coefficient was expected to be negative. However, this result is not unexpected because appreciation of exchange rate in favour of naira will lead to increase in demand for import items that make use of PMS which will lead to increase in demand for PMS hence the estimated coefficient will be positive.

In equation (30) non of the explanatory variables is significant either at 1 percent, 5 percent nor 10 percent probability level. The estimated coefficient of the price of AGO (PAGO) was negative though it is expected and it confirms economics theory. Per capita income was not significant though the estimated coefficient was positive. Import was not significant with negative sign. Electricity was not significant also with negative sign. Exchange rate was not significant but the estimated coefficient was positive.

Equation (31) shows the regression equation of DPK. It reveals low statistical goodness of fit as about 17 percents of the changes in domestic demand for DPK was explained by the explanatory variables in the model. The price of DPK (PDPK) was not significant but the estimated coefficient was positive. Per capita income was not significant with negative sign. Electricity was not significant with negative sign also. Import of capital items that make use of DPK was significant at 10 percent probability level. Exchange rate was also significant at 5 percent probability level.

The significance of import of capital items that make use of DPK was expected and the negative sign of the estimated coefficient was also expected and confirm with economic theory. This is because decrease in import of capital items that make use of DPK will decrease domestic demand for DPK. Besides, household kerosene is used mainly by rural and low income urban households for lighting and cooking. The significance of the exchange rate was not expected and the positive sign of the estimated coefficient does not agree with exchange rate demand relationship. The value of exchange rate of naira/dollar reveals that the value of naira keep on depreciating in favour of dollar. Therefore, exchange rate ought not to be a significant factor in explaining domestic demand for DPK from 1986 – 2004.

The next sets of regression equations shows the factors influencing domestic demand for PMS, AGO and DPK for the whole period of 1970 – 2004.

4.2.3 Empirical Model for PMS, AGO and DPK (1970 – 2004)

$$D_dDPMS = 2614521.6 + 12730.348LPMS - 2.34E+09LPGDP$$
$$(0.79) \qquad (-1.22)$$
$$-1.646LIMP + 548.282\,LELE + 15577.515LEXR - 1920244LGOP \quad - \quad 32$$
$$(-0.35) \qquad (3.17) \qquad (1.10) \qquad (-2.42)$$
$$R^2 = 0.59\ R^2\ Adj = 0.49 \quad DW = 1.121 \quad F = 5.802 \quad N = 1970 - 2004$$

$$D_dAGO = 1999434.6 - 8965.284LPAGO - 1.52E+09LPGDP - 4.026LIMP$$
$$(-0.93) \qquad (-1.69) \qquad (-1.76)$$
$$+ 308.908LELE + 8842.807\,LEXR - 1035793LGOP \quad - \quad - \quad 33$$
$$(3.67) \qquad (1.27) \qquad (-2.63)$$
$$R^2 = 0.42\ R^2Adj = 0.28\ DW = 1.077\ F = 2.935\ \ N = 1970 - 2004$$

$$D_dDPK = 1726028.4+5373.431LPDPK + 1.593+09LPGDP -5.019LIMP$$
$$(0.50) \quad (-2.26) \quad (-2.80)$$
$$+ 186.648LELE+10254.129LEXR - 181824.2LGOP \quad - \quad 34$$
$$(-2.75) \quad (1.82) \quad (-0.60)$$
$$R^2 = 0.45 \; R^2Adj = 0.32 \quad DW=1.114 \; F = 3.320 \; N = 1970 - 2004$$

Equation (32) manifested statistical goodness of fit as 49 percents of changes in domestic demand for PMS is explained by the explanatory variables in the model. The domestic price (PPMS) was not significant but the estimated coefficient was positive, per capita income was not significant with negative sign. Import of capital items that make use of PMS was not significant also with negative sign. Electricity (LELE) was significant at 1 percent probability level. Exchange rate was not significant though the estimated coefficient was positive. Government policies was significant at 1 percent probability level.

The significance of electricity was expected but the positive sign of the estimated coefficient does not agree with the demand economic theory, since the increase in consumption of electricity suppose to lead to decrease in demand for PMS. PMS and electricity are said to be close substitute. Government policies was significant at 1 percent probability level. The estimated coefficient negative sign do agree with economic theory of demand. Government oil economic policies such as the withdrawal of subsidy and taxation, ban on importation of 'tokunbo'(second hand) cars older than 5 years could account for decrease in demand for petrol (PMS).

Equation (33) reveals low statistical goodness of fit as about 28 percents of the changes in domestic demand for AGO is explained by the explanatory variables in the model. The price of AGO (PAGO) was not significant with negative sign though the negative estimated coefficient confirm price – demand theory relationship, per capita income was significant at 10 percent probability level. Import of capital items that make use of AGO was significant at 10 percents probability level. Electricity consumption was significant at 1 percent probability level. Government policies was also significant at 1 percent probability level.

The significant of per capita income (PGDP) was expected and the negative sign of the estimated coefficient do not agree with the a – priori expectation and economic theory. The significant of import of capital items was expected and the negative sign of the estimated coefficient confirm the a – priori expectation. Increase in the amount paid as excise duties on import of capital goods will decrease import for such goods, and decrease in import - demand for such goods that make use of AGO will decrease domestic demand for AGO. The significant of government policies was also expected and the same explanation of government policies under PMS also would for AGO. Electricity was expected to be significance but the positive estimated coefficient sign was not expected. Increase in domestic consumption of electricity would decrease domestic demand for AGO since AGO and electricity are substitute.

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Equation (34) shows the regression model of DPK from 1970 – 2004. It reveals a low statistical goodness of fit as about 32.0 percents of the changes in domestic demand for DPK was explained by the explanatory variables in the model. The price of DPK (PDPK) was not significant though the estimated coefficient has positive sign, per capita income was significant at 1 percent probability level. Import was significant at 1 percent probability level. Electricity was significant also at 1 percent probability level. Exchange rate was significant at 10 percents probability level.

The significance of PGDP was expected but the negative sign of the estimated coefficient does not agree with the a–priori expectation and income – demand relationship. This result is not unexpected as kerosene is mainly used by rural and low income household. Besides, a fall in the price of cooking gas can lead to the decrease in demand for DPK as income increases. The significance of electricity was expected but the positive sign of the estimated coefficient does not agree with economic demand theory. Moreso, significance of import was expected and it holds the same explanation with import of capital items in equation (33). The significance of exchange rate was not expected to have any significant impact on domestic demand for DPK. The positive sign of the estimated coefficient of EXR does not agree with a – priori expectation. However, increase (appreciation) of

naira against dollar can increase import demand of capital items that make use of DPK hence an increase in domestic demand for DPK.

4.2.4 Implication of the disaggregated model

The model are disaggregated into three different period to examine the impact of structural changes in the domestic consumption of PMS, AGO and DPK in Nigeria.

The empirical findings of the study reveals that from 1970-1985, price of PMS, import of capital items, per capita income, electricity, price of DPK has significant impact on the consumption of PMS, AGO and DPK. The elasticities of share of the price of PMS, Import of Capital items were positive. The elasticities share of price of PMS and per capita income was significant. For AGO, the elasticities of share of the price of AGO, import of capital items and electricity were positive. The elasticities share of per capita income, import of capital items and electricity was significant. The elasticities of share of the price of DPK, import of capital items, electricity and exchange rate were positive. The elasticities share of price of DPK and import of capital items was significant while the elasticities share of electricity and exchange rate was insignificant.

From 1986 – 2004 empirical findings reveals that, the price of PMS, import of capital items, electricity and exchange rate has significant impact on domestic

demand for PMS. Per capita income and exchange rate has significant impact on domestic consumption of AGO. Price of DPK, and exchange rate has significant impact on domestic demand for DPK. The elasticities of shares of the price of PMS, import of capital items, electricity and exchange rate were positive. The elasticities share of exchange rate was significant while the elasticities shares of the price of PMS, import of capital items and electricity was insignificant. The elasticities of shares of per capita income and exchange rate were positive but insignificant. The elasticities of shares of the price of DPK, and exchange rate was positive while that of import of capital items was negative. The elasticities shares of import of capital items and exchange rate was significant while that of the price of PMS was insignificant.

Finally, from 1970 – 2004, the price of PMS, electricity and exchange rate has significant impact on demand for PMS. Electricity and exchange rate has significant impact on domestic demand for AGO. Price of DPK, electricity and exchange rate has significant impact on domestic demand for DPK. The elasticities of shares of the price of PMS, electricity and exchange rate were positive. The elasticities shares of the price of PMS and exchange rate was insignificant while that of electricity and government policies was significant though the coefficient elasticity of government policies was negative. The elasticities shares of electricity and exchange were positive while price of AGO, per capita income, import of capital items and government policies were negative.

The elasticities shares of per capita income, import of capital items, electricity and government policies was significant. The elasticities shares of price of DPK, electricity and exchange rate were positive while that of per capita income, import of capital items and government policies were negative. The elasticities shares of per capita income, import of capital items, electricity and exchange rate was significant while the elasticities shares of price of DPK and government policies were insignificant.

The result of the statistical analysis carried out indicated that about 80 percent changes in domestic demand for (PMS, AGO and DPK) are explained by the explanatory variables from 1970 – 1985 and 1986 – 2004.

4.3 TRENDS IN THE DOMESTIC DEMAND FOR PETROLEUM PRODUCTS IN NIGERIA (1970 – 2004)

4.3.1 TRENDS IN THE ABSOLUTE DEMAND FOR PETROLEUM PRODUCTS IN NIGERIA

Appendix 4 shows absolute domestic demand for petroleum products from 1970 – 2004 in metric tones. Consumption of petroleum products has been on the increase in line with economic and income growth. The domestic demand for PMS, AGO, DPK, LPG and LBO shows a significant increase in demand from 1970 – 1980, for instance, the demand for PMS rose from 421,009 metric tones to 5,284,570 metric tones in1970 and 1980 respectively, while AGO increases from 349,496 metric tones in 1970 to 2,010,073 metric tones in 1980, DPK increases in

absolute demand from 189,816 metric tones in 1970 to 1,823,958 metric tones in 1980. LPG increases from 9,413 metric tones in 1970 to26,262 metric tones in 1980 and LBO 32,769 metric tones in 1970 to 167,121 metric tones in 1980. By 1981 the products reaches their peaks at 6,573,007 metric tones, 3,131,634 metric tones, 2,161,368 metric tones, 27,970 metric tones and 172,295 metric tones for PMS, AGO, DPK, LPG and LBO respectively and begin to fall in absolute demand.

