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Trade in Nigeria's Petroleum Products Market: Theoretical Base for Oil Subsidy Removal Policy

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ABSTRACT

This article focused on detailed analysis of trade transactions within Nigeria's petroleum products market. It was aimed at developing theses which could be constituted into vibrant theoretical framework to support oil subsidy removal policy of the federal government. Study was designed as a descriptive survey. Data were sourced from National Bureau of Statistics, Nigerian National Petroleum Corporation and Central Bank of Nigeria. Data were analyzed using partial correlation and time series component of trend. Results indicate that: (1) There was a significant inverse relationship between demand and price of petroleum products (2) Trade on AGO tended towards market pricing system (3) DPK was more readily available during partial subsidy regime only at higher price than it was available during partial privatization regime (4) Trade on DPK tended towards market pricing system (5) PMS was more readily available at lower price during partial privatization regime than it was available at higher price during partial subsidy regime (6) Rise in price of PMS accompanied by a corresponding rise in its demand revealed PMS as pseudo-giffen good. Based on these findings, it was recommended, inter alia, that FG should embark on total oil subsidy removal in order to subject petroleum products to market pricing system for adequate supply of AGO, DPK and PMS at competitive prices.

Key words: demand, DPK, AGO, petroleum pricing, petroleum motor spirit (PMS)

1. Introduction

Recently the Goodluck Jonathan administration embarked on total oil subsidy removal in its efforts to curb the alleged corrupt practices and excesses of the independent oil marketers. This FG action represented a religious implementation of the recommendations made by inter-ministerial committee set up by the Abubakar administration in 1998. Notwithstanding the several Town Hall meetings convened, to discuss the economic prospects of oil subsidy removal, the measure had evoked widespread protests by trade unions, civil societies and the entire citizens of the country.

Through intense negotiations with trade unions, FG had settled for petroleum product prices below the market prices. Palliatives were provided to cushion the adverse effect of

oil subsidy removal. The government proposed a subsidy re-investment and empowerment programme (SURE-P) to harness revenue accruals from oil subsidy removal for the provision of basic infrastructures. By and large, these measures were considered a temporary panacea to the problems of revenue leakages in oil marketing through corruption, non availability of petroleum products and unaffordable petroleum product prices in Nigeria. However, it was not long before the unfolding events revealed that the temporary panacea constituted only a temporary solution to what is considered a permanent problem in Nigeria. Alleged corruption in the execution of SURE-P, non availability of petroleum products and their sky-rocketing prices soon cast an aspersion as to whether or not oil subsidy removal actually represent a viable option. This unsavory development has raised a number of issues bordering on demand-price nexus in petroleum products market, responsiveness of demand for automotive gas oil (AGO) to changes in price of AGO, responsiveness of demand for dual purpose kerosene (DPK) to changes in price of DPK and responsiveness of demand for premium motor spirit (PMS) to changes in price of PMS.

The present study was focused on addressing these issues. Unless these issues are addressed through a detailed analysis of transactions within the downstream oil sector, FG oil subsidy policy would lack a dynamic theoretical base for its implementation with its attendant evil of corroding the country's revenue base.

To address these issues, this paper is organized into five sections, including the running section on introduction. Section two deals with review of recent studies, section three deals with method of study, section four contains the discussion of results while section five concludes the study and makes some recommendations.

2. Recent Studies

Federal government programme on deregulation of downstream oil sector has remained an integral part of its privatization policy adopted in 1986. FG deregulation policy has evoked considerable research interests among scholars of diverse academic disciplines and orientations. It has become necessary, in this section, to review recent studies in related field in order to gain an insight into possible outcomes of the present study and so determine their applicability in providing a dynamic theoretical base for FG oil subsidy policy.

Bello (1990) infer that deregulation of the downstream oil sector is an effective measure to check smuggling and diversion of petroleum products to neighboring countries. He observed that there is a wide disparity in petroleum products prices between Nigeria and neighboring countries. According to him, smuggling of petroleum products across the borders contributes immensely to scarcity of petroleum products and the accompanying sky-rocketing prices of these products.

