

# **Effects of Trade Liberalization and Exchange Rate Changes on Prices of Carbohydrate Staples in Nigeria**

By

A.I Achike, M. Mkpado and C.J. Arene  
*Department of Agricultural Economics,  
University of Nigeria, Nsukka  
Nigeria*

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# 1. Introduction

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Carbohydrate foodstuffs, derived from cereals and tubers, are major parts of food consumed in Nigeria. Food insecurity in the country is often worsened by the ban on importation of rice and wheat. This is because Nigeria's population is growing rapidly at the rate of 3% per annum, while the rate of food production is at 1% per annum (Achike, 2004). The liberalization of trade during the Structural Adjustment Programme (SAP) era, subsequent removal of some import prohibition and input subsidy and implementation of programmes to improve domestic food production for possible export, have exposed small scale farmers, who are major crop producers, to more economic pressure in competing with large scale farmers elsewhere. Arene and Mkpado (2004) opined that this economic pressure is more severe when the people prefer imported goods to domestic ones. Changes in trade policy may have offered some form of protection to these local farmers. For example, prior to the adoption of ECOWAS common trade tariffs, rice, which is the major imported carbohydrate staple, was heavily taxed such that about ₦5 billion from rice tax could be invested into agriculture during annual budgets (FGN, 2004). Trade liberalization has resulted in exportation of cassava - a carbohydrate crop from Nigeria - since 1990 (Eurostat, 2000). Currently, Nigeria is reputed to be the world largest producer of this crop (FAOSTAT, 2005).

In order to achieve the Millennium Development Goals, the Nigerian government has instituted the National Economic Empowerment Development Strategy (NEEDS), and more recently, a seven-point agenda policy instrument. The objectives of the policy instrument, with respect to agriculture, include achieving food security, poverty eradication and creation of a responsive modern and globally competitive sector that will ensure higher income for farmers and rural dwellers. To achieve this laudable objective, the Federal Government of Nigeria has put in place a number of programmes and projects for increasing agricultural production such as the presidential initiative on cassava, Fadama Development Projects, national special programme on food security, and National Export Promotion Council, which encourages Nigerian exports and so on. There is a need to assess the sustainability of such programmes and projects within the liberalization era by determining the effects of exchange rate and trade policy variables that indicate liberalization, namely, varying tariff rates, nominal protection coefficient and trade intensity on domestic pricing system as it affects target clients of the programmes and projects for national development and poverty reduction (Achike, Agu and Oduh, 2005). The ability of small-scale carbohydrate food crop farmers to attain profit maximization goals or satisfy their subsistence food security needs is influenced by the prevailing policy environment, especially in this era of globalizing economy.

The global financial and economic crises have watered down the importance of the market in economic decision-making such as in resource allocation, and heightened the belief that the state has a role in regulating the market and the economy at large. The “Washington Consensus” has been found wanting and is virtually dead. The term Washington Consensus was coined in 1989 by [John Williamson](#) to describe a set of 10 specific economic policy prescriptions that he considered should constitute the “standard” reform package promoted for [crisis-wrecked developing countries](#) by [Washington, D.C.](#)-based institutions such as the [International Monetary Fund](#) (IMF), [World Bank](#), and the [US Treasury Department](#). Subsequently, the term has come to be used in a different and broader sense, as a synonym for market fundamentalism. The term has become associated with neoliberal policies in general and drawn into the broader debate over the expanding role of the free market, constraints upon the state, and the influence of the United States, and globalization more broadly, on countries’ national sovereignty. “Stabilization, privatization, and liberalization” became the mantra of a generation of technocrats who cut their teeth in the developing world and the political leaders they counselled. Another paradox that the global financial crises has presented for those who believe in “Washington consensus”! But for those proponents of state intervention in markets as a means of mitigating effects of market failures, it is a plus. The impacts of the global financial crisis on inflation depend on the degree of changes of commodity prices and the accompanying changes in the terms of trade. Owing to the commodity price boom, inflation rates rose strongly. The soaring prices of food crops in 2008 have triggered several responses in the economy. One of the implications of these responses is that food price increase in Nigeria has sent inflation rates up from 5.4% to 5.8% (Olu and Tayo, 2009). The level of the composite food index was higher than the corresponding level a year ago by 12.4% (National Bureau of Statistics [NBS], 2008). The NBS attributed the rise to the sharp increase in the prices of rice and other staple foods and vegetables. Reactions from various farm families indicated that the percentage share of income spent on food crops tripled over three months, as the poverty gap seemed to have been widening in other sectors of the economy (IFAD, 2009).

