



An Assessment of the impact of Petroleum Subsidy on Consumer Price Index in Nigeria

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Abstract

The partial removal of fuel subsidy in Nigeria in 2012 has generated a lot of argument in the Nigeria literature. A major policy concern on fuel subsidy reform is its adverse effects on the poor. This paper evaluates the impact of fuel subsidy reforms on consumer price index (CPI) since 1986. The study uses the co-integration and error correction model (ECM) to establish the relationship between fuel subsidy removal and CPI using data of the pump price of premium motor spirit (PMS) and CPI from 1986 to 2014. The study found that although the change in the fuel price does have short term impact on CPI, the short run impact is 12 percent. Only 0.2 percent of this distortion in CPI caused by such change is corrected within a year. This implies that fuel subsidy reforms will not lower the real household income or increase poverty, but could have permanent impact on the economy. The study opined that gradual removal of fuel subsidy is found to have little impact on the price of retail goods. Fuel subsidy reforms should be embarked upon and the fiscal savings invested in ventures that will increase the income and welfare of poor households.

Keywords: subsidy reform, CPI, poverty

1. Introduction

Energy is the mainstay for economic growth and development of any nation. It plays a significant role in the production of goods and services in all sectors of the economy. That is why countries find it necessary to subsidize and ensure citizens have access to energy that are of national importance. Government subsidize energy to address cases of market failure-mainly poverty especially in developing countries where subsidies are given to allow the poor participate in economic activities. Also, energy subsidy protects fragile economies from shocks in the international market (Onyishi, Eme & Eme, 2012).

Government policy on energy subsidy has been on for a long time with the sole aim of making vital energy accessible to citizens. Scholars such as Burmaux (1992), Heggie and Vickers (1998), and other world organizations (International Monetary Fund [IMF], 2012), (International Energy Agency [IEA], 1999) have advocated for energy subsidy removal because subsidies distort the true market price by failing to reflect the true market cost, it always lead to inefficient consumption and production of the subsidized goods (Sannders & Schneider, 2000). Subsidy reform although supported by positive economic theories, its application is quite challenging in sub-Saharan Africa as 46.8 percent of the population still live below one dollar a day (World Bank, 2011). The removal of subsidy will not only affect the poor directly but will affect the prices of goods and services in the economy thereby increasing the rate of poverty.

According to World Bank (1997) and the IEA (1999), energy consumption subsidy is any policy by the government that is aimed at reducing the price of energy consumed by citizens relative to what the price would have been in the absence of such policy. The regulated price arguably will reduce the consumer price index (CPI) and make it easy to regulate the level of inflation. One implicit implication of reducing the price of a product below its cost price is that, consumers tend to place less value on the product. Subsidy often leads to increase demand for PMS due to over use and waste arising from reduced price of the product, creating unnecessary shortage of supply.

The consumer price index (CPI) measures the average change in the prices of representative basket of goods and services purchased by households. It shows on average, consumer expenditures, cost of living and welfare of citizens living in a country. High prices of energy arguably trigger high inflation rate and consequently the CPI. Since the Nigeria economy largely depends on fuel (premium motor spirit [PMS]) especially for transportation of goods and provision of services (Ogubodede, Ilesanmi & Olurankinse, 2010). There is possibly relationship between the price of PMS and CPI in Nigeria. Although PMS is rarely used in production of most goods in Nigeria it is used for distributional purposes which add to the final cost of goods produced. This study seeks to ascertain the extent to which subsidy removal affects the poor by looking at the impact of the price of PMS on retail prices of goods and services in Nigeria.

Azel del Granado, Coady and Gillinghan (2012) argued that households with high income benefits more from subsidy than households with low incomes because they consume 20 times more fuel than those with low income. Since subsidies are on per unit of fuel consumed and not base on the level of income, the majority of funds allocated to subsidies are attributed to rich households who have the where withal to pay. They argued that subsidies increases inequality because it is a way of making the rich get richer and the poor get poorer. What remained unclear is the extent to which fuel subsidy reform will affect the poor in Nigeria.

