

**TRADE POLICY REFORMS AND RURAL POVERTY IN
NIGERIA.**

BY

**Philip C. Omoke,
Department of Economics,
Ebonyi State University,
Abakaliki, Ebonyi State
Email: philomoke@yahoo.com**

Abstract

This paper examines the impact of tariff reform and currency devaluation on rural poverty and inequality in Nigeria using a computable general equilibrium framework. Specifically, it examines the rural inequality implications of a gradual phasing out of import duties (trade liberalisation) and a market determined exchange rate regime. The Study observed that trade liberalisation reduces rural real wage and rural income leading to higher labour demand with worsening inequality. Currency devaluation was observed to raise the domestic price of imports leading to better terms of trade for the urban import competing sector. Rural terms of trade also improved but this did not translate to higher per capital rural income and higher rural real wage. Rural inequality was observed to further deteriorate. Hence, the study calls attention to the fact that the policy of trade liberalisation should be complemented with appropriate macroeconomic and sectoral policies that will ensure that gains from trade are equitably distributed.

Key words: Trade policy reform, rural poverty, inequality, computable general equilibrium model.

JEL: D58, F13, I38

1. Introduction

By the year 2006, it will be two decades since Nigeria commenced a series of reform measures aimed at putting the economy back on the path of sustainable growth and development. There is no doubt that several structural changes had taken place in the Nigerian economy (some positive while others are not too impressive). In achieving external equilibrium, exchange rate, trade and trade policy related reforms are undoubtedly the most profound of all the reform measures embarked upon since 1986. At the commencement of the economic reform program, several benefits were hypothesized as accruable from such measures. The standard theoretical comparative static analysis of national gains from international trade emphasizes the economic benefits from production specialization and exchange so as to exploit comparative advantage in situations where a nation's costs of production and/or preferences differ from those in the rest of the world. This is part of the more general theory of the welfare effects of distortions in a trading economy, as summarized by Bhagwati (1971). Since, it is demonstrated that nations can gain from a free trade, it is imperative to examine the implications of such 'opening up' for growth, and hence, poverty and inequality. The mechanisms by which openness contributes to growth (and poverty alleviation) are gradually getting to be better understood by economists, thanks to the pioneering work of such theorists as Grossman and Helpman (1991), Rivera-Batiz and Romer (1991) and the literature those studies spawned. Such channels identified by the literature include the scale of the market when knowledge is embodied in the products traded, the degree of redundant knowledge creation that is avoided through openness (Romer 1994), and the effect of knowledge spillovers (Taylor 1999).

After about two decades of reforms, concern is growing regarding the impacts on income distribution and poverty of macroeconomic policies such as fiscal reform, exchange rate deregulation, and trade liberalization. In the past decade or so there has been sharp contrast amongst analyst, researchers, and policy makers on the extent of poverty reduction and inequality in the Nigerian economy. Official figures indicate that poverty is on the decline (though inequality might be on the rise) while casual observers are of the opinion that the reform measures adopted since 1986

have brought more woes and sorrows to households than benefits. The debate rages on. The argument of those who believe that the reform measures have caused poverty and inequality to rise is based on the fact that currency devaluation has led to massive inflation while privatization and trade liberalization have increased layoffs, led to low industrial capacity utilization, hence, slowed the growth process.

In sum, it is argued that the basic aim of the reform which is to restore long-term growth and development has not been realised and even if growth is achieved, as claimed by the government, it has significant distributional costs. Hence, a prominent feature or fallout of the reform is the pervasive and widespread poverty and unemployment of the vast majority of the people. The expected growth seems elusive and major distortions are still found in the structure of the economy. This wide spread poverty, high unemployment rate, decay in public infrastructure, inefficient social sector (like health and education), and rising general price level, obviously, will have negative long term effects on growth, income, production capacity and development. Thus, this paper sets out to examine the impact of trade policy reform, as implemented since 1986, on rural poverty and inequality in Nigeria. Trade policy here implies abolition of quantitative restrictions and a progressive reduction in tariff to achieve a uniform low rate that steadily approaches zero. This is coupled to achieving a competitive exchange rate. In other words, we restrict ourselves to those aspects of trade policy that directly impact on relative prices¹. The rest of the paper is arranged as follows. Section 2 presents a brief review of trade policy reform measures in Nigeria since 1986 when the neo-liberal economic reform measures commenced. Brief reviews of theoretical and empirical literature are presented in section 3 while the methodology is described in section 4. The results from the simulation exercises are reported in section 5 and the paper concludes in section 6.

2. A Brief Review of Trade Policy Reform Measures in Nigeria Since 1986

At independence, the government was a major player in the rural, largely agricultural, sector both as a producer and facilitator. Before the commencement of the SAP (Structural Adjustment Programme) in June 1986, rural poverty and income distribution activities was largely related to agricultural development since majority of the rural labour force are engaged by this sector. Thus, agricultural development and rural development were seen to be synonymous. A major framework for implementing agriculture related trade policies included a Marketing Board Policy, through which all exportable agricultural products were purchased by the Boards on behalf of the government at prices far lower their world prices, thus regulating the reward to rural labour. Commodity Marketing Boards were established in 1977 by the Federal Military Government to take care of specific export crops such as cocoa, rubber, roots and tubers, etc., which were largely produce by the rural labour force. In order to boost production and diversify export base, the government decided to use the economic reform package as a channel to increase the incentive to the agricultural sector. This, it is hoped, will increase rural income and hence attract resources to the rural economy.

Undoubtedly, the exchange rate reform measure is the most profound trade policy reform measure introduced since 1986 in terms of getting prices right and boosting rural income and agricultural productivity. At the commencement of the reform measures, it was argued that the domestic currency, which was administratively fixed by the relevant monetary authority, was highly overvalued (see

¹ Generally, trade and trade policy reforms should be seen as a set of economic instruments and institutional arrangements which create an environment for traders (hence transactions) that is predictable, consistent, and sustainable in order to achieve better allocation of resources

Olofin 1992; Abebefe 1995; and Agbaje and Jerome 2004). Major exchange rate re-alignments were needed if the goal of stimulating agricultural production and export is to be achieved. It should be noted that exchange rate reforms were aimed not only at the agricultural sector but was a measure aimed, amongst other things, at ensuring external balance and improve competitiveness. Hence, it was expected that the prices of agricultural exports will rise in domestic currency value terms if major reform measures (in form of series of devaluations) are carried out. The implication for rural poverty and inequality is obvious. Hence, the rate at which the domestic currency will exchange for major international currencies were left to be determined by market forces, with some intervention by the government as deemed appropriate (see Ajayi, 1988; Adubi and Okunmadewa, 1999; Odubogun 1996; and Sanusi, 2004 for detailed discussion of various exchange rate measures introduced since 1986).

The naira which exchange for about a dollar per unit of the naira in 1985 exchanged for about 130 naira per unit of the dollar in 2004. A prominent exchange rate policy measure in the 1980s and the 1990s was the setting up of a Second-Tier Foreign Exchange Market (SFEM) as a mechanism for securing a more market friendly rate for the Naira and aligning relative prices so as to enhance efficiency in resource allocation, and to promote domestic-based production and non-oil exports. The SFEM came into being on September 26, 1986 when the determination of the Naira exchange rate was made to reflect market forces. Different versions of a (managed) float were experimented with over the period 1990-1998. For example a transitory dual exchange rate system (first and second-tier) was adopted in September, 1986. On 2nd July 1987, the first and second-tier markets were merged into an enlarged Foreign Exchange Market (FEM). Various pricing methods, such as marginal, weighted average and Dutch system, were also adopted. On March 5, 1992, the system of pre-determined quota was abandoned for a complete floating of the naira. It is generally believed that the non-abating pressure on the foreign exchange market resulted in this policy reversal in 1994. By 1995, a policy shift was made again to what was termed “guided deregulation” which led to the establishment of the Autonomous Foreign Exchange Market (AFEM). The AFEM transformed into a daily, two-way quote Inter-Bank Foreign Exchange Market (IFEM) on October 25, 1999.