The increase in consumption (Demand) for these products could be attributed to developmental and structural change and increasing impact of urbanization on the Nigerian economy. The oil boom in the early 1970 is a major anchor of the Nigerian economy in terms of it massive revenue generation capability for national development as well as the spin-off effects of its downstream activities. The bulk of consumption has been in PMS, AGO and DPK. The PMS and AGO are the major fuels utilized in the road transportation sector as well as for small to medium sized electricity generation plants for power supply in homes and locations detached from NEPA, as well as standby power sources in industries. Specifically, PMS is used in vehicles, small electricity generating plants, drives for compressors, AGO is used largely on heavier engines while DPK is used for household cooking, industrial use to produce insecticides and other pest control products.

Appendix 4 also depicts a downward trend in the domestic demand for petroleum products from 1982 – 1998. for instance, demand for PMS decreases from 4,300, 047 metric tones in 1982 to 2,729,112 metric tones in 1998. AGO decreases from 3,226,358 metric tones in 1982 to 1,548,681 metric tones in 1998. DPK decreases from 1,551,484 metric tones in 1982 to 1,104,061 in 1998. LPG decreases from 45,087 metric tones in 1982 to 37,023 metric tones in 1998 and LBO decreases from 194,073 metric tones in 1982 to 42,350 metric tones in 1998.

The decline in the consumption is attributed to the world economic recession of the mid-1981, the problems of distribution, storage inadequacies and increase in its prices which tends to eliminate wastes. Moreso, the demand for the products is usually met by the domestic refineries. However, owing to the poor conditions of three of the four refineries, there have been shortages which had to be augmented with importation from time to time. There was relative increase in the demand for these products from 1999 – 2003. The figure below shows the trends in Domestic Demand for PMS, AGO, and DPK from 1970 – 1985, 1986 – 2004 and the whole period of 1970 – 2004.

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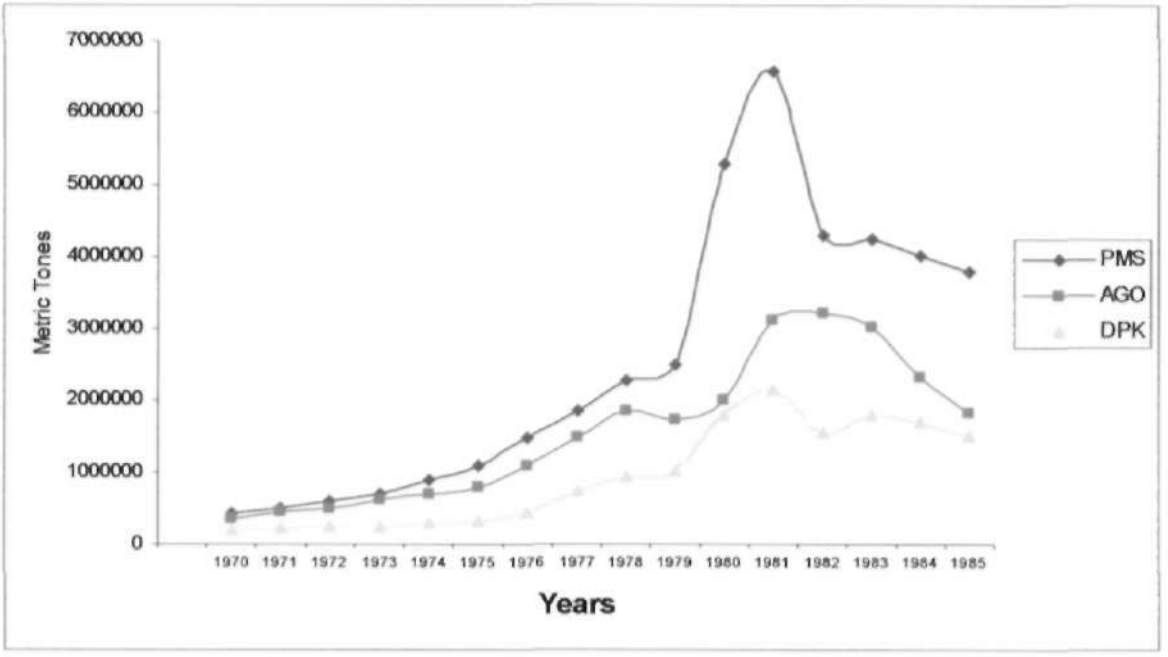


Fig 4.1 Trends In The Domestic Demand For Petroleum Products In Nigeria (1970-85)

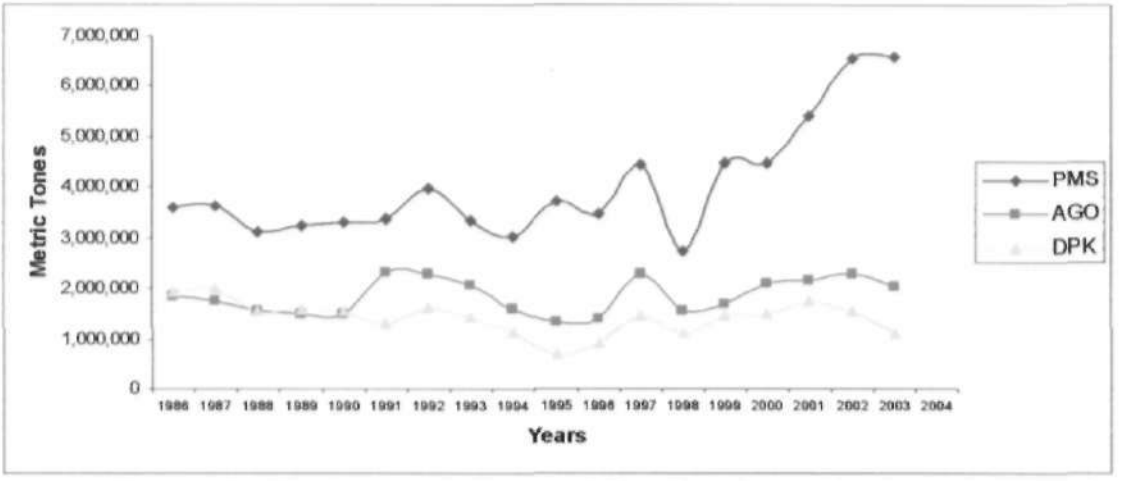


Fig. 4.2 Trends In The Domestic Demand For Petroleum Products In Nigeria (1986-2004)

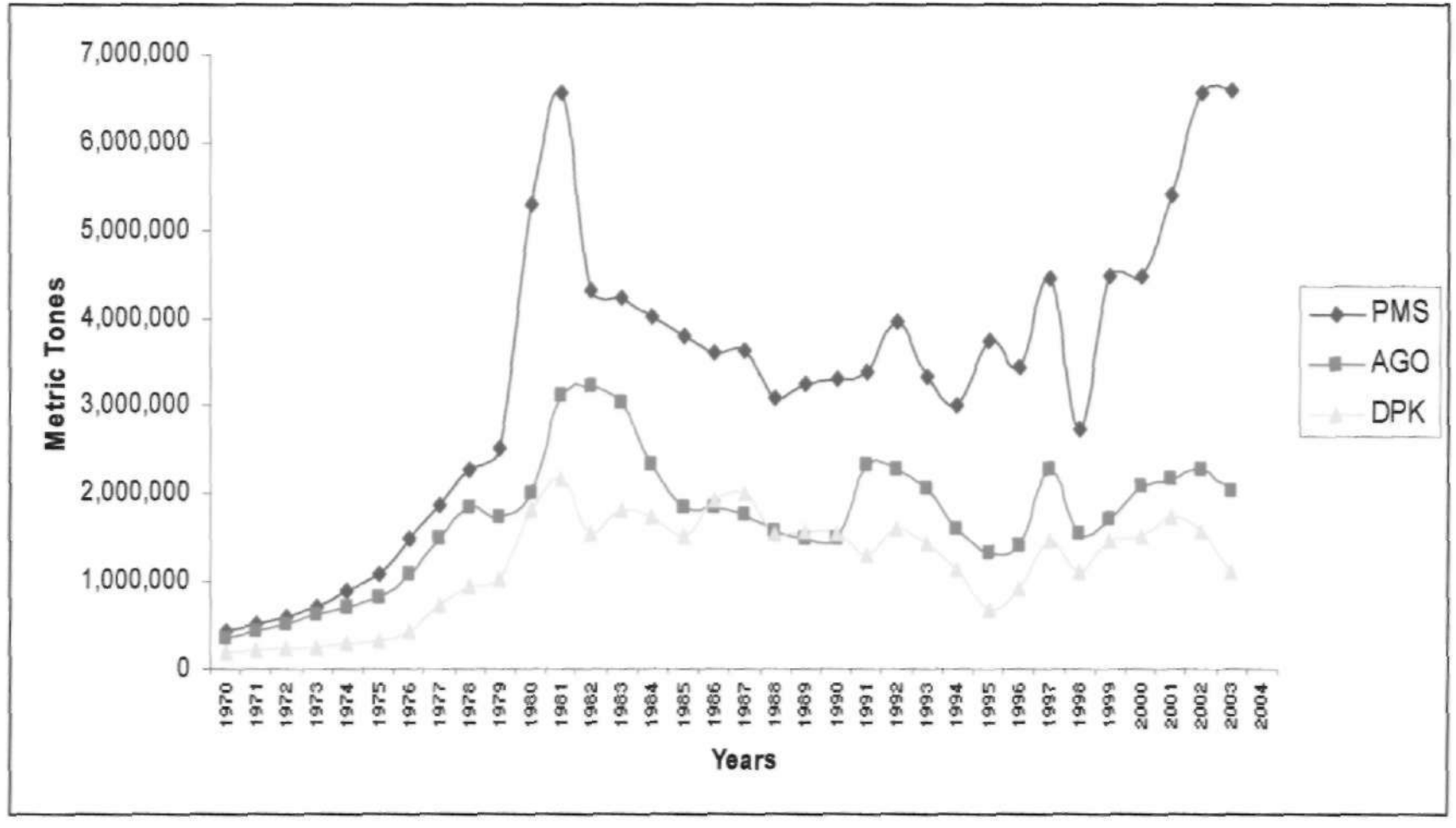


Fig. 4.3 Trends In The Domestic Demand For Petroleum Products In Nigeria (1970-2004)

4.3.2 TRENDS IN THE ANNUAL GROWTH RATE OF PETROLEUM PRODUCTS IN NIGERIA (1970 – 2004)

Absolute demand for petroleum products as depicted by appendix 4 is not sufficient to determine whether there is a significant demand for petroleum products in Nigeria. Therefore, appendix 5 shows the annual growth rate in percentage for the demand for petroleum products in Nigeria.

The annual growth rate as shown in appendix 5 shows a significant increase for the products from 1971 – 1981 except for 1979 that shows -6.4 percent for AGO, -20.8 percent and -45.2 percent in 1977 and 1979 for LPG, and -33.8 percent in 1974, -26.1 percent in 1978 and -5.9 percent in 1979 for LBO. There was positive and significant increase in growth rate for this five petroleum products. For instance there was a rise of 20.7 percent in 1971 to 110.1 percent in 1980 for PMS, 25.1 percent in 1971 to 55.8percent in 1981 for AGO, 13.7 percent in 1971 to 78.8percent in 1980 for DPK, 26.3 percent in 1971 to 48.2 percent in 1980 and 61.2 percent in 1982 for LPG, 39.0 percent in 1971 to 121.9 percent in 1977 for LBO.