Anyanwu (1993) attributes the declining productivity in agriculture to overdependence on oil. Viewed thus, deregulation of the downstream oil sector could be an important step toward diversifying the economy.

NNPC (1993) observe that since the seventies oil has constituted the dominant source of revenue for financing Nigeria's development plans. Therefore, deregulation of downstream oil sector is a viable option to enlarge the country's revenue base and so achieve fast pace of economic development.

According to Ajagu (1995), petroleum contributes significantly to the revenue generated by the federal government. Deregulation of downstream oil sector would yield additional revenue from local consumption to finance the country's development plans.

Lukeman (1998) states that petroleum has been the most vital source of energy for the country's commercial and industrial development. Deregulation of downstream oil sector would curtail wasteful petroleum products consumption and save energy for productive activities.

NNPC (1999) reports that at least 600,000 barrels of petroleum products (about 5 million liters, per day) are lost to smuggling. This, NNPC had attributed to the phenomenal increase in the demand for petroleum products over the years, far above rational projections made by the corporation.

Anya (1999) reports that low energy prices encourage wasteful consumption, inefficient utilization and resource misallocation. He noted that Nigeria consumed about 370,000 barrels of petroleum products per day in 1997 and 460,000 barrels per day in 1998. If correct pricing were adopted, the excess of 90,000 barrels per day could have been conserved for export to earn foreign exchange or added to the country's strategic reserve.

Aminu (1999) observe that to maximize the already huge profits from smuggling petroleum product across borders to other West African countries, some unscrupulous Nigerians often resort to product adulteration with its attendant hazards. This unwholesome practice is induced by inappropriate price relativities resulting from subsidies on petroleum products.

In the words of Onwioduokit (2000), the economic crisis in Nigeria which reached its peak in 1986 was caused by the general depression in the international oil market. Deregulation of downstream oil sector would be useful for diversifying the economy and reducing Nigeria's overdependence on oil in order to put back the economy to the path of recovery.

According to Oshiomhole (2000), deregulation would squeeze the masses of this country to their bones especially the common man. He was of the view that participants and stakeholders in the oil sector would form an evil cartel to dictate their prices arbitrarily, cut down or withhold supplies indiscriminately to the detriment of the poor masses.

Tony (2000) affirms that deregulation of prices of petroleum products would have adverse effect on the entire economy. He was of the view that it would amount to an added cost on Manufacturing Association of Nigeria (MAN) for doing business. This added cost is likely to be shifted to the consumers.

Bussari (2000) points out that deregulation would lead to increase in prices of petroleum products. He stated that high prices of petroleum products will affect adversely students of primary, secondary and tertiary institutions from poor families who take buses everyday to their institutions.

According to Okoye (2001), breaking the monopoly of NNPC as sole supplier and distribution of petroleum products, creating enabling environment for indigenous and foreign entrepreneurs, and encouraging joint partnership to establish refineries will antagonize the economic well-being of Nigerians.

Onyechi (2007) concludes that deregulation of downstream oil sector was a viable option for Nigeria as this would induce competitiveness in the petroleum products market.

Agu (2009) reports that market system did not necessarily allocate resources efficiently. Accordingly, he advocated government intervention because there is no guarantee that the price system would solve "for whom" problem in such a way as to satisfy the ethical beliefs of members of society.

Mordi (2011) reports that subsidy is usually given by governments in both developed and developing nations either as incentives to some sectors of the economy or as social protection of the vulnerable groups of the society.

Oyaga (2012) reports that oil subsidy had benefited the "cabals" and not the target population. He had recommended that further importation of fuel should be stopped while new refineries are built and the existing ones revamped.

From the foregoing, it is evidently clear that there are inconsistencies in the findings reported by the authors, thereby leading to lack of unanimity among them on the efficacy of oil subsidy for removing imperfection in the petroleum product market. The conflicting findings have lent credence to the present study which could yield results that would mediate among the conflicting findings of earlier studies. Besides, review has also revealed three major sources of need for oil subsidy in Nigeria. The first was supply. The second was demand while the third source was price. This study related to the second and the third, that is, a detailed analysis of the degree of responsiveness of demand for petroleum products to changes in their prices. The results of this analysis would certainly find applicability in the modeling of a dynamic oil subsidy policy.