The federal government of Nigeria commenced a comprehensive review of its agricultural policy, with a focus on large-scale private sector commercial agriculture as a means of increasing production and productivity. In response to the global food crisis and the concomitant increase in prices, the federal government released 53,610 tonnes of grains (sorghum, maize and millet) between March and May 2008 from the National Strategic Grains Reserves (NSGR) to the states in Nigeria. The government also approved a tax holiday for importers of rice for the period May-October 2008.

## The research problem

**I**ncreasing agricultural output and exports are among the rationale for the introduction of SAP, liberalization policy and devaluation of Nigeria’s currency. The effects of SAP and policies to cushion it have continued to affect macroeconomic variables, especially the pricing system in Nigeria, in relation to international trade. The prices of agricultural products influence their production and revenue of farmers due to cost of production, depreciation and abolition of agricultural marketing boards. The domestic

price of agricultural commodities is essentially a function of exchange rate policy, trade liberalization and substitution of one crop for another especially with respect to crops that serve similar purposes such as those of the class of cereals and tubers, which can serve as sources of carbohydrates. Fluctuations in prices of agricultural output increase risks and uncertainties associated with the industry and possible investment. Stabilizing agricultural prices is critical to achievement of the United Nations Millennium Development Goals (MDGs)<sup>1</sup> targets especially Goal 1, which is to eradicate extreme poverty and hunger and 2015 target, which is to halve proportion of people living on less than \$1 a day, and those suffering hunger.

Effects of trade policy and its liberalization on agriculture have attracted the attention of researchers. But the experience of carbohydrate food crops, especially in Nigeria has been neglected. For example Osuntogun et al. (1993) examined some strategic issues for promoting Nigeria's non-oil export, while Nwosu (1992) made a general assessment of SAP on Nigerian agriculture. Ihimodu (1993) examined SAP in all context of enhancing agricultural development. Adubi and Okunmadewa (1999) examined the relationship between price and exchange rate volatility on export and import prices in the context of dynamic adjustment involving currency devaluation in Nigeria. Studies that have tried to fulfill this specific need include those by Chidebelu et al. (1998), Phillip (1996), Ayichi (1997), Okoli and Okoye (2005), Arene and Okafor (2000), Arene and Odusolu (1998), and Arene (2000). These studies have concentrated on effects of price and exchange rate on export of one or a few of the following crops: cocoa beans, groundnuts, cotton, palm produce and cassava. Only the study by Okoli and Okoye (2005) involved cassava. It appears that the experiences with food crops are neglected. Also studies on effects of exchange rate and its volatility or risk have concentrated on its impact on tradeable crops. But since exchange rate changes could pass through to domestic prices, there is a need to investigate its effect on the prices of non-tradeable crops.

Opinions of researchers still vary on the effects of trade policy on agriculture. To illustrate, Mwase (1998) noted that liberalization and privatization of agricultural marketing was a major U-turn in Tanzania's cashew economy that resulted in easier access to foreign exchange and inputs, privatization of input purchases, processing and export of cashews. This in turn enhanced competition, increased producer prices and prompt payment to farmers. Kidane (1999) noted that in Ethiopia farmers responded positively to devaluation via increase in Real Exchange Rate (RER) by diverting both human and material resources at their disposal to the production of coffee, which had continued to be the major source of foreign exchange. While in Ghana, the reverse was the case because Asuming-Brempong (1994) noted that exchange rate changes and trade policies, which tend to limit the volume of importable crops, have adversely affected the production of exportable crops by reducing incentives for production of exportable crops relative to non-tradeables. It implies that distortions caused by government policy affected RER such that income derivable from exportable crops do not reflect their real value over income from non-tradeable crops. What is the experience in Nigeria? It may be informative to note that the effects of trade liberalization and privatization on agriculture, which differ from Tanzania and Ethiopia on the one hand and Ghana on the other hand, could be as a result of the positive impact of socialist-oriented countries hitherto having excessively more controlled economies which liberalization broke thus

increasing competitions. The Ethiopian currency – the birr – for example, maintained the same exchange rate with the US dollar for many years leading to distortions which were removed by devaluation.