The increase in growth rate was due to the low prices for the products, the Udoji commission's comprehensive review and evaluation of jobs in the public service, which led to new pay and benefits structure, representing the first policy impact of the oil wealth in the 1970s, the rate of growth in GDP and the massive inflow of

foreign exchange earnings mainly from improved petroleum prices as well as high rate of domestic and foreign investments in the oil industry. Moreso, inflation in the oil boom era reached double digit except for 1972 and 1973 when the rates were 3.2 percent and 5.4 percent respectively. The rate of inflation were 16.0, 33.9, 21.2 and 15.4 percent in 1971, 1975, 1976 and 1977 respectively. The annual growth rate in 1978, 1980, 1986, 1987, 1992 could be attributed to the moderate inflation of 16.6, 9.9, 5.4, 10.2 and 44.5 percent respectively.

The negative annual growth rate in 1979 to 2003 was associated to the adverse development in the international oil market in the early 1980s, which resulted in a sharp fall in oil prices. Consequently Nigeria's export revenue and budgetary receipts dropped significantly. Public spending did not slow down proportionately during this period. This resulted in the build-up of large fiscal and external deficits. In the bid to finance the domestic deficits, government resorted to borrowing heavily from the banking system, especially the central bank, while the financing of foreign deficits led to massive foreign borrowing and the drawing down of external reserves. Moreso, deregulation of the oil industry led to increases in price hence a fall in demand. The figure below shows the trends in the annual growth rate of PMS, AGO and DPK from 1970 – 1985, 1986 – 2004 and the whole period of 1970 – 2004.

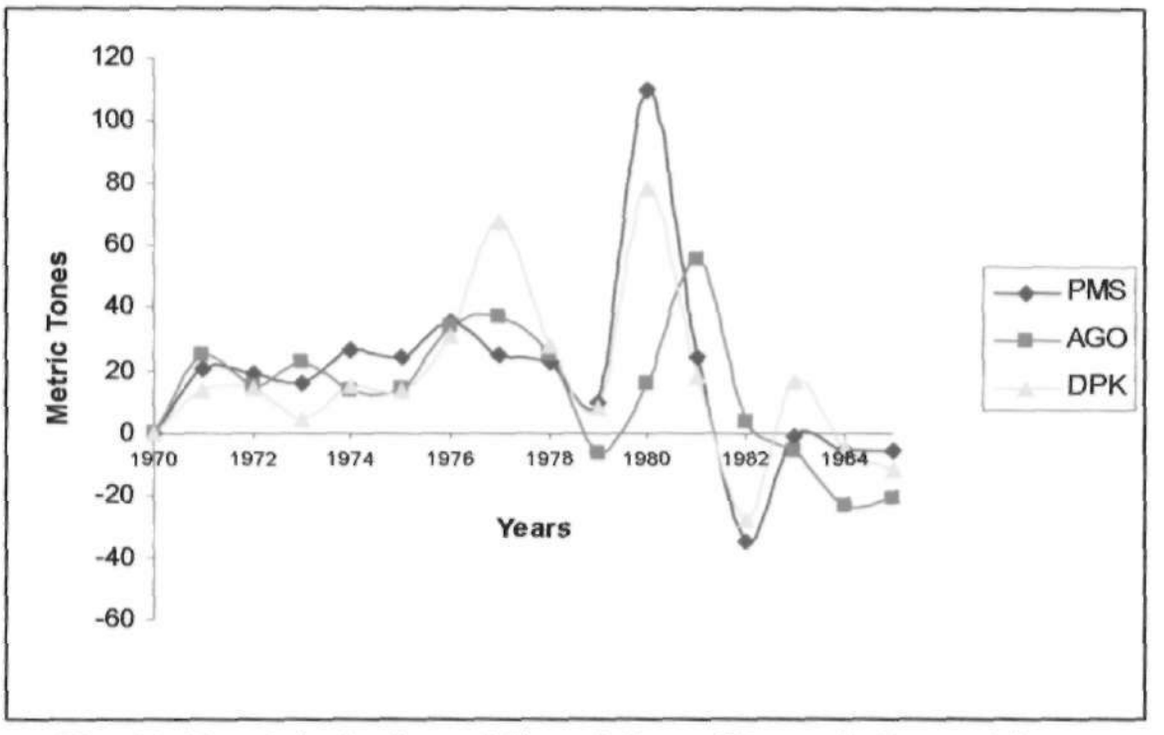


Fig. 4.4: Trends in the Annual Growth Rate of Domestic Demand for Petroleum Product (1970-1985)

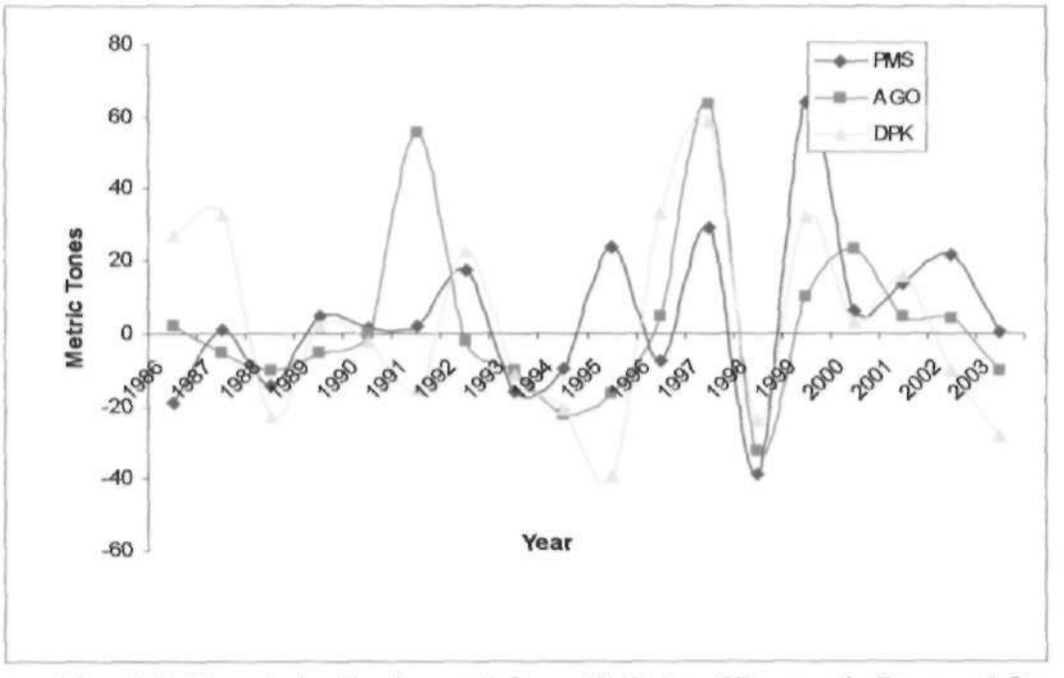


Fig. 4.5: Trends in the Annual Growth Rate of Domestic Demand for Petroleum Products (1986-2004)

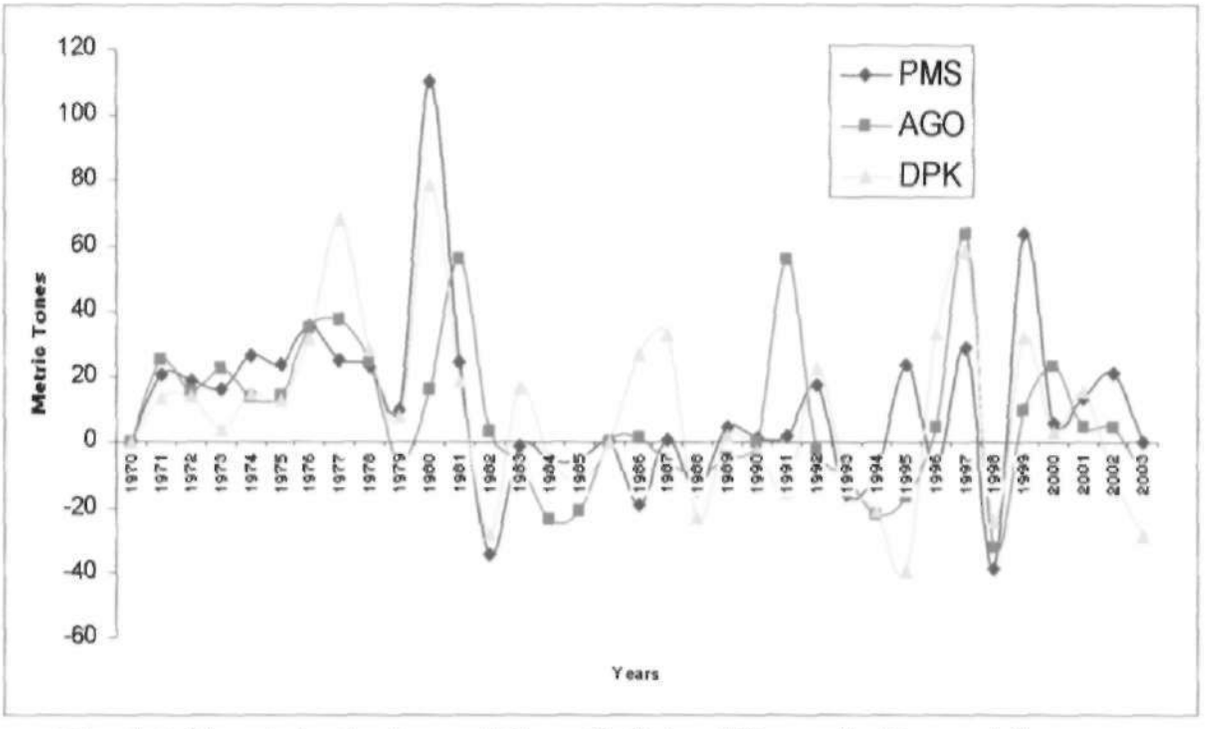


Fig. 4.6: Trends in the Annual Growth Rate of Domestic Demand for Petroleum Products (1970-2004)