As a policy objective, the liberalization and de-regulation of the exchange control regime is designed to facilitate and enhance trading activities. Items on the import prohibition list have over time been drastically reduced, with government opting to utilise tariff structures to protect end-user product pricing of local industries and discourage frivolous imports. For instance, In 1998, the import prohibition list was reduced to 11 items namely: maize, sorghum, millet, wheat flour, vegetable oils (excluding linseed and castor oils used as industrial raw materials), barytes and bentonites, gypsum, mosquito repellent coils, domestic articles and wares made of plastic materials (excluding babies' feeding bottles), retreaded/used tyres, gaming machines². Aside drastic exchange rate reform measures embarked upon since 1986, numerous tariff and non-tariff measures were also implemented with the aim of stimulating production and exports of non-oil goods particularly agricultural commodities. In general, trade policy reforms were largely designed to provide incentive for the non-oil sector, particularly the rural agricultural sector with the hope that rural poverty and inequality will be reduced.

Some specific trade liberalization measures undertaken under the SAP includes the removal of bureaucratic controls on trade. Furthermore, the import licensing system, together with exchange control on all current transactions was abolished as soon as exchange liberalization began in

² Nigerian Investment Promotions Commission (2000) “Country Profile: Main Thrust of Nigeria’s Trade and Industrialisation Policy” http://www.nipc-nigeria.org/trad_pol.htm. (Accessed 1/05/2005)

September 1986. The abolition of commodity marketing boards was also followed by abolition of the export prohibition for most items and a reduction in the number of prohibited imported items. The early years of the reform saw the introduction of a new export finance facility and a financing and rediscount facility was put in place to assist private exporters by providing refinancing for the export of both agricultural and non-agricultural products. These measures were supported with the introduction of a duty drawback/suspension scheme which was aimed at enabling exporters to import raw materials and intermediate products for use in the manufacturing of export products. It could be observed that trade policy measures were not only aimed at diversifying the export base of the country, but also to add value to the export of agricultural produce. By 1995, more emphasis was placed on market oriented exchange rate system to enhance export competitiveness. A new seven-year tariff reform programme was also introduced in 1995 with frequent adjustments and changes to the tariff structure. As at 2004, the applied tariff rate averaged about 25 percent, with some exceeding 100 percent. Currently, Nigeria maintains a 150 percent ceiling rate binding on all agricultural goods. In general, recourse to quantitative restrictions on imports is on the decline, Nigeria still bans imports of such products as maize, sorghum, millet, wheat flour, vegetables and plastic articles. Nigeria also enforces a ban for health reasons on all types of meat.

The above review suggests that trade policy in Nigeria has focused both on relative price incentives (in terms of exchange rate and tariff adjustments) and quantitative restrictions in term of quota and outright ban. As discussed earlier the broad objective of trade policy practice in Nigeria is the diversification of export earnings from oil to non oil. Akin to this is the fact that trade policy practice in Nigeria aim at minimising external imbalance. In other words, it is aimed at curtailing incessant importation of consumer goods and protecting domestic production.

3. Brief Review of Literature

3.1. Theoretical Thinking on Trade and Distribution

First it should be realised that the issue of trade policy and poverty is very contentious in the economic literature. As Winter (2001) pointed out, poverty is not directly the result of international trade. Poverty is seen to reflect some conditions and situations which include, but not limited to, low earning power, few assets, poor access to communal resources, poor health and education, powerlessness and vulnerability. Hence, Winter (2001) argues that trade policy matters only to the extents (a) that it affects the direct determinants of poverty and (b) that, relative to the whole range of other possible policies, it offers an efficient policy lever for poverty alleviation. Thus, trade policy becomes relevant if it directly impacts on employment, earnings, and resource allocation. Since these variables are influenced by relative prices in the system and since trade policy influences relative prices, then trade policy affects poverty and inequality. Much of the cost and benefits of trade policy reform has been related to the issue of static and dynamic effects of trade. In other words, efficiency and growth (see, for instance, Romer, 1994 and Berg, Andrew, and Krueger, 2002). It is generally believed that if trade policy reform leads to higher growth, then based on the trickle down hypothesis, poverty and inequality will be reduced (Cornia 2004 and Janvry and Sadoulet, 2000).

Economic theory has long demonstrated that although for small countries trade interventions are generally inefficient and wasteful, their inefficiency is usually dominated quantitatively by their redistributive effects (see Bhagwati, 1971; Bourguignon, Pereira da Silva, and Stern, 2002; and Bermudez, 2004 for a detailed discussion of this issue). That is, the net losses from intervention will generally comprise large positive effects for some people/households and large negative effects for others. In this light, it is seen that removing interventions will generally be income-enhancing overall,

it is likely to generate both winners and losers. For example, liberalising an import sector typically redistributes real income from producers to consumers as prices fall, and between different factors of production so that some gain while others lose more heavily than average. Generally, experience with structural adjustment has allowed economists to estimate the impacts of openness and trade liberalization on economic growth and poverty reduction. Many economists conclude from the evidence that openness fosters growth which in turn reduces poverty (Nordstrom, Ben David and Winters, 2002; Berg and Kreuger, 2002). Based on this and similar studies, the World Bank argued in its *2004 Global Economic Prospects* (World Bank, 2003) that trade liberalization generally could yield \$500 billion in annual gains to developing countries, with over \$100 billion of those gains due to direct (static) improvements in resource allocations as a result of the elimination of distortionary agricultural policies.

Following the Asian financial crisis of the late 1990s, policies of the IMF (International Monetary Fund) and the World Bank, particularly the structural adjustment programme (SAP), came under severe criticism because of the impacts they appeared to have on income distribution. Ever since, both the IMF and the World Bank have identified poverty reduction as a key goal of their strategies. Policies now need to be chosen taking into account impacts on income distribution and the extent to which they reduce poverty. It is now generally acknowledged that while growth may be necessary to reduce poverty, some policies which lead to growth will improve the distribution of income while others make it worse. Where trade policy belongs to in this category is still not clear from the literature. If trade policy stimulates growth then it might be possible to link growth and poverty. This approach is common in the literature (see Ravallion and Chen, 1997; de Janvry and Sadoulet, 1998; and Agenor 2002). A formalization of this approach is given by endogenous growth models (see Romer 1990; Grossman and Helpman, 1991; and Lumenga-Neso, Olarreaga and Schiff 2004). Under endogenous models, growth reflects the contribution to productivity from structural and governance reforms on the one hand, and the adoption of new technology on the other. Trade is seen as affecting long run growth through its impact on technological change—i.e. it influences the rate of change in technological progress. Endogenous growth models, therefore, hold that trade provides access to imported products, which embody that new technology; additionally trade alters (mainly increases) the effective size of the market facing producers which raises returns to innovation; and affects a country's specialization in research-intensive technologies and production systems. The emphasis is on the fact that trade gives a poor country the opportunity to remove domestic shortages, to overcome the diseconomies of a small domestic market and accelerate the learning rate of the economy. As it is generally argued, if trade increases the capacity for development, then the larger the volume of trade, the greater the potential for development (Meier, 1995).

The basic issues about trade policy and its impact is again well captured by Rodrik (2002) as he argued that trade reform goes beyond changes in relative prices to encompass institutional reforms. Institutional reforms not only alter policy parameters but also behavioural relationships. Hence, Rodrik argues, the resource-allocation and dynamic consequences of trade reform become harder to discern. Household behavior and investment decisions get altered in a way that is difficult to track in the absence of knowledge about the parameters of the economy. When the reform is well-designed and consistent with the institutional needs of the economy, it can spur unexpected levels of entrepreneurial dynamism and economic growth. When it is not, it can result in a stagnation that will appear surprising. Even, when trade policy reform is well designed, reforms come at a cost. As argued by Matusz and Tarr (1999), despite this evidence of improved incomes from trade reform, some policy makers are reluctant to implement trade reform due to fear of excessive adjustment costs. It is argued

that policy makers fears may be based in part on political dynamics of reform (politicians in power fear they will incur the anger of the owners of displaced resources while the benefits may accrue in later years), but may also be based in part on the fact that there is much less written and known on the subject of the nature, magnitude, and duration of adjustment costs. Matusz and Tarr (1999) defined adjustment costs to encompassing a wide variety of potentially disadvantageous short-run outcomes that might result from trade liberalization. These outcomes may include, but not limited to, a reduction in employment and output, the loss of industry-specific and firm-specific human capital, and macroeconomic instability resulting from balance of payments difficulties or reductions in government revenue.