3. Method of Study

This study was designed as a descriptive survey. Descriptive survey was considered suitable since the research efforts were focused on describing the trend in demands and

prices of petroleum products in Nigeria. Data were sourced from National Bureau of Statistics, Nigerian National Petroleum Corporation and Central Bank of Nigeria. Data were analyzed using partial correlation and time series component of trend.

Partial correlation coefficient was applied for determining the nature and degree of relationship between demand for petroleum product and their prices. Time series component of trend was used for determining the responsiveness of demands for petroleum products to changes in their prices.

4. Results Presentation and Discussion

The results of data analysis have been presented in tables and figures and have been discussed under the following subheadings:

- a. Demand – price nexus in petroleum products market.
- b. Responsiveness of demand for AGO to changes in price of AGO.
- c. Responsiveness of demand for DPK to changes in price of DPK.
- d. Responsiveness of demand for PMS to changes in price of PMS.

a. Demand - Price Nexus in Petroleum Products Market

Partial correlation coefficients between demands for petroleum products and their prices were presented in Table 4.1.

Table 4.1. Partial r between Demand and Prices of Petroleum Products

Dependent Variable	Prices of petroleum products			Nature	Remark
	Independent Variable Demand for	Partial r	Signs of partial r		
AGO	-0.586	Negative	0.000	Inverse	Significant
DPK	-0.741	Negative	0.000	Inverse	Significant
PMS	-0.589	Negative	0.000	Inverse	Significant

As can be seen in Table 4.1, the partial r between the price of AGO and the demand for AGO was -0.586 ($p \leq 0.000$), partial r between price of DPK and the demand for it was -0.741 ($p \leq 0.000$) and between price of PMS and demand for it was -0.589 ($p \leq 0.000$).

The negative signs of these coefficients suggest that there were inverse relationships between the prices of these petroleum products and the demands for them. In other words, as the prices of these commodities were rising, the demand for them was falling and vice-versa.

Also, since $p \leq 0.000$ is less than $p \leq 0.05$, partial r of -0.586 , -0.741 , and -0.589 were considered to be significant. Thus, there were significant inverse relationships between demands for petroleum products and their prices.

The conformity of demand – price nexus in the petroleum products market has come as a surprise. One would expect that the existing imperfections in the petroleum products market could have distorted the operation of market forces. The finding is in agreement with the results reported by Onyechi (2007).

b. Responsiveness of Demand for AGO to Changes in Price of AGO

Moving averages of demand and price of AGO have been presented in Table 4.2. As can be seen in Table 4.2, between 1981 and 1986 (subsidy regime) demand for AGO decreased steadily at the rate of 62.85% per annum while during the corresponding period, price rose at the incremental rate of 0.02% per annum. For the period, 1987 – 1997 (partial privatization regime), demand for AGO rose at the incremental rate of 25% per annum while during the corresponding period, price rose at the incremental rate of 0.87% per annum. Between 1998 and 2012 (partial subsidy regime) demand for AGO decreased at the rate of 84.17% per annum while during the corresponding period, price rose at the incremental rate of 9.68% per annum.

Table 4.2. Moving Averages of Demand and Price for AGO in Nigeria's Petroleum Products Market