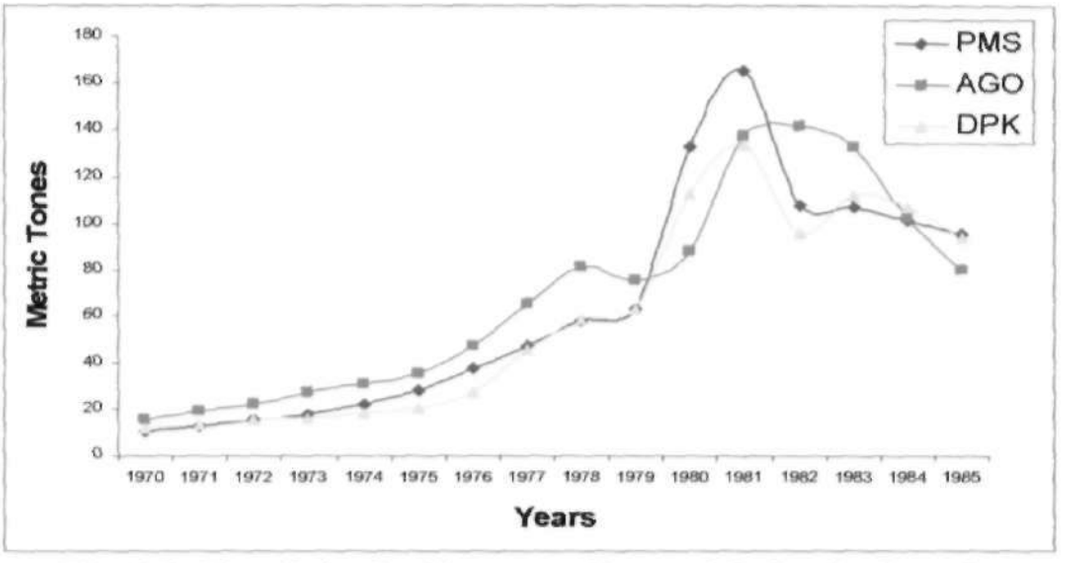
4.3.3 TRENDS IN THE CONSUMER DEMAND INDEX FOR PETROLEUM PRODUCTS (1970 – 2004)

Consumer Demand Index (CDI) measure the demand level of the consumer for the period of 1970 – 2004 taking (1992 = 100) as the base year. It shows whether there is significant demand for petroleum products during the period under study.

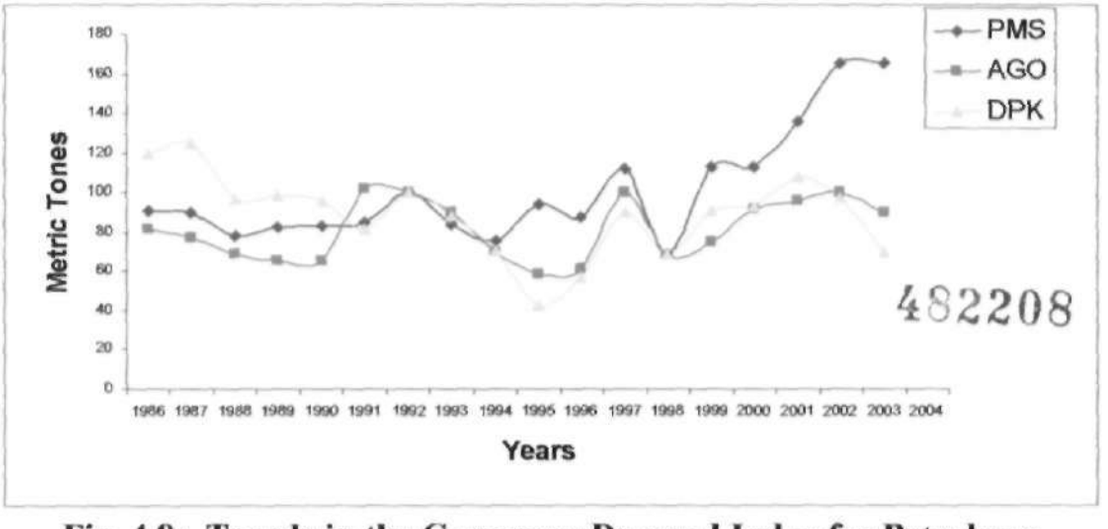
Appendix 6 shows that Consumer Demand Index for PMS, AGO, DPK, LPG and LBO from 1970 – 1980 was insignificant except for 1980 Consumer Demand Index for PMS was 133.14, 113.14 for DPK and 111.41 in 1977 for LBO. Though the Index show a positive sign for all the products but insignificant. For instance, it was 10.61 in 1970 for PMS and 133.14 in 1980, 15.33 in 1970 for AGO and 88.16 in 1980, 11.77 in 1970 for DPK and 113.14 in 1980, 19.25 in 1970 for LPG and 53.70 in 1980, and 18.43 in 1970 for LBO and 94.00 in 1980.

There was significant demand for PMS as the Index shows 165.60, 108.35, 106.94, 101.08, and 100.00 in 1981, 1982, 1983, 1984 and 1992 the base year. From 1997 – 2004, it show a significant improvement except for 1998. CDI ranges from 112.4, 112.76, 112.76, 135.98, 165.19 and 165.94 in 1997, 1999, 2000, 2001, 2002, 2003 and 2004 respectively. There was significant demand in AGO from 137.34, 141.50, 133.14, 101.91, 102.23 and 100.00 (base year) in 1981, 1982, 1983, 1984, 1991 and 1992 and 100.17 in1997. For DPK, CDI show little improvement of 134.07, 112.40, 106.94, 119.61, 125.14, 100.00 (base year)

and 108.21 in 1981, 1983, 1984, 1986, 1987, 1992 (base year) and 2002. LPG show a remarkable demand than any of the products. The CDI ranges from 141.62, 196.59, 299.34, 181.40, 212.88, 152.29, 131.80, 123.44, 113.81, 100.00 (base year), 108.91 and 321.94 in 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992 (base year), 1996 and 1997 respectively. LBO shows little improvement in demand as the CDI ranges from 109.16, 100.03, 102.03, 103.74, 100.94, 155.34, 100.00 (base years), 158.19 in 1982, 1983, 1984, 1985, 1988, 1991, 1992 (base year) and 1996 respectively. The figure below shows the trends in the Consumer Demand Index for PMS, AGO, and DPK from 1970 – 1985, 1986 – 2004, and the whole period of 1970 – 2004.



Fig, 4.7: Trends in the Consumer Demand Index for Petroleum Products (1970-1985)



Fig, 4.8: Trends in the Consumer Demand Index for Petroleum Products (1986-2004)

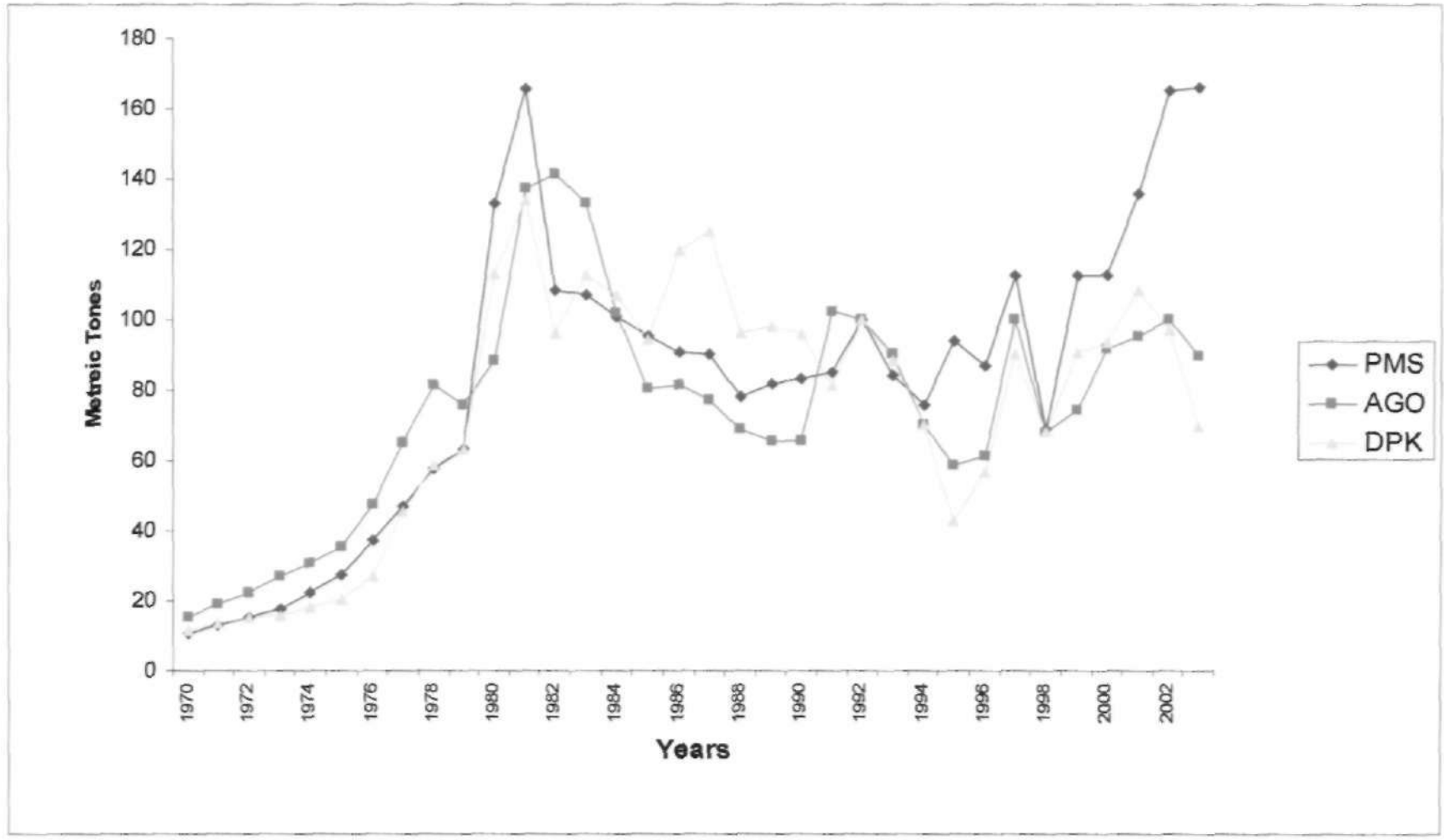


Fig: 4.9: Trends in the Consumer Demand Index for Petroleum Product (1970-2004)

4.4 EMPIRICAL INVESTIGATION AND ANALYSIS

This section identified factors that affect demand for various petroleum products in Nigeria. In traditional economic theory, quantity demanded for goods or commodities depends on the price of the commodity, the price of other commodity such as substitutes and complements, consumers income, taste, expectation of future rise in price and government policy to mention just but few.

An empirical investigation was conducted in Zaria from population sample of 100 people or consumers of these different petroleum products through the administering of questionnaire to get the responses of the consumers on the demand for petroleum products. The petroleum product in question are:premium motor spirit (PMS), Automotive gas oil (AGO) and Dual purpose kerosene (DPK) for various consumers such as, domestic consumption, private motorist consumption, commercial motorist (heavy and light vehicles) consumption, motorcyclist (private and commercial) consumption and industrial consumption (light and heavy) industries.