The general conclusion is that knowledge of the distribution of private costs of trade policy reform is also useful because of genuine concerns for an equitable distribution of income. On the other hand, the social costs and benefits become relevant measures when considering the aggregate welfare effect of trade reform. Obviously, reforms should not be undertaken if the costs outweigh the benefits. Even in situations where the benefits of reform are a little larger than the costs, it may not be beneficial to liberalize since policies designed to spread the burden of adjustment by redistributing income are likely to be distortionary and entail a social cost of their own. Matusz and Tarr (1999) argues that this is true whether these policies are motivated by political expediency or by concerns for equity. It was observed that the probability of being able to implement redistributive policies in a fashion that generates political support for reform and minimizes the adverse impact on the distribution of income grows as the ratio of social benefits to social costs increases.

3.2. Empirical Literature

The empirical analysis of the impact of economic reform measures on poverty and income distribution has received much attention in the literature. Different techniques and methodologies have been adopted ranging from micro-simulation and econometric models to large scale computable general equilibrium models (CGE). In examining stabilization and income distribution in the case of Indonesia, Thorbecke (1991) observed that adjustment programs restore equilibrium and improve income distribution. The study by Lambert, Schneider and Suwa (1991) for Cote d'Ivoire demonstrates that reduction of public expenditures by cutting wages of public employees reduces inequality but were unable to efficiently reduce poverty. The study further observed that currency devaluation reduces inequality and poverty in Cote d'Ivoire.

Sahn, Dorosh and Younger (1997), and Dorosh and Sahn, (2000) have examined the impacts of trade and exchange rate liberalization on income distribution and poverty in countries such as Cameroon, Gambia, Madagascar and Niger, using Social Accounting Matrices (SAMS) for the period 1989–93. The findings from these studies show that trade and exchange rate liberalization benefits poor households in urban and rural areas. Bautista and Thomas (1997) have also examined the impact of reform, particularly import liberalization, on poverty in the Philippines. The results indicate favourable effects of import liberalisation on income distribution and poverty. Lofgren, Chulu, Sickinga and Simtowe (2001) have also examined the impact of reform on the household in Malawi. The study observed that lower tobacco price plus higher petrol prices penalise nonagricultural population, real depreciation affected the poor disproportionately and real appreciation benefited the urban population. In another study on Indonesia, Robilliard, Bourguignon and Robinson, (2001) observed that reform in the form of the El Nino worsens household welfare more than credit crunch. Examining various reform options such as food price subsidy, public works programme and targeted household transfers, they found targeted transfers to be the most efficient. Decaluwe, Patry, Savard, and Thorbecke (1999)

have also used a CGE model for an archetype African developing economy to analyse the impact of a fall in the price of the export crop and an import tariff on poverty and income distribution. The study demonstrated that reductions in import tariffs are beneficial to the alleviation of poverty.

Aka (2003) examined the effects of the level of fiscal adjustment required to compensate for the drop in fiscal receipt because of the trade liberalization and adoption of external common tariff in WAEMU countries on income distribution and poverty in Cote d'Ivoire. The study concludes that the elimination of agricultural exports and import taxes leads to more poor households than in the pre-shock scenario. The elimination of taxes on industrial exports reduces the number of households that are poor in comparison to the pre-shock scenario. In the case of Nigeria, Obi (2003) examines the potency of fiscal policy as a tool for redistributing income in Nigeria. The study observed that targeting of government expenditure seems to be the most potent tool for effective redistribution of income. Moreover, tariff adjustment tends to aggravate income disparity among households. Anderson and Evia (2003) examined the distributive impact of aid flows in Bolivia. The study observed that in terms of income distribution, the impacts differ considerably between the two extreme cases. In the case where more aid is used exclusively for current spending, the ones who benefit most are the skilled workers in urban areas, since these accounts for most of government spending. Those who lose most are rural workers and employers. Rural workers lose because they work in modern agriculture, an export sector that gets hurt by the real appreciation of the exchange rate following the influx of aid. The employers lose because their enterprises become less competitive due to the appreciation. In the case where foreign aid is converted fully into public capital, the distributional impact is completely different. The main winners are urban informals, employers, and skilled workers who are typically employed in public investment projects. The only group that loses in this scenario is rural workers, but they benefit in the end due to the higher level of productivity and incomes in the economy.

4. Methodology

In justifying the use of an economy-wide model, several authors have argued that the indirect allocation effects may differ in direction and even dominate over the direct effect identified in partial equilibrium analysis (Thorbecke, 1991; Decaluwe, Patry, Savard, and Thorbecke, 1999; Dorosh and Sahn, 2000; and Glomsrod, Monge, and Vennemo 1997). This clearly demonstrates the importance of adopting an economy-wide approach. Hence, to capture these indirect effects of economic reforms on relative rural income in Nigeria, we apply a CGE model.

4.1. Basic Structure of the Model³

Two basic issues are essential in building the model. First is the issue of production in the agricultural (rural) frontier sector. The frontier represents marginal farm land. The second is modelling the nature of incentive for encroachment into the frontier. In other words, we have to model labour migration into the frontier. These two issues are essential in this model in identifying the impact of reform on rural income. The (core) static part of the model is in line with traditional neoclassical general equilibrium framework as described in Dervis et al (1982). Economic agents are assumed rational and hence they maximise benefits (profits and utility.) In the goods market, equilibrium is ensured such that the goods market clears. Due to our focus on rural inequality, the labour market is modelled differently. In the labour market there is the possibility of unemployment (which is a more realistic framework given the Nigerian circumstances.) Like traditional neoclassical equilibrium models, we ignore the capital market. Because of the prevalence of balanced national accounts data (including social accounting

³ This section and the model follow closely from Glomsrod, Monge and Vennemo (1997).

matrices) for Nigeria for the period 1996, the model is calibrated to 1996 data. The appendix contains the full listing of the model.

Producers

Due to data limitations and given that the focus is on the rural sector the level of disaggregation is kept manageable. The model contains 5 sectors each producing a single commodity. Among these are 3 agricultural sectors. All the agricultural sectors are classified as rural while the remaining sectors are classified as urban. Commodities are produced by labour, capital, and intermediates. The intermediates are used in fixed proportions to the production levels. Demand for labour is determined by equating the value of the marginal product of labour to the nominal wage rate, and is decreasing in the real wage rate. Each sector receives a fixed share of total nominal investments. Production functions are Cobb-Douglas, except in the agricultural rural frontier sector where the only input factor, labour, is proportional to output, which is a linear composite of basic grains and tubers.

Labour Market

We model labour supply as a variable growing by a constant rate based on population growth forecast. The rural-urban migration mechanism is modelled in the tradition of Harris and Todaro (1970), where there is unemployment in the urban-sector, but migration to cities is positive as long as expected urban income, adjusted for the probability of getting a job, is higher than the rural wage. The model is run in two different versions, with constant and flexible real urban wage, respectively, to illustrate the two extremes among wage formation rules and unemployment regimes.

Social Classes and Distribution

Migration of the labour force is induced by the structure of income distribution. Income comes from profits, wages, and transfers from abroad. Small farm holders also earn rent as agricultural smallholders, while the big farmers are among those that receive profit. Agricultural workers and urban workers earn wages, and frontier farmers earn imputed income arising from their production of grains and tubers. The consumption function of the classes is modelled as a linear expenditure system with stipulated minimum consumption function based on savings ratios. Frontier production is assumed to be for subsistence consumption.

