NIGERIAN JOURNAL OF SECURITIES AND FINANCE

(A publication of The Nigerian Stock Exchange)

Volume 14 September 2009 Number 2

ARTICLES

Printed and Bound in the Federal Republic of Nigeria by Centric Publishers Ltd., Plot 24, Block 113, Lekki Peninsular Scheme 1, Eti Osa, Lagos State, Nigeria.

ISSN: 2006 - 554X

Second Half, 2009, Vol.14, No 2

A Computable General Equilibrium Analysis of Policy Options under the Nigeria's National Economic Empowerment and Development Strategy (NEEDS) -2

By
Akin P. Iwayemi, Sam O. Olofin, Abdul-Razaq A. Olopoenia, Adeola F. Adenikinju, Olugboyega A. Oyeranti and Alarudeen Aminu*[7]

Abstract

The study uses a computable general equilibrium model of Nigeria to investigate the likely effects of two main policy options that will be given special consideration in the National Economic Empowerment and Development Strategy (NEEDS)-2 slated for implementation under the framework of the recently launched Seven-Point Agenda. The two policy options are the increase in the rate of value-added tax (VAT) and trade liberalisation. It is found that an increase in VAT rate or a doubling of VAT rate for that matter will increase government revenue but this will be at the cost of a higher rate of inflation and impoverishment of poor households who are in the majority in Nigeria. This finding in part implies that the monetary authority concerned with price level stability should be on the alert whenever any attempt is made by the fiscal authority to increase VAT rate. Any attempt to liberalise trade (especially import) between Nigeria and other countries through the instrumentality of reduction in import duties' rates will boost both import and export transactions but this will at the same time reduce government revenue. One other interesting finding is that a higher percentage reduction in import duties' rates will result in a lower rate of naira depreciation and this sort of suggests that a higher percentage reduction in import duties' rates should be preferred to a lower percentage. The reduction in government revenue due to trade liberalisation implies that government will need to explore and exploit other sources of revenue to ensure sustainability of government expenditure.

Key Words: *Computable General Equilibrium Model, National Economic Empowerment and Development Strategy, Tax Reforms, Value-Added Tax, Tariffs, Households.*

JEL Classification Numbers: *D57, D58, D61. H2*

I. INTRODUCTION

It is on record that the various policies encapsulated in the first National Economic Empowerment and Development Strategy (NEEDS) of Nigeria from 2004 to 2007 were never subjected to any empirical analysis to determine the impact they could have on the

[7]*Akin Iwayemi, Sam Olofin and Adeola Adenikinju are Professors of Economics, Abdul-Razaq Olopoenia is a Senior Lecturer while Olugboyega Oyeranti and Alarudeen Aminu are Lecturers, all at the University of Ibadan, Ibadan, Nigeria. The corresponding author's email address is: alarudeen@yahoo.com. The views expressed in this paper are strictly those of the authors.*

economy before the economic blue-print was implemented in the first instance.[8] There is no doubt that such an empirical analysis should have furnished the government with the prior likelihood of success or failure of the myriad of policies whose impacts are still reverberating with ferocious intensity in the economy. As efforts are now being made to contemplate and package another set of policies to be implemented during the effective years of the NEEDS-2 (2008-2011), it should be of policy relevance to enquire into the impact which some of the policies to be implemented will have on the economy. It is in the light of this that this study is undertaken to determine the likely impact/effects of some of the policy options proposed under NEEDS-2 as the economic blue-print still forms the central aspect of the Seven-Point Agenda being canvassed by the federal government. The Agenda comprises issues, programme and policies related to agriculture, water, employment generation, Niger Delta, energy, transport, education and health and security.[9]

While there are many policies proposed under NEEDS-2,[10] the policy options considered in this study are just two. The basic reason for our focus on two of the policy options is that they belong to the genre of policies with profound economy-wide implications. One of the policy options we consider is an increase in value-added tax rate from 5% to 10%[11] while the other policy option is trade liberalisation. A computable general equilibrium (CGE) model of Nigeria is used to examine these two policy options. The rest of this paper is structured into four Sections. Section 2 reviews the National Economic Empowerment and Development Strategy (NEEDS) while Section 3 reviews the theoretical and empirical literature on tax reform, which provides the framework for the analysis in the study. Needless to say that any attempt made to alter the rate of any tax amounts to reforming the tax and the key aspect of any tax reform is anchored on welfare implications. It is for this reason that tax reform normally revolves around welfare of the people to be served by the tax reform. A tax reform is deemed worthwhile if it results in increased welfare for the people or it ensures a sort of minimisation of welfare loss when compared with an alternative tax reform. We describe the computable general equilibrium (CGE) model used for the policy analysis in Section 4. The results of CGE model simulations are contained in Section 5. The last Section summarises the findings and proffers some policy recommendations.

---

[8]There is also the criticism that borders on want of macroeconomic framework for the blue-print.

[9]After two years of launching the Agenda, there appears to be little or no progress in each of the key areas. In fact, there has been an escalation of especially the Niger-Delta crisis and electricity production, transmission and distribution problem.

[10]The policies proposed under NEEDS-2 are very numerous but the ones considered in this study are among those with far reaching economy-wide implications. A copy of the various policies is obtainable from the National Planning Commission, Abuja, Nigeria. Interested readers may consult National Planning Commission (2007).

[11]Before now, Nigerians were inundated with proposals from government quarters on the need to effect a 100 percent increase in the nation's VAT rate (which would have ensured a VAT rate of 10 percent). However, in recent times, there are indications and unconfirmed reports that the nation's VAT rate is to be aligned with what obtains in the Economic Community of West African States (ECOWAS), which hovers around 15 percent to satisfy the ECOWAS treaty on tax policy (see The Nation, August 6, 2008, page 19, wherein the Chairman of the Federal Inland Revenue [Mrs. Ofueko Omogui-Okauru] denied any plan by government to raise VAT rate to 15 percent in spite of the 15 percent VAT recommended in the new tax policy submitted (a few weeks before then) to the National Assembly).

II. NATIONAL ECONOMIC EMPOWERMENT AND DEVELOPMENT STRATEGY (NEEDS)

It was in a bid to realise the potential of the country for greatness that a far reaching and comprehensive socioeconomic development policy called National Economic Empowerment and Development Strategy (NEEDS) was packaged and the policy has been implemented since 2004.[12] The first phase of NEEDS was implemented from 2004 to 2007. The second phase of NEEDS (otherwise called NEEDS-2) is expected to span the period 2008-11. While the conceptual issues on which the first phase of NEEDS (NEEDS-1) is based are encapsulated in four goals, the framework for realising the goals is anchored on three pillars. These goals are poverty reduction, wealth creation, employment generation, and value re-orientation. The pillars on the other hand are made up of empowering people and improving social delivery, fostering private sector-led growth through creating the appropriate enabling environment, and enhancing the efficiency and effectiveness of government (through changing the way government does its business).