4.4.1 FACTORS AFFECTING DEMAND FOR PETROL BY CATEGORY

An empirical investigation was conducted to see various factors that influence domestic demand for petroleum products by different users or consumers. The table below presents the responses of different consumers of petrol on the issue of its determinants.

TABLE 4.1 FACTORS AFFECTING DOMESTIC DEMAND FOR PETROL BY PRIVATE MOTORIST

FACTORS	FREQUENCY	%
Price	2	13.33
Income	0	00.00
Uses	7	46.67
Price and income	0	00.00
Price and uses	2	13.33
Income and uses	1	6.67
Price income and uses	3	20.00
TOTAL	15	100.00

Source: Field survey, 2006

Table 4.1 above reveals that among other factors affecting domestic demand for petrol indicated above, uses of petrol indicates significant result for the demand of petrol by 46.67 percent.

TABLE 4.2 FACTORS AFFECTING DOMESTIC DEMAND FOR PETROL BY COMMERCIAL MOTORIST (LIGHT VEHICLES)

FACTORS	FREQUENCY	%
Price	1	6.67
Total Revenue	0	00.00
Uses	0	00.00
Price and total revenue	0	00.00
Price and uses	0	00.00
Total revenue and uses	2	13.33
Price, total revenue and uses	12	80.00
TOTAL	15	100.00

Source: Field survey, 2006

From the responses of commercial motorist (light vehicles) consumers, price-total revenue and uses shows significant result of 80 percent indicating that domestic demand for petrol is determined by the composite factors of price-total revenue and uses.

TABLE 4.3 FACTORS AFFECTING DOMESTIC DEMAND FOR PETROL BY PRIVATE MOTOR CYCLIST

FACTORS	FREQUENCY	%
Price	0	00.00
Income	1	6.67
Uses	5	33.33
Price and income	0	00.00
Price and uses	5	33.33
Income and uses	0	00.00
Price, income and uses	4	26.67
TOTAL	15	100.00

Source: Field survey, 2006

Table 4.3 reveals that uses of petrol indicates significant result of 33.33 percent and 33.33 percent for combination of price and uses. We can infer from this empirical investigation that uses, price and uses is a significant factor affecting domestic demand for petrol by private motorcyclist.

TABLE 4.4 FACTORS AFFECTING DOMESTIC DEMAND FOR PETROL BY COMMERCIAL MOTORCYCLIST

FACTORS	FREQUENCY	%
Price	0	00.00
Total revenue	0	00.00
Uses	6	40.00
Price and total revenue	0	00.00
Price and uses	0	00.00
Total revenue and uses	7	46.67
Price, Total revenue and uses	2	13.33
TOTAL	15	100.00

Source: Field survey, 2006

Empirical investigation of the responses of commercial motorcyclist reveals that uses, total revenue and uses indicate significant result of 40.00 percent and 46.67 percent among other factors. This implies that uses of petrol together with total revenue and uses is a significant factor influencing domestic demand for petrol by commercial motorcyclist.

TABLE 4.5: FACTORS AFFECTING DEMAND FOR PETROL BY HOUSEHOLD CONSUMERS.

FACTORS	FREQUENCY	%
Price	0	00.00
Income	0	00.00
Uses	7	46.67
Price and income	0	00.00
Price and uses	4	26.67
Income and uses	0	00.00
Price income and uses	4	26.67
TOTAL	15	100.00

Source: Field survey, 2006

The responses of domestic consumers (household) of petrol from table 4.5 above shows that uses of petrol is a significant factor that determines demand for petroleum with 46.67 percent.

4.4.2 FACTORS AFFECTING DOMESTIC DEMAND FOR DIESEL BY CATEGORY

An empirical investigation was also conducted to determine various factors that influence domestic demand for diesel by different users or consumers for the product. The tables below presents the responses of different consumers of diesel on its determinants.

TABLE 4.6 FACTORS AFFECTING DOMESTIC DEMAND FOR DIESEL BY COMMERCIAL MOTORIST (HEAVY VEHICLE)

FACTORS	FREQUENCY	%
Price	0	00.00
Total revenue	0	00.00
Uses	0	00.00
Price and total revenue	0	00.00
Price and uses	0	00.00
Total revenue and uses	11	73.00
Price, total revenue and uses	4	26.67
TOTAL	15	100.00

Source: Field survey, 2006

The empirical result reveals 73.00 percent for total revenue and uses. This is a significant result meaning that, composite factor of total revenue and uses of diesel is a major determinant that influence the demand for diesel by commercial motorist (heavy vehicles).

TABLE 4.7 FACTORS AFFECTING DOMESTIC DEMAND FOR DIESEL BY INDUSTRIAL USERS (LIGHT AND HEAVY) INDUSTRIES.

FACTORS	FREQUENCY	%
Price	0	00.00
Total revenue	0	00.00
Uses	5	50.00
Price and total revenue	0	00.00
Price and uses	3	30.00
Total revenue and uses	0	00.00
Price, Total revenue and uses	2	20.00
TOTAL	10	100.00

Source: Field survey, 2006

Empirical result from table 4.7 above shows 50.00 percent for uses and 30.00 percent for price and uses. This implies that uses for diesel is a significant factor that determine demand for diesel above all other factors. Though price and uses also indicate relative significant of 30.00 percent.

4.4.3 FACTORS AFFECTING DOMESTIC DEMAND FOR KEROSENE BY CATEGORY

In the same manner, questionnaires were administered to fifteen (15) household users or consumers of kerosene to determine the factors that influence domestic

demand for kerosene. The table below presents the responses of household consumer of kerosene on the determinants of kerosene.

TABLE 4.8 FACTORS AFFECTING DOMESTIC DEMAND FOR KEROSENE BY HOUSEHOLD

FACTORS	FREQUENCY	%
Price	0	00.00
Income	0	00.00
Uses	7	46.67
Price and income	0	00.00
Price and uses	4	26.67
Income and uses	0	00.00
Price, income and uses	4	26.67
TOTAL	15	100.00

Source: Field survey, 2006

The responses of the household consumers of kerosene reveals that uses of kerosene has a significant impact on the demand for kerosene with 46.67 percent. This implies that uses of kerosene is the major factor that determine the demand for kerosene among all other factors.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The study has reviewed the role of petroleum products on the Nigerian economic growth. Consumption of petroleum products has been on the increase in line with economic growth. The increase in consumption (demand) for these products could be attributed to the developmental and structural changes and increasing impact of urban population concentration as well as the relative importance of the major sectors of the Nigerian economy. The petroleum products under consideration are PMS, AGO and DPK. The bulk of consumption has been in PMS, AGO and DPK. The PMS and AGO are the major fuels utilized in the road transportation sector as well as for small medium size electricity generation plants for power supply in homes and standby power sources in industries while DPK is used for household cooking, industrial use to produce insecticides and other pest control products.

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This study also identified and examined the trends in the domestic demand for PMS, AGO and DPK. Furthermore, the various factors affecting the domestic demand for various categories (PMS, AGO, and DPK) were identified. An empirical econometric analysis of the factors affecting three categories of petroleum products was conducted for the period of 1970 – 1985 (pre-oil regulation), 1986-2004 (during oil regulation) and for the whole period of 1970 –

2004. An empirical investigation was also conducted in Zaria from population of 100 people or consumers of these different petroleum products through the administering of questionnaire to get the responses of the consumers on the determinant of domestic demand for PMS, AGO and DPK to re-enforce the secondary data. The main factors identified are price of the products, per capita income, import of capital items that make use of petroleum products, electricity, exchange rate and government policy. The result of this primary data reveals that apart from price and income, uses of the products shows a significant factor and other composite factors such as income and uses, price and uses that affect domestic demand for petroleum products in Nigeria.

5.2 CONCLUSION

The conclusion reached in this study are that consumption of petroleum products (PMS, AGO and DPK) has been on the increase in line with economic growth. The consumption of these products grew tremendously from the middle of the 1980s, reflecting the rapid growth in the number of automobiles, industries, households, intensified rural-urban migration, economic and political development. Together, they account for more than 60.0 percent of the total consumption of petroleum products. The trend in consumption of these products has also been supported by the low prices of these products, increase in incomes, uses of the products and demand by household and businesses. Other factors that have contributed to increase in demand for petroleum products as identified in this

study include price of the products, per capita income, import of capital items, electricity, exchange rate and government policies such oil regulation (subsidy) and oil deregulation (taxation).

The result of empirical investigation from primary data reveals that factors such as uses, and other composite factors like price-total revenue and uses, price and uses, total revenue and uses are factors that significantly determined the consumption of petroleum products in Nigeria.

5.3 POLICY RECOMMENDATIONS

In the light of the foregoing study and findings, it becomes imperative to offer the following policy recommendations.

- There should be appropriate pricing of petroleum products based on the market based approach and capital replacement approach. Low pricing of petroleum products are all attributed to regulatory measures taken by the government. Low pricing is said to be inimical to the efficiency and growth of the industry. Therefore, appropriate pricing through supply and demand forces of the products and to recover the capital expanded in its production and refining will eliminate the problem of smuggling and diversification which leads to scarcity, wasteful consumption, product adulteration, environmental and other hazards, low investment and expansion, and other related problems.

- Uses of petroleum products is a significant factor from the result of primary investigation that determined domestic demand for petroleum product. Therefore, in line with the background of the increase in the domestic consumption of petroleum products, and to ensure self reliant, sustainable, efficient and adequate demand of petroleum products, government must take decisive steps to immediately repair all refineries for adequate supplies that will match up with demand. This is necessary from the standpoint of economic recovery, employment generation, domestic asset utilization and stable prices.
- On a general outlook, it seems a paper policy recommendation is not sufficient to effect most desired changes. A lot have been written on policy measures but it is disheartening that even with laudable programmes and policies little or no success were usually recorded. Hence, one may say that there is a need to change the orientation of the entire Nigerians on national issues in general starting from the grass root. The corruptive minds of Nigerians that always hinder the effective achievement of beautiful goals need a complete overhaul. The way this may be achieved is through sincerity of purpose and most importantly dedication of our leaders and the respect for law and order by the masses.