Saving and Investment

The saving of a particular class is modelled as the residual from income less taxes and expenditure. Differential saving rates among classes is assumed which largely influences the level of total saving. The government gets foreign transfers through official development assistance, workers and capitalists get private remittances. Government savings is then the residual of public revenues less the exogenous public expenditures. The level of total savings determines investment in real capital. This implies that domestic savings largely influences the growth path of the economy. We assume that a large proportion of private savings comes from capitalists' profits while the contributions of workers, small farm holders and the landless farmers are insignificant. The capital stock in period $t+1$ is equal to the capital stock in period t less depreciation plus investment in period t . Allocation of investment by destination is determined by fixed (base year) coefficients. The sectoral pattern of investment by destination is translated into demand for investment goods by sector of origin.

Foreign trade

The external sector is modelled by assuming that domestically produces goods compete with foreign goods both on the world market and at home. The Armington assumption that domestically produced

commodities and imported goods of the same category are non-perfect substitutes is also invoked. The higher the price of the domestically produced commodity relative to the price of the imported variety, the higher is the import share on the production side. A CET (constant elasticity of transformation) function indicates that domestic output cannot be shifted costlessly between the domestic market and the world market. The higher the price on exports relative to the domestic price, the higher the export share.

Production Technology at the Rural Agricultural Sector.

We assume that agricultural land consist, among others, of areas which are colonised by squatters, combining the features of rapid expansion of cultivation with the availability of virgin forests. Hence, agricultural production is assumed to be extensive rather than intensive (due to limited application of technology, which is a typical characteristic of the agricultural sector in Nigeria), which implies that agricultural expansion encroaches into the forest. In addition, high population growth combined with widespread poverty and unemployment in Nigeria further encourages migration to the frontier where income is assumed secure and does not fall below a subsistence level due to the practically unrestricted access to forestland.

Based on the above discussion, the rural labour force (LF^t) produces zl_{gr} , and zl_{tb} units of grains and tubers per man-year. The corresponding frontier production level for a single crop, b , is:

$$XF_b^t = zl_b LF_b^t, b \in (gr, tb) \quad (1)$$

Where b represents grains (gr) and tubers (tb). This production level is expected to generate an imputed income WF^t per man-year:

$$WF^t = \sum_b PF_b^t zl_b, b \in (gr, tb) \quad (2)$$

at the frontier. This is the level of income which is attracting migrators or not, depending on alternative income opportunities in the economy. The product price obtained at the rural sector (PF_b^t) is set equal to the price (P_b^t) facing the market integrated producers of basic grains and tubers in the economy:

$$PF_b^t = P_b^t, b \in (gr, tb) \quad (3)$$

Production at the frontier rural agricultural sector is for own consumption and as such, the output of grains and tubers have a basic value independent of market prices. However, Glomsrod, Monge and Vennemo (1997) argued that for accounting purposes, it is reasonable to calculate an imputed income based on general market prices. The important assumption for the result is that a change in market prices signals a change in the opportunity cost of remaining within the market economy and not getting access to the frontier diet. If frontier rural Agricultural productions were commercialised, farm gate prices would in general be lower than in non-frontier agricultural areas with better infrastructure and lower transportation cost. By assuming that all output is for self-consumption we disregard the fact that a minor share of output is commercialised.

Alternative occupation and income is available in the established rural economy, and in urban areas with a probability less than one. Equilibrium is obtained when there is equality between the expected

income options. The rural wage level WR^t , which is an index for wages in established rural production sectors, is equal to the urban wage level WU_0 , adjusted for the probability of being employed in urban sectors:

$$WR^t = (I - UR^t) WU_0 \quad (4)$$

UR^t is the share of unemployed in the urban economy which is where unemployment exists. Farming at the rural frontier is primarily an alternative to non-frontier rural farming. We assume that landless labourers in rural farming leave for the frontier if income at the frontier is large relative to income in non-frontier rural farming.

In considering how to model this relationship, an extreme alternative would assume that people leave for the frontier if income at the frontier is larger than income in non-frontier rural farming, making the income levels equal in equilibrium. A less extreme alternative, which we chose, is to assume a constant elasticity of transformation (CET) macro-relationship between working in rural non-frontier farming and working at the frontier. This relationship means that some landless labourers leave for the frontier immediately when income at the frontier exceeds income in rural non-frontier agriculture. Others need a larger income incentive in order to move, for reasons of transport costs, non-peculiarly preference or risk aversion. In equilibrium, a non-zero income differential is associated with a finite stock of frontier farmers. To model the CET relationship, we use the dual and specify the macro-index of income in rural agriculture and frontier:

$$WX^t = [\alpha_1(WF^t)^p + \alpha_2(WR^t)^p]^{1/p} \quad (5)$$

WX is the macro-index of income. We explain the stock of frontier farmers as a function of income relative to the wage index (which, since the wage index consists of frontier income and rural income, is equivalent to defining it as a function of frontier income relative to rural income):

$$LF^t = \alpha_1 LS^t [WF^t/WX^t]^{p-1} \quad (6)$$

To fully describe the labour market, it remains to determine the stock of landless rural labourers and urban workers. To do so, the model allocates potential labourers between urban unemployed and rural labour such that the urban unemployed equal the number necessary for the expected urban wage to equal rural income for the landless labourer. Total supply of labour (LS^t) in the economy grows at an annual rate of:

$$LS^t = LS_0 (1 + g)^t \quad (7)$$

Where LS_0 is the base year labour supply. To assess the impact of economic reforms on rural income we have chosen trade policy scenarios containing some central adjustment elements. These are narrowing the foreign trade gap (devaluation) and tariff reduction. Below we sketch the background for implementing the policy measures and finally some characteristics of the base scenario. The policy simulations represent a mixture of implemented and planned policies, which we simulate over a ten-year period (1996-2005).

4.2 Data

The data uses in this study are derived from various national accounts of Nigeria as published by the Federal Office of Statistics (FOS). Consumption elasticities are derived from studies like Obi (2003). The social accounting matrix (SAM) is calibrated to 1996 base year. Base year household allocations and income distribution index are based on the National Integrated Household Survey (NISH) of the FOS. Initial estimate of capital employed is based on the assumption of a fixed capital output ratio, while labour distribution is as reported by the FOS in the NISH. A strong, though realistic, assumption made is that 70 percent of the active labour force is engaged in agriculture. Forest resource allocation is based on 1996 estimates of the FOS in the national accounts on forest product and their locations. Import and export elasticities are also 'guesstimates'. World market prices are exogenous, *i.e.* it is assured that Nigeria is a small country unable to affect external terms of trade. The prices of imported and exported goods are determined as the world prices multiplied by the exchange rate and adjusted for tariffs

5. Results from Policy Simulations

The base-run scenario portrays the continuation of base-year behaviour and policies. The labour force is assumed to grow at an annual rate of 3.0 per cent. The population growth was estimated to be 2.9 per cent in the years 1990-1995. Tax revenue is mainly generated from a value added tax of 5 per cent, tariffs and income taxes. The rural sectors pay practically no taxes. The base run assumes a constant real urban wage while the level of urban unemployment is variable. Public expenditures are assumed to grow at an annual rate of 10 per cent. The base run scenario is mirroring shrinking investments, increasing unemployment and an annual declining of about 1 per cent in real GDP. The base run behaviour and restrictions offer a reference point for analysis of various economic reforms and their impact on rural income and inequality.

5.1 Simulated Scenarios

A. Gradual Reduction in Trade Tariff.

We focus on the impact of gradually reducing (and eventually eliminating) international trade taxes (import duties specifically). We examine the impact of the gradual reduction in import tariff embarked upon since 1986 on rural income and inequality.

B. Narrowing the trade gap.

A series of devaluation efforts have been carried out since 1986. Several exchange rate management measures have been adopted over the past decade. How these have affected rural income disparity is evaluated

Below we present the results for each scenario by first pointing at the short-term effects of the implemented policies, and thereafter commenting on the outcome after 10 simulation periods. Figure 1 shows the effect of single policy measures on basic macroeconomic variables: - GDP, unemployment rate, and private consumption. The first set of bars shows deviation from the base run, the second shows deviation from the first and the last shows deviation from the previous scenario.