The achievements of NEEDS-1 have now been documented and it has even been asserted that the socioeconomic blueprint had met most of it targets and in some cases had surpassed its targets.[13] Some progress was recorded in poverty reduction from 70 percent in 2003 to 56 percent in 2005. The nation's gross domestic product grew by 6 percent in the period 2004-2007 as against the growth rate of 3.3 percent recorded at the onset of the new democratic experiment in 1999. External reserves rose from $4 billion in 1999 to about $50 billion by the end of 2007. Another achievement of NEEDS-1 has been the elimination of external debt burden of $34 billion through a 60 percent write-off deal during the period 2005-06.[14] The banking and insurance sectors have equally undergone a programme of recapitalisation that results in the reduction of firms in the sectors and in a substantial increase in the firms' capital base. The public sector also has its own share of achievements of NEEDS-1 especially in the areas of improved service delivery (referred as SERVICOM), pension reforms, monetisation of fringe benefits and appropriate pricing of public sector projects/supplies (under the so-called Due-Process).

NEEDS-2 is regarded as a continuation of the vision, mission and strategies of NEEDS-1 with a renewed vigour and a set of new targets to be achieved between 2008 and 2011. The second phase of NEEDS as contained in NEEDS-2 document is expected to sustain and improve on the achievements of NEEDS-1. The main goal of NEEDS-2 is poverty reduction. The blueprint is to achieve this overriding goal through the instrumentality of an inclusive growth that brings forth high employment opportunities for wealth creation for the majority

---

[12]Nigeria's greatness has remained an elusive target on account of some debilitating, long running problems such as poor governance, unemployment, rising level of poverty, near collapse of social and economic infrastructure, inefficient state-owned enterprises, pervasive corruption, and general insecurity of life and property. See Aminu (2009) for a review of all these and other problems facing Nigeria.

[13]The achievements of NEEDS-1 are contained in Chapter 1 of NEEDS - 2 document prepared by the National Planning Commission, Abuja, Nigeria. The second and last authors of this paper participated in drafting the NEEDS -2 document (see National Planning Commission, 2007).

[14]The elimination of the external debt problem may not, to a large extent, be attributed to NEEDS-1. In fact, the solution to the debt problem was in the main made possible by the sudden oil wealth that accrued from the skyrocketing price of crude-oil export. About 95 percent of Nigeria's foreign exchange earnings (and, by extension, foreign reserves) is accounted for by oil export (see CBN, 2008:213).

of Nigerians that are both able and willing to work. The inclusive growth is to be realised by concentrating programmes and policies on the sectors where the poor and the vulnerable groups are found in large numbers. The sectors that are expected to be the drivers of the envisaged growth are agriculture, small and medium scale enterprises and informal sector. It is also expected that NEEDS-2 will assist in no small measure in realising the Millennium Development Goals (MDGs) by 2015.

The underlining strategies of NEEDS-2 are the promotion of the private sector as the engine of growth, huge and productive investment in human capital, adoption of frontier shifting development approach and commitment to international economic diplomacy. Government is expected to function as a catalyst, enabler and regulator. In addition to this, government is to ensure a substantial investment in the infrastructure sector to boost the productive base of the economy and this thus calls for increased revenue both from the traditional and new sources of revenue over the plan period. Traditional sources like oil and gas and the various taxes are to exploited to generate the needed fund to finance the various expenditure programmes of the government. While NEEDS-2 seeks to integrate the nation's economy with the global economy (as a sectoral policy) through among others the reduction/elimination of tariff barriers to trade, which, of course, leads to reduction in import duties' revenue, it is at the same time seeking to generate substantial revenue to finance the various expenditure programmes especially in the area of infrastructure development.

One tax instrument that has been identified as a veritable source of generating some additional revenue for the government is the value-added tax (VAT). The only feasible way at present to generate the needed revenue from this instrument is to increase the tax rate and this is expected to be in the region of 100 percent.[15] In fact, the contemplated integration of the nation's economy with the international economy presupposes that the loss of import duties' revenue that is bound to accompany the integration will be generated from other sources of revenue especially the traditional and perhaps the internal sources. It is also an aspect of the Economic Community of West African States' (ECOWAS) treaty on Common External Tariff (CET) that member countries should reduce/eliminate and harmonise their existing tariff barriers while generating the loss in revenue arising thereof from increases in VAT rate, which is expected to be in the region of 15 percent. It is against this background that this study is undertaken to shed light on what may be the likely impact of the two policy options on the Nigerian economy. The outcome of the analysis should point out the areas of our economy that should require attention as efforts are made to implement at least the policies on international trade and increase in VAT rate in the next four years.

III. THEORETICAL AND EMPIRICAL LITERATURE ON TAX REFORM

The theoretical underpinning of tax reform is found in the theory of optimal taxation. The work of Newbery and Stern (1987) has been described by Thirsk (1997:8) as perhaps the best illustration of the modern theory of tax reform. The modern theory (of tax reform)

[15] *The other way to generate any additional revenue from VAT or any tax for that matter is to broaden the base or coverage of the tax. The present VAT rate in Nigeria is 5 percent and a 100 percent increase in the rate will mean a VAT rate of 10 percent.*

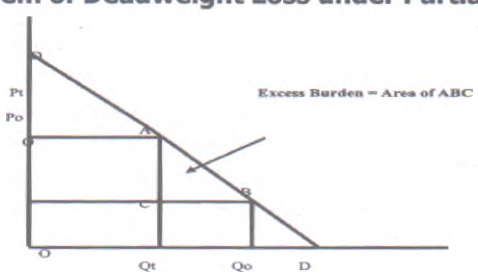
analyses tax reform within the normative framework provided by the theory of optimal taxation. Given a government revenue objective, an optimal tax reform seeks to maximise an explicit social welfare function that balances vertical equity gains against tax-induced losses in the efficiency of resource allocation. Tax reform revolves around a notion of some movement away from a given state of tax structure, administration or both.

The theoretical exposition of optimal taxation normally begins with a set of fundamental assumptions.[16] One of these assumptions is that production takes place in firms under competitive conditions, with profits distributed to consumers. The other fundamental assumptions are that there are no externalities, and that the price-taking consumers maximise utility. Yet another assumption that is of importance relates to the tax instrument under consideration. In case it is commodity tax, it is assumed that all goods can be taxed while under income tax, it is assumed that income can be observed perfectly. All these assumptions are meant to ensure some sort of tractability and isolation of the impact of the absence of lump-sum taxes. In the literature, optimal taxation theories are considered as an examination of the principles of taxation when there is no lump-sum taxation (see Stern, 1987:26).

There are three main aspects of the optimal tax theory. These are optimal commodity taxation, optimal income taxation and optimal combination of commodity and income taxation. In the literature, these main aspects are said to be very much related to issues of indirect taxation, direct taxation, and a combination of both the direct and indirect taxation. Theoretical analysis of optimal commodity taxation started with the contribution of Ramsey (1927).[17] The problem addressed by Ramsey has to do with the objective of raising a given revenue from a consumer through the taxation of the commodities consumed in such a way as to minimise the loss in utility that emanates from taxation.

The analysis of Ramsey problem can be approached from a partial equilibrium point of view. This, however, requires some other assumptions besides the ones outlined in the earlier paragraph. First, it is assumed that the demand for a given commodity does not depend on the price of other commodities to permit the derivation of a downward sloping demand curve as depicted in Figure 1 below. Second, producer prices P are fixed so that the effect of a tax vector t is to increase price faced by consumers from Po to Pt. With these assumptions, the deadweight loss from the taxation of the ith commodity is measured by triangle ABC in the Figure.