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APPENDIX 1

Dependent Variable: D_0PMS
Method: Least Squares
Sample (adjusted): 1970 – 1985
Included observation: 15

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	5533790	9413694	0.588	0.578
LPPMS	280883.8	147871.6	1.900	xxx0.106
LPGDP	-2.1E+09	4.3E+09	-0.499	0.635
LIMP	750.998	263.779	2.847	x0.029
LELE	-328.464	523.298	-0.628	0.533
LEXR	-8251864	9412768	-0.877	0.414
R-squared	0.895	Mean dependent Var.		2937373
Adjusted R-squared	0.808	S. D. dependent Var.		1905187.6922
Durbin-Watson stat.	2.550	F. Statistic		0.895
S. E. of the Estimate	35415.8575	Prob (F-statistic)		0.007

Dependent Variable: D_0AGO
Method: Least Square
Sample (Adjusted): 1970 – 1985
Included observation: 15

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	1264334	2353924	0.537	0.611
LPAGO	115632.4	85263.442	1.356	0.224
LPGDP	-2.2E+09	8.2E+08	-2.722	x0.035
LIMP	348.295	56.438	6.171	x0.001
LELE	220.934	86.458	2.555	x0.043
LEXR	-699040	2119364	-0.330	0.753
R-squared	0.980	Mean dependent Var.		1833393
Adjusted R-squared	0.964	S. D. dependent Var.		946549.4980
Durbin-Watson stat.	2.446	F. Statistic		60.315
S.E. of the Estimate	79004.2612	Prob (F-statistic)		0.000

Dependent Variable: D_0DPK
Method: Least Squares
Sample (adjusted): 1970 – 1985
Included observation: 15

482208

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	-3397629	1231164	-2.760	0.028
LPDPK	323684.6	96803.120	3.344	X0.012
LPGDP	-70E+08	1.3E+09	-0.550	0.602
LIMP	206.395	80.310	2.570	X0.037
LELE	5.798	107.754	0.054	0.959
LEXR	1342499	1775313	0.756	0.474
R-squared	0.908	Mean Dependent Var.		1091200
Adjusted R-squared	0.855	S. D. Dependent Var.		694142.8605
Durbin-Watson stat.	2.799	F. Statistic		17.184
S.E. of the Estimate	4544.0634	Prob (F-statistic)		0.001

KEY
x 1% level of stgnificant
xx 5% level of significant
xxx 10% level of significant

APPENDIX 2

Dependent Variable: D_dPMS
Method: Least Squares
Sample (Adjusted): 1986 – 2004
Include Observation: 18

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	1982233	1399319	1.417	0.182
LPPMS	7656.505	7844.670	0.976	0.348
LPGDP	-1.4E+09	1.7E+09	-0.799	0.440
LIMP	0.393	2.832	0.139	0.892
LELE	283.501	167.836	1.689	0.117
LEXR	15415.391	7379.505	2.089	xx0.059
R-squared	0.857		Mean dependent Var.	4025476
Adjusted R-squared	0.798		S. D. dependent Var.	113106.9245
Durbin-Watson stat.	2.090		F. Statistic	14.432
S.E. of the Estimate	8460.0283		Prob (F-statistic)	0.000

Dependent Variable: D_dAGO
Method: Least Square
Sample (Adjusted): 1986 – 2004
Included observation: 18

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	1188002	882858.0	1.346	0.203
LPAGO	-7267.383	6197.138	-1.173	0.264
LPGDP	8.6E+08	1.1E+09	0.772	0.455
LIMP	-0.474	1.817	-2.261	0.799
LELE	-16.654	108.269	-0.154	0.880
LEXR	4200.827	4824.587	0.871	0.401
R-squared	0.361		Mean Dependent Var.	1849675
Adjusted R-squared	0.094		S. D. Dependent Var.	344317.2378
Durbin-Watson stat.	1.623		F. Statistic	1.355
S.E. of the Estimate	27646.3122		Prob (F-statistic)	0.307

Dependent Variable: DdDPK
Method: Least Squares
Sample (adjusted): 1986 – 2004
Included observation: 18

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	2372817	7449493	3.185	0.008
LPDPK	3733.154	7675.659	0.486	0.635
LPGDP	-6.8E+08	9.8E+08	-0.692	0.502
LIMP	-2.899	1.628	-1.780	xxx0.100
LELE	-30.698	100.644	-0.305	0.766
LEXR	8907.473	4374.936	2.036	xx0.064
R-squared	0.416		Mean dependent Var.	1426500
Adjusted R-squared	0.173		S. D. dependent Var.	336402.2082
Durbin-Watson stat.	1.463		F. Statistic	1.713
S. E. of the Estimate	5872.1705		Prob (F-statistic)	0.206

x 1% level of significant
xx 5% level of significant
xxx 10% level of significant

APPENDIX 3

Dependent Variable: D_0PMS
Method: Least Squares
Sample (Adjusted): 1970 – 2004
Include Observation: 34

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	2614521.6	1935112.1	1.351	0.189
LPPMS	12730.348	16084.849	0.791	0.436
LPGDP	-2.34E+09	1.91E+09	-1.220	0.234
LIMP	-1.646	4.755	-0.346	0.732
LELE	548.282	172.752	3.174	x0.004
LEXR	15577.575	14200.053	1.097	0.284
LGOP	-1920244	792606.87	-2.423	x0.023
R-squared	0.592		mean dependent Var.	35966610.9
Adjusted R-squared	0.490		S. D. dependent Var.	1530218.6289
Durbin-Watson stat.	1.121		F. Statistic	5.802
S.E. of the Estimate	1092912.4370		Prob (F-statistic)	0.001

Dependent Variable: D_0AGO
Method: Least Square
Sample (Adjusted): 1970 – 2004
Included observation: 34

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	1999434.6	918640.43	2.177	0.040
LPAGO	-8965.284	9638.768	-0.930	0.362
LPGDP	-1.52E+09	9.02E+08	-1.687	xxx0.105
LIMP	-4.026	2.283	-1.763	xxx0.091
LELE	308.908	84.265	3.666	x0.001
LEXR	8842.807	6987.325	1.266	0.218
LGOP	-1035793	394322.54	-2.627	x0.015
R-squared	0.423		Mean Dependent Var.	1842828.8
Adjusted R-squared	0.279		S. D. Dependent Var.	629098.6098
Durbin-Watson stat.	1.077		F. Statistic	2.935
S.E. of the Estimate	534171.1552		Prob (F-statistic)	0.027

Dependent Variable: D_0DPK
Method: Least Squares
Sample (adjusted): 1970 – 2004
Included observation: 15

Variables	Coefficient	Std. Error	T-Statistic	Prob.
C	1726028.4	703108.86	2.455	0.022
LPDPK	5373.431	10689.918	0.503	0.620
LPGDP	-1.59E+09	7.02E+08	-2.263	x0.033
LIMP	-5.019	1.796	-2.795	x0.010
LELE	186.648	67.852	2.751	x0.011
LEXR	10254.129	5623.229	1.824	xx0.081
LGOP	-181824.2	305135.86	-0.596	0.557
R-squared	0.454		Mean dependent Var.	1299747.7
Adjusted R-squared	0.317		S. D. dependent Var.	519100.3970
Durbin-Watson stat.	1.114		F. Statistic	3.320
S.E. of the Estimate	429019.1843		Prob)F-statistic)	0.016

x 1% level of significant
xx 5% level of significant
xxx 10 % level of significant

APPENDIX 4

DOMESTIC CONSUMPTION FOR PETROLEUM PRODUCTS (METRIC TONES)

YEAR	PREMIUM MOTOR SPIRIT	AUTOMOTIVE GAS OIL	DUAL PURPOSE KEROSENE	LIQUEFIED PETROLEUM GAS	LUBRICATING OIL
1970	421,009	349,496	189,816	9,413	32,769
1971	508,027	437,287	215,853	11,885	45,551
1972	602,850	504,821	246,492	12,549	56,156
1973	699,026	619,977	256,492	17,141	97,268
1974	883,450	703,336	294,385	18,158	64,343
1975	1,097,071	802,486	333,106	22,137	67,070
1976	1,484,940	1,099,952	437,855	27,500	80,242
1977	1,861,618	1,484,243	735,949	21,792	198,076
1978	2,291,514	1,851,320	943,645	32,321	146,283
1979	2,515,789	1,731,917	1,020,224	17,721	137,575
1980	5,284,570	2,010,073	1,823,958	26,262	167,121
1981	6,573,007	3,131,634	2,161,368	27,970	172,295
1982	4,300,647	3,226,358	1,551,484	45,087	194,073
1983	4,244,798	3,035,358	1,811,914	69,261	177,830
1984	4,012,041	2,323,601	1,724,021	96,144	181,399
1985	3,787,895	1,832,819	1,520,777	146,396	184,434
1986	3,597,356	1,854,275	1,928,190	88,717	146,936
1987	3,625,220	1,755,580	2,017,336	104,114	144,910
1988	3,103,079	1,573,996	1,554,391	74,482	179,449
1989	3,256,442	1,496,644	1,583,488	64,457	172,198
1990	3,302,808	1,495,739	1,546,848	60,373	152,336
1991	3,380,049	2,331,018	1,311,893	55,661	276,167
1992	3,969,276	2,280,125	1,612,075	48,907	177,783
1993	3,336,215	2,054,424	1,427,784	36,262	144,844
1994	3,015,634	1,596,260	1,131,057	20,610	112,172
1995	3,735,700	1,334,418	686,719	11,390	107,775
1996	3,454,327	1,398,021	916,206	53,266	281,235
1997	4,461,348.0	2,283,908.00	1,453,194.0	157,453.0	60,794.0
1998	2,729,112.0	1,548,681.00	1,104,061.0	37,023.0	42,350.0
1999	4,475,565.0	1,700,089	1,459,464.0	43,311.0	40,640.0
2000	4,475,568.0	2,093,866.00	1,508,065.0	13,808.0	60,082.0
2001	5,397,577.4	2,179,226.40	1,744,430.1	13,812.4	65,359.1
2002	6,556,675.5	2,275,129.80	1,567,863.1	23,106.0	62,841.2
2003	6,586,619.0	2,042,744.00	1,123,935.0	21,632.0	60,629.0
2004	N/A	N/A	N/A	N/A	N/A

SOURCE: **(a) CBN Statistical Bulletin, 2003**
(b) Department of petroleum resource
(Federal Ministry of mines, power and steel)

APPENDIX 5

ANNUAL GROWTH RATE OF PETROLEUM PRODUCTS (1970 – 2004)

Year	PMS Annual Growth Rate %	AGO Annual Growth Rate %	DPK Annual Growth Rate %	LPG Annual Growth Rate %	LB0 Annual Growth Rare%
1970	-	-	-	-	-
1971	20.7	25.1	13.7	26.3	39.0
1972	18.7	15.4	14.2	5.6	23.3
1973	16.0	22.8	4.1	36.6	73.2
1974	26.4	13.4	14.8	5.9	-33.8
1975	24.2	14.1	13.2	21.9	4.2
1976	35.4	34.5	31.4	24.2	33.1
1977	25.4	37.4	68.1	-20.8	121.9
1978	23.1	24.7	28.2	48.3	-26.1
1979	9.8	-6.4	8.1	-45.2	-5.9
1980	110.1	16.1	78.8	48.2	21.5
1981	24.4	55.8	18.5	6.5	3.1
1982	-34.6	3.2	-28.2	61.2	12.6
1983	-1.3	-5.9	16.8	53.6	-8.4
1984	-5.5	-23.5	-4.9	39.0	2.0
1985	-5.6	-21.1	-11.8	52.3	1.7
1986	-19.1	1.8	26.8	-39.4	-20.3
1987	0.8	-5.3	32.7	17.4	-1.4
1988	-14.4	-10.3	-22.9	-28.5	23.8
1989	4.9	-5.2	1.9	-13.5	-4.0
1990	1.4	-0.1	-2.3	-6.3	-11.5
1991	2.3	55.8	-15.2	-7.8	81.3
1992	17.4	-2.2	22.9	-12.1	-35.6
1993	-15.9	-9.9	-11.4	-25.9	-18.5
1994	-9.6	-22.3	-20.8	-43.2	-22.6
1995	23.9	-16.4	-39.3	-44.7	-3.9
1996	-7.5	4.8	33.4	367.7	160.9
1997	29.2	63.4	58.6	195.6	-78.4
1998	-38.8	-32.2	-24.0	-76.5	-30.3
1999	63.9	9.8	32.2	16.9	-4.0
2000	6.2	23.2	3.3	-68.1	47.8
2001	13.6	4.7	15.7	0.03	8.8
2002	21.5	4.4	-10.1	67.3	-3.9
2003	0.5	-10.2	-28.3	-6.4	-3.5
2004	N/A	N/A	N/A	N/A	N/A