Tariff Reform

This is implemented as an across the board reduction in average tariff (import duties) over a five year period to the zero level. In other words, we examine the implications of a gradual phase-out of import duties. This experiment is a proxy to measure the gradual reduction in average tariff in the country

since 1995. Though tariff on some good were increased while some were reduced, actual average tariff rate has been on the decline since 1995. Hence, an equal rate of reduction was postulated for five years. The implications for macro aggregates such as gdp (gross domestic product), national unemployment and private consumption are shown in Figure 1 (bars corresponding to 1-base). It could be observed that gdp rose by about 4 percent when compared to the base case and unemployment fell by about 1 percent. Private consumption also rose by about 1.6 percent.

Figure1

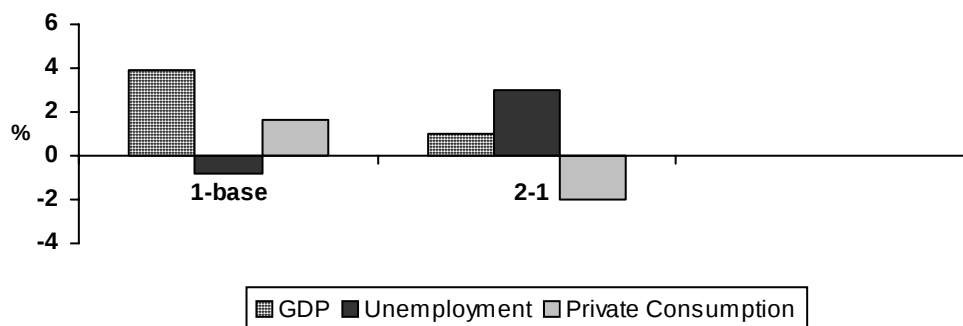


Table 1

**Impact of Economic Reforms on Rural Income and Main Economic variables in Nigeria.
Deviation from Base Run Scenario: (Year 2005. Per cent)**

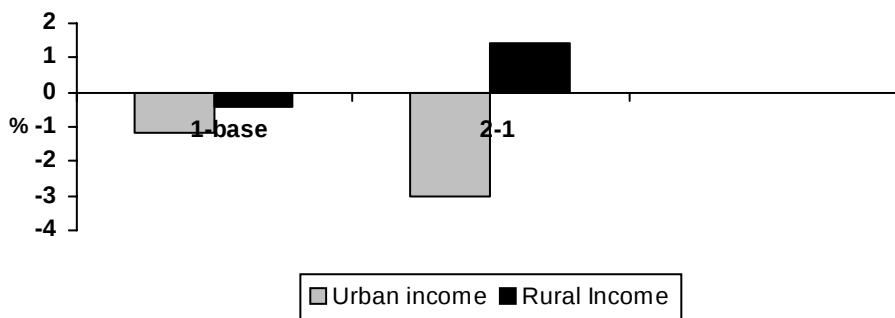
	(1) Tariff Reform (%)	(2) Currency Devaluation (%)	(3) Flexible Real Wages (%)
	(1)	(1)+(2)	(1)+(2)+(3)
Gross domestic product	3.9	4.1	4.6
Consumption	1.6	3.1	3.2
Export	1.2	1.6	1.6
Import	2.3	2.8	2.9
Urban real wage	-	-	-2.1
Rural real wage	-0.6	-1.7	1.4
Per capita rural income	-0.4	-1.2	1.4
Per capita urban income	-1.2	1.4	-0.5
Rural Unemployment	-0.2	-0.3	-0.2
Urban Unemployment	-0.8	-1.7	-2.1
Inequality: Rural Gini Index	0.62	0.65	0.66

Source: Results from policy simulations

The simulations show that rural real wage declined by about 0.6 percent when compared with the base case scenario while per capital rural income also declined by about 0.4 percent. This

decline in real wage translated to a 0.2 percent reduction in rural unemployment. The growth in gdp came largely from the urban sectors and not the rural sector. Given a rigid urban wage assumption we observed that unemployment reduced by about 0.8 percent in the urban sector. However, the growth of import (2.3 percent) was more than the growth of export (1.2 percent). This could have serious implications for the current accounts. This we did not pursue in this study. The tariff reform measures are observed to have lowered rural real wages and per capital rural income but marginally increased rural and urban employment. Intra-household allocation of income as measured by the Gini coefficient shows inequality rating of 0.62.

Figure 2: Per Capita Income



Currency Devaluation

In this simulation we now relax the assumption of a fixed exchange rate regime. In this simulation, external reserves are fixed and the exchange rate is allowed to close the external deficit for each simulation period. This simulation is combined with the first scenario, tariff reduction. The immediate impact of devaluation was to increase domestic price of imports and hence resources were allocated to the production of urban goods to take advantage of better domestic terms of trade. Export performance improved slightly, growing by about 1.6 percent. GDP performance also improved but most of the investment gains went to the urban sector. We could observe higher labour demand in the rural agricultural area and in the import-competing urban sector. Higher employment led to increased rural-urban migration. Rural real wage reduced leading to higher employment. We observed that agricultural output however increased due to better terms of trade. However more labour was demanded and less of intermediate input used. Export of the agricultural sector also improved which implies that

there is increased extensive cultivation. Rural real wage also fell by about 1.7 percent mainly due to inflationary pressure of devaluation while per capita rural income fell by about 1.2 percent. A rise was witnessed for per capita urban income while urban unemployment fell by about 1.7 percent. Most of the gains from devaluation tend to accrue to the urban sectors rather more than the rural sector. In sum, based on the assumption of a rigid urban wage structure, we observed that rural real wage and rural income both declined due to tariff reforms and currency devaluation. The Gini index of inequality rose to 0.65 in this simulation showing increased rural inequality.

Flexible Real Urban Wages

The earlier scenarios assume that trade unions are able to negotiate higher nominal wage rate which is equivalent to the change in price level, leaving urban real wage rate unchanged. We examine a situation where market forces can now influence wage rate determination. Again, we assume the possibility of unemployment such that the market can generate a vector of wage rates that will reduce unemployment to about 10 per cent when compared to the base case scenario. Earlier policies introduced are still maintained.

Allowing for flexible real urban wage rate we observed that there was steady decline in real wage rate leading to higher employment and higher rural-urban migration which reduced frontier cultivation. The rural-urban migration tends to drive up real rural wages leading to higher output prices of agricultural products. The higher rural wage increased the demand for agricultural goods and basic grains and tubers. However a countervailing effect exists. This is the price incentive to frontier farmers due to higher prices of grains and tubers leading to higher frontier activity. This effect was particularly strong over the medium to long-term period. The declining real wages increase the level of economic activity in virtually all sectors. Private consumption increased showing the stronger consumption effect of non-wage earning economic agents and the rural sector. Both import and export improved. However, rural inequality deteriorated to a Gini index of 0.66.

In sum, the three scenarios depict evidence of rising rural inequality in Nigeria, with the Gini index moving from 0.62 to 0.66 indicating rising inequality.

5.2 Policy Dimension to Simulation Results

The policy implications of the above simulation results are obvious. First it could be observed that trade policy in itself may not ensure poverty alleviation and a more equitable distribution of income. Though “opening up” increases growth performance but the expected “trickle-down” effect was not broad based. The rural sector witnessed worsening inequality. Since the simulation was based on relative price reforms, we observed that emphasis on excess relative price reform as observed in the reform package (getting prices right) may ensure efficient resource allocation but cannot guarantee poverty reduction in the rural area. Trade policy will need to be accompanied by institutional and sectoral reforms that are directly targeted at reducing poverty and inequality. In other words, support programmes targeted at the rural agricultural sector may be more efficient in reducing poverty though may distort resource allocation. The direct observation is that market oriented resource allocation (relative price adjustment) and poverty reduction are not necessarily complementary. Tradeoffs exist. This in part suggests a need for strong policy intervention in the rural agricultural sector in the form of infrastructural development and price support. Unguided and unbridled deregulation can boost economic growth, but at the expense of poverty reduction.

