Implication of Switching Fuel Subsidy on Households Welfare in Nigeria

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Abstract:

A critical view of how the various fuel pricing policies directed towards addressing the challenges of the fiscal stability of Nigerian economy will translate to improved social welfare is farfetched. This study used a static computable general equilibrium model to assess the impact of phased and withdrawal of PMS consumption subsidy as well as their alternative curtailing policies on the welfare of farm and non-farm households in Nigeria. Results showed that partial and total PMS subsidy reform with the subsidy gains conserved reduced households consumption level, increased their expenditures on all commodities and reduced social welfare by a worst ₦70.47 billion and lowest ₦40.80billion. However, an alternative policy of reallocating fuel subsidy into the crop and service sectors contributed largely to increased household consumption basket and utility increased as low as 0.11% on phased PMS subsidy reform measure among urban non-agriculture and as high as 0.35% among rural agricultural households on account of subsidy withdrawal measure. Thus, social welfare increased from a minimum gain of about ₦43.42 billion on the alternative policy to phased PMS subsidy reform and a maximum gain of about ₦67.90billion on the alternative policy to PMS subsidy withdrawal. Keywords: fuel subsidy, reform, consumption, households, welfare

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1. Introduction

1.1. Fuel subsidy problem

Nigeria is the largest oil-producing country in Africa. Export of petroleum is the mainstay of the its economy and the major source of revenue for the country, contributing over 95% to export earnings and 70% total government revenue. It export over 80% of crude petroleum and import over 70% of refined products to meet the domestic demand (IEA 2012), as the domestic refineries are not capable to meet growing demand. Petroleum products accounted for the most highly consumed energy source of about 36% in 2009 next to biomass (Sambo, 2012 and Isa *et al*.,2013). The products consist mostly of premium motor spirit (PMS) commonly known as gasoline and automotive gas oil (AGO) commonly used for transportation and power generation (Badmus *et al*., 2012; Desalu, *et al*., 2012; Fagoyinbo, 2014). It also includes household

kerosene for cooking and lighting in households amongst others. Among these products, premium motor spirit is widely consumed constituting about 76.4% annually.

Until 2005 and now, the price of petroleum products have been regulated through subsidy as their domestic prices have been below their import costs. The government finances the gap through subsidy, even when there is a bigger gap arising from higher international price. These costs have grown over years between 1.5% and 3.4% of yearly GDP from 2006 to 2011 and had cost over 39% of the government expenditure in 2011 (Adenikinju, 2010). The growing subsidy cost has drawn attention to questions of sustainability as it is being financed at the expense of the real sectors growth in the economy such as agriculture, manufacturing and service sectors. On the consumer side, subsidy has proven to be regressive, benefitting largely the richest group (IEA, 2011; CPPA, 2012). The above challenges have informed a corrective measure of subsidy withdrawal in the country in 2005, which was reversed to a gradual withdrawal due to extensive strikes and violent public protests particularly by low-income population groups (IEA, 2014).

Studies have shown that subsidy cut or withdrawal has a distributive effect on the its own commodity price and prices of other commodities such as transportation, food, manufactured goods amongst others (Nwafor *et. al*, 2006, Adenikinju, 2012 ; Dartanto, 2012; Manzoor *et al.*, 2009 and Oktaviani *et al.*,2005). It alters the production cost and outputs of economic activities in the short run due to input-output linkages which in turn affects income of households (Bresinger *et al*., 2012; Manzoor et. al, 2009; Fofana *et al.*, (2009)). Increases total consumption expenditures of producers and households (Nwafor,*et al.*2006; Oyekale and Udia, 2007; Adenikinju, 2012) imposing high cost of living high for an average consumer, changes consumption behaviour (Lutz, 2007) and enforces welfare reduction (Manzoor *et al.*, 2009; Ayele, 2012).

These negative conditions driven by phasing-out or withdrawing energy subsidies, presumably stems from the indirect effect which contributes about 60% of the total effect of the policy shift without compensation (Granado et al.,2010). Thus,such policy shift has impinged adverse effects on social welfare, rise in poverty and inequality and affect macroeconomic components positively (Ikhsan *et al*., 2005; Yusuf and Resosudarmo, 2008; Dartanto, 2012; Bresinger *et al*., 2012 and Ayele. 2014). However, the degree of poverty increases among rural and farm households in developing countries (Indonesia, Iran) is higher than urban households

(Oktaviani *et al.*,2005 and Manzoor *et al*.,2009). Thus, in Nigeria, evidence has shown that the rural poor which constitute about 48.5% of the total households were the worst hit by subsidy reform (Omenka and Adenikinju, 2013). They tend to become poorer and worst affected by subsidy withdrawal (poverty increased by 3.23%) without any form of mitigation measure than the urban households (reduced by 5.23%) (Nwafor *et al.*, 2006). This implies that about 75.6% of the total households who are rural dwellers with farming the main means of livelihood (NBS, 2010) were affected due to their limited income from farming and fishing. Thus, a well thoughtful measure of giving back to the vulnerable or the most affected is expected. However, some empirical studied have reported that some compensation strategies were either progressive nor distributive as they sometimes favour a group of households significantly than the other. For instance, compensation through cash transfers to Nigerian urban and rural households that disregard households' heterogeneity favoured rural households and disfavoured urban households (Nwafor,*et al*., 2006). Similarly, cash transfers and food subsidy were more beneficial to rural than to urban households in Indonesia (Oliver *et al*., 2015). Labour tax support was less beneficial to rural households because of greater importance to informal sector (Oliver *et al*., 2015). Other instances of increasing government expenditure or fiscal policy with all proceed from subsidy, increased total rural consumption expenditure in Nigeria, while those of urban households reduced (Omenka and Adenikinju, 2013). Similarly, Nwafor, *et al*.,(2006) reported an increased urban poverty and decreased rural poverty. At these instances, alternative compensatory measures to subsidy shock are necessary. In analysing the effect of the alternative policy measure, the study will provide responses to the following questions; what is the consumption structure of the Nigerian households? What impact has the energy pricing policy reforms and curtailing measures on households? What is the implication of the policies on households' welfare?