Year	Demand (Liters)	3-yr Moving Average	Price (₦)	3-yr Moving Average
1980	1,944.11		0.110	
1981	2,285.88	2,223.33	0.110	0.11
1982	2,439.99	2,414.73	0.110	0.11
1983	2,518.31	2,435.32	0.110	0.11
1984	2,347.67	2,340.34	0.110	0.11
1985	2,155.05	2,117.93	0.110	0.17
1986	1,851.07	1,909.09	0.295	0.23
1987	1,721.14	1,824.27	0.295	0.30
1988	1,900.60	1,874.05	0.295	0.31
1989	2,000.42	2,094.60	0.350	0.38
1990	2,382.79	2,255.67	0.500	0.47
1991	2,383.80	2,211.60	0.550	0.53
1992	1,868.20	2,539.91	0.550	1.37
1993	3,367.73	2,515.43	3.000	4.18
1994	2,310.35	2,677.43	9.000	7.00
1995	2,354.37	2,354.36	9.000	9.00
1996	2,398.37	2,413.04	9.000	9.00
1997	2,486.37	2,074.24	9.000	9.00
1998	1,337.99	1,938.85	9.000	12.33
1999	1,977.20	1,766.94	19.000	16.33
2000	1,985.64	2,209.13	21.000	20.33

2001	2,664.54	2,432.05	21.000	22.67
2002	2,645.98	2,562.08	26.000	26.33
2003	2,345.71	2,310.82	32.000	40.67
2004	1,910.76	2,218.19	64.000	55.00
2005	2,368.11	1,976.21	69.000	67.67
2006	1,649.75	1,800.94	70.000	74.75
2007	1,384.96	1,517.41	85.250	81.75
2008	1,517.52	1,344.31	90.000	91.75
2009	1,130.44	1,175.78	95.000	99.33
2010	879.37	995.90	108.000	102.52
2011	977.90	844.66	153.550	140.52
2012	676.73		160.000	

In general, demand trend for AGO was downward sloping while price trend was upward sloping. This is depicted in Fig. 4.1.