This work is specifically aimed at providing empirical evidence of the effects of trade liberalization on prices of carbohydrate staples in Nigeria. The questions this study addresses that are relevant to government objective of increasing food production and ensuring food security in Nigeria are: Will Nigerian carbohydrate crop farmers still have price advantage in the presence of competition with imported foodstuffs serving similar purposes? Will there be a drastic shift and abandonment of the carbohydrate food crops enterprises with complete reliance on rice importation? What is the prospect of cassava export in relation to rice importation in improving the prices of non-tradeable carbohydrate staples in Nigerian? Specifically, what are the effects of trade liberalization variables on prices of carbohydrate staples in Nigeria?

## Objectives

The broad objective of the study is to examine the effects of trade liberalization and exchange rate changes on prices of carbohydrate staples in Nigeria. It aims at identifying economic variables that are associated with trade liberalization and exchange rate changes that affect prices of non-tradeable carbohydrate staples. Specifically, the study aims at:

- (i) examining the effects of trade intensity and exchange rate changes on prices of carbohydrate staples in Nigeria.
- (ii) determining the impact of price of importable rice relative to price of exportable cassava on prices of carbohydrate staples in Nigeria.

## Hypothesis

The null hypothesis that guided the study is that exchange rate changes and trade liberalization variables such as trade intensity and nominal protection coefficient have not affected prices of non-tradeable carbohydrate staples.

## Justification

Many studies that have examined the effects of price or exchange rate on Nigeria's agricultural trade concentrated on the price and export effects in a static setting. Such studies include those by Ihimodu (1993), Nwosu (1992) Osuntogun et al. (1993), Phillip (1996), Ayichi (1997), Chidebelu et al. (1998), and Adubi and Okunmadewa (1999). The study by Onyebinama (2005) was on the effects of devaluation on Nigerian agriculture with emphasis on the determinants of food import values and domestic agricultural output. The effects of liberalization on prices of carbohydrate staples in Nigeria need examination.

This work is justifiable because it was motivated by the need to document the effects of trade policy on the livelihood of crop farmers. Over 80% of Nigerians are engaged in

agricultural activities. This sector, agriculture, underemployed the largest labour force in the country that can be mobilized for high productive enterprises. Majority of the farmers are crop producers. It is important to peer into the efficiency of resources used as demanded by trade liberalization. Else, how can policy makers drive the economy aright without empirical results of effects of the ongoing policies to effect efficient allocation of resources?

Welfare of this majority is critical in achieving the MDGs, especially Goal 1 in Nigeria. Recognizing this need, Food and Agriculture Organization (FAO) and the African Union (AU) stipulated some minimum floors (20% and 25%, respectively) as mandatory allocations to agriculture in the national budget of developing countries (Ayoola, 2006). Average percentage total allocation to agriculture ranged from 2.76% in 1977–1980 to 8.03% in 1981–1985, while it averaged 4.83% in 1977–1993 (Garba, 2000). It was increased to about 7% in 2008 and slightly increased to 11.2% in 2010. On the average, agricultural budgetary allocation has not reached substantial levels when compared with the recommended standard. It has been claimed that in mineral-rich Zambia, for example, that government has undermined agriculture by meagre budgets, compared with the social sector. But in Nigeria, agriculture has been suffering neglects since the mid 1970s due to the boom from crude oil sector. One way to rekindle interest in agriculture is stabilization policies development that will improve agricultural pricing system that can improve farmers' real income; this work has proved helpful in this regard.

All the studies considered so far were conducted in the context of pre-SAP and SAP experiences. Although the effects of SAP still influence many developing economies, other trade policies such as General Agreement on Trade and Tariffs (GATT), which has been succeeded by WTO, New Economic Partnership for African Development (NEPAD) and ECOWAS common external tariffs more importantly affect trade.

A Poverty Reduction Strategy Paper (PRSP) is a comprehensive, detailed document prepared by a developing country explaining its own plan for reducing poverty. National Economic Empowerment Development Strategy (NEEDS) is a major PRSP which rests on four key strategies: (i) reforming the way government works and its institutions; (ii) growing the private sector; (iii) implementing a social charter for the people; and (iv) reorientation of the people with an enduring African value system. According to NEEDS (2004) Nigeria has been successfully reintegrated into the international community and, not only provides effective leadership under NEPAD and within ECOWAS, but also now (as of November 2010) chairs the Commonwealth of Nations. The size of the police force has been doubled since 1999; electricity generation has more than doubled and there has been a telecommunications revolution with the number of telephone lines increased from about 400,000 in 1999 to about 3 million in 2003. The various initiatives in agriculture have resulted in a boom, with the groundnut pyramids returning in the North and the FAO in 2003 declaring that Nigerian agriculture grew by an unprecedented 7%.