For instance, Parikh, Purohit, and Maitra (2007), studied the demand projections of petroleum products and natural gas in India showed that in India, a 10 percent increase in prices of diesel decreases the real income across all income group by only 0.45 percent. However, there is no detail studies carried out to determine the impact of fuel (PMS) on CPI in Nigeria. In addition, removing energy subsidy should be based on the effect of such subsidy on the macroeconomic

variable such as CPI, inflation and GDP and how much effect such change will have on the welfare of the citizens. No adequate studies have been done on the impact of subsidy on CPI.

This paper attempts to respond to the following questions: What is the impact of subsidy reform on consumer price index? What type of subsidy reformed should be implemented in Nigeria?

This study is organized as follows; section 1 is an introduction to the study, section 2 reviews literatures on subsidy reforms and impact of crude oil price on the economy. Section 3 discussed the methodology used in analyzing the data of the study. The findings of the study are analyzed in section 4, while section 5 discussed the conclusion of the study.

2. Literature Review

The effect of subsidy reform on CPI is quite important because 90 percent of all transportation of goods and person in Nigeria is done through road transport which involves the use of fuel (Aketola, 2014). Thus, the impact of any subsidy reforms arguably have impact on the rich as well as the poor since such reforms directly affect household income.

Proponents of fuel subsidy such as Ogunbodede et al (2010) argued that subsidy is a social obligation to ameliorate the suffering of the economically disadvantaged keeping the price of fuel exceptional low absorbed the poor from fluctuating international price. But evidence have shown that such policy does not in reality favors the poor but the few rich (World Bank, 2010). In Nigeria for instance, poverty have not reduced since the introduction of subsidy rather the rate of poverty have increased. For example, the poverty rate in 1987 was 34 percent while in 2011 poverty rate was 67 percent (National Bureau of Statistics [NBS], 2012)-an increase of 33 percentage point. This is an indication that policies such as fuel subsidy hardly achieve its aim because of free-riding and crowd-out effect. Fuel subsidy does not target the poor and vulnerable in the society. The poor are mostly located in rural areas and suburbs of cities but the large amount of fuel is consumed in the cities.

Even if the benefits exceed its cost scholars such as Steiner (2008), argued that subsidies may not be the most efficient means of achieving social welfare goals because subsidies is not an effective way of redistributing income but accentuate inequality.

Olomola (2012) studied the impact of oil price shock on aggregate economic activity in Nigeria. He used the Vector Autoregressive (VAR) model to assess the volatility of GDP, Money supply, exchange rate, CPI caused by change in oil price. He found that change in oil price have no significant impact in all the dependent variable except for exchange rate. Azel del Granado and et al (2012) found that an increase in in the price of fuel (diesel) by \$0.25 per liter increases the cost of living across all income groups by 6 percent. They argued that about half or more of the increase in the cost of living was due to the indirect effect of diesel on the prices of other goods especially in countries where diesel forms a major energy source of production.

IEA (1999) pointed out that the elimination of energy subsidies reduces environmental degradation, increases social welfare, promote economic efficiency and resource allocation and increases energy intensity. In addition, the removal of energy subsidies affect prices, increase the cost of production and may distort the economy. Other normative reasons for subsidizing energy prices arguably are to ensure the security of energy supply, increase competitiveness of local firms, support households income and to protect domestic jobs.

Barnes and Floor (1996) argued subsidy does not encourage competition because subsidy by it very essence distort the efficient working of the market. Efficient pricing involves raising all energy prices to capture their full cost. They pointed out that a government should support a market oriented policies that will make energy accessible and attractive to investors and consumers. This will increase the incentive to use energy efficiently because consumers will be encouraged to invest in energy efficient equipment and technology.

IMF (2013) maintained that any subsidy program that is poorly planned is more likely to face widespread opposition. In planning for subsidies those who would be affected and how they will benefit should be taken into consideration. The problem of most energy subsidy program arguably is its poor planning and inability to meet its target population.