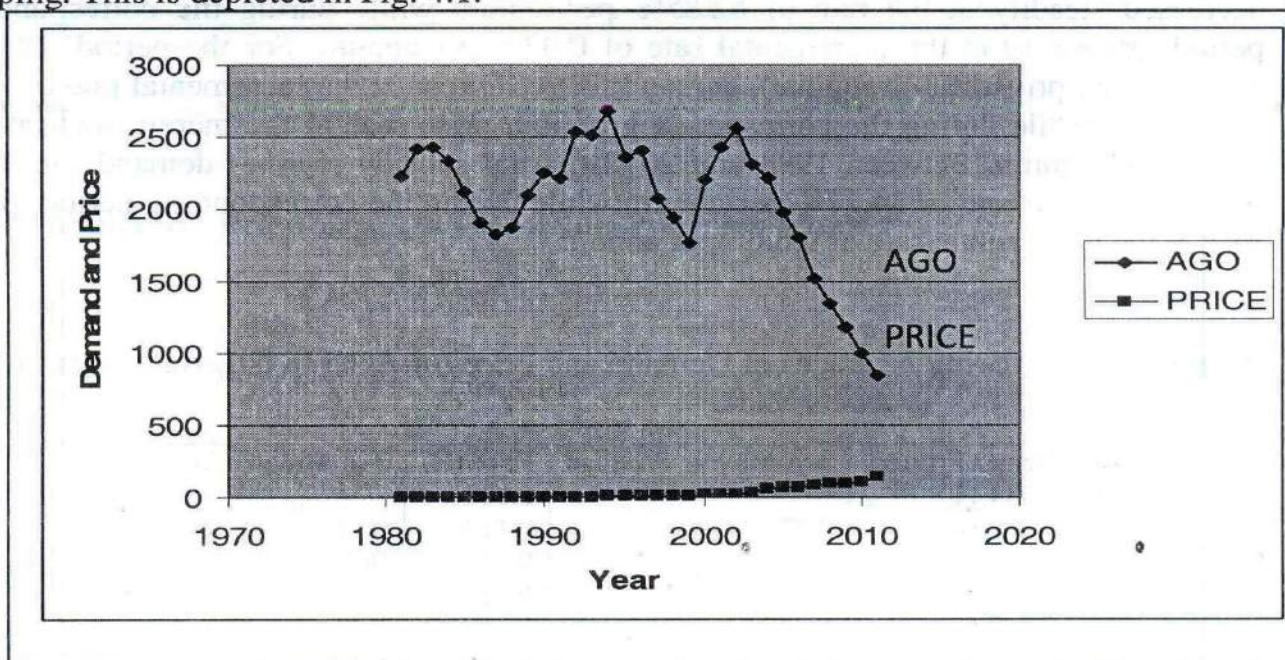


Fig. 1 Demand and Price Trends for AGO

As shown in the figure, AGO demand trend is steeper than its price trend. These results suggest that the demand for AGO was relatively more variable than its price. This is clearly reflected by the high level of interdependence between the two. The high degree of interdependence between price and demand for AGO implies that trade on AGO had tendency to conform to market pricing system. Based on this fact, it could be stated inferably that AGO market has no need for oil subsidy. This finding is in agreement with the findings of Maduabuchi (2011) and Ikuomola (2012) which indicate that subsidy removal was a viable option in the Nigerian situation.

c. Responsiveness of Demand for DPK to changes in Price of DPK

Moving averages of demand and price for DPK have been presented in Table 4.3.

Table 4.3. Moving Averages of Demand and Price of DPK in Nigeria's Petroleum Products Market

Year	Demand (in liters)	3-yr Moving Average	Price (N)	3-yr Moving Average
1980	1,201.83		0.105	
1981	1,385.29	1,357.67	0.105	0.11
1982	1,485.89	1,572.31	0.105	0.11
1983	1,845.76	1,693.75	0.105	0.11
1984	1,749.59	1,777.02	0.105	0.11
1985	1,735.71	1,802.77	0.105	0.11
1986	1,923.02	1,909.07	0.105	0.12
1987	2,068.48	2,049.80	0.150	0.14
1988	2,157.90	2,206.39	0.150	0.15
1989	2,392.80	2,274.69	0.150	0.23
1990	2,273.37	2,313.39	0.400	0.35
1991	2,273.99	2,096.14	0.500	0.47
1992	1,741.05	2,090.66	0.500	1.25
1993	2,256.95	1,875.11	2.750	3.08
1994	1,627.34	1,829.95	6.000	4.92
1995	1,605.56	1,598.30	6.000	6.00
1996	1,562.00	1,569.26	6.000	6.00
1997	1,540.22	1,377.98	6.000	6.00
1998	1,031.71	1,361.78	6.000	9.67
1999	1,513.42	1,212.06	17.000	13.33
2000	1,091.06	1,548.17	17.000	17.00
2001	2,040.03	1,681.29	17.000	19.33
2002	1,912.79	1,774.67	24.000	24.33
2003	1,371.20	1,372.84	32.000	35.33
2004	834.52	1,198.16	50.000	48.67
2005	1,388.75	1,050.07	64.000	63.00
2006	926.93	950.26	75.000	71.33
2007	535.10	813.76	75.000	77.33
2008	979.25	740.00	82.000	82.00
2009	705.66	784.49	89.000	97.00
2010	668.55	758.31	89.000	99.33
2011	900.71	733.41	120.000	113.00
2012	630.96		130.000	

As can be seen in Table 4.3, between 1981 and 1986 (oil subsidy regime), demand for DPK increased steadily at the incremental rate 110.28% while during the corresponding period, its price remained stable. During the period, 1987 and 1997 (partial privatization era), demand for DPK decreased steadily at the rate of 67.18% per annum while during the corresponding period, the price rose steadily at the incremental rate of 0.59% per annum. Between 1998 and 2012, (partial oil subsidy regime), demand for DPK

decreased steadily at the rate of 48.34% per annum, while during the corresponding period, its price rose sharply at the rate of 7.96% per annum. In general, the trend of demand for DPK was downward sloping while the trend of its price was upward sloping. This is illustrated in Fig.4.2