Thus, the study examines the impact of phased and outright withdrawal of PMS subsidy and their alternative savings transfer policy to production sectors as means of compensating households in Nigeria. The rest of the paper is organized as follows: Section 2 presents the theoretical background of the study; section 3 describes methodology used for the study, section 4 presents the results and conclusion follows.

1.2. Theoretical Framework

Consumer theory relates the consumption of goods and services to consumption expenditures. The theory emphasized that the consumption of a consumer respond to change(s) in external factors. The theory assumes that the number of commodities in a space is finite (say L), with the commodity bundle $x = [x_1 \ldots x_L]$ and viewed as a point R^L+ (commodity space)(Andreu *et al.*, 1995 and Levin and Milgrom 2004). However, the consumption choices are typically limited by a number of physical constraints like environmental (limited bundle in the environ), institutional (government policy) and most importantly economic constraint in which case consumption choice is limited to those commodity bundle that one can afford (Andreu et al. (1995). The set of consumption bundle is a set of commodities represented as;

$$X = R^L+ = \{X \in R^L; X_i \geq 0 \quad \text{for } i = 1 \ldots L\}$$

In formalizing the economic constraint, it is assumed that; (i) the commodities are traded in the market at a price that is publicly quoted (universality of markets). Such prices are represented as price vectors; $P = [p_1 \ldots p_L] \in R^L$. However, the affordability of a consumption bundle depends on; (a) the market price $P = (p_1 \ldots p_L)$, (b) the consumer's wealth level w. However, there is a consensus that consumer demand, which is based on the relation between price and wealth is objective at meeting consumer's certain level of satisfaction. On this conclusion, consumer is faced with challenges of preference to his/her demand at attaining a maximum utility within his limited wealth or a certain utility level expected to be greater than the initial utility by minimizing his/her expenditure. Such utility level which is equated as welfare in economics is associated with a person's good, benefit, advantage, interest, prudential, value, happiness, flourishing, eudemonia and quality of individual's life. Most time it is related to consumer surplus (Manzoor, 2009 and Netherland Competition Authority, 2011). However, the capacity to attain a certain level of welfare is measured by a consumer's income, assets and access to credit (The international Labour Organization, 2003) and actual consumption. Michael and Robin (2014), explained the theoretical bases of welfare pioneered by the classical and neoclassical economists and the utility of a social group or institution is achieved by the greatest sum of their consumptions.

$$\sum_{i=1}^{N} k(i)U(i)$$

However, the external factor that can influence income asset and consumption of a consumer could be economic, political and ideological forces interaction of a public policy. The interaction provides the basis and justification of a welfare improving ability (Pearson, 2012). However, an understanding of welfare policy requires the ability to grasp its economic justifications and consequences that underlie the policy decisions. Sabara (2012) asserts that policy is formulated to attain some goals and objectives and the output of subsidy is needful ensuring its continuity (Harvey, 2005).

2. Methodology

2.1. Structure of the models

A CGE model was used to determine the impact of energy price policy changes and their alternative shock measures on households in Nigeria. This model was inspired by the energy based model of Nwafor *et al*.,(2006), Manzoor *et al.* (2009), Erero (2010) and Chitiga *et al.* (2010). The PEP-1-1version 2.1 Standard Single Country Static Model developed by Decaluwe *et al.* (2013) was adopted. The models follow as below.

I) Production and Factor Demand Block:- Production system in the model is a nested structure. Each productive activity combines value added and total intermediate consumption in fixed shares following the Leontief production function. Industry's value addition combines labour and capital as factors of production, following a constant elasticity of substitution specification (CES). It is assumed that intermediate inputs are perfectly complementary and combine following a Leontief production function.

$$Industrial\ output - \quad XS_j = VA_j + CI_j \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$Value\ added - \quad VA_j = B_j^{VA}\left[B_j^{VA} LD_j^{-RjVA} + \left(1 - B_j^{VA}\right) KD_j^{-RjVA}\right]^{-\frac{1}{RjVA}} \qquad \ldots\ldots\ldots\ldots\ldots (2)$$

Import price

$$PM_i = (1 + ttim_i)\left[(1 + ttim_i)ePWM_i + \sum_{ij} PC_{ij} tmrg_{ij,j}\right] \qquad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Purchase price of composite commodity

$$PC_i = \left\{\frac{PM_i IM_i + PD_i DD_j}{Q_j}\right\} pcrti \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Consumer price index

$$PIXCON = \frac{\sum_i PC_i \sum_h C_{i,h}^o}{\sum_{ij} PC_{ij}^o \sum_h C_{ij,h}^o} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (5)$$

II) Income and Savings Block:- In this model, household income comes from three sources; labour income, capital income and transfers received from other agents (transfers from firms, government and the rest of the world).

$$YH_h = YHL_h + xYHK_h + YHTR_h \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (6)$$

III) Demand for Commodities and Utility:- Household's demand is assumed to have a Stoney Geary utility function from which its linear expenditure system is derived. The utility function is based on the assumption that there is a minimum level of consumption of each commodity. Hence, each type of household demand for each good is determined by utility maximization subject to household's budget constraint.