That SAP had failed to achieve economic growth and reduced poverty in low-income economies, especially in Africa is no more news. Bretton Woods Institutions (BWIs) and Civil Society Organizations (CSOs) implementation of Structural Adjustment Programme (SAP) has been devastatingly referred as a "secular God" with many limitations. One of the weaknesses of SAP had been that conditions were imposed and often did not engage the recipient government or people. This weakness is rectified in the PRSP process

because the strategy is prepared with the full participation by the government and is expected to engender a sense of ownership and commitment to the objectives. In PRSP preparation, the government is to be in the driver's seat. Although initiated by the World Bank, the PRSP process has been widely accepted at all levels of development effort and most aid agencies have incorporated it or otherwise made it compatible with their own programmes. The attack on SAP reforms grew out of their recognition that reforms to reduce government control and intervention will be ineffective or even damaging in low-income economies. This is because market failures arising from such reforms will inevitably be very large where the market is highly imperfect under severe information imperfection. While this argument is theoretically valid, it may be refuted on the grounds that in the economies characterized by high degrees of information imperfection, government failures may be even more damaging than market failures. This is likely to be especially the case in Africa where national boundaries were determined through the politics of colonial powers and, therefore, national integrity and government authority have been very weakly established.

In the mid 1990s, the Organization for Economic Cooperation and Development (OECD) formulated a list of quantified goals to be met by a set date, the International Development Targets (IDTs). In 2000, the United Nations adopted essentially the same list as its Millennium Development Goals (MDGs) to begin with the goal of halving, between 1990 and 2015, the proportion of people whose income is less than US\$1 a day and the proportion of people who suffer hunger. It is important to note that all the goals specified in MDGs are related to quality of life and no target is stipulated for economic growth, reflecting the current mode of the development assistance community to set poverty reduction as the immediate goal rather than the consequence of economic growth.

The extent to which trade liberalization policies have affected prices of carbohydrate staples alongside changes in per capita income (PCY) is still a grey area to economists and policy makers. The ability of small-scale carbohydrate food crop farmers to attain profit maximization goals or satisfy their subsistence food security needs is influenced by the prevailing policy environment especially in this era of globalizing economy. The need, therefore, to empirically examine the effects of trade liberalization and exchange rate changes on prices of crops and hence ascertain their implications on the livelihood of farmers in Nigeria cannot be overemphasized.

## 2. Carbohydrate staples in Nigeria

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Prior to, and shortly after, 1967, Nigerian agriculture contributed well over 50% of the GDP, served as the major source of food security, accounted for over 70% of the foreign exchange earnings, supplied raw materials to agro-based industries and accommodated over 70% of the labour force (Olayide and Olatunbosun, 1972; Helleiner, 1996; Oluwasanmi, 1996). But the sector suffered stagnation and decline from the early 1970s to the mid 1980s (Falusi, 2005). Carbohydrate food crops, which supplied raw materials to breweries, flour mills, livestock feed mills, starch industries and domestic foodstuffs constitute a sub-sector of Nigerian agriculture. Adepoju (2006) noted that, in three states of northern Nigeria, the demand for maize by 42 firms increased from 12,375 metric tonnes in 1986 to 45,578 metric tonnes in 2000. The consumption of sorghum and millet has fallen by 12kg per capita and their share in cereal foods decreased from 61% in the early 1970s to 49% in the early 1990s; while the per capita consumption of rice grew from 3kg to 7.3kg and its share in cereal foods grew from 15% to 26% (Akpokodje et al., 2001). Sani et al. (1995) revealed that about 28%, 41% and 31% of Nigerian communities consume cassava and its by-products (especially garri) once, twice and thrice daily, respectively. FAO (2005) puts the national production of yam and cassava at 26.587 metric tonnes and 38.179 metric tonnes, respectively. According to National Economic Empowerment and Development Strategy (NEEDS, 2004), export proceeds from cassava was expected to reach \$3 billion annually by 2007 and the impact of a targeted reduction of food imports from 14% to 5% in 2007 is expected to be offset by local production of carbohydrate food crops because rice is the major food import.

Nigerian government efforts to develop the carbohydrate sub-sector can be seen in its efforts to establish and fund National Cereals Research Institute, National Root Crops Research Institute, and others that deal with agriculture. Using NEEDS, the special programme on food security included Fadama II Project, Root and Tuber Expansion Project, presidential initiatives on cassava, rice, and vegetable oil, tree crops, livestock, fishery and aquaculture (Falusi, 2005; NEPZA, 2006). Others included provision of rural infrastructure to encourage agriculture generally. Trade policies that have affected carbohydrate staples are abolition of export tax and establishment of the National Export Promotion Council. However, poor funding, diseases and neglect of agriculture have continued to mar the development of carbohydrate sub-sector. Table 1 shows the trends in output of major carbohydrate staples in Nigeria.