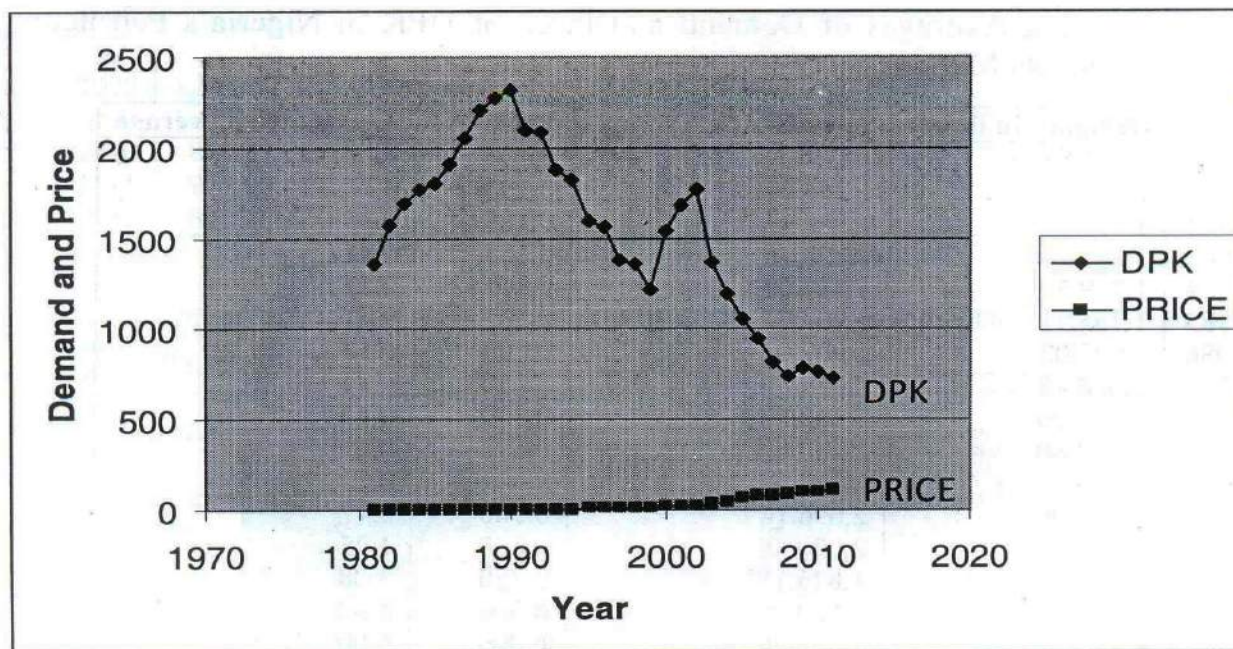


Fig. 4.2 Demand and Price Trends for DPK

Fig 4.2 depicts DPK demand trend as downward sloping curve and its price trend as upward sloping. The results suggest that DPK was more readily available to consumers during partial oil subsidy regime only at higher price than it was during partial privatization era. The implication of downward demand trend and upward price trend is that DPK transactions tended towards market pricing system.

It could be deduced from these results that FG oil subsidy removal policy aimed at encouraging private participation would dislocate further the already fractured pricing system within the petroleum products market. To put the downstream oil sector wholly into private hands would be tantamount to subjecting the petroleum products market to oligopolist market which could foster the formation of a cartel for the much-dreaded Nigerian cabals to thrive. Badmus (2009) and Afonne (2011) had also noted the economic consequence of the undesirable activities of importers of petroleum products.

d. Responsiveness of Demand for PMS to Changes in Price of PMS

Moving averages of demand for PMS and price of PMS have been presented in Table 4.4. Table 4.4 shows that for the period, 1981-1986, (subsidy regime), demand for PMS increased steadily at the rate of 50.11% per annum while for the corresponding period, its price increased steadily at the rate of 0.03% per annum. During the period, 1987-1997 (partial privatization regime), demand for PMS rose sharply at the incremental rate of

140.6% per annum while during the corresponding period, price rose steadily at the incremental rate of 1.60% per annum. Between 1998 and 2012 (partial oil subsidy regime), demand for PMS increased steadily at the rate of 38.94% per annum, while during the corresponding period, price of PMS rose sharply at the incremental rate of 4.74% per annum.

Table 4.4. Moving Averages of Demand for PMS and Price of PMS in Nigeria's Petroleum Products Market.