Household demand for commodities

$$PC_i C_{ih} = PC_i C_{ih}^{MIN} + \Upsilon_{i,h}^{LES}\left(CTH_h - \sum_{ij} PC_{ij} C_{ij,h}^{MIN}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

$$U_h = In\left\{\left(C_{ih} - C_{ih}^{MIN}\right)\sum \gamma_{ih}^{LES}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (8)$$

Where

YH_h : Total income of type h households
YHK_h : Capital income of type h households
YHL_h : Labour income of type h households
$YHTR_h$: Transfer income of type h households
SH_h : Savings of type h households
PIXCON : Consumer price index
η: Price elasticity of indexed transfers and parameters
e: Exchange rate
sho_h : Intercept (type h household savings)
$sh1_h$: Slope (type h household savings
PWM^i: World import price of commodity i
PC_i : Purchaser price of composite commodity i (including all taxes and margins)
$Pm_{i:}$ Import price of commodity i
$ttim_{i:}$ Import tax rate of commodity
$tmrg_{ij,j}$: Sectors trade margin on commodity i

$C_{i.h}$: Consumption of commodity i by type *h* households

$C_{i,h}^{MIN}$: Minimum consumption of commodity i by type h households

CTH_h: consumption budget of type h households

$\gamma_{i,h}^{LES}$: Marginal share of commodity i in type h household consumption budget

ln: Natural logarithm

U_h: Household utility level

III) Hicksian equivalent variation in income was used to evaluate the gain or loss of phased and total withdrawal of PMS subsidy as well as their alternative measures on households following the pattern of Andnt *et al.,(*2008) and Obi-egbedi *et al*.(2013). The equivalent variation (EV) takes the old equilibrium income and prices and computes the change required to achieve utility levels reached in the new equilibrium.

$$EV_h = \frac{(U_h^1 - U_h^0)Y_h^0}{U_h^0} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \quad (6)$$

Where

U_h^0 is the initial utility level of a typical household before price change

U_h^1 is the utility level of a typical household after price change

Y_h^0 is the initial income of typical household

EV>0 increase in household welfare; EV<0 decrease in household welfare

2.2. Data

The built Nigerian SAM from 2011 input –output table served as the benchmark for the calibration of the model. It consist of 9 aggregated sectors which include crop, livestock, mining, PMS, DPK, manufacturing, electricity, transport and services with 9 commodities (each sector is assumed to produce a single commodity). The representative households are disaggregated into 4 households based on the dominant occupation of a household. These include households in rural agriculture, urban agriculture, rural non-agriculture and urban non-agriculture. Elasticities in the model were sourced exogenously from other empirical works of Nwafor *et al*., (2007) and Adenikinju *et al*., (2009) among others.

Simulation Experiment in the model: Three major categories of policies were simulated in this study captioned as;

A) *Subsidy reform policies:*-They were viewed in two forms as

Phased reform: - This was captured as partial subsidy reform. This policy reform goes with PMS price review. Until 2005, the rate at which PMS subsidy were administered were not

known. It becomes difficult to work with the face subsidy cost and simulate any of such policy adjustment using the actual adjustment rates. The need to work with the retail price of each commodity arose here, as subsidy reform reflects in the price of the commodities. From 2005, the highest pump price on PMS was ₦97 per litre which was about 49.23% larger than the pump price of ₦65 per litre in the previous years. The study, simulates using the largest price band of PMS as proxy to import subsidy cost adjustment rate as adopted by Ayele (2014). This could help to examine the largest impact, the phased subsidy adjustment specification would have transferred on consumers. Besides, the base year subsidy for PMS computed from the SAM reads 55.67%.

Therefore, the study simulates the options of

1) Reducing PMS subsidy by 49%

Outright Withdrawal of subsidy: - In 2005, the federal government came up with total deregulation policies to encourage private participation and boost economic efficiency which would allow price liberalization. This necessitates experiment on outright subsidy withdrawal on PMS. Hence, we simulate;

2) 100% PMS subsidy withdrawal

B) Reallocation policies:- This experiment is to serve as an alternative short term mitigation measure to the negative effect of energy price shock on social welfare. Since the inception of SURE-P in 2012, the gains from reducing subsidies have been directed to a wide range of programmes that is difficult to estimate the gain/losses as there are no clear shares directed to the projects. From then till now their contribution to reducing the high rate of poverty among the vulnerable predominant in the rural areas are insignificant as poverty rate is increasing. Thus, a reduction in fuel subsidy redirected to their core sectors producing the commodities which constitute the bulk shares of rural households' expenditures could help lighten the burden of energy price shock (World Bank, 2014). Reallocation policy in this study adopts the strategy of re-distributing the savings from subsidy reforms above (phased subsidy cuts/withdrawals) to crop and service sectors. Thus, the study simulates such policy transfer of PMS subsidy on equal amount in each case of the scenarios as in (1) above following the pattern of Maipita *et al*.,(2012) and Fathurrahman (2014). Hence, the simulations are organized as thus;

Therefore, the study simulates for

2a) 1ai) and 50% PMS subsidy savings reallocation to crop and service each

2b) 1b(i) and 50% PMS subsidy savings reallocation to crop and service each

3.0. Results and Discussions

3.1: Profile of the consumption structure of the Nigerian Households

A profile of household consumption in table 1 illustrates that all households spent most of their income on services (62.27%) (This is in support of the finding by Fathurrahman, 2014). This was followed by crop (16.61%) and livestock (7.83%). However, the rural households had the largest consumption share on crop produce (19%) and livestock (7%) than the urban households. These indicate that the rural households spent a significant portion of their disposable incomes on basic need (food) than the urban households. On the other hand, significant shares were allocated for transport (4.32%) and manufactured goods (4.02%) among other commodities, which imply that processed food, households' items and households' distribution network were very vital to maintain life and pleasure. Thus, the rural agricultural households had the largest share of about 4.61% on transport, while the largest share on manufactured goods was sustained among the urban agricultural households (4.55%).

Importantly, the consumption shares for energy goods were less, relative to food commodities, manufactured goods, transport and service. This could be premised on the reduced amount spent on the purchases of the energy commodities below their market prices and the problem of availability. Therefore, urban non-agricultural households had the largest budget share on electricity consumption close to 1.53% (in line with the finding by Anyiro *et al.,* 2013). The rural farm and non-farm households encountered the largest DPK shares of 0.53% and 0.52% respectively. The urban households sustained a higher share on PMS than their rural counterparts on the average (This coincides with the findings of Breisinger *et. al.*, 2012 and Fofana *et. al.*, 2009). In addition to this, the urban non-agricultural households had higher share of PMS (4.72%) than to transport. This implies that urban non-farmers had a larger consumption share of PMS due to the verse need of the commodity in most home items over their needs for transport. Subsequently, the indirect effect of price of PMS on transportation due to the inter-sectoral relationship is very vital to household real income and consumption. On this instance, the urban households bore larger burden of PMS than the rural households, while the rural

households bore a greater burden on transport than the urban households. These stipulates that, changes in the price of PMS commodity might likely have the largest effect on urban households income and the rural household will bear the largest income effect of PMS price change on transportation. Similarly, changes in the prices of DPK and electricity are most likely to affect the rural non-farmers and urban non-farmers respectively who had larger shares of the commodities than others. Peradventure prices of other commodities are affected, all households budget burden are most likely to enlarge for services, crop, and livestock.