Source: Extracted from appendix 4

APPENDIX 6

CONSUMER DEMAND INDEX (CDI) FOR PETROLEUM PRODUCTS (1970 – 2004)

Year	CDI for PMS (1992=100)	CDI for AGO (1992=100)	CDI for DPK (1992=100)	CDI for LPG (1992=100)	CDI for LBO (1992=100)
1970	10.61	15.33	11.77	19.25	18.43
1971	12.80	19.18	13.39	24.30	25.62
1972	15.19	22.14	15.29	25.66	31.59
1973	17.61	27.19	15.91	35.05	54.71
1974	22.26	30.85	18.26	37.13	36.19
1975	27.64	35.19	20.66	45.26	37.73
1976	37.41	47.36	27.16	56.23	50.20
1977	46.90	65.09	45.65	44.56	111.41
1978	57.73	81.19	58.54	66.09	82.28
1979	63.38	75.96	63.29	36.23	77.38
1980	133.14	88.16	113.14	53.70	94.00
1981	165.60	137.34	134.07	57.19	96.91
1982	108.35	141.50	96.24	92.19	109.16
1983	106.94	133.14	112.40	141.62	100.03
1984	101.08	101.91	106.94	196.59	102.03
1985	95.43	80.38	94.34	299.34	103.74
1986	90.63	81.32	119.61	181.40	82.65
1987	91.33	76.99	125.14	212.88	81.51
1988	78.18	69.03	96.42	152.29	100.94
1989	82.04	65.64	98.23	131.80	96.86
1990	83.21	65.60	95.95	123.44	85.69
1991	85.16	102.23	81.38	113.81	155.34
1992	100.00	100.00	100.00	100.00	100.00
1993	84.05	90.10	88.57	74.14	81.47
1994	75.97	70.01	70.16	42.14	63.09
1995	94.12	58.52	42.60	23.29	60.62
1996	87.03	61.31	56.83	108.91	158.19
1997	112.4	100.17	90.14	321.94	34.20
1998	68.76	67.92	68.49	75.70	23.82
1999	112.76	74.56	90.53	88.56	22.86
2000	112.76	91.83	93.55	28.23	33.80
2001	135.98	95.57	108.21	28.24	36.76
2002	165.19	99.78	97.26	47.24	35.35
2003	165.94	89.59	69.72	44.23	34.10
2004	N/A	N/A	N/A	N/A	N/A

Source: Extracted from appendix 4.

APPENDIX 7

NIGERIAN OFFICIAL PRICE FOR PETROLEUM PRODUCTION FROM 1970 - 2004 (IN KOBO/NAIRA PER LITRE)

YEAR	PMS	AGO	DPK
1970	N/A	N/A	N/A
1971	N/A	N/A	N/A
1972	N/A	N/A	N/A
1973	9.50	8.80	8.10
1974	9.50	8.80	8.10
1975	9.50	8.80	8.10
1976	9.50	8.80	8.10
1977	9.50	8.80	8.10
1978	9.50	8.80	8.10
1979	15.30	11.00	10.50
1980	15.30	11.00	10.50
1981	15.30	11.00	10.50
1982	20.00	11.00	10.50
1983	20.00	11.00	10.50
1984	20.00	11.00	10.50
1985	20.00	11.00	10.50
1986	39.50	29.50	10.50
1987	39.50	29.50	10.50
1988	42.00	35.50	15.00
1989	42.00/60.00	35.50	15.00
1990	60.00	50.00	40.00
1991	0.70	0.50	0.50
1992	0.70	0.55	0.50
1993	3.25	3.00	2.75
1994	11.00	9.00	6.00
1995	11.00	9.00	6.00
1996	11.00	9.00	6.00
1997	11.00	9.00	6.00
1998	11.00	9.00	6.00
1999	20.00	19.00	17.00
2000	22.00	21.00	17.00
2001	22.00	21.00	17.00
2002	26.00	26.00	24.00
2003	40.00	38.00	38.00
2004	53.00	62.00	60.00

Source:

a. Evans, J. and Todd, J..., Nigeria: Draft public sector pricing study, World Bank Mission
b. Federal government Budget of 1990
c. Daily Times, 2003 (Enwaiklide et al, 2004) and Guardian 2004).

APPENDIX 8
ELECTRICITY CONSUMPTION AND VALUE OF MAJOR IMPORTS TRANSPORT EQUIPMENT

YEAR	Total Electricity consumption (Million Kilo Watt Hours)	Value of Major Import: Machinery and transport Equipment (₦ million)
1970	1,272.8	285.3
1971	1,586.0	417.8
1972	1,848.9	391.9
1973	2,038.4	491.4
1974	2,331.1	561.8
1975	2,791.6	1,561.0
1976	3,239.3	2,467.2
1977	3,816.9	3,311.0
1978	4,419.1	3,573.4
1979	4,030.3	2,905.1
1980	4,703.1	3,650.4
1981	3,503.7	5,668.1
1982	5,969.9	4,569.9
1983	6,103.1	3,213.4
1984	5,478.5	2,568.1
1985	6,285.0	2,414.4
1986	7,376.7	2,277.8
1987	7,471.4	6,827.7
1988	7,476.7	8,900.6
1989	8,556.3	12,362.7
1990	7,870.5	18,515.8
1991	8,292.0	17,926.2
1992	8,698.0	62,158.3
1993	9,998.0	74,579.1
1994	9,593.9	46,232.0
1995	9,435.9	206,905.0
1996	9,051.7	129,404.1
1997	8,843.7	202,964.9
1998	8,521.2	195,956.0
1999	8,576.3	204,392.3
2000	8,688.9	232,075.8
2001	9,034.6	327,206.6
2002	12,842.4	376,901.5
2003	12,866.6	465,462.2
2004	N/A	N/A

SOURCE: CBN STATISTICAL BULLETIN 2003

APPENDIX 9
EXCHANGE RATE AND GROSS DOMESTIC PRODUCT AT 1984 CONSTANT FACTOR COST

YEAR	EXCHANGE (N/US $1.00)	YEAR	GDP AT 1984 CONSTANT FACTOR COST (N MILLION)
1970	0.7143	1970/71	54,148.9
1971	0.6955	1971/72	65,707.0
1972	0.6579	1972/73	69,310.6
1973	0.6579	1973/74	73,763.1
1974	0.6299	1974/75	82,424.8
1975	0.6159	1975/76	79,988.5
1976	0.6265	1976/77	88,854.3
1977	0.6466	1977/78	96,098.5
1978	0.6060	1978/79	89,020.9
1979	0.5957	1979/80	91,190.7
1980	0.5464	1980	96,186.6
1981	0.6100	1981	70,395.9
1982	0.6729	1982	70,157.0
1983	0.7241	1983	66,389.5
1984	0.7649	1984	63,006.4
1985	0.8938	1985	68,916.3
1986	2.0206	1986	71,075.9
1987	4.0179	1987	70,741.4
1988	4.5367	1988	77,752.5
1989	7.3916	1989	83,495.2
1990	8.0378	1990	90,342.1
1991	9.9095	1991	94,614.1
1992	17.2984	1992	97,431.1
1993	22.0511	1993	100,015.2
1994	21.8861	1994	101,330..0
1995	21.8861	1995	103,510.0
1996	21.8861	1996	107,020.0
1997	21.8861	1997	110,400.0
1998	21.8861	1998	113,000.0
1999	92.3428	1999	116,400.0
2000	100.1194	2000	121,207.8
2001	111.0166	2001	126,323.8
2002	120.4700	2002	131,489.8
2003	129.2230	2003	136,470.0
2004	N/A	2004	N/A

SOURCE: CBN STATISTICAL BULLETIN 2003

APPENDIX 10:

TRENDS IN INFLATIONARY RATE (1970-2004)

Year	Inflation rate %
1970	13.8
1971	16.0
1972	3.2
1973	5.4
1974	13.4
1975	33.9
1976	21.2
1977	15.4
1978	16.6
1979	11.8
1980	9.9
1981	20.9
1982	7.7
1983	23.2
1984	39.6
1985	5.5
1986	5.4
1987	10.2
1988	38.3
1989	40.9
1990	7.5
1991	13.0
1992	44.5
1993	57.2
1994	57.0
1995	72.8
1996	29.3
1997	8.5
1998	10.0
1999	6.6
2000	6.9
2001	18.9
2002	15.7
2003	11.3
2004	N/A

Source: CBN Statistical Bulletin 2003

APPENDIX 11
RESEARCH QUESTIONNAIRE
DEPARTMENT OF ECONOMICS
AHMADU BELLO UNIVERSITY
ZARIA.

THESIS TITLE: An Assessment of the Domestic Demand for Petroleum Products in Nigeria (1986 – 2004)

This research questionnaire is for the purpose of collecting data for the above titled thesis carried out in Zaria. Please answer the questions to the best of your knowledge by giving the correct information to the questions that will enhance the success of this research work.

The petroleum products consumed in Nigeria with respect to the limit of this research work are broken down into

a) Premium motor spirit (PMS) or petrol

b) Automotive gas oil (AGO) or diesel

c) Dual Purpose kerosene (DPK) or kerosene (Household) are used by different categories of consumers. The consumption of these commodity can be categorized into

(a) Domestic consumption (b) private motorist consumption (c) commercial motorist (Heavy and Light Vehicles) consumption and (d) motorcyclist consumption (Private and Commercial) and (e) Industrial Consumption (Heavy and Light Industries)

ASAOLU, TAIWO MOSS
M.SC/SOC.SCI/27730/2001-02
(STUDENT)

DOMESTIC CONSUMPTION OF PETROLEUM PRODUCTS

1. Do you consume any of these petroleum products Petrol, Diesel, Kerosene)
   Yes [ ] No. [ ]

2. If your answer to question 1 is yes, then indicates which of the products you consume
   a. Petrol [ ] b. Diesel [ ] c. Kerosene [ ]

3. How many liters of the following petroleum products do you consumed per week on average?

Number of Litres consumes per week	Petrol	Diesel	Kerosene
0 – 10			
11 – 20			
21 – 40			
Over 40			

4. Indicate the activities or uses of these petroleum products

Products	Uses	
	Generator	Cooking
Petrol		
Diesel		
Kerosene		

5. Is your demand for the product indicated above influenced by the following factors identified? Tick as appropriate

Products	Factors influencing demand for the products		
	Price	Income	Activities or uses
Petrol			
Diesel			
Kerosene			

6. Is your demand for petroleum products and the purpose demanded for influenced the substitutes and complementary products?