Year	Demand (in liters)	3-yr Moving Average	Price (₦)	3-yr Moving Average
1980	2,863.35		0.153	
1981	3,596.17	3,501.14	0.153	0.17
1982	4,043.91	3,940.51	0.200	0.18
1983	4,181.44	4,069.11	0.200	0.20
1984	3,981.98	4,046.73	0.200	0.20
1985	3,976.76	3,860.09	0.200	0.27
1986	3,621.52	3,751.71	0.395	0.33
1987	3,656.85	3,722.74	0.395	0.40
1988	3,889.86	2,515.57	0.420	0.47
1989	4,410.72	4,222.29	0.600	0.54
1990	4,366.30	4,381.91	0.600	0.63
1991	4,368.71	4,378.35	0.700	0.66
1992	4,400.05	4,701.85	0.700	1.55
1993	5,336.35	5,125.47	3.250	4.98
1994	5,640.01	5,561.37	11.000	8.42
1995	5,304.25	5,573.25	11.000	11.000
1996	5,775.50	5,663.68	11.000	11.000
1997	5,911.29	5,128.78	11.000	11.000
1998	3,699.55	5,180.32	11.000	14.00
1999	5,930.12	4,796.91	20.000	17.67
2000	4,761.07	5,944.64	22.000	21.44
2001	7,142.72	6,863.80	22.000	23.33
2002	8,687.60	8,185.42	26.000	27.33
2003	8,725.94	8,688.88	34.000	36.67
2004	8,653.10	8,674.43	50.000	49.67
2005	8,644.26	8,534.78	65.000	60.00
2006	8,306.99	8,603.68	65.000	65.00
2007	8,859.80	8,889.06	65.000	65.00
2008	9,500.38	9,288.60	65.000	65.00
2009	9,505.62	8,453.17	65.000	65.00
2010	6,353.52	7,182.53	65.000	65.00
2011	5,688.45	5,686.50	65.000	75.67
2012	5,017.54		97.000	

In general, demand trend was upward sloping while price also showed an upward trend. This is illustrated in Fig.4.3.