3.2. Impact on domestic output

The result from the simulation demonstrates that the transfer of PMS subsidy partially or wholly to food crop and service sectors had the largest influence on sectoral outputs than on conserving the subsidy savings excluding mining, electricity and transport sectors (see table 2). However, the relative decline or contraction in output here might be related a fall in demand by consumers as price remained high which might reduce supply or production in the sectors. Conversely, the positive changes might be inclined to the fact that subsidizing the sectors reduced their input cost and significant increase of the need for local consumption of PMS as a result of removing PMS import subsidy partly or totally. However, the best livestock, service and crop sector had good turnover rates owing to switch. This explains that subsidizing the crop and service sectors as a price shock absorbing measure are worthwhile policy measures to subsidy shocks.

3.3. Impact of subsidy reform and their alternative policies on composite commodity prices

The result shows that across individual scenarios, phased or total withdrawal of PMS subsidy elicit about 45.33% and 83.73% increase in the pump price of PMS (see table 3). The assertion is in harmony with the findings by Manzoor *et al*., 2009; Oktaviani *et al*.,2005; Hamid and Rashid, 2012; Narges *et al*., 2010 who supported that prices of energy commodities due to policy reform or price change stir their commodity prices higher. Due to inter-linkages of PMS and other sectors, all prices of other composite commodities also significantly increased most in the crop and the transport sectors depending on the level of inter-sectoral reliance. Outright PMS subsidy withdrawal registered the greatest impact than the event of phased subsidy reform and the reallocation policies. A transfer of the subsidy to the crop and service sectors, though had the price of PMS commodity retained high, but cushioned the effect of higher prices compared to the

phased and withdrawal scenarios with no subsidy reallocation (supported by Durand *et al*., 2015). The price of crop and service considerably reduced in this experiment by above 2%,, while prices of other sectors commodities declined slightly relative to their counterpart experiment. Thus, a rise in commodity prices is tantamount to a rise in the revenue accruing to all sectors. Workers are expected to smile home with increased labour wages or return to capital asset rented to sector and sometimes higher dividends to shareholders in the sectors.

Impact on labour and capital prices

By the assumption that labour is mobile across sectors and each type of labour wage rate is fixed across sectors, result from simulation, revealed that skilled and unskilled labour received large wage price by subsidizing the crop and service sectors than in their counter scenarios. However, a switch of all PMS subsidy to the selected sectors, encountered the greatest effect on wage rates, and contributed about 0.8% or more in excess of the wage price in the counter scenario where all savings were conserved (see table 4). The possibility could stem from the model assumption of full employment and observing the Philip's curve theory. This assumption postulates that as output increases with decreasing rate of unemployment even where commodity price rose, wage price is bound to rise. The effect of such subsidy switch on capital returns (see table 5), shows a significant impact, larger where all PMS subsidies were switched to the crop and service sectors. This might correspond to the level of production growth in the sectors spurred by the transferred savings. This supports Futhurrahman (2014) findings that an increment in production due to subsidy reallocation policy caused a boost in capital return. He equally reported that capital return increased when all subsidies withdrawn were redirected for production (in the mining sector) compared to the benefit on partial reform.

Impact on import and export demand

Comparably, switching all PMS subsidy to food crop and service sectors reduced the import demand for PMS as well as other sectors excluding livestock and DPK which had their import demand slightly raised than in the similar phased reform scenario (see table 6). However, in comparative, import demand for food crop significantly reduced by subsidizing the sectors than service, mining, transport and manufacturing amongst others. Subsidizing the food crop and

service sectors were responsible for the import falls across most sectors from a minimum fall of 0.03% of PMS imported and a maximum rate of 9.08% in the food crop sector. On the contrary, sectors contributing to export in table 7 had a slight magnitude of a decline in export demand than they experienced where PMS subsidy was conserved. In relative term, food crop and service exports encountered the biggest increment, by a surplus of 2.14% and 1.04% respectively by injecting all PMS subsidy into the sectors. Implying that the resource injected was responsible for the significant change in export demand and import falls of most sectors that could be related to a boost in the domestic production which could offset shortages in domestic demand. The implication of this is that import bill is most likely to fall if the large sum spent on consuming PMS is plowed back into the production sectors largely contributing to consumers demand. Also with a slight boost in export we tend to attain a more favourable balance of trade.

3.3. Impact on macroeconomic aggregate

The phased and total PMS subsidy withdrawals in table 8 demonstrated the vulnerability of the economy to price shock. Nevertheless, the total withdrawal scenario showed the most significant effect. However, injection of all PMS subsidy to selected sectors slightly favoured export by an excess value of 0.36% relative to its counterpart with conserved savings. Nevertheless, real GDP falls by 0.02%, a fall in the real GDP reflects a loss to the value added of the economy due to increased intensity of production subsidy. It means that an increase in factor income is not commensurate to increase in total production subsidies of the economic system. Consequently, import declined by 0.89%. It is about 1,15% lower than its counterpart experiment. It is an indication that import demand is being substituted by domestically produced commodities. On the other hand, values of other aggregate variables in these simulations declined relative to their counterpart values. However, a fall in aggregate import improves a country's terms of trade and it is an indication that domestic output is able to meet demand.