**Table 1: Average output of major carbohydrate staples in Nigeria in '000 metric tonnes (1970–2006)**

Year	*Crop GDP	Maize	Millet	Sorghum	Local Rice	Cassava	Coco-yam	Yam
1970-73	199578.1	1041.0	3031.3	3317.5	373.3	3806.3	1158.5	3390.8
1974-77	193163.1	894.5	3394.0	3473.5	414.3	2337.0	465.5	7156.5
1978-81	119177.6	619.5	2447.0	2930.8	175.8	1157.0	198.0	5395.5
1982-85	18466.1	1152.0	3120.5	4070.3	177.5	6601.3	233.0	4692.5
1986-89	24164.9	4056.0	4480.5	5839.3	1618.8	14802.0	517.3	7209.0
1990-93	28764.1	5927.0	4587.0	5378.0	3012.8	26080.8	817.0	17998.5
1994-97	24466.8	6583.8	5530.0	7055.5	2995.8	32217.8	1246.3	18443.0
1998-2001	82192.2	6921.1	7083.3	8420.8	3488.0	33823.9	1622.7	25013.1
2002-2006	119990.5	9557.6	6812.8	9719.7	3690.0	32047.6	8397.5	25866.3

\*Crop sector GDP are in million of naira

Source: Calculated from NBS Annual Abstracts 1987,1997,2000 and 2007; CBN Statistics Bulletin 1990, 2000, 2003, 2008

Government effort to improve the sector was one of the reasons for the growth. There is a gradual increase over the years in the output of the crops. This is one of the reasons why the crop sectorial GDP showed a gradual increase, even though other non-carbohydrate crops make up the sub-sector. The table shows that the output of cassava and yam are maximum while those of millet and sorghum were least. A word of caution in examination of the output of the crops is to avoid error of aggregation due to differences in nature of the crops involved; but when the price changes are taken into consideration a better inference can be made.

Table 2 shows the trends in prices of major carbohydrate staples in Nigeria. There are increases in the prices and the per capital income that are similar to the increase in the exchange rate as shown in Table 5. From Table 2, we see very large price differentials among the crops. From 2002 to 2006, the prices of maize, cassava and millet were the highest. The prices increased from less than ₦100.00 per metric tone to tens of thousands for the period under review (1974-2006).

**Table 2: Average prices of major carbohydrate staples in Nigeria in naira/metric tonne (1974–2006)**

Year	Maize	Millet	Sorghum	Local Rice	Cassava	Yam	Per Capita Income
1974-77	92.5	81.3	74.8	300.0	78.8	80.0	1502.6
1978-81	180.0	195.3	107.8	534.0	205.0	185.0	1342.6
1982-85	790.0	587.8	425.8	711.5	650.0	550.0	922.1
1986-89	1450.0	1175.0	1207.5	2187.5	1300.0	1225.0	2560.6
1990-93	3264.3	4856.7	4174.8	11158.5	5013.5	5237.0	3593.2
1994-97	16074.8	15619.0	15308.3	35866.5	19667.0	18538.5	3509.5
1998-2001	38420.8	47355.5	39519.0	39358.5	28557.0	34618.0	3381.8
2002-2006	43603.6	29459.6	24919.2	30281.4	33334.4	23287.0	4300.5

Source: Calculated from NBS Annual Abstracts 1987,1997,2000 and 2007; CBN Statistics Bulletin 1990, 2000, 2003, 2008

Analysis of crops of high returns to investments in Nigeria with emphasis on carbohydrates

Manyong et al. (2003) results indicated that countrywide cassava gives the highest benefits to investments. They ranked food crops according to their returns on investment in Nigeria. The next nine ranked commodities are yam, maize, millet, groundnut, rice, sorghum, poultry, vegetables, and cowpea. The second group of priority commodities includes pepper, beef, oil palm, fish, melon, soybean, onion, rubber, and cocoa. The third lower ranked commodities include ginger, pork, goat, mutton, benniseed, and cashew nut. Manyong et al. (2003) compared their results with those documented by IFPRI (2003) for West Africa. They noted that to a large extent, the priority commodities identified for Nigeria are found in West Africa probably because of the heavy economic weight of Nigeria in the subregion. There are regional differences in the ranking of commodities within the country, which are worth highlighting. On the basis of the total benefit from each commodity, one can make the ranking of commodities in each development domain relative to the crop ranked one. Only the first 15 ranked crops were reported. The root and tuber crops (cassava and yam) came on top in the southern zones, while cereals are first in the far northern zones. The north central zone or middle belt is a mixture of root and tubers and cereals.