Aliyu (2009), studied the impact of oil price shock and real exchange rate volatility on gross domestic product (GDP) in Nigeria. He employed the cointegration technique to determine the volatility of GDP to change in oil prices and exchange rate. The result of the long run analysis showed that an increase in the oil price by 10 percent increases GDP by 7.7 percent. Also, a 10 percent increase in exchange rate will increase GDP by 0.35 percent. His work showed that the short run mechanism has a significant impact on the long-run equilibrium. He opined that to reduce the impact of oil, the economy should be diversified.

2.1 Theoretical framework

Poverty gap theory

This theory was propounded by Foster, Greer and Thorbeck (1984) to measure inequality in a nature. The theory is use to explain the impact of a shock on a nation. The theory emphasis that poverty should be measured not just base on average of the per capita income of the population but should be sensitive to the distribution of income among the citizens of a country especially the poor.

The theory uses the Gini coefficient to estimate the degree of income inequality among the citizens of a nation. The measure of Gini coefficient is important because the effect of any economic shock differ greatly across different income groups which also depend on the level and distribution of resources in a nation. This is because if there is high inequality and poverty in a country, savings rate tends to be low. Thus, increasing government expenditure by imposing high tax on the rich in a bid to reduce poverty may lead to a reduction in growth rate (Todaro & Smith, 2009). Scholars, such as Kuznets (1995) and Alesina and Rodrick (1994) have shown that viewed from the macro perspective, increasing the income of the poor will in the long run increase over all expenditures and investment. This is because with the increase in the income of the poor and middle income class demand and growth will increase.

The theory maintained that government policies should be based on two principles: the monotonicity principle and distributional sensitivity principle. The monotonicity principle states that if income is added to someone below the

poverty line, holding other things constant, poverty level will not be higher than it was. The distributional sensitivity principle states that holding other things constant, if income is transferred from the poor to the rich, poverty is increased. Based on these principles to reduce poverty, government policy should aim at redistributing income in favor of the poor. The theory is important because any desirable subsidy reforms should be sensitive to the distribution of income and income level of people living a country.

3. Methodology

The study elicited yearly data of consumer price index (CPI) and price of Premium motor spirit (PMS) obtained from the National Bureau of Statistics (NBS) and the Nigeria National Petroleum Cooperation (NNPC) respectively for the year 1986-2014.

The Augmented Dickey Fuller (ADF) and the Phillips-Perron tests are used to test the stationarity of the data. The unit roots equation for trend and intercept for LCPI and PMS are stated thus:

$$\Delta LCPI_t = \alpha + \psi_t + \gamma \Delta LCPI_{t-1} + \varepsilon_t \text{-----eqn1}$$

$$\Delta PMS_t = \alpha + \psi_t + \gamma \Delta PMS_{t-1} + \varepsilon_t \text{-----eqn2}$$

Where α and ψ_t are the intercept and trend components of the data respectively. ε_t is the stochastic component that is independently and identically distributed as a normal distribution with zero mean and constant variance. The null hypothesis of the unit root test is that both CPI and PMS follow a random walk process. Thus, we expect $\gamma = 0$. If we fail to reject the null hypothesis in any of the time series it means that particular time series is not stationary and we need to difference the series until stationarity is achieved. To avoid possibility of committing a type II error the Schwarz Information Criterion (SIC) is used to determine the lag length.

To determine the short term dynamics and the long term dynamics of subsidy removal the study uses the cointegration and the Error Correction Model (ECM) to establish if there is a long-run relationship between fuel pump price and CPI. The cointegration analysis states the long-run relationship between the subsidy removal and CPI. According to Engel and Granger (1987), the cointegration technique ensures that although the individual variables may not be stationary, but the linear combination may be stationary. If two variables are cointegrated, the relationship between them can be expressed as ECM. The ECM corrects for deviation between the long run and the short run. The study also conducted a unit root test to test for the stationarity of the variables and order of integration.