3.4. Impact on Income

The outcome revealed that comparatively, income increased by 6% on average among all household categories due to the injection PMS phased subsidy (see table 9). Furthermore, such subsidy switching policy to the crop and service sectors on phasing out PMS subsidy, favoured more the families in agriculture than the non-agricultural households. The changes in income with largest impact among rural farm families may be attributed to their heavy involvement in

the crop sector in rural regions, while others enjoy the spillover effect (This finding related to those of Maipita *et al*., 2012). On the other hand, the injection of PMS subsidy withdrawn, impacts positively on households' remuneration across all groups. The impact is at a significant percentage point above the remuneration in the similar scenarios without a transfer of savings to other sectors. This is buttressed by Fathurrahman (2014) findings depicting that in comparison to phased subsidy reform, savings from withdrawal of fuel subsidy reallocated to gas sector improved households' income in most classes. Significantly, the agricultural households benefited more from each reallocation of savings across all scenarios. However, the result on PMS subsidy reinjection is remarkable on household income (increased between 2% and 3%) higher than its PMS subsidy withdrawal scenario.

3.6. Impact on Expenditure

Higher commodity prices as a result of total PMS subsidy withdrawal produced higher expenditure changes on commodities over those in the phased reform (see table 10). The size of expenditure changes on commodities owing to PMS subsidy withdrawal was greater than in the phased reform. Hence, the non-agricultural households experienced the largest expenditure change on PMS, followed by food crop among the urban households and livestock among the rural households. In other words, the household real income in the different categories would have decreased (supported by CBO, 2006; Oyekale and Udia, 2007; Arndt *et al.*, 2008 and Narges *et al*., 2010). On the other hand, on the account of an improved income, a PMS subsidy reinjection, kept the expenditure changes higher than in their counterpart scenarios for all household. The reinjection of all PMS subsidy induced a remarkable impact on all commodity expenditures by almost twice as in phased PMS subsidy switch. This is linked to a increased demand of commodities and well improved income of households to do so than in the base year and under the phased shock absorption measures.

3.7. Impact on Utility

The base year value shows that the urban non-agricultural households had the largest utility gain on quantity of commodities demanded at about 14.51points, while urban agricultural households had the least gain close to 12.81points (see table 11). Households encountered the largest utility losses due to PMS subsidy withdrawal compared to PMS subsidy phased reform. The cause for

such level of utility losses is linked to greater losses in the amount of goods and services due to seismic hike in energy prices. The utility gain of all households appreciated more owing to the switch of all PMS subsidy to food crop and service sectors than in the phased subsidy. The greatest impact was among the rural farm households who had about at about 0.35% in excess of the rate where thre was no occurrence of subsidy switch. The policy also favoured the urban agricultural families than the urban non-farm family. The increased agricultural households' utilities could be linked to the fact that the reallocation of PMS subsidy to food crop and service sectors boosted the yield of the sectors which the families either earn their livings or depend so much for their existence. Hence, improvement in the sectors boosted the consumptions of the farm families more than their counterparts. On the other hand, total utility gain of each household's categories is an indication that the reallocation policies translated to an increased consumption of most commodities to maximize post shock utility owing to PMS subsidy withdrawal. This was possible because the households were able to spread-out the consumption of other commodities in an expanse that flouts the loss of PMS quantity for each households group.

Impact on Welfare

Using the Hicksian equivalent variation in income, total switch of all PMS subsidy to food crop and service sectors induced welfare losses to all households, large in magnitude than were encountered under the phased PMS subsidy switch (see table 12). This could account for the loss in consumption relative to their base year consumption. However, urban non-agricultural households were the most affected by losing ₦25.28billion to avert the negative effect of total subsidy withdrawal, while urban agricultural households were the least affected at a loss of about ₦7.89 billion. This could be linked to the fact urban non-agricultural households experienced the least income change that could maintain the least possible size of commodity demand due to higher commodity prices. On the other hand, a switch of all PMS subsidy policy proved to have an outstanding impact than the switch of the phased policy measure. Hence, the rural agricultural households were the most favoured (₦45.68 billion), those in urban agriculture gained the least of about ₦16.34billion. This result agreed with Durand-Lasserve *et al., (*2015) who found that food subsidy reallocation policy favoured the rural households than the urban households. The large rural agricultural households were the most favoured because of the larger sum of the

savings transferred to their core sector (crop), had enabled them to attain a maximum satisfaction than other households while the enjoyed some public services provided. Hence, social welfare was worse-off on PMS subsidy withdrawal (₦70.47billion) and the trade-off of the subsidy switch was an improved welfare gain of about ₦67.90billion

4. Conclusion

The study found that PMS subsidy reform attracted higher PMS and other commodity prices. The higher prices reduced households' consumption level and increased the amount spent where there is no means of switching the PMS subsidy for production. The welfare of households and social welfare deteriorated if PMS subsidy was at one time totally withdrawn. Howbeit, a transfer of all PMS subsidy to the key sectors contributing to households consumption demand favoured all categories of household's income and enlarged their consumption expenditure. However, households and social welfare improved tremendously where all PMS subsidy were switched back to food crop and service sectors. This alternative policy also favoured most macroeconomic aggregates. It discouraged importation, reduced inflation, encouraged export than in the conservation of PMS subsidy savings and it also kept most other variable positive. Thus, it is recommended that such alternative policy of transferring PMS subsidy to crop and service sectors contributing to households' largest share be adopted as they have the tendency of cushioning, high commodity price shocks and enhance quick tangible welfare benefits to all households categories.

References

Adenikinju. A, Ajakaiye.O, Decaluwe. B and Iwayemi. A (2009): Computable General Equilibrium Modelling in Nigeria; Ibadan University Press.

Adeola Adenikinju (2012): Energy Sector Reform: Prices and Private Sector Response; Department of Economics, and Centre for Petroleum, Energy Economics and Law, University of Ibadan. Pp.1-28

Akinwale Y. O, Olaopa O.R., Ogundari I. and Siyanbola W. O (2013): Political Economy of Phasing-out Fuel Subsidy in Nigeria; Energy and Power 2013, 3 (4): Pp.37-43

Andreu, M., Michael, D.,Whinston, T and Jerry, R. G (1995): Microeconomic theory, New York Oxford University Press.