Figure 1: Ramsey Problem of Deadweight Loss under Partial Equilibrium



[16]*The theoretical exposition presented here draws on Stern (1987:22-59)*
[17]*Other later contributors are Boiteux (1956) and Samuelson (1951).*

The measure of deadweight loss presupposes that profits are zero as producer prices are fixed and competition drives profits to zero. When there is no taxation government revenue is zero but with a tax, the revenue is given by the rectangle P_tACP_o and consumer surplus is the area below the demand curve *(DD)* and above P_t. The net loss or deadweight loss is then the triangle *ABC*. The Ramsey problem is the minimisation of the sum (across commodities) of triangles such as *ABC*, subject to the constraint that the sum across commodities of rectangles such as P_tACP_o is not less than a given amount (government tax revenue). The solution to the problem reveals that the tax as a proportion of the consumer price of each good should be inversely related to the elasticity of demand. This result (or what is commonly called Ramsey rule) is the same with the one obtained from approaching the problem in a rigorous sort of way through the use of utility function in which commodities and leisure consumed are arguments. The result/rule has been described in the literature as an example of the general principle that efficient taxation is directed toward goods that cannot be varied by consumers (see Stern, 1987:32).

The relationship between tax reform and optimal taxation can be illustrated as follows. We assume a vector of some tax tools *t* in operation, the society's social welfare function is represented by *V(t)* and government revenue is denoted by *R(t)*. *V(t)* is a Bergson-Samuelson social welfare function. If we consider some increase in the ith tax ti sufficient to raise one naira of extra revenue, the rate of change with regard to the tax is $\partial R / \partial t$. Hence to raise one extra naira, the tax must be increased by $(\partial R / \partial t)^{-1}$. The rate of change of welfare with regard to the tax is $\partial V / \partial t$. The reduction in welfare, λ_i, is defined as the reduction in *V* as a result of raising one additional naira by increasing the tax (or tax rate) on the ith good.

$$\lambda_i = - \frac{\partial V / \partial t_i}{\partial R / \partial t_i} \quad \text{.....3.1}$$

According to Stern (1987:53) λ_i may be regarded as the marginal cost in terms of social welfare of raising one more naira from the ith tax. He explains further that if the marginal cost for tax i exceeds that for tax *j* then it would be a beneficial reform to switch taxation on the margin from *i* to *j*. And that if λ_i is greater than λ_j, there is a gain in welfare of $\lambda_i - \lambda_j$ from raising one more naira through tax *j* and one less naira from tax *i*. In general terms, any change or reform of any tax instrument/tool is considered beneficial if social welfare increases and government revenue either increases or it remains constant. In empirical literature, to obtain the marginal welfare cost of raising one more naira from a tax, we divide the marginal excess burden (associated with the one naira increase in tax revenue) by the change in tax revenue (see Creedy, 2004:457).[18] When marginal excess burden is expressed as a percentage of the change in tax revenue, the direction for tax reform will be the same with the one suggested by the results of marginal welfare cost.

Stern (1987:53) further explains that there is a whole collection of beneficial reforms and that one should not expect uniqueness. The optimum state of affairs in tax reform, according to Stern, is the one in which no beneficial reform is possible and it is at this point that the theories of optimal taxation and tax reform are very close. It, therefore, follows that

[18] *A related concept is marginal cost of fund, which is defined as equivalent variation divided by the change in tax revenue. It can as well be expressed as marginal welfare cost plus one (see Creedy, 2004:457).*

at the optimum state, all the λ_is are equal as depicted in equation (3.2) below.

$$\partial V / \partial t_i + \lambda \partial R / \partial t_i = 0 \quad \text{.....3.2}$$

Equation (3.2) is the first-order condition for optimality that results from the Ramsey problem when cast in terms of indirect utility maximisation subject to the constraint that government tax revenue is not less than a given amount. The Ramsey problem is stated hereunder to bring out the first order condition especially with regard to optimal commodity taxation. We assume one consumer whose demands x(q,w) are a function of consumer prices only. Where q represents tax-inclusive price while w is wage rate. The maximum utility the consumer can achieve when facing prices q is V(q,w), which is an indirect utility function. The Ramsey problem here is to search for t (tax rates), or, q (tax-inclusive prices) to maximise V(q,w)

subject to the constraint that the tax revenue $\sum_i t_i x_i$ meets the requirement $\bar{R}$. The problem can be expressed as follows

Maximise *V(q,w)*

Subject to $R(t) = \sum_i t_i x_i \geq \bar{R}$ .....(3.3)

If we take a Lagrange multiplier for the constraint, , the first-order conditions for maximisation are

$$\partial V / \partial t_i + \lambda \partial R / \partial t_i = 0 \quad \text{.....(3.4)}$$

It can thus be seen that equation (3.4) is the same with equation (3.2) in every respect. The closeness between the optimal tax theories and tax reform is thus established. The condition required for optimum state under tax reform is found to be the same with the condition for optimality under optimal tax theories.

It can be discerned from the above that the theoretical analysis of tax reforms is rooted in welfare maximisation in the process of generating a given level of government revenue. It is interesting to note that the empirical literature still harps on the welfare implications of tax reforms. A few of the empirical studies are reviewed hereunder. While studies like those of Devarajan et al. (2001) and Walters (2004) derive estimates of marginal welfare cost or marginal excess burden of taxes/tariffs (which could provide the basis for tax reforms), studies such as Holmoy and Vennemo (1995) and Bettendorf (1998) investigate welfare implications of some specific tax reforms. One methodological characteristic of all these studies (and others of that hue) is the applied general equilibrium (AGE) approach, which, of course, takes into consideration the economy-wide implications of any policy change. It is pertinent to point out that AGE has remained a veritable approach to investigating issues of tax policies in a macro setting since the pioneering efforts of Harberger (1959, 1962, 1966).[19]

In the study conducted by Devarajan et al. (2001), they obtain estimates of marginal welfare

[19] *To the best of our knowledge, econometric models have not been employed in the literature to investigate issues related to efficiency effects (welfare impact) of taxes.*

cost/effects across sectors for Bangladesh, Cameroon, and Indonesia in respect of two tax instruments, indirect tax (domestic) and tariff. In the case of Bangladesh, indirect tax instrument generates marginal welfare gains that range from 3 to 9 percent (of tax revenue) in some sectors while it generates marginal welfare loss that ranges from 1 to 23 percent (of tax revenue) in other sectors. The same instrument is associated with efficiency gains that range from 3 to 52 percent (of tax revenue) in some sectors while it leads to efficiency loss that range from 0 to 32 percent in other sectors in Cameroon. In Indonesia, the marginal welfare gains associated with the instrument range from 3 to 26 percent in some sectors but in other sectors it generates marginal efficiency/welfare losses that range from 0 to 23 percent. As regards tariff, efficiency gain ranges from 1 to 30 percent in Indonesia for some sectors while the gain is 18 and 3 percent for a single sector in Bangladesh and Cameroon respectively. The instrument (tariff) marginal efficiency loss ranges from 0 to 91 percent for other sectors in Indonesia while it ranges from 5 to 37 percent for other sectors in Cameroon. For other sectors in Bangladesh, the tariff instrument efficiency loss ranges from 6 to 118 percent. The sectors considered in Bangladesh are tobacco, fisheries, sugar and livestock. In the case of Cameroon the sectors are cash crops, food and forestry, food and consumption and intermediate goods. With respect to Indonesia, the sectors include liquid natural gas, electricity and gas, other industries, and business services.