The analysis by commodity reveals interesting and contrasting advantages of the development domains under consideration. For root and tubers, and in decreasing order of importance regions with a comparative advantage for cassava are South-south, Northcentral, Southeast, and Southwest. Comparative advantage for yams exists in Northcentral followed by Southsouth and Southwest. The middle belt or Northcentral is the Nigerian basket for root and tubers. Regions of a comparative economic advantage for cereals are Northcentral, Northwest, Southwest, and South-south, in decreasing order of importance. The far northern regions are well suited for cereals followed by the other two northern regions. The same trend was observed for benniseed. The Northcentral region dominates rice production while the Southeast region yields lower economic returns. The general pattern is that grain legumes should be promoted in the three northern zones, although cowpea shows some economic benefits in the southern zones of Nigeria. Leafy vegetables can be grown throughout the country. The other types of vegetables gave the highest returns in the drier regions of the north. As expected, tree crops of the humid zones also yield higher economic returns in South-south or Southeast. That is the case for oil palm and rubber. Southwest is specialised in cocoa while cashew nut is grown in Northeast and ginger in Northwest.

Manyong et al. (2003) summarized by saying that, in the case of commodities with the highest domestic consumer demand and the greatest potential for commercialization/trade internationally, especially within the West African subregion, the following are the most important (in descending order) in the various development domains for Nigeria.

These commodities could form the basis for investment with expected high returns in Nigeria. It may essentially reflect the investment pattern among rational farmers in Nigeria. Hence, their results showed that, for Nigeria, cassava, maize and yam are cultivated more and hence are of more economic importance than millet and sorghum, which are important in Northeast and Northwest, respectively.

**Table 3: Agricultural commodities in which development domains have comparative advantage in the domestic, regional, or world market by development domain**

Zone	Unprocessed	Processed
North central	Soybean, yam, cassava, benniseed, groundnut, neem, fruit, honey, mango, cashew, palm kernel, maize, and citrus.	Soya oil and meal, canned fruit, orange juice, and vegetable oil.
Northeast	Vegetable production (tomato paste, pepper, onion, etc.), oil seeds production (groundnut), gum arabic production, and cotton.	Vegetable processing (tomato, pepper, onion etc), cotton lint, and gum arabic products.
Northwest	Ginger, tomato paste, cotton, sorghum, groundnut, garlic, gum arabic, soybean, sesame, cowpea, and wheat.	Textiles, beer, groundnut oil, hides & skin, tomato paste, resin, and leather.
Southeast	Oil palm, cassava, yam, rice, poultry, cocoyam, plantain, banana, vegetables, ginger, timber, cashew nuts, cocoa, maize, melon, rubber, and copra.	Palm oil, cassava chips/gari, yam flour, fruit juice, canned fish, cocoyam chips, plantain chips, vegetable oil, cassava flour, honey, plantain flour, rubber products, cashew products, and kola nut.
South-south	Cocoa, palm fruit, rubber, timber, non-timber forest products, cassava, fish, crayfish and shrimps.	Cassava chips, palm oil, latex, cassava toasted granules (gari), cocoa powder and chocolate palm kernel oil, and cake.
Southwest	Cassava, palm produce, cocoa, timber, oil palm, fish, and shrimps.	Fish, shrimps, yam, timber, cassava, and cocoa cake.
The whole country	Cassava, yam, maize, millet, groundnut, rice, sorghum, poultry, vegetables, cowpea, pepper, beef, oil palm, and fish.	cassava, yam, maize, millet, groundnut, rice, sorghum, poultry, vegetables, cowpea, pepper, beef, oil palm, and fish.

Source: Manyong et al. (2003)

## Nigerian domestic agricultural market: The CMB experience and afterwards

In terms of policy intervention, the agricultural market in Nigeria has passed through two policies, namely, the Commodity Marketing Board (CMB) and the Structural Adjustment Programme (SAP). It was after the Second World War, in 1947, that the Nigerian Produce Marketing Board (NPMB) was established as the sole buyer of all commodities produced for export (Olusegun 2006). The board determined sole purchase price under the approval of the central government. However, the Nigerian Produce Marketing Company Limited (NPMC), incorporated in the United Kingdom, handled overseas marketing.