Products	Competitive Products		
	Electricity bill	Electricity supply	Wood
Petrol			
Diesel			
Kerosene			

7. If your demand for petroleum product in (5) is influenced by price of the commodity then what is the relationship between quantities demanded and the price of the commodity when price increases?
   a. Increased in demand [ ] b. decrease in demand [ ]

8. If your demand in (5) is influenced by the uses then how does the increase uses for the commodity affect the demand
   a. Increased in demand [ ] b. decrease in demand [ ]

9. If your demand in (5) is influenced by your income then what is the relationship between income and quantities demanded when income increase
   a. Increased in demand [ ] b. decrease in demand [ ]

10. It is a well-known fact that the demand for petroleum products in Nigeria is in competitive demand with other source of energy supply such as electricity. How do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?
   a. Increased in demand [ ] b. decrease in demand [ ]

PRIVATE MOTORCYCLIST DEMAND FOR PETROLEUM PRODUCTS

1. Do you own a motorcycle? Yes [ ] No [ ]

2. What type of motorcycle are you using? Tick the correct answer from the option given below
   a. Honda [ ] b. Yamaha [ ] c. Suzuki [ ]
   d. others _____

3. Is your motor cycle using petrol of diesel? Tick as appropriate
   Petrol [ ] Diesel [ ] Both [ ]

4. How many number of litres do you consumed per week on average?

Number of Litres consumes per week	Petrol	Diesel
0 – 10		
11 – 20		
21 – 40		
Over 40		

5. Is your demand for any of these petroleum products indicated in question (3) and (4) above influenced by the following factors. Tick as appropriate

Products	Factors influencing demand for the products		
	Price	Income	Activities or uses
Petrol			
Diesel			

6. If your demand for petroleum products in (5) is influenced by the price of the commodity, then what is the relationship between quantity demanded and the price of the commodity when price increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

7. If your demand in (5) is influenced by your income, then state the relationship between income and quantity demanded when income increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

8. If your demand in (5) influenced by the uses, then how does the increase? uses for the commodity affect the demand
   a. Increase in demand [ ] b. decrease in demand [ ]

9. It is a well known fact that the demand for petroleum products in Nigeria is in competitive demand with other sources of energy supply such as the

electricity. I low do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?

a. Increase in demand | | b. decrease in demand | |

COMMERCIAL MOTORIST DEMAND FOR PETROLEUM PRODUCTS (HEAVY VEHICLES)

1. Do you own a vehicle
   Yes [ ] No [ ]

2. What type of car/bus are you using
   a. Trailer [ ] b. Tanker [ ] c. Mercedeez 911[ ] d. Other [ ]

3. Is your vehicle using petrol or diesel?
   Petrol [ ] Diesel [ ]

4. How many number of litres do you consumed per week on average?

Number of Litres consumes per week	Petrol	Diesel
0 – 500		
501 – 1000		
1001 – 1500		
Over 1500		

5. What are the areas covered by your vehicles? Tick as appropriate in the options given below:
   a. Zaria – Kaduna [ ]
   b. Zaria – Kano [ ]
   c. Zaria – Lagos [ ]
   d. Zaria – Port Harcourt [ ]
   e. other
      i. _____
      ii. _____
      iii. _____
      iv. _____
      v. _____

6. Is your demand for the petroleum products indicated in question (3) above influenced by the following factors. Tick as appropriate

Products	Factors influencing demand for the products		
	Price	Total Revenue	Activities or uses
Petrol			
Diesel			

7. If your demand for petroleum products in (6) is influenced by the price of the commodity, then what is the relationship between quantity demanded and the price of the commodity when price increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

8. If your demand in (6) is influenced by your total revenue, then what is the relationship between total revenue and quantity demanded when income increases?
a. Increase in demand [ ] b. decrease in demand [ ]

9. If your demand in (6) is influenced by the uses, then how does the increase uses for the commodity affect the demand?.
a. Increase in demand [ ] b. decrease in demand[ ]

10. It is a well known fact that the demand for petroleum products in Nigeria is in competitive demand with other sources of energy supply such as the electricity. How do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?
a. Increase in demand [ ] b. decrease in demand [ ]

COMMERCIAL MOTORIST DEMAND FOR PETROLEUM PRODUCTS (LIGHT CARS)

1. Do you own a car/bus
   Yes [ ] No [ ]

2. What type of car/bus are you using
   a. Volkswageen [ ] b. Toyota bus [ ] c. Peugeot [ ]
   d. other [ ]

3. Is your bus meant for town service?
   Yes [ ] No [ ]

4. If the answer to question (3) above is no, then indicate _____

5. Is your bus using petrol or disease?
   Petrol [ ] Diesel [ ]

6. How many number of litres do you consumed per week on average?

Number of Litres consumes per week	Petrol	Diesel
0 – 50		
51 – 100		
101 – 150		
Over 150		

7. Is your demand for any of these petroleum products indicated in question (5) and (6) above influenced by the following factors. Tick as appropriate

Product	Factors influencing demand for the products		
	Price	Income	Activities or uses
Petrol			
Diesel			

8. If your demand for petroleum products in (7) is influenced by the price of the commodity, then what is the relationship between quantity demanded and the price of the commodity when price increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

9. If your demand in (7) is influenced by your total revenue, then what is the relationship between total revenue and quantity demanded when income increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

10. If your demand in (7) is influenced by the uses, then how does the increase uses for the commodity affect the demand?.
    a. Increase in demand [ ] b. decrease in demand[ ]

11. It is a well known fact that the demand for petroleum products in Nigeria is in competitive demand with other sources of energy supply such as the electricity. How do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?

a. Increase in demand [ ] b. decrease in demand [ ]

PRIVATE MOTORIST CONSUMPTION FOR PETROLEUM PRODUCTS

1. Do you own a car?
   Yes [ ] No [ ]

2. How many cars do you have? [ ]

3. What type of car/bus are you using?
   a. Mecedeez [ ] b. Honda [ ] c. Toyota [ ] d. Other [ ]

4. Is your bus using petrol or diesel?
   Petrol [ ] Diesel [ ]

5. How many number of litres do you consumed per week on average?

Number of Litres consumes per week	Petrol	Diesel
0 – 20		
21 – 40		
41 – 60		
Over 60		

6. Is your demand for any of these petroleum products indicated in question (4) and (5) above influenced by the following factors. Tick as appropriate

Products	Factors influencing demand for the products		
	Price	Income	Activities or uses
Petrol			
Diesel			

7. If your demand for petroleum products in (6) is influenced by the price of the commodity, then what is the relationship between quantity demanded and the price of the commodity when price increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

8. If your demand in (6) is influenced by your total revenue, then what is the relationship between total revenue and quantity demanded when income increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

9. If your demand in (6) is influenced by the uses, then how does the increase uses for the commodity affect the demand?.
   a. Increase in demand [ ] b. decrease in demand[ ]

10. It is a well known fact that the demand for petroleum products in Nigeria is in competitive demand with other sources of energy supply such as the electricity. How do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?

a. Increase in demand [ ] b. decrease in demand [ ]

COMMERCIAL MOTOR CYCLIST DEMAND FOR PETROLEUM PRODUCTS

1. Do you own a motorcycle? Yes [ ] No [ ]

2. What type of motorcycle are you using? Tick the correct answer from the option given below
   a. Honda [ ] b. Yamaha [ ] c. Suzuki [ ] d. others [ ]

3. Is your motor cycle using petrol of diesel? Tick as appropriate
   Petrol [ ] Diesel [ ] Both [ ]

4. How many number of litres do you consumed per week on average?

Number of Litres consumes per week	Petrol	Diesel
0 – 10		
11 – 20		
21 – 40		
41 – 60		
Over 60		

5. Is your demand for any of these petroleum products indicated in question (3) and (4) above influenced by the following factors. Tick as appropriate

Products	Factors influencing demand for the products		
	Price	Total Revenue	Activities or uses
Petrol			
Diesel			

6. If your demand for petroleum products in (5) is influenced by the price of the commodity, then what is the relationship between quantity demanded and the price of the commodity when price increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

7. If your demand in (5) is influenced by your income, then state the relationship between income and quantity demanded when income increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

8. If your demand in (5) influenced by the uses, then how does the increase uses for the commodity affect the demand?
   a. Increase in demand [ ] b. decrease in demand [ ]

9. It is a well known fact that the demand for petroleum products in Nigeria is in competitive demand with other sources of energy supply such as the

electricity. How do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?

a. Increase in demand [ ] b. decrease in demand [ ]

INDUSTRIAL CONSUMPTION FOR PETROLEUM PRODUCT

1. What is the capacity of your generating plant? [ ]

2. How many liters of the following petroleum products do you consumed per week on average?

Litres consumed per week	Petrol	Diesel
0 – 500		
501 – 1000		
1001 – 1500		
Over 1500		

3. Indicate the activities or uses of these products

Products	Uses			
	Generator		Fueling car	
	No. of liter	Cost per litre	No. of liter	Cost per litre
Petrol				
Diesel				

4. Is your demand for the product indicated above influenced by the following factors identified? Tick as appropriate

Products	Factors influencing demand for the products		
	Price	Total revenue	Activities or uses
Petrol			
Diesel			

5. Is your demand for petroleum product and the purposes demanded for influenced the substitutes and complementary products? Tick as appropriate

Products	Competitive Products	
	Electricity Bill	Electricity Supply
Petrol		
Diesel		

6. If your demand for petroleum products in (4) is influenced by the price of the commodity, then what is the relationship between quantity demanded and the price of the commodity when price increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

7. If your demand in (4) is influenced by your total revenue, then what is the relationship between total revenue and quantity demanded when income increases?
   a. Increase in demand [ ] b. decrease in demand [ ]

8. If your demand in (4) is influenced by the uses, then how does the increase uses for the commodity affect the demand?.
   a. Increase in demand [ ] b. decrease in demand[ ]

9. It is a well known fact that the demand for petroleum products in Nigeria is in competitive demand with other sources of energy supply such as the electricity. How do you think the epileptic electricity supply in the country affect the domestic demand for petroleum products?
   a. Increase in demand [ ] b. decrease in demand [ ]