A related study is the one undertaken by Walters (2004). His study focuses on marginal cost of fund (MCF) for 28 countries (including Nigeria) in the sub-Saharan Africa. He employs a computable general equilibrium approach. The model for each country has two producing sectors, and three goods. The goods are domestic good, exports and imports. The model also has provision for an informal good, and four factors of production. The factors are formal capital, informal capital, formal labour and informal labour. He defines informal good or factor as the one on which no tax is paid. The size of informal activity in each country is obtained by dividing VAT revenue by the VAT rate. The study considers five tax instruments: export tariff, import tariff, domestic tax, capital and labour taxes. Among the study's findings is that the marginal cost of fund (of the taxes) ranges from -193.74 to 214 percent while the average marginal cost of fund for the entire tax system is 117 percent in the 28 African countries thereby suggesting a required rate of return of 117 percent for African public project. The study further shows, on average, that the lowest MCFs are associated with taxes on domestic and imported consumption goods and the highest MCFs are common with the two taxed factors (formal capital and formal labour).

Holmoy and Vennemo (1995) employ a dynamic general equilibrium model to analyse and evaluate the reform in capital taxation in Norway. The underlying aim of the study is to ascertain the welfare gain induced by the reform and the distribution of this gain between different groups of households. The reform's guiding principle is to "level the playing field" with regard to investments. The key aspects of the reform are that the corporate tax on factors, debt, retention, and dividends are to be equal, and depreciation allowances are to be lowered in an effort to approach a system of true economic depreciation. One other aspect of the reforms is the elimination of write-offs and special regional provisions. They identify multiple sources of distortion in both the pre- and post-reform systems of capital taxation. The whole analysis revolves around 17 private industries and 14 household groups who are distinguished by socioeconomic status. Household utilities are measured in terms

of money metric utility functions of the linear expenditure system. The study finds that it is the households with larger number of members that gain most in absolute terms. The percentage gain is found to be fairly distributed. Wage income does not, however, contribute to increased welfare. Furthermore, households without children suffer the most from lower wages while the elderly (mainly non-working) are the least affected.

Another interesting applied general equilibrium tax policy study undertaken by Bettendorf (1998) specifically investigates the importance of international linkages for investment- promoting policies in a small open economy. The central analysis, however, revolves around simulations of a decrease in corporate income tax and an increase in investment tax credit rate, and the implications that such policies have for the welfare of current and future generations. The model incorporates intertemporal optimisations by households and firms, which are endowed with perfect foresight. It also integrates overlapping generations with a fixed lifetime. It again encompasses adjustment costs in investment and technical progress. Above all, there is some sort of symmetrical modelling of a small open and a large closed economy such that international trade and capital flows are derived from optimising behaviour. The study shows that whereas both tax policies yield a small trade deficit in the steady state, in the first period, a trade surplus is obtained with regard to corporate income tax policy and a trade deficit found with respect to investment tax credit policy. It is also discovered that when investment tax credit rate is raised smaller welfare losses are generated (than when corporate income tax is decreased) for current generations and larger welfare gains for future generations, whereas the latter are received more quickly. And to cap it all, the comparison between the closed and small open economy cases show the importance of incorporating international trade and capital flows, and the international distribution effects harm welfare of all generations in case there is corporate income tax reform, while only minor utility changes are involved in the case of investment tax credit.

A recent study by Aminu (2008c) on tax reforms in Nigeria is both interesting and illuminating as it assesses two major non-oil tax reforms implemented in the last one and a half decades in the context of the various reforms that have characterised the nation's economic landscape since the second half of the 1980s. The study finds that the non-oil tax reforms implemented in 1998/99 period cannot be described as welfare-improving when compared with the alternatives. The study also shows that value-added tax (VAT) is a veritable tax instrument to shore-up government revenue in implementing revenue-neutral, welfare-improving non-oil tax policy reforms at the federal level in Nigeria.

IV. A COMPUTABLE GENERAL EQUILIBRIUM MODEL OF NIGERIA

The CGE model developed to examine the two policy options under NEEDS-2 is an open-economy, single-country model that treats the rest of the world (besides Nigeria) as one trading partner/agent. The model follows closely the ones developed for Nigeria in recent times (see Aminu, 2006; Aminu, 2008a; Aminu, 2008b; Aminu, 2008c; Iwayemi et. al., 2006).[20] The present model has 29 producing sectors and 6 households. Each of the sectors is tradable (as each supplies both domestic and foreign markets) and there is also import transaction in every sector. This structure of the model is informed by Armington assumption

[20] *The various equations that constitute the model can be obtained from the corresponding author.*

(Armington, 1969), which relates to the notion that imports and domestic demand as well as exports and domestic supply are imperfect substitutes. Every sector produces only a single product using labour and capital.

Within the model, producers (represented by 29 sectors) maximise profits subject to a Leontief production function in which intermediate inputs (domestic and imported) are combined with labour and capital to yield final output. Labour and capital are combined using a constant elasticity of substitution (CES) production technology. Each of the households maximises a Cobb-Douglas type utility function. The model focuses on the real side (rather than on the monetary side) of the Nigerian economy.

Each household group allocates a fixed percentage of her expenditure to each sectoral composite good. The savings of each household group are residually generated by netting out the expenditures on composite goods from her income. Government spends her revenue on the same composite goods and also spends on transfers (to households and rest of the world). Government savings are residually generated. Each producer/sector buys intermediate goods (domestic and import), and pays for the use of labour and capital inputs, the only two factors recognised in the model. The firms as an institution in the model, receive net value-added. The firms' expenditures are made up of tax payment (corporate taxes), dividend payment to households, the rest of the world, and a sort of provision for savings (retained earnings).

The nation's savings pool receives savings from the various household groups, firms, government and rest of the world. The savings pool finances investment across the producing sectors. As the level of investment in the model depends on that of savings, the investment is thus said to be saving-driven. The sort of rule guiding the investment in this model is called neoclassical closure rule. The closure rule is more realistic than the Kaldorian closure rule[21] in the Nigerian context as the amount of financial resources mobilised domestically and externally (through the instrumentalities of foreign grants, aids and loans, and, also by way of excess of imports over exports) determines the level of domestic investment in every fiscal year.

One other notable feature of the model relates to the modelling of the factor market in Nigeria. Capital factor is assumed to be immobile across sectors and this in deference to most computable general equilibrium models on developing countries (see Devaranjan et al., 1994; Aminu, 2008a). In these models, capital is treated as immobile in developing countries due to the underdeveloped nature of their capital markets unlike what obtains in the developed countries. To capture this phenomenon, we allow returns to capital to differ across sectors. Labour on the other hand is assumed to be mobile across sectors thereby earning the same wage rate. In calibrating and solving the model, we fix external balance and allow exchange rate to adjust to ensure equilibrium in the external sector while examining the trade liberalisation policy. Consumer price index is used as numeraire for the model and world prices of imports (intermediates and final) are fixed to align with small country assumption in modelling the external sector. Under VAT rate doubling policy, exchange rate serves as numeraire.