In 1954, regional marketing boards were established to handle marketing in various regions while the Nigerian central marketing was set up to:

- (1) Act as an agent of the regional marketing boards;
- (2) Handle export sales and shipping of produce;
- (3) Establish and control quality and grades; and
- (4) Purchase from regional boards (Olusengu, 2006).

In 1957/58, the NPMB and NPMC, registered in Lagos, became effective. Many overseas buyers could purchase commodities either on cost of insurance and freight (cif) or free on board (fob). The London office was closed in 1962/63 and all sales were conducted from Lagos on a net price basis. The regional marketing boards, with their statutory powers and duties, became responsible for the marketing of major export crops. It appointed Licensed Buying Agents (LBAs), fixed prices, and established crop stabilization fund from its reserve funds.

In 1973, following a period of low world market prices for major primary commodities (cocoa, coffee, palm kernel, rubber, and groundnut), the federal government introduced legislation for central control of the pricing and financing mechanisms of export crops. Also, a technical committee on producer prices was established to advise the Head of State (Olusegun, 2006). The creation of 19 States in 1976 brought about reorganization of the marketing boards, instead of creating marketing board for each state, which may lead to a very high overhead cost.

The reorganized marketing boards were made up of boards, which operated a nationwide and cut across state boundaries. Unlike the NPMB, whose major objective was to market Nigeria's agricultural products overseas, the main objective of the 1976 reorganized commodity boards was to encourage production and organized the marketing of major agricultural commodities, especially for local consumption and local processing (Olusegun, 2006). Emphasis was on price stabilization to ensure maximum benefit to the farmers to encourage production for satisfaction of home demand and increase the country's export.

The seven commodity boards were: (i) cocoa board, also responsible for coffee; (ii) groundnut board which also looked after soyabean, beniseed, sheabutter, and ginger; (iii) cotton board, which also looked after kenaf and similar fibers; (iv) palm produce board which looked after palm oil, palm kernel and copra; (v) rubber board; (vi) grains board which dealt with food grains; and (vii) root crop board, which dealt with tubers and root crops. Each of the boards provided a guarantee minimum price at which farmers sold to the boards. This did not prevent farmers from selling directly to local processor without getting through relevant boards.

The LBA, who could either be companies, individuals or cooperative societies, purchase, bag, store, grade and transport to the board's point stores. The State Ministry of Agriculture and Natural Resources Produce Department inspects grades and certifies the produce before it leave the LBA stores. The boards published, annually, the list of its LBAs, their functions, responsibilities, grades, transport cost, handling instructions, annual price, and buying allowance payable to the LBAs.

## Trade liberalization episodes in Nigeria

Trade liberalization episodes in Nigeria can be traced back to different trade disappointing policies before 1986. This historic account can be examined in context of pre-SAP that was from 1960 to 1970s, and from 1980 to 1985. During SAP era, which was from 1986 to 1994 and post-SAP era, which is from 1995 to date; but for the purpose of this report, such examination is limited to 2006.

### *Trade policy trends between 1960 and 1970s*

During the first decade of independence, Nigeria pursued an import substitution industrialization strategy. This involved the use of trade policy to provide effective protection to local manufacturing industries through such measures as quantitative restrictions and high import duties. Many items were accordingly placed on import prohibition. During this period, all imports from Japan were placed under import licence. Machinery and spare parts imports were restricted and exchange controls on the repatriation of dividends and profits were enforced. Restrictions were also applied on capital goods, spare parts and non-essential imports. Although the import substitution industrialization strategy continued even after the Nigerian civil war in 1970, trade policy between 1970 and 1976 assumed a less restrictive stance, ostensibly because of demands necessitated by the post-war reconstruction. Thus, only items that were regarded as non-essential consumer goods were restricted, while tariff rates on raw materials were reduced and quantitative restrictions on spare parts, agricultural equipment and machinery were relaxed. Similarly, the reconstruction surcharge on imports was reduced from 7.5% to 5% and later completely eliminated, while exchange controls and profit repatriation were also relaxed. The 1960s and early 1970s also saw the application of export duties in the range of 5-60% on agricultural exports such as cocoa, rubber, cotton, palm oil, palm kernel, and ground nuts. In 1973, however, these duties were eventually abolished, as a result of the oil boom and the need to promote agricultural exports as part of the export diversification strategy. However, this spurt of liberalization ended in 1977 when a wide range of imported finished goods requiring licences, came to be placed on very high duties or were banned outright. This renewed restrictive trade policy culminated in the banning of 82 items in 1979, while a further 25 items were placed on import licence.