The model for this study is specified thus:

$$LCPI_t = \alpha + \beta LPMS_t + \varepsilon_t \text{-----eqn3}$$

Where LCPI is the log of CPI and LPMS is the log of PMS, ε is the error term. If price and CPI are cointegrated it means that both CPI and PMS share some stochastic trend and a linear combination of them is assumed to be stationary and therefore ε_t will be stationary. If ε_t is stationary then the ECM can be specified thus:

$$\Delta LCPI_t = \alpha + \beta \Delta PMS_t + \delta ECM_{t-1} + \varepsilon_t \text{-----eqn4}$$

Equation 4 shows the short run adjustment mechanism. The value of δ determines how fast any disequilibrium is restored. That is the ability of CPI to converge towards its long run equilibrium level after the shock of the subsidy removal.

4. Data analysis and result

The unit root test was used to assess the series properties of the variables in the model. This study employed the Augmented Dickey Fulley (ADF) and Phillips Perron (PP) unit root test to determine the order of integration of the variables in the model. The lag length as determined by SIC is seven. The null hypothesis of the ADF and PP tests is that all the variables have unit root thus not stationary. The result of test is shown below:

Variables	Levels		First Difference		Second Difference	
	ADF	PP	ADF	PP	ADF	PP
CPI	-1.68	-1.40	-4.14**	-2.5	-4.74*	-8.54*
PMS	-1.67	1.37	-5.94*	-8.97*	-3.94**	-27.52*
ECM	-3.52*	-3.19*	-	-	-	-

*and ** indicates if a variable is statistically significance at 1% and 5% respectively
The MacKinnon critical values of constant and trend are -4.031(1%), -3.445(5%) and -3.148(10%).

The results of both the ADF and PP unit root tests are presented in table 1. Both the CPI and PMS are not stationary at level but they are stationary at first difference. CPI and PMS are integrated to the order 1 [I(1)], which means that there is possibility of a long run co-integrating relationship between the two variables. The unit root test of the residuals as shown in the table shows that it is stationary at level.

$$\widehat{LCPI}_t = 1.64 + 0.78LPMS_t$$

(25.01) (35.6)

$$R^2 = 0.97 \quad DW = 1.23$$

The result indicates that a one percent increase in the price of PMS will cause CPI in Nigeria to increase 78 percent.

This meets our a priori expectation, since increasing the price of PMS leads to increase in CPI.

The value of the cointegrating relationship is presented below:

$$\Delta LCPI_t = 0.144 + 0.12 \Delta LPMS_t - 0.002 ECM_{t-1}$$

(5.03) (1.89) (-1.24)

$$R^2 = 0.138 \quad DW = 1.03$$

The short run change in CPI is only about 12 percent and significant at 10 percent suggesting that the short run impact of an increase in the price of PMS is small. The error correction mechanism shows about 0.2 percent of the discrepancy between the long run and short run is corrected within a year. This is to say any disequilibrium due to shock in the short run is corrected almost immediately. The result however shows that the error correction mechanism is not significant implying that the impact of an increase in the price of PMS on CPI is permanent and usually the price of goods does not return to their initial equilibrium.

5. Conclusion and Recommendation

The study found that the short run impact of an increase in the price of PMS on retail price of goods although small but tend to be permanent. The price of retail goods tends not to revert to their original equilibrium price as shown by the error correction mechanism which could trigger inflation. The result suggest that the removal of subsidy does not have significant impact on the CPI, thus the poor is not severely affected. However, high price of PMS may have permanent impact on the economy, since the return to initial equilibrium is very slow and insignificant.

Thus, a policy recommendation is that if the price of PMS increases moderately, the prices of retail goods are not affected in such a way that inflict penury on the poor. The study opined that if subsidy on PMS is removed gradually it will not have adverse impact on the economy and subsequent subsidy policy should be design to overcome market failure that will improve social welfare.

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