[21] *The closure rule in which savings adjust to a fixed level of investment.*

V. RESULTS OF CGE MODEL SIMULATIONS

Two policy impact analyses (simulations) are carried out under this section. One relates to an increase in VAT rate from 5% to 10 percent. The other policy simulation focuses on some far reaching tariff reductions under the framework of trade liberalisation (which could be inspired by trade policy agreements with European Union [under EPA], ECOWAS and WTO). The results of these simulations are explained under the following headings.

5.1 Impact of Raising Value-Added Tax Rate from 5% to 10%

The impact of this policy option is economy-wide. Its impact is more noticeable in the areas of government revenue, external balance, general price level/inflation, investment, firm savings, sectoral output and prices, household welfare and gross domestic product. The policy will also affect the volume of trade especially in the areas of export, intermediate and final import. The Tables below show the likely changes (in percentage) that may occur in these macro and sectoral variables.

Table 1: Impact of 10% VAT Rate on Sources of Government Revenue

Sources of Government Revenue	Percentage Change (%)
Value-Added Tax	97.25
Company Income Tax	-17.02
Import Duties	-4.89
Excise Duties	-3.37
Net Domestic Sales of Petroleum	1.58
Net Export of Petroleum & Gas	2.58
Net Petroleum Profit Tax	1.58
Total Government Revenue	6.36

Source: CGE Model Simulations

The table shows that the 10% VAT rate will ensure that VAT revenue increases by 97% while other taxes such as company income tax, excise duties and import duties will register some declines in the regions of 17%, 3% and 5% respectively. The declines in the revenue accruing from these taxes may be due to decline in purchasing power as a result of the sharp increase in price level (20.96%). See Table 2 below for the increase in price level. The fall in import duties' revenue can be attributed to the decline in intermediate and final imports brought about by the increased domestic prices of these imports. The increased domestic prices are due to the increase in VAT rate. The petroleum-based revenue sources will record some increases that range from 1.58% to 2.58%.

The increases in VAT revenue and petroleum-based revenue far outweigh the decline observed in company income tax, excise and import duties' revenue as the total government revenue increases by 6.36%. Given the large size of petroleum-related revenue in government revenue portfolio, it is most probable that the increase in VAT rate may not lead to the expected

increase in government revenue if petroleum revenue should fall. To minimise or counter the likely declines in other taxes, efforts will be needed to moderate the inevitable increase in price level so that the purchasing power of economic agents will not be seriously impaired. The role of the Central Bank of Nigeria in price level stability will thus be highly relevant whenever VAT rate is to be increased. The next table presents the likely effects of the proposed VAT rate on some macroeconomic variables.

Table 2: Impact of 10% VAT Rate on Macro Variables

Macro Variables	Percentage Change (%)
Real Gross Domestic Product	-5.32
Price Index	20.96
Firms' Savings	-17.02
Government Savings	15.07
Wage Rate	89.48
External Balance/Foreign Savings	-73.96
Investment	4.66

Source: CGE Model Simulations

The results in the table show that the real gross domestic product (GDP) will decline by 5.32% while firms' and foreign savings will fall by 17.2% and 73.96% respectively. The fall in real GDP may be due to the corrosive impact of the inflation induced by the increase in VAT rate. The declines recorded in firms' savings may be traced to the reduction in returns to capital input, which also affects the extent of revenue derivable from company income tax. The reduction in foreign savings can be due to the declines in the volume of intermediate and final imports (see Table 3). The declines in imports must have been caused by the increases in their domestic prices as a result of the increase in VAT rate. In Nigeria, all imports are subject to VAT. Government savings or fiscal position may be better by 15.07% while investment may increase by 4.66%. If wage rate is flexible we may expect labour through their various unions to intensify their demand for increased wage under a situation of declining purchasing power consequent upon the VAT-induced increase in price level. The lots of pensioners and those whose income may not be increased may likely become worsened. The next Table contains the results of model simulations on sectoral variables.

Table 3: Impact of 10% VAT Rate on Sectoral Variables

Sectors	Percentage Change (%) in Sectoral Variables				
	Composite Price	Output	Export	Intermediate Imports	Final Imports
Crop Production	-1.73	2.07	2.99	2.07	-2.22
Livestock	59.43	-41.69	-65.11	0.00	-3.41
Forestry	-51.76	153.45	191.41	153.38	0.00
Fishing	201.58	-70.44	-91.10	-70.44	-3.32
Crude Petroleum	-6.22	2.06	2.58	2.06	-19.27
Natural Gas	6.06	-15.41	-19.57	-15.41	-6.35
Coal/oth.Min.Qua	-86.07	405.14	791.99	405.14	-83.45
Food Drink &Tob	30.22	-30.32	-49.68	-30.32	-2.36
Textiles & Leather	33.17	-29.49	-48.87	-29.49	-2.43
Wood & Paper	21.44	-91.75	-99.31	-91.74	-1.13
Chem & Plastics	173.94	-97.79	-99.95	-97.79	2.33
Refined Petroleum	73.82	-82.89	-96.90	-82.89	5.11
Metal & fabrication.	59.1	-81.88	-96.84	-81.88	2.96
Cement & man.	-1.13	13.51	26.28	13.51	-0.27
Electricity	133.38	-97.43	0.00	-97.43	6.22
Water	12.62	-83.69	0.00	-83.69	-2.47
Building & Estate	16.02	-15.75	0.00	-15.75	-1.47
Road Rail & Water.	4.18	-6.19	-10.71	-6.19	-2.65
Air Transport	76.23	-95.00	0.00	-95.00	11.22
Telecom	15.26	-96.62	0.00	-96.62	-2.17
Post	8.82	-94.34	0.00	-94.29	-2.20
Distribution	4.15	-6.60	-10.63	-6.60	-3.62
Hotels & Restaurants	20.84	-98.32	0.00	-98.33	-2.43
Financial Institutions	-17.54	22.25	57.32	22.25	-6.97
Insurance	55.98	-94.83	0.00	-94.83	3.89
Public Administration	-26.58	92.13	0.00	92.13	2.59
Non-Profit Orgs.	-38.38	80.30	0.00	80.30	-11.68
Education	9.7	-40.40	0.00	-40.41	2.01
Health	-0.65	47.76	0.00	47.80	2.29
Aggregate % Change				-17.31	-0.98

Source: CGE Model Simulations

In the Table, it can be seen that most of the sectoral prices will increase as a result of the increase in VAT rate. It appears some of the increases in sectoral prices will impact household welfare seriously. Among these sectoral prices are those of refined petroleum, electricity, education, telecom, tourism (hotels and restaurants), building and estate, air transport, food and drinks, livestock, fishing, textiles and leather, chemical and plastics. The increases in sectoal prices negatively affect sectoral output while declines in sectoral prices trigger increases in domestic output. The increases in Sectoral prices reduce purchasing power of economic agents while the declines in the prices bolster purchasing power thereby leading to increased purchases and supplies/production.