6. Conclusion

We examined the effect of trade reform measures on economic performance and rural inequality in Nigeria using a computable general equilibrium model. The study observed that total savings (both private and public) which can be effectively translated into investment is essential for growth and poverty reduction. This is because employment and per capital urban wage can increase leading to less extensive rural activity. Tariff reform was observed to have reduced rural real wage and per capital rural income with adverse impact on rural inequality. Currency devaluation was observed to increase the domestic price of imports leading to resource allocation to the production of urban goods. This translated to higher labour demand in the urban sector which aggravated the rural-urban migration process. The rural agricultural sector also enjoyed better domestic terms of trade due to devaluation. However, rural real wage declined raising employment and at the same time increasing the level of inequality. By relaxing the assumption of rigid urban wage rural inequality did not abate. The paper concludes that trade policy reform has not impacted positively on rural inequality. This is due mainly to

the fact that many of the rural active labour force are landless frontier farmers. In terms of policy implications, we suggest that to ensure that trade reforms translate to reduced inequality, complementary macroeconomic and sectoral policies will be required that will ensure that gains from liberalisation are more equitable distributed. This study is limited in several respects. First is the quality of data used several assumptions were made where data could not be found. Second is the fact that not all instruments of adjustment reform were considered. The assumption about real wages being rigid for the rural area could also be seen as a restriction that may not be empirically tenable. However, this is made for the purpose of convenience.

REFERENCES

- Abebebe, H. A. (1995). The Structure of Nigeria's External Trade: A Focus on Exports. Central Bank of Nigeria *Bulletin*, Vol. 19, No.4.
- Adubi, A. A. and F, Okunmadewa. (1999) Price, Exchange Rate Volatility and Nigeria's Agricultural Trade Flows: A Dynamic Analysis. AERC *Research Paper* 87 African Economic Research Consortium. Nairobi March.
- Agbaje, A. and A. Jerome (2004) Institutional Framework and the Process of Trade Policy Making in African Countries: The Case of Nigeria, Final Report Submitted to the African Economic Research Consortium, January.
- Agenor [2002], "*Macroeconomic Adjustment and the Poor: Analytical Issues and Cross-Section*", Mimeo, The World Bank, 2002.
- Ajayi, S. I. 1988. "Issues of Overvaluation and Exchange Rate Adjustment in Nigeria". Prepared for Economic Development Institute (EDI). The World Bank, Washington, D.C.
- Aka, B. F. (2003). "Fiscal Adjustment, Poverty, Inequality and Welfare in Cote d'Ivoire: A CGE Model Analysis", Final Report, AERC, Nairobi, Kenya.
- Akindele, R. A. (1988) "The Foundation and Implementation of Nigeria's External Economic Policy: Institutional Structure and Processes" in Akindele, R. A and Ate, B. F. (Eds.,) *Nigeria's Economic relations with the major developed market-economy countries, 1960-1985*, Lagos, Nigeria. Institute of International Affairs (NIIA).
- Anderson, L. E., and J. Evia. (2003). "The Effectiveness of Foreign Aid in Bolivia", Research Paper, No. 10, Instituto de Investigaciones Socio Economicas, Documento de Trabajo, Bolivia.
- Ayonrinde F. and O. Ola (2002) *Trade Liberalization and Technology Acquisition in the Manufacturing Sector: Evidence from Nigeria*. African Economic Research Consortium (AERC) Research Paper 117, Nairobi Kenya.
- Bautista, R. and M. Thomas. (1997). "Income Effects of Alternative Trade Policy Adjustments on Philippine Rural Households: A General Equilibrium Analysis", TMD Discussion Paper No. 22, International Food Policy Research Institute.
- Berg, Andrew, and Anne Krueger, (2002). "Trade, Growth and Poverty," Working Paper, 2002 Annual Bank and Conference On Development Economics, The World Bank, Washington D.C., April.
- Bermudez, E. (2004), *Sustainability Assessments of Trade Policies and Programmes*, Gland: WWF International, January.
- Bhagwati, J.N. (1971), 'The Generalized Theory of Distortions and Welfare', in *Trade, Balance of Payments and Growth*, edited by J.N. Bhagwati et al, Amsterdam: North-Holland.
- Bhagwati, J.N. (2004), *In Defence of Globalization*, London and New York: Oxford University Press.
- Bhasin, v. K. and s. K. Annim, (2005) Impact of Elimination of Trade Taxes on Poverty and Income Distribution in Ghana. Revised Final Report Submitted to Global Development Network. January 2005
- Bourguignon, F., Pereira da Silva, L., and N. Stern (2002) Evaluating the Poverty Impact of Economic Policies: Some Analytical Challenges. www.undp.org/rblac/documents/poverty/Bourguignon-PovandMacro.pdf
- Cornia G. A. ed. (2004). Inequality, Growth, and Poverty in an Era of Liberalization and Globalization. WIDER Studies in Development Economics.

- Danju D. and J. Weiss. (1997) Manufacturing Performance During Adjustment: Evidence from Nigeria. *Development Policy Review*, December, Vol. 15, No. 4, pp. 357-369.
- Decaluwe, B., Dumont, J., and L. Savard. (1999). "Measuring Poverty and Inequality in a Computable General Equilibrium Model", CREFA, Working Paper 99-20, Department of Economics, University of Laval, Quebec, Canada.
- Dervis, K., J. de Melo, and S. Robinson (1982), *General Equilibrium Models for Development Policy*, Cambridge: Cambridge University Press.
- Dorosh, P. A. and D. E. Sahn. (2000). "A General Equilibrium Analysis of the Effect of Macroeconomic Adjustment on Poverty in Africa", *Journal of Policy Modelling*, Vol. 22, No. 6, 753-76.
- Fajana, O. (1988). "The Post-War International Economic Order: Development Trends in the Flow of Trade, Aid, Loans and Private Foreign Investment", in Akindele, R. A and Ate, B. F. (eds.), *Nigeria's Economic relations with the major developed market-economy countries, 1960-1985*, Lagos, Nigeria. Institute of international Affairs (NIIA).
- Federal Government of Nigeria (2002) *Trade Policy of Nigeria*, Federal Ministry of Commerce, Abuja, Nigeria, January.
- Fine, Jeffrey (2001) "Implementing Trade Policy in Nigeria: Findings and Recommendations", Chemonics
- Flakierski Henryk (1979) Economic Reform and Income Distribution in Hungary Cambridge Journal of Economics, 1979, vol. 3, issue 1, pages 15-32
- Francois, J. F., N. Håkan., and C. R. Shiells, (1997) Transition Dynamics and Trade Policy Reform in Developing Countries. www.intereconomics.com/francois/text9601.pdf
- Fullerton, D. (1991) "Reconciling Recent Estimates of the Marginal Welfare Cost of Taxation". *American Economic Review* 81, (March), pp.302-308.
- Gemmell, Norman & Morrissey, Oliver (2005) Distribution and Poverty Impacts of Tax Structure Reform in Developing Countries: How Little We Know. *Development Policy Review* 23 (2), 131-144.
- Glomsrod, S., M. D. Monge, and H. Vennemo (1997) "Structural Adjustment and Deforestation in Nicaragua", *Environment and Development Economics*. 4(1):19-43.
- Greenaway, D. and D.R. Nelson (eds.) (2002), *Globalization and Labour Markets*, (two volumes), London: Edward Elgar Publishers.
- Grossman, G.M. and E. Helpman (1991), *Innovation and Growth in the Global Economy*, Cambridge, Mass.: MIT Press.
- Harris, J. and M. P. Todaro (1970), "Migration, Unemployment and Development: a two sector analysis", *American Economic Review*, 60(1): 126-142.
- Harrison, Ann (1991) *Openness and Growth: A Time Series Cross-Country Analysis for Developing Countries*-World Bank Policy Research Papers No. 809, Washington, DC.
- Janvry and Sadoulet [2000], *Growth, Poverty, and Inequality in Latin America: A Causal Analysis, 1970-94*. Review of Income and Wealth v46, n3 (September 2000): 267-87
- Jerome, A. (2005) Institutional Framework and the Process of Trade Policy Making in African: The Case of Nigeria. Paper for the International conference "African Economic Research Institutions and Policy Development: Opportunities and Challenges" Dakar, January 28-29, 2005
- Lambert, S., Schneider, H., and A. Suwa. (1991). "Adjustment and Equity in Cote d'Ivoire: 1980-86", *World Development*, Vol. 19, No. 11, 1563-76.