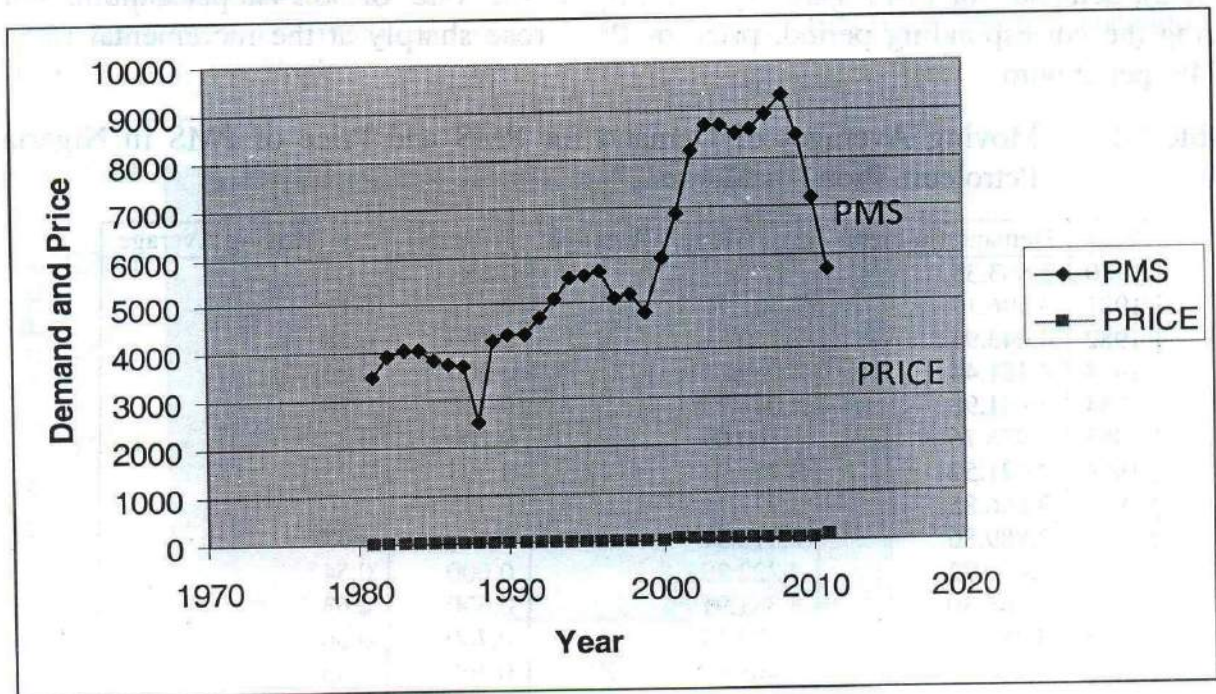


Fig 4.3 Demand and Price Trends for PMS

Fig.4.3 depicts both demand and price trends as upward sloping. These results indicate that PMS was readily more available at lower price during partial privatization regime than it was available at higher price during partial oil subsidy regime. Upward sloping demand and price curves imply that rise in price was accompanied by rise in demand.

The finding that PMS was more readily available at lower price during partial privatization regime than it was available at higher price during partial subsidy regime has not come as a surprise. After all, privatization programme is an integral component of its deregulation policy. The deregulation policy has as its objective the strengthening of private hands through smooth operation of market forces in pure competition. In the same vein, it could be argued that since subsidy distorts market forces, demand for PMS could only come at a higher price.

Moreover, there is the finding that rise in price was accompanied by rise in demand. This is rather surprising considering that PMS is not a giffen good since demand for PMS does not fall as its price falls. Certainly, PMS in Nigeria represents an archetype of 'pseudo-giffen' good. A possible explanation for the corresponding rise in demand and price of PMS is that subsidy creates a conducive environment for cartels to thrive. Often, cartels adopt unhealthy practices to constrict supply in order to induce higher demand at higher price. The activities of cabals in Nigeria's petroleum products market have already aroused the curiosity of several researchers including Okpole (2010), Nweze (2011), Yusuf (2011) and Omonijo (2012), to mention only a few.

Theses

Major inferences warranted by the results and accompanying discussion include the following:

1. There was significant inverse relationship demand for petroleum products and their prices.
2. Trade on AGO had tendency to conform to the market pricing system in Nigeria.
3. DPK was more readily available to consumer during partial subsidy regime only at higher price than it was during partial privatization regime.
4. Trade on DPK tended toward market pricing system.
5. PMS was more readily available at lower price during partial privatization regime than it was available during partial subsidy regime at higher price.
6. Rise in price of PMS accompanied by a corresponding rise in demand has put a garb of pseudo-giffen good on PMS.

5. Recommendations and Conclusion

Based on the above-stated theses, the article has recommended the following:

1. Federal Government should set up new refineries and revamp the existing ones in order to re-activate its participation in the provision of petroleum products as social goods.
2. Federal Government should embark on total oil subsidy removal to subject petroleum products to market pricing system.
3. Federal Government should pursue vigorously its policy of deregulation of downstream oil sector to facilitate the entry of small, medium, and large-scale enterprises and so install perfect competition in the petroleum products market.

Perhaps, what is a glaring outcome of this study is that oil subsidy distorts the pricing system in the petroleum products market in Nigeria. Oil subsidy had created an independent oil market within the country commodity market. This distinct market is managed by independent oil marketers who have constituted themselves into cabals with huge economic and political powers to control supply of petroleum products at a level that would keep the prices of these products high enough to maintain their huge profits. Thus, oil subsidy failed to equalize demand for petroleum products as social goods and demand for petroleum products as private goods thereby causing oil market failure in Nigeria.

Obviously, the crystallization of PMS from Nigeria's petroleum products market as pseudo-giffen good is a direct consequence of market failure. In turn, market failure was a result of conflicts between independent oil market and the commodity market which were accentuated by weak policies emanating from fragile theoretical base. It is in this respect that the theses developed in this study constitute a worthy contribution which would provide a vibrant and dynamic theoretical framework to support oil subsidy removal policy of the federal government.

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