The increase in VAT rate will alter relative prices in favour of export of crops (both cash crops and crops), crude petroleum, cement and other manufactured products, forestry products and solid minerals. Imports (intermediate and final) are most likely to be affected negatively as a result of the increase in their domestic prices. However, some intermediate imports may not be seriously affected and these are related to such sectors as crop production, crude petroleum, coal and other mining, cement and other manufacturing and non-profit organisations (which are of course funded in most cases from outside the country). Final imports of refined petroleum, metal fabrications, electricity, chemical and plastics, air transportation, education and health will also not be adversely affected. This goes to show that the increases induced in the domestic prices of these sectoral imports are not enough to lead to any decline in their purchases perhaps due to their inelastic price elasticity of demand. These may also be due to the fact that the goods/services are necessities. A very important economic agent in the economy that will as well be adversely affected by an increase in VAT rate is the households. The next Table focuses on the impact the policy option may have on the households.

Table 4: Impact of 10% VAT Rate on Households

Households	Percentage Change (%)	
	Income	Welfare
Urban Non-Poor	-13.60	-7.18
Urban Moderately Poor	-11.61	-8.25
Urban Poor	-0.08	-8.64
Rural Non-Poor	-6.40	-8.07
Rural Moderately Poor	-1.24	-8.21
Rural Poor	31.27	8.56

Source: CGE Model Simulations

The Table shows that urban poor will suffer the most in terms of decline in welfare while it will suffer the least decline in income. This means that the welfare derived from an extra naira by urban poor is higher in relative terms than the welfare that accrues to any other household (besides rural poor) from an extra naira. Rural poor will not be negatively affected either in terms of income or welfare perhaps due to their low level of purchase of VAT-ridden commodities and services. These results suggest that urban poor and rural moderately poor should be targeted for poverty alleviation when VAT rate is increased.

5.2 Impact of 50% and 80% Reductions in Import Duties' Rates

The Tables presented below contains the impact the proposed policy options may have on the various sources of government revenue, macroeconomic and sectoral variables, and households. First, we present Table 5, which relates to the impact of 50% and 80% reductions in import duties' rates on sources of government revenue.

Table 5: Impact of 50% and 80% Reductions in Import Duties' Rates on Sources of Government Revenue

Sources of Government Revenue	Percentage Change due to:	
	50% Cut in Import Duties	80% Cut in Import Duties
Value-Added Tax	2.02	0.13
Company Income Tax	0.24	0.42
Import Duties	-53.08	-86.95
Excise Duties	-0.08	0.73
Net Domestic Sales of Petroleum	2.10	1.37
Net Export of Petroleum & Gas	2.15	1.53
Net Petroleum Profit Tax	2.10	1.37
Total Government Revenue	-1.78	-4.72

Source: CGE Model Simulations

The Table shows that the revenue from import duties will fall by more than the percentage decline in import duties' rates irrespective of the percentage reduction in rates. With the exception of excise duties' revenue under a 50% reduction in import duties' rates, all other sources of government revenue may register some increases but the increases appear inadequate to neutralise the decline in import duties' revenue brought about by the reduction in import duties' rates. The results underline the importance of import duties' revenue in government revenue portfolio. Interestingly, all other sources of revenue (besides company

income tax) may record lower increases under an 80% reduction in import duties' rates, which sort of suggest that a higher percentage cut in rates (of import duties) will not be in the interest of government as the increases in other sources of revenue cannot adequately compensate for the loss in import duties' revenue. The policy implication of the results is that trade liberalisation is better pursued through minimal reduction in import duties' rates as too high a reduction can seriously impair government revenue profile, which may affect over-all fiscal position. The next Table contains the results of what may happen to some macro variables under a trade liberalisation that involves either a 50% or 80% reduction in import duties' rates.

Table 6: Impact of 50% and 80% Reductions in Import Duties' Rates on Macro Variables

Macro Variables	Percentage Change due to:	
	50% Cut in Import Duties	80% Cut in Import Duties
Real Gross Domestic Product (GDP)	0.03	0.68
Firms' Savings	0.24	0.42
Government Savings	-2.89	-8.34
Wage Rate	-21.17	51.13
Exchange Rate (₦/$)	2.31	0.67
Investment	-0.07	-1.61

Source: CGE Model Simulations

The Table shows that a higher quantity of goods and services (real GDP) can be produced under an 80% reduction in import duties' rates than under a 50% reduction in the rates. This may be traced to the higher declines in composite prices in many sectors, which stimulate demand and subsequent production (see Table 3). Firm savings will most likely increase at a higher percentage under an 80% reduction in import duties' rates than under a 50% reduction. On the other hand, government savings (over-all fiscal position) will be under greater stress under an 80% reduction in import duties' rates perhaps due to the size of import duties' revenue in government revenue portfolio. Aggregate investment declines more under an 80% reduction in import duties' rates and this can be traced among others to the higher decline in government savings under the same scenario.

While wage rate will decline following a 50% cut in import duties' rates, it will register a profound increase under an 80% reduction in rates. This can be traced to the increased production across most sectors (as depicted by a higher percentage increase in real GDP) under an 80% reduction in rates. The exchange rate of naira to dollar (or any other internationally traded currency such as euro or pound sterling) will be higher under a 50% reduction in import duties' rates than under an 80% reduction in rates. The basic explanation for this is that the increase in imports (both intermediate and final) following a 50% reduction in import duties rates is not matched by an enough increase in export thereby resulting in

income tax) may record lower increases under an 80% reduction in import duties' rates, which sort of suggest that a higher percentage cut in rates (of import duties) will not be in the interest of government as the increases in other sources of revenue cannot adequately compensate for the loss in import duties' revenue. The policy implication of the results is that trade liberalisation is better pursued through minimal reduction in import duties' rates as too high a reduction can seriously impair government revenue profile, which may affect over-all fiscal position. The next Table contains the results of what may happen to some macro variables under a trade liberalisation that involves either a 50% or 80% reduction in import duties' rates.

Table 6: Impact of 50% and 80% Reductions in Import Duties' Rates on Macro Variables

Macro Variables	Percentage Change due to:	
	50% Cut in Import Duties	80% Cut in Import Duties
Real Gross Domestic Product (GDP)	0.03	0.68
Firms' Savings	0.24	0.42
Government Savings	-2.89	-8.34
Wage Rate	-21.17	51.13
Exchange Rate (₦/$)	2.31	0.67
Investment	-0.07	-1.61

Source: CGE Model Simulations

The Table shows that a higher quantity of goods and services (real GDP) can be produced under an 80% reduction in import duties' rates than under a 50% reduction in the rates. This may be traced to the higher declines in composite prices in many sectors, which stimulate demand and subsequent production (see Table 3). Firm savings will most likely increase at a higher percentage under an 80% reduction in import duties' rates than under a 50% reduction. On the other hand, government savings (over-all fiscal position) will be under greater stress under an 80% reduction in import duties' rates perhaps due to the size of import duties' revenue in government revenue portfolio. Aggregate investment declines more under an 80% reduction in import duties' rates and this can be traced among others to the higher decline in government savings under the same scenario.

While wage rate will decline following a 50% cut in import duties' rates, it will register a profound increase under an 80% reduction in rates. This can be traced to the increased production across most sectors (as depicted by a higher percentage increase in real GDP) under an 80% reduction in rates. The exchange rate of naira to dollar (or any other internationally traded currency such as euro or pound sterling) will be higher under a 50% reduction in import duties' rates than under an 80% reduction in rates. The basic explanation for this is that the increase in imports (both intermediate and final) following a 50% reduction in import duties rates is not matched by an enough increase in export thereby resulting in

higher exchange rate depreciation than under an 80% reduction in rates, which spurs a higher percentage increase in export to finance the increased level of imports (see Table 7 below).