### *Trade policy trends between 1980-1985*

From 1981, there was a policy shift towards exports promotion and a move to intensify the use of local raw materials in industrial production. However, the increase in the value of imports led to a worsening of the balance of payments (with, in addition, the backdrop of the collapse in world oil prices), which forced the government to promulgate the Economic Stabilization (Temporary Provisions) Act in April 1982. Under this Act, tariffs on 49 items were raised, while a prohibition was imposed on gaming machines and frozen poultry. Further, 29 commodities were removed from the general import

license regime and placed under specific license, while the use of pre-shipment inspection became widespread. During 1983-1985, 152 items were brought under specific import license, and foreign exchange regulations became more stringent. The central objective of trade policy was to provide protection for domestic industries and reduce the perceived dependence on imports; a corollary to that objective was a desire to reduce the level of unemployment and generate more revenues from the non-oil sector. Accordingly, tariffs on raw materials and intermediate capital goods were scaled down (Inye, 2006).

### ***The Structural Adjustment Programmes era, 1986-1994***

From 1986, there was a significant shift in trade policy direction towards greater liberalization. This shift in policy is directly attributable to the adoption of the Structural Adjustment Programmes. The Customs, Excise, Tariff etc (Consolidation) Decree, enacted in 1988, was based on a new customs goods classification, the Harmonized System of Customs Goods Classification Code (HS). It provided a seven-year (1988-1994) tariff regime, with the objective of achieving transparency and predictability of tariff rates. Imports under the regime thus attracted ad valorem rates applied on the Most Favoured Nation (MFN) basis.

### ***Trade policy under the post-SAP: (new agricultural policy (1995-1998) and the NEEDS era (1999-2006)***

A new seven-year (1995-2001) tariff regime, established by Decree No. 4 of 1995 succeeded the previous (1988-1994) regime. The tariff structure over the period 1988 - 2001 increased import duties on raw materials, and on intermediate and capital goods, while tariffs on consumer goods were slightly reduced. This was aimed at reducing distortions in resource allocation and combating smuggling. Both the 1988 and 1995 tariff schedules had provisions for reviews and amendments. However, they maintained the familiar mixed trends in tariff regimes. Three types of changes were subsequently common, namely, reduction in rates, increase in rates, and/or removal from or addition to the import prohibition list (Inye, 2006).

As pointed out above, Nigeria's trade policy regime as currently contained in the NEEDS and trade policy documents, has been geared to enhance competitiveness of domestic industries, with a view to, inter alia, encouraging local value added and promoting as well as diversifying exports. The mechanism adapted to this end is gradual liberalization of the trade regime. Thus, the government intends to liberalize the trade regime in a manner which will ensure that the resultant domestic costs of adjustment do not outweigh the benefits. This is the fundamental basis on which to gauge the direction and implementation of policy. The clarion call is "gradual liberalization". This addresses the question as to what is the kind of trade strategy the government has adopted in furtherance of its development agenda. Current reform packages are, therefore, designed to allow a certain level of protection of domestic industries and enterprise (Inye, 2006). Concretely, this has translated into tariff escalation, with high effective rates in several sectors and lower import duties on raw materials and intermediate goods unavailable

locally. This policy perspective has also led to the application of relatively high import duties on finished goods which compete with local production.

### **Measures affecting imports**

The tariff structure indicates that Nigeria's bound tariffs, taken together, are in the range of only 19.2% . In the period since 1998, the average applied MFN tariffs have increased from about 24% to 29% , with applied MFN tariff rates on agriculture and non-agricultural products averaging 50% and 25%, respectively. A general assessment of the tariff structure reveals that tariff rates are widely dispersed, ranging from 2.5% to a maximum of 150% , with a total of only 19 bands applied. Thus, the overall picture reveals mixed escalation, and this is attributable to the high tariffs on agricultural commodities. This seems to indicate a policy bias in favour of agricultural protection. A number of industries are also protected through positive tariff mechanisms, while several industries benefit from tariff exemptions and concessions on imports of inputs of raw materials (Inye, 2006).

### **Duty exemption and concessions**

Duty exemptions and concessions also remain some of the quantitative policy instruments for affecting trade policy in favour of domestic producers and to achieve the aim of diversification. Exemptions on import duties have been put in place for a number of goods. There are tariff concessions which have been put in place to attract investment and boost production. These concessions apply to certain raw materials used by manufacturers. Tariff