- Lofgren, H., Chulu, O., Sichinga, O., Simtowe, F., Tchale, H., Tseka, R., and P.Wobst. (2001). "External Shocks and Domestic Poverty Alleviation: Simulations with a CGE Model of Malawi", IFPRI Working Paper, No. 71.
- Lumenga-Neso, O., M. Olarreaga and M. Schiff (2004), 'On 'Indirect' Trade-Related R&D Spillovers', *European Economic Review* (forthcoming).
- MacLaren, D, 1992, "The Political Economy of Agricultural Policy Reform in the EU and Australia", *Journal of Agricultural Economics*, 43 (3), 424 – 439.
- Matusz, J. Steven. and David Tarr (1999) "Adjusting to Trade Policy Reform". <http://www.worldbank.org/html/dec/Publications/Workpapers/wps2000series/wps2142/wps2142.pdf> (Accessed 23/04/04)
- Meier, G. (1995) *Leading Issues in Economic Development*, Oxford University Press
- Nordstrom, Hakan, Dan Ben-David, L. Alan Winters, (2000). "Trade, Income Disparity and Poverty," Special Studies, World Trade Organization, Geneva. http://www.wto.org/english/news_e/pres00_e/pr181_e.htm#fntext1
- Obi, B. P. (2003). "Fiscal Policy and Income Distribution: Some Policy Options for Nigeria". Final Report, AERC, Nairobi, Kenya.
- Odubogun, K. (1996) Institutional Reforms and the Management of Exchange Rate Policy in Nigeria. African Economic Research Consortium (AERC) *Research Report* 36. Nairobi, Kenya.
- Olofin, S. (1992) "Trade Policies in Nigeria" in Salvatore, D. *National Trade Policies: Studies in Comparative Economic Policies*, Vol.2 North Holland
- Oyejide, A., 1998 "Trade Policy and Regional Integration in the Development Context: Emerging Patterns, Issues, and Lessons for Sub-Saharan Africa," *Journal of African Economies*, 7, Supplement 1: 108-145.
- Oyejide, T. A. (2000) Interests and Options of Developing Countries in a New Round of Multilateral Trade Negotiations, G-24 Discussion Paper Series, United Nations Conference on Trade and Development and Center for International Development, Harvard University, United Nations.
- Ravallion, M. and S. Chen [1997], *What Can New Survey Data Tell Us about Recent Changes in Distribution and Poverty?* World Bank Economic Review v11, n2 (May 1997): 357-82.
- Reed, David (1996). *Stabilization and Structural Adjustment: Macroeconomic Frameworks for Analyzing the Crisis in Sub-Saharan African*, New York: Ratt Ledge.
- Rivera-Batiz, L. and P. Romer (1991), 'International Integration and Endogenous Growth', *Quarterly Journal of Economics* 106: 531-56.
- Rodrick, Dani (1992) "Conceptual Issues in the Design of Trade Policy for Industrialization" *World Development* Vol 20 No. 3
- Rodrick, Dani (1992) "The Limits of Trade Policy Reform in Developing Countries" *Journal of Economic Perspectives*, Vol 6, No.1
- Rodrick, Dani (1998) *Trade Policy and Economic Performance in Sub-Saharan Africa*, Expert Group on Development Issues (EGDI:1), Swedish Ministry of Foreign Affairs.
- Rodriguez, F. and D. Rodrik (2001), 'Trade Policy and Economic Growth: A Skeptic's Guide to Cross-National Evidence', in B.S. Bernanke and K. Rogoff (eds.), *NBER Macroeconomics Annual 2000*, Cambridge MA: MIT Press.
- Rodrik, D. (2003), 'Growth Strategies', NBER Working Paper 10050, Cambridge MA, October.

- Rodrik, Dani (1997) *Why is Trade Reform so Difficult in Africa*, *Journal of African Economies*, Vol. 7 Supplement 1.
- Rodrik, Dani (2000) Trade Policy Reform as Institutional Reform. ksghome.harvard.edu/~drodrik/Reform.PDF
- Romer, Paul. (1994), 'New Goods, Old Theory, and the Welfare Costs of Trade Restrictions,' *Journal of Development Economics* 43(1): 5-38,
- Romer, Paul. (1994) "New Goods, Old Theory and the Welfare Costs of Trade Restrictions" *Journal Of Development Economics*, 43 p 5-38
- Romer, Paul. (1990) "Endogenous Technical Change." *Journal of Political Economy* 98(5) (October): S71-S103.
- Rutherford, T.F. and D.G. Tarr (2002), 'Trade Liberalization, Product Variety and Growth in a Small Open Economy: A Quantitative Assessment', *Journal of International Economics* 56(2): 247-72, March.
- Sahn, D. E., Dorosh, P. A. and S.A.Younger.(1997). *Structural Adjustment Reconsidered: Economic Policy and Poverty in Africa*, Cambridge University Press, Cambridge. 33
- Sahn, David E., ed. (1996) *Economic Reform and the Poor in Africa*. Oxford University Press.
- Sanusi, j. O. (2004) "Exchange Rate Mechanism: The Current Nigerian Experience" <http://www.cenbank.org/OUT/SPEECHES/2004/Govadd-24Feb.pdf> (accessed 23/04/05)
- Siddiqui,R., and A. Kemal. (2002). "Remittances, Trade Liberalization, and Poverty in Pakistan: The Role of excluded Variables in Poverty Change Analysis", Study No. 1, Department for International Development, U.K.
- Taylor, M.S. (1999), 'Trade and Trade Policy in Endogenous Growth Models', Ch. 15 in *International Trade Policy and the Pacific Rim*, edited by J. Piggott and A. Woodland, London: Macmillan for the IAE.
- Thiele, R. (2003), 'The Bias Against Agriculture in Sub-Saharan Africa: Has it Survived 20 Years of Structural Adjustment Programs?' *Quarterly Journal of International Agriculture* 42(1): 5-20.
- Thorbecke, E. (1991). "Adjustment, Growth and Income Distribution in Indonesia", *World Development*, Vol. 19, No. 11, 1595-1614.
- Winters L A., (2001) Trade Policies for Poverty Alleviation in Developing Countries. *A Paper prepared for The Series of Advanced International Policy Seminars*. European International Policy Forum,
- World Bank (1994), *Adjustment in Africa*, Oxford, New York.
- World Bank (2000), *Can Africa Claim the 21st Century*, Washington.
- World Bank, 2003. *Global Economic Prospects 2004: Realizing the Development Promise of the Doha Agenda*, the International Bank for Reconstruction and Development /The World Bank, Washington D.C.
- World Rain Forest Movement (WRM's) Bulletin N° 28, November 1999. <http://www.wrm.org.uy/bulletin/28/Cameroon.html>
- World Trade Organisation (1991) *Trade Policy Review – Nigeria*, Geneva: World Trade Organization
- World Trade Organisation (1998) *Trade Policy Review – Nigeria*, Geneva: World Trade Organisation.
- Yeats, A., A. Amjadi, U. Eincke and F. Ng (1997), "Did Domestic Policies Marginalize Africa in International Trade?" *Directions in Development*, Washington D.C.: The World Bank

Appendix

An Applied General Equilibrium (AGE) Model for Nigeria.