On the over-all, the results suggest that trade liberalisation may be pursued as a policy option but it must be noted that the gains in terms of increased volume of goods and services are small as they range between 0.03% and 0.68% of real GDP. It needs be stressed that the percentage change in real GDP in this study is within the range obtained in similar studies. We present the results of model simulations with respect to sectoral variables in Table 7 below.

Table 7: Impact of 50% and 80% Reductions in Import Duties' Rates on Sectoral Variables

Sectors	Percentage Change in *Composite Price* due to:		Percentage in Change in *Output* due to:		Percentage in Change in *Export* due to:		Percentage Change in *Intermediate Imports* due to:		Percentage Change in *Final Imports* due to	
	50% Cut in Import Duties	80% Cut in Import Duties	50% Cut in Import Duties	80% Cut in Import Duties	50% Cut in Import Duties	80% Cut in Import Duties	50% Cut in Import Duties	80% Cut in Import Duties	50% Cut in Import Duties	80% Cut in Import Duties
Crop Production	0.81	-4.33	-0.12	7.05	0.49	9.53	-0.12	7.05	1.29	4.28
Livestock	72.55	-10.32	-44.98	12.42	-69.23	27.04	0.00	0.00	1.36	3.28
Forestry	-39.61	765.92	106.88	-84.70	131.63	-96.27	106.82	-84.71	0	0.00
Fishing	-23.53	-30.02	32.42	45.96	80.51	114.41	32.42	45.96	-0.69	2.53
Crude Petroleum	0.93	-1.87	-0.18	0.78	-0.16	0.86	-0.18	0.78	1.33	1.44
Natural Gas	0.92	-2.25	-0.07	1.59	0.38	3.07	-0.07	1.59	1.47	2.05
Coal/Other Mining/Quarrying	13.24	-80.86	161.82	6.49	364.45	83.22	161.83	6.49	-92.24	-93.27
Food, Drink & Tobacco	-18.65	-13.33	26.37	17.30	63.83	37.60	26.37	17.30	-0.50	6.37
Textiles & Leather	-0.05	0.04	-0.08	-0.99	2.32	-1.25	-0.08	-0.99	1.75	6.04
Wood & Paper	0.36	3.55	-12.93	-56.06	-21.99	-80.21	-12.92	-56.07	0.75	3.55
Chemicals & Plastics	0.51	-2.26	-5.02	-3.70	-6.64	-5.58	-5.02	-3.70	0.68	4.44
Refined Petroleum	-0.05	-2.47	0.42	-3.00	2.20	-1.22	0.42	-3.00	0.87	-1.34
Metal & fabrication.	-16.31	70.25	55.11	-92.03	150.02	-99.36	55.11	-92.03	-0.07	6.05
Cement & man.	20.43	23.09	-67.31	-76.52	-88.67	-94.19	-67.31	-76.52	0.79	3.14
Electricity	-3.17	4.14	9.87	-22.32	0.00	0.00	9.87	-22.32	0.60	3.64
Water	21.38	-11.69	-97.61	273.60	0.00	0.00	-97.62	273.63	0.82	0.95
Building & Estate	0.35	-1.12	-1.10	0.02	0.00	0.00	-1.10	0.02	0.65	4.07
Road Rail & Water.	2.13	-1.01	-0.71	-0.23	-1.26	0.77	-0.71	-0.23	2.46	2.71
Air Transport	3.18	6.26	-5.74	-20.69	0.00	0.00	-5.74	-20.69	0.04	1.01
Telecom	1.62	4.80	-14.59	-68.60	0.00	0.00	-14.59	-68.60	-0.65	1.82
Post	5.83	-0.52	-80.60	-28.33	0.00	0.00	-80.55	-28.35	-0.72	1.56
Distribution	-6.23	-7.05	6.60	7.38	16.90	16.47	6.60	7.38	1.48	5.71
Hotels & Restaurants	1.66	-1.95	-22.42	-7.15	0.00	0.00	-22.41	-7.14	-0.56	2.54
Financial Institut	2.51	-3.54	-0.23	4.53	-0.48	10.50	-0.23	4.53	0.03	-1.28
Insurance	46.07	-31.90	-89.12	321.81	0.00	0.00	-89.13	321.83	3.32	-7.14
Public Administration	-22.05	-1.96	65.80	2.80	0.00	0.00	65.80	2.80	-2.65	-2.48
Non-Profit Orgs.	5.97	-0.67	-4.02	1.91	0.00	0.00	-4.02	1.91	1.17	-0.11
Education	18.54	-12.71	-74.66	71.96	0.00	0.00	-74.66	71.92	0.08	1.91
Health	8.22	-1.63	-86.76	-5.73	0.00	0.00	-86.76	-5.70	-1.24	-0.22
Aggregate % Change					1.98	2.93	26.00	3.59	0.34	2.69

Source: CGE Model Simulations

The results in the Table show that most of the sectoral prices fall more under an 80% reduction in import duties' rates than under a 50% reduction in rates thereby triggering higher increases in most sectoral output. The higher increases in sectoral output translate to a higher percentage increase in real GDP under an 80% reduction in rates (see Table 6). An integral aspect of output produced is exports, which also register an over-all percentage increase that is higher (2.93%) under an 80% cut in import duties' rates than what obtains (1.98%) under a 50% cut in the rates. The increases in exports of tradable sectors such as agriculture sub-sectors, petroleum and gas might have been made possible by the cheaper imported inputs on account of the large reduction in import duties' rates. There are, however, some variations in the responses of sectoral variables to the reduction in import duties' rates. These variations are the results of different elasticities of substitution between imports and domestic commodities, and they are also traceable to the different elasticities of transformation that subsist between exports and domestic supply across sectors.

If we discount the response of coal, other mining and quarrying sector, sectoral intermediate and final imports (on average) will increase by a higher percentage under an 80% reduction in import duties' rates. This should be expected as lower domestic prices for imported intermediate and final goods will result in greater demand and this will lead to a higher level of imports than before. Barring other barriers to trade, imports are thus an increasing function of the level of reduction in import duties. On the whole, the results suggest that trade liberalisation will spur output and export growth while it will, of course, result in higher levels of both intermediate and final imports. The next Table documents the impact, which the reduction in import duties' rates will have on the various households.

Table 8: Impact of 50% and 80% Reductions in Import Duties' Rates on Households

Households	Percentage Change due to 50% Cut in Import Duties		Percentage Change due to 80% Cut in Import Duties	
	Income	Welfare	Income	Welfare
Urban Non-Poor	-0.13	0.20	1.20	0.77
Urban Moderately Poor	-0.61	0.13	2.37	1.24
Urban Poor	-2.44	-0.62	6.54	3.91
Rural Non-Poor	-1.44	-0.11	4.25	2.05
Rural Moderately Poor	-2.25	-0.48	6.12	3.35
Rural Poor	-7.40	-7.08	17.86	20.26

Source: CGE Model Simulations

The results presented in the Table shows that households are only better-off under an 80% reduction in import duties and this can be traced, to a very extent, to the fact that sectoral prices decline more under an 80% reduction in rates as shown in Table 8. Again, aggregate output increases the more under an 80% decline in import duties' rates and this translate to a large quantity of goods and services for the households. The increases registered in households' income under an 80% reduction in import duties' rates can in part be explained by the increase in wage rate and labour-related income under the same scenario. The nation's factor markets are assumed to be in equilibrium in all the scenarios.