Anyiro, C.O, Ezeh C. I, Osondu C.K and G, A Nduka (2013): Economic Analysis of Household Energy Use: A Rural Urban Case Study of Abia State, Nigeria; *Research and Review: Journal of Agriculture and Allied Sciences*

Arndt C., Benfica. R., Maximiano., N., Nucifora. A.N.D., Thurlow. J. T (2008): Higher Fuel and Food Prices, Economic Impacts and Responses for Mozambique; IFPRI Discussion Paper 00836, December

Ayele. G (2014): Quantifying Economy-Wide Impacts of Reducing Subsidy to the Electricity Sector in Kuwait; Paper to be presented at International Conference on Economic Modeling, 2014; Bali – Indonesia, July 16–18, 2014

Breisinger. C, Engelke. W and Ecker. O (2012): Leveraging Fuel Subsidy Reform for Transition in Yemen; Sustainability, Volume 4, issue 2862-2887; doi:10.3390/su4112862

Centre for Public Policy Alternatives (CPPA, 2012): Nigeria Fuel Subsidy @ toluogunlesi.wordpress.com/... */fuel-subsidy-desktop-study-report-by- The*

Chitiga, M.,Fofana, I and Mbaugu, R(2010): Analysing Alternative Policy Response to High Oil Prices, Using an Energy Integrated CGE Microsimulation Approach for South Africa; Working Paper Number 196, Nov

Dartanto T(2012): Reduing Fuel Subsidies and the Implication on Fiscal Balance and Poverty in Indonesia;
A simulation Analysis. Working Paper in Economics and Business, Vol.11, No.6/2012.

Decaluwé. B, Lemelin. A, Robichaud. V and Maisonnave. H (2013): The PEP standard single-country, static CGE model

Durand. O, Campagnolo. L, Chateau. J and Dellink. R (2015): Modelling of Distributional Impacts of Energy Subsidy Reforms, An illustration with Indonesia; OECD Environment Working Paper No. 8, OECD Publishing @ http:dx.doi.org/10.1787/5js4kOscrqq5-en

Erero, J. L (2010): The Impact of electricity Pricing Shock on the South African Economy; A CGE Analysis. Working Paper 1.2 EP 07 Jan.

Fathurrahman. F (2014): Simulating Indonesian Fuel Subsidy Reform; A Social Accounting Matrix (Sam) Analysis; A published Thesis Submitted to the Graduate School of Natural and Applied Sciences of Middle East Technical University

Fofana, I., Chitiga, M., Mabugu, R (2009) : Oil prices and the South African economy: A macro–meso–micro analysis; Energy Policy 37 (2009) 5509–5518

International Energy Agency (2011): World Energy Outlook 2011. Paris: OECD/IEA. @ http://www.iea.org/publications/freepublications/publication/weo2011_web.pdf

Maipita. I, Mohamed. D.J, Fitrawaty and Narimo. S (2012): The Impact of Diverting of Fuel Subsidy to Agricultural Sector on Poverty; CMU.Journal of Economics, Vol.16. issue 1.

Manzoor. D, Asaghar. S and Iman. H (2009): An Analysis of Energy Price Reform: A CGE Approach @ www.iiccgov.org/iew2009/... /manzoor-etal-AnAnalysisof energypricereform.pdf

Narges. M, Zakariah. A, Taufiq. H and Anuuar. M (2010): The Impact of Increasing Energy Prices on the Prices of Other Goods and Household Expenditure: Evidence from Malaysia

National Bureau of Statistics (2010): Annual Abstract of Statistics @ www.nigerianstat.gov.ng/nbslibrary/nbs-annual-abstract-of-statistics

National Bureau of Statistics (2013): Foreign Trade Statistic Fourth Quarter, 2012; Strong Merchandise Trade Growth in 2012 @ www.nigerian**stat**.gov.ng/pages/download/102

Nigerian politico Online (2013): Poverty has increased considerably in Nigeria; @http://nigeriapoliticsonline.com/poverty-has-increased-considerably-in-nigeria-world-bank-as-bureau-of-statistics-confirms-112-million-nigerians-living-below-poverty-line/ accessed on 6th September, 2015.

Nwafor. M., Ogujiuba, K and Asogwa, R (2006): Does Subsidy Removal Hurt the Poor; Evidence from Computable General Equilibrium Analysis; African Institute For Applied Economics. Pp.4-30.

Nwafor.M, Adenikinju. A and Ogunjiuba. K. (2007): The Impact of Trade Liberalization on Poverty in Nigeria; Dynamic Simulations in CGE model, MPIA Working Paper 2007-16.

Obi-Egbedi. O, Okoruwa.V, Aminu. A and Yusuf. S (2012): Effect of Rice Trade Policy on Household Welfare in Nigeria European Journal of Business and Management, Vol. 4, No.8, 2012.

Oktaviani. R. D, Hakim. B, Siregar. H and Sahara (2005): Impact of lower Oil Subsidy on Indonesian Macroeconomic Performance, Agricultural Sector and Poverty Incidences; A Recursive

Dynamic Computable General Equilibrium Analysis
Omenka. S. C and Adenikinju. A (2013): Fuel Subsidy Removal in Nigeria: Alternative Options for Re-targeting the Budgetary Gains. A Paper Prepared for Presentation at the 6th Nigeria Association of Energy Economics (NAEE) Annual International Conference on Energy Resource Management in a Federal System: Challenges, Constraints and Strategies, Sheraton Hotel, Lagos, Nigeria. April 22 – 23
Oyekale, A.S and Udia, J.W (2007): Changing Rural Households' Expenditure and Copping Strategies under Deregulated Fuel Price Regime in Nigeria: A micro-Evidence from Ikene Local Government; Pakistan Journal of Social Science Vol.4, Issue 1. Pp. 102-106
International Labour Organization (2003): Household income and expenditure statistics; Report II Seventeenth International Conference of Labour Statisticians Geneva, 24 November-3 December
World Bank (2013): Nigeria Economic Report @ Accessed on 6th September, 2015