Model equations

1. Composite price: $PC_i \cdot XC_i = PD_i \cdot XD_i + pm_i \cdot M_i$
2. Composite price in non-importing sectors: $PC_i = PD_i$
3. Value of sale (gross revenue): $P_i \cdot X_i = PD_i \cdot XD_i + pe_i \cdot E_i$
4. Unit value of sale in non-exporting sector: $P_i = PD_i$
5. Price on capital: $Pk_i = \sum_i PC_i \cdot imat_{ij}$
6. Activity level, exporting sector CET: $X_i = at \cdot [\gamma_i \cdot E_i^{\rho_e} + (1-\gamma_i) \cdot XD_i^{\rho_e}]^{1/\rho}$
7. Activity level, non-exporting sector: $X_i = XD_i$
8. Commodity composition of output: $E_i/XD_i = [pe_i/PD_i \cdot (1-\gamma_i)/\gamma_i]^{1/(\rho_e-1)}$
9. Composite commodities CES: $XC_i = ac_i [\delta_i \cdot M_i^{\rho_m} + (1-\delta_i) \cdot XD_i^{\rho_m}]^{1/\rho_m}$
10. Output in non-importing sectors: $XC_i = XD_i$
11. Demand for imports: $M_i/XD_i = [(PD_i/pm_i) \cdot ((1-\delta_i)/\delta_i)]^{1/(1+\rho_m)}$
12. Unit cost: $COST_i = \sum_i PC_i \cdot a_{ji} + W_i \cdot LC_i$
13. Profit: $GAN_i = [P_i \cdot (1-tv_i) - COST_i] \cdot X_i$

Income and consumption

14. Income working class: $Y_{wk} = \sum_i W_i \cdot LC_i \cdot X_i + er \cdot trxk_{wk}$
15. Income of farmers: $Y_{cp} = \sum_i dgc_i \cdot GAN_i$
16. Income producers class: $Y_{pr} = \sum_i dgs_i \cdot GAN_i + er \cdot trxk_{pr}$
17. Income capitalist class: $Y_{kp} = \sum_i (1-dgc_i) \cdot GAN_i + \sum_i (1-dgs_i) \cdot GAN + er \cdot trxk_{kp}$
18. Expenditure: $EXPEND_k = (1-s_k) \cdot (1-td_k) \cdot Y_k$
19. Basic consumption: $SUB_k = \sum_i csub_{ik} \cdot PC_i$
20. Private consumption (LES): $PC_i \cdot CD_{ik} = PC_i \cdot csub_{ik} + q_{ik} \cdot (EXPEND_k - SUB_k)$

Wage formation

21. Rural sector wage: $W_i = relw_i \cdot WR$
22. Urban sector wage: $W_i = relw_i \cdot W_{i0} \cdot IPC_{0k,t-1}$

Labour Market

23. Labour supply: $LS = ls_o(1+g)^t$
24. Frontier labour: $LF = (\eta_1/WF_0) \cdot LS \cdot (WF/WX)^{\rho-1}$
25. Rural wage index: $WX = (\eta_1 WF^{\rho} + \eta_2 WR^{\rho})^{1/\rho}$
26. Frontier labour: $LF = (1-U) \cdot LS - \sum_i LC_i X_i$
27. Unemployment: $WR = wu_o(1-U)IPC_{0k,t-1} (1-u_{ro})/(1-u_o)$

Frontier Production and income

28. Frontier prices: $PF_i = P_i$
29. Production function: $XF_i = z_l LF$
30. Income per man year: $WF = \sum_i PF_i z_{li}$
31. Frontier income: $Y_{fd} = WF \cdot LF$

Investment and savings

32. Capital in period $t+1$: $KF_{i,t+1} = KF_{i,t} \cdot (1-depre) + DK_{i,t}$
33. Total investments equal savings: $INV = \sum_k s_k \cdot (1-td_k) \cdot Y_k + SGOB + er \cdot s_{for}$
34. Investment by destination: $INV = \sum_i Pk_i \cdot DK_i$
35. Sectoral investment: $DK_i = kshare_i \cdot DKTOT$

Government

36. Government revenue: $GR = \sum_i [tv_i \cdot P_i \cdot X_i + tv_i/(1+tm_i) \cdot pm_i \cdot M_i + te_i \cdot pe_i \cdot E_i] + \sum_k td_k \cdot Y_k$
37. Government expenditure: $GD_i = gshare_i \cdot gdtot_o$
38. Government consumption: $GR = \sum_i PC_i \cdot GD_i + SGOB$

39. Equilibrium of demand and supply: $XC_i = \sum_j a_{ji} \cdot X_i + \sum_k CD_{ik} + GD_i + \sum_j imat_{ij} \cdot DK_i + csub_{i,fd}$

Production

40. Production: $X_i = ad_i \cdot b_i \cdot [LC_i \cdot X_i]^{\alpha_i} \cdot KF_i^{1-\alpha_i}$

41. Consumer price index: $IPC_k = [\sum_i PC_i \cdot CD_{ik}] / \sum_i CD_{ik}$

42. Demand for labour: $Wi \cdot LC_i = (\alpha_i / (1-\alpha_i)) \cdot GAN_i / X_i$

List of variables

Endogenous variables

CD_{ik}	= Demand for commodity i by class k
$COST_i$	= Unit cost of production
DK_i	= Investment by sector of destination
$DKTOT$	= Total real investment
E_i	= Exports of commodity i in local currency
$EXPEND_k$	= Expenditure on consumption by class k
GAN_i	= Total profit in sector i .
GD_i	= Government expenditure on commodity i .
GR	= Total income to the government
INV	= Total nominal investment.
IPC_k	= Consumer price index for class k
KF_i	= Capital by sector i
LC_i	= Labour per activity unit in sector i
LS	= Labour supply
LF	= Labour at the frontier
M_i	= Import of commodity i in local currency
P_i	= Output price
PC_i	= Composite price of domestic and imported commodities
PD_i	= Price of domestic commodity i
PF_i	= Price at the frontier
PK_i	= Price of capital
$SGOB$	= Government savings
SUB_k	= Basic consumption by social class
U	= Unemployment rate
W_i	= Wage rate
WF	= Imputed income per man-year at the agricultural frontier
WR	= Rural wage rate
WX	= Rural age index
X_i	= Activity in sector i
XF_i	= Production at the agricultural frontier
XC_i	= Composite commodity of domestic and imported products
XD_i	= National production for the domestic market
Y_k	= National income by class k

Exogenous variables and parameters

α_i	= Cost share of labour
γ_i	= Share parameter in export equation.
δ_i	= Share parameter in creation of composite commodity
η_1	= Allocation parameter
η_2	= Allocation parameter
ρ	= Transformation parameter in rural wage index
ρ_e	= Transformation parameter in export equation
ρ_m	= Transformation parameter in import equation
a_{ij}	= Input-output coefficient
ac_i	= Shift parameter in creation of composite commodity
ad_i	= Shift parameter in Cobb-Douglas production function

at_i	= Shift parameter in activity equation
b_i	= Shift parameter due to erosion
$csub_{ik}$	= Basic consumption
$depre$	= Depreciation rate of capital
dgc_i	= Distribution coefficients of profits - farmers
dgs_i	= Distribution coefficients of profits – producers
er	= Exchange rate
g	= Growth rate of population
$gdtot_0$	= Total real government consumption in base year
$gshare_i$	= Government expenditure coefficients
$imat_{ij}$	= Conversion matrix from destination to origin in investment
$index_i$	= Wage indexation rule
$kshare_i$	= Share coefficient on total investment
ls_0	= Total labour supply in base year
q_{ik}	= Budget share of consumption by class
$pe0_i$	= Price of exports in local currency
$pm0_i$	= Price of competitive imports in local currency
pwe_i	= World price on export in \$
pwm_i	= World price on competitive imports in \$
s_k	= Marginal propensity to consume by class
$sfor$	= Foreign savings
td_k	= Direct taxes on income
te_i	= Tariff rate on exports
tm_i	= Tax on competitive import goods.
$trxk_k$	= Transfers from abroad to class k in \$
tv_i	= Tax on value added
u_{ro}	= Urban unemployment rate in base year
u_o	= Unemployment rate in base year
wu_o	= Urban nominal wage rate in base year
zl_i	= Production per man-year at the frontier

Social Classes

1. Farmers
2. Urban workers
3. Urban small producers
4. Capitalists
5. Frontier farmers

Production Sectors

1. Agricultural frontier – production of basic grains and tubers for own consumption
2. Other crops – include cash crops and other legumes
3. Other agricultural activities – Fishery, Forestry, animal husbandry, etc.
4. Industry - Manufacturing/Mining/Construction/energy, etc
5. Services/Transport/and others

The first three sectors are regarded as rural while the last two are urban. For convenience mining is treated as urban.