VI. FINDINGS AND POLICY IMPLICATIONS

This study documents the likely effects, which two of the vital policy options proposed under NEEDS-2 (an integral aspect of the recently launched Seven-Point Agenda) can have on the economy, government fiscal balance, sectoral output/prices, external sector and the households. One of the two policy options is the doubling of VAT rate. The other relates to trade liberalisation via the reduction in import duties' rates. The analysis in the study is anchored on a computable general equilibrium model of the Nigerian economy as at 2004. The analyses show that the immediate impact of doubling VAT rate will be a sharp increase in VAT revenue but the tax revenue will not be doubled as its rate. Aggregate government revenue will increase by 6.36% even though revenue from such taxes as company income tax, excise duties, and import duties may decline due mainly to the reduction in domestic production (real GDP) and imports. Real GDP will fall by 5.32%. The increase in VAT rate will also exert an upward trend on the general price level. The consumer price index (CPI) will most likely increase by 20.96%. What this means is that if the CPI is 100 and inflation rate is 0%, a 20.96% increase in CPI will result in inflation increasing from 0% to 20.96%.

The welfare of households (besides rural core poor) will be badly bruised when VAT rate increases by 100%. The corrosive impact of high inflation when VAT rate is doubled, will require the monetary authority to be more conscious of its responsibility to maintain price level stability if the gains in government revenue are to be achieved at not too great a cost to the economy. There may also be need to channel a substantial amount of the increased VAT revenue to sectors that have the most profound impact on poor households both in the urban and rural areas. The analyses conducted under import duties' rates reduction show that real GDP will record a higher positive change under an 80% reduction in rates than under a 50% reduction in rates. Households will fare better under a higher (80%) reduction in import duties' rates.

As it should be expected, a higher level of imports is achieved under a higher percentage reduction in import duties' rates. Exports will also be boosted under a higher percentage reduction in import duties' rates. However, aggregate investment will fall slightly due to reduction in government revenue and savings. The exchange rate of naira against any other foreign currency will register a lower rate of depreciation under a higher (80%) reduction in import duties' rates than under a lower (50%) reduction in the rates. On the whole, trade liberalisation policy is worth pursuing but government may need to broaden its revenue base or explore new sources of revenue to counter the inevitable shortfall in its revenue.

REFERENCES

Aminu, A. (2008a), "Infrastructure-Growth Nexus: A Computable General Equilibrium Analysis for Nigeria," *A paper presented at the African Econometric Society's (AES) Annual Conference, July 9-12, 2008, University of Pretoria, Pretoria, South Africa.*

Aminu, A. (2008b), "An Exploration of the Impact of a Sustained Electricity Development on the Nigerian Economy," *A paper submitted for the Annual Conference of the Nigerian Economic Society,* July 2008.

Aminu, A. (2008c), "A Computable General Equilibrium Assessment of Non-Oil Tax Policy Reforms in Nigeria," *Nigerian Journal of Securities and Finance,* Volume 13 Number 1 :7-45.

Aminu, A. (2006), Incidence and Efficiency Effects of Non-oil Taxes, *A doctoral dissertation submitted to the Department of Economics, University of Ibadan, Ibadan,* Nigeria.

Aminu, A. (2009), "Nigerian Economy and the Global Financial Meltdown," *A training paper for Cooperative Societies in South-West Nigeria, U.I Hotels, University of Ibadan,* June 2009.

Armington, P. (1969), " A Theory of Demand for Products Distinguished by Place of Production" *IMF Staff Papers* 16

Bettendorf, Leon (1998) "Investment-Promoting Policies in the Presence of International Interactions" *Journal of Policy Modelling* 20(6): 715-740.

Boiteux, M. (1956). "Sur la gestion des monopoles publics astreints à l'equilibre budgétaire" Econometrica Vol.24 (January). pp. 22-40. English translation, under title "On the Management of Public Monopolies subject to Budgetary Constraint" in *Journal of Economic Theory* Vol.3 (September 1971). pp.219-40.

Central Bank of Nigeria (2008), *Statistical Bulletin,* Volume 17, December 2006.

Creedy, John (2004), "The Excess Burden of Taxation", *The Australian Economic Review,* Volume 37, No. 4, pp. 454-64.

Devaranjan, S, Jeffrey D. Lewis and Sherman Robinson (1994), *"Getting the Model Right: The General Equilibrium Approach to Development Policy," Draft Manuscript.*

Devarajan, Shantayanan; Karen E. Thienfelder and Sethaput Suthiwart (2001), "The Marginal Cost of Public Funds in Developing Countries", in Amedeo Fossati Wolfyang Wiegard (eds.), *Policy Evaluations with Computable General Equilibrium Models,* New York: Routledge.

Federal Office of Statistics (FOS) (1999) *'Poverty Profile for Nigeria, (1980-1996),* FOS: Lagos.

Harberger, A.C. (1959), "The Corporation Income Tax: An Empirical Appraisal", *Tax Evasion Compendium 1 (House Committee on Ways and Means, 86th Congress, First Session),* 231-240.

Harberger, D. C. (1962), "The Incidence of the Corporation Income Tax," *Journal of Political Economy,* Volume 70, pp. 215-240

Harberger, A. C. (1966), "Efficiency Effects of Taxes on Income from Capital", In Marion Krzyzaniale (ed), *Effects of Corporation Income Tax,* Detroit: Wayne State University Press.

Holmoy, Erling and Haakon Vennemo (1995), "A General Equilibrium Assessment of a Suggested Reform in capital Income Taxation", *Journal of Policy Modeling,* Volume 17 No.6, pp. 531-556.

Iwayemi, Akin P., A. Aminu and Adeola F. Adenikinju (2006), "Economic Impact on Nigeria of The Proposed Economic Partnership Agreement With The European Union: A General Equilibrium Evaluation," *Nigerian Journal of Economic and Social Studies (Forthcoming)*

National Planning Commission (2007), *NEEDS - 2 (2008-2011) : Creating Prosperity through Growth, Abuja : National Planning Commission.*

Newbery, David M. G. and N. W. Stern (eds.) (1987) *The Theory of Taxation for Developing Countries* New York: Oxford University Press.

Ramsey, F. O. (1927), "A Contribution to the Theory of Taxation", *Economic Journal,* Volume 37 (March), pp. 47-61.

Samuelson, Paul A. (1951), "Consumption Theory in Terms of Revealed Preference " *Economica,* 15-16, pp.243-253

Stern, Nicholas (1987), "The Theory of Optimal Commodity and Income Taxation: An Introduction", In David Newbery and Nicholas Stern (eds.), *The Theory of Taxation for Developing Countries,* Oxford: Oxford University Press, pp. 22-59.

Thirsk, W. (1997), "Intellectual Foundation of Tax Reforms" in Thirsk (ed). *Tax Reform in Developing Countries.* Washington: World Bank. Chapter 1.

Walters, Michael. (2004), "Infrastructure and the Marginal Cost of Public Funds", an *Unpublished doctoral dissertation, Universite de Toulouse I- Social Sciences Sociales, France.*