APPENDIX

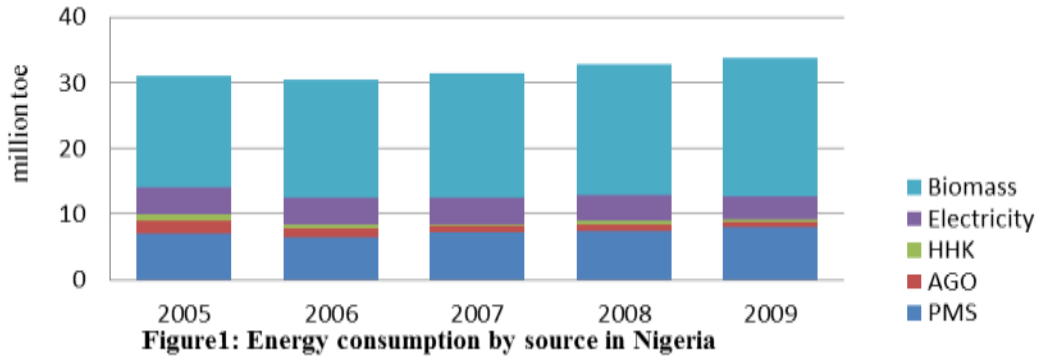

Figure1: Energy consumption by source in Nigeria

Table 1: Household consumption profile

Commodities	Rural Agriculture	Rural Non-Agriculture	Urban Agriculture	Urban Non-Agriculture	All
Crop	19.76	19.97	10.90	11.18	16.61
Livestock	7.95	8.97	6.83	7.33	7.83
Mining	0.00	0.00	2.26	2.16	0.81
Premium Motor Spirit	2.05	1.66	3.92	4.72	2.74
Dual Purpose Kerosene	0.52	0.53	0.42	0.41	0.49
Manufacturing	3.83	3.66	4.55	4.25	4.02
Electricity	0.56	0.58	1.50	1.53	0.91
Transport	4.61	4.34	4.05	3.85	4.32
Service	60.73	60.29	65.57	64.57	62.27
Total	100.00	100.00	100.00	100.00	100.00

Source: Computed from Input-Output Table of Nigeria, 2011

Table 2: Impact on domestic output

Commodity	Base year value (₦'billion)	Change from base year(%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Crop	14024.55	1.02	1.58	1.15	1.78
Livestock	1682.45	0.02	-0.15	0.40	0.46
Mining	16812.13	-2.49	-3.82	-2.76	-4.25
Premium Motor Spirit	348.72	10.37	20.57	10.82	21.27
Dual Purpose Kerosene	62.01	-2.37	-3.87	-1.97	-3.25
Manufacturing	5732.59	1.33	1.87	1.40	1.96
Electricity	381.33	0.65	0.98	0.16	0.17
Transport	3830.66	4.93	7.46	4.29	6.44
Service	14870.64	2.54	3.80	2.82	4.23

Source: CGE Model Simulation Results

Table 3: Impact on Composite commodity price

Commodity	Base year value	Change from base year(%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Crop	1.00	11.87	18.80	9.18	14.41
Livestock	1.01	7.20	11.43	7.02	11.16
Mining	1.00	7.33	11.65	6.82	10.83
Premium Motor Spirit	0.54	43.00	83.73	42.73	83.20
Dual Purpose Kerosene	0.49	3.53	5.75	3.23	5.26
Manufacturing	1.08	7.54	12.18	6.46	10.44
Electricity	1.00	5.88	9.41	5.45	8.72
Transport	1.04	8.57	14.33	7.71	12.95
Service	1.00	7.95	12.67	6.50	10.30

Source: CGE Model Simulation Results

Table 4: Impact on labour price

Type of labour	Base year price	Change from base year(%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Unskilled	1	6.85	10.92	7.30	11.68
Skilled	1	7.31	11.62	7.81	12.47

Source: CGE Model Simulation Results

Table 5: Impact on price of capital

Sector	Type of labour	Base year price	Change from base year(%)			
					Savings Reallocation measures	
			49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Food Crop	Capital	1.00	9.26	14.79	10.01	16.05
	Land	1.00	9.26	14.79	10.01	16.05
Livestock	Capital	1.00	7.06	10.74	8.63	13.31
Mining	Capital	1.00	2.01	3.21	1.92	3.06
Premium Motor Spirit	Capital	1.00	27.10	52.84	28.56	55.42
Dual Purpose Kerosene	Capital	1.00	2.31	3.19	3.59	5.25
Manufacturing	Capital	1.00	10.41	16.15	11.08	17.23
Electricity	Capital	1.00	7.68	12.20	7.76	12.34
Transport	Capital	1.00	14.54	23.00	14.05	22.24
Service	Capital	1.00	12.34	19.47	13.42	21.29

Source: CGE Model Simulation Results

Table 6 : Impact on import

Commodity	Base year value (₦'billion)	Change from base year(%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased PMS subsidy	PMS subsidy withdrawal
Crop	295.68	25.43	41.20	20.08	32.12
Livestock	99.16	15.66	25.25	15.76	25.44
Mining	384.45	12.52	20.02	10.51	16.73
Premium Motor Spirit	1769.06	-21.15	-32.27	-21.26	-32.44
Dual Purpose Kerosene	216.60	1.48	2.27	1.56	2.40
Manufacturing	495.63	8.77	13.94	7.79	12.34
Electricity	102.14	3.60	5.66	2.88	4.48
Transport	824.85	9.05	14.39	8.00	12.70
Service	3101.73	6.18	9.58	5.82	8.99

Source: CGE Model Simulation Results

Table 7: Impact on export

Commodity	Base year value (₦'billion)	Change from base year(%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Crop	6781.87	-5.70	-8.73	-4.30	-6.59
Livestock	4.91	-2.15	-3.45	-1.82	-2.95
Mining	14983.77	-3.66	-5.66	-3.76	-5.82
Premium Motor Spirit	78.22	-3.39	-5.43	-2.80	-4.53
Dual Purpose Kerosene	90.59	0.57	0.46	0.40	0.20
Manufacturing	22.49	-0.87	-1.46	-0.19	-0.42

Source: CGE Model Simulation Results

Table 8: Impact on macroeconomic aggregates

Variable	Base year value (₦' billion)	Change from base year (%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Export	21961.85	-4.26	-6.58	-3.90	-6.02
Import	7289.30	1.12	2.04	0.42	0.89
Government Revenue	7189.24	6.80	10.80	-1.15	-2.49
Government Savings	2904.09	35.32	57.73	15.90	25.23
GDP	36615.96	7.07	11.22	5.95	9.36
Real GDP	36615.96	0.01	0.01	-0.01	-0.02
Investment	3579.02	61.99	100.01	47.57	75.94
Consumer Price Index	1.00	9.47	15.52	8.01	13.13

Source: CGE Model Simulation Results

Table 9: Impact on Income and savings

Households	Base year value (₦'billion)	Change from base year (%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phased-out PMS subsidy	PMS subsidy withdrawal
Rural Agriculture	6243.14	7.38	11.77	7.67	12.28
Rural Non-Agriculture	8235.13	8.05	12.87	8.39	13.45
Urban Agriculture	4693.02	8.33	13.35	8.58	13.79
Urban Non-Agriculture	10284.31	7.24	11.56	7.48	11.97

Source: CGE Model Simulation Results

Table 10: Impact on expenditure

Households	Commodities	Base year value (₦'billion)	Change from base year(%)			
					Savings Reallocation measures	
			49%PMS subsidy reduction	PMS subsidy withdrawal	Phasing-out PMS subsidy	PMS subsidy withdrawal
Rural Agriculture	Crop	1212.98	8.99	14.13	8.30	13.02
	Livestock	487.92	6.16	9.62	7.14	11.24
	Mining	0.00	7.12	11.28	6.86	10.89
	Premium Motor Spirit	125.86	28.30	54.23	28.84	55.07
	Dual Purpose Kerosene	32.03	3.62	5.87	3.41	5.53
	Manufacturing	235.07	5.74	8.90	7.11	11.18
	Electricity	34.43	5.77	9.16	5.87	9.33
	Transport	282.75	7.08	11.48	7.48	12.17
	Service	3727.87	6.48	10.13	6.92	10.89
	Total	6138.91	7.38	11.77	7.67	12.28
Rural Non-Agriculture	Crop	679.27	9.98	15.77	8.98	14.15
	Livestock	304.95	6.97	11.00	7.82	12.42
	Mining	0.00	7.18	11.38	7.26	11.54
	Premium Motor Spirit	56.29	26.96	51.36	27.64	52.46
	Dual Purpose Kerosene	18.03	4.17	6.70	4.29	6.92
	Manufacturing	124.56	6.83	10.75	8.38	13.33
	Electricity	19.78	6.28	9.94	6.92	11.02
	Transport	147.58	7.58	12.30	8.21	13.36
	Service	2050.33	7.21	11.38	7.81	12.39
	Total	3400.77	8.05	12.87	8.39	13.45

Source: CGE Model Simulation Results

Table 10: Impact on expenditure(continued)

Households	Commodities	Base year value (₦'billion)	Change from base year (%)			
					Savings Reallocation measures	
			49%PMS subsidy reduction	PMS subsidy withdrawal	Phased PMS subsidy	PMS subsidy withdrawal
Urban Agriculture	Crop	400.86	10.52	16.53	8.97	14.02
	Livestock	251.28	6.94	10.85	7.45	11.70
	Mining	82.99	7.07	11.07	7.25	11.40
	Premium Motor Spirit	143.96	30.11	57.62	30.62	58.42
	Dual Purpose Kerosene	15.42	5.32	8.15	6.42	9.98
	Manufacturing	167.30	6.33	9.43	8.46	12.98
	Electricity	55.09	6.21	9.53	7.28	11.33
	Transport	148.82	6.66	10.16	8.27	12.84
	Service	2410.69	7.16	11.10	7.44	11.59
	Total	3676.40	8.33	13.35	8.58	13.79
Urban Non-Agriculture	Crop	201.01	10.24	16.06	8.46	13.16
	Livestock	131.74	6.21	9.61	6.61	10.29
	Mining	38.81	6.50	10.13	6.53	10.21
	Premium Motor Spirit	84.91	30.80	59.28	31.20	59.90
	Dual Purpose Kerosene	7.38	3.62	5.12	4.93	7.31
	Manufacturing	76.32	3.35	4.33	5.48	7.87
	Electricity	27.55	4.12	5.85	5.53	8.19
	Transport	69.20	4.11	5.79	5.76	8.52
	Service	1160.61	5.67	8.55	6.00	9.11
	Total	1797.53	7.24	11.56	7.48	11.97

Source: CGE Model Simulation Results

Table 11: Impact on Utility

Households	Base year value(util)	Change from base year(%)			
				Savings Reallocation measures	
		49%PMS subsidy reduction	PMS subsidy withdrawal	Phasing-out PMS subsidy	PMS subsidy withdrawal
Rural Agriculture	13.88	-0.24	-0.39	-0.02	-0.04
Rural Non-Agriculture	13.32	-0.14	-0.24	0.09	0.13
Urban Agriculture	13.20	-0.18	-0.33	0.05	0.04
Urban Non-Agriculture	12.52	-0.40	-0.70	-0.15	-0.31

Source: CGE Model Simulation Results

Table 12: Impact on Welfare

Households	49%PMS subsidy reduction	PMS subsidy withdrawal	Savings Reallocation measures	
			Phased-out PMS subsidy	PMS subsidy withdrawal
Rural Agriculture	-14.68	-24.25	-1.00	-2.56
Rural Non-Agriculture	-11.75	-19.48	7.35	10.70
Urban Agriculture	-8.26	-15.32	2.51	1.78
Urban Non-Agriculture	-40.67	-71.59	-15.78	-31.68
Social Welfare	-75.36	-130.64	-6.92	-21.76

Source: CGE Model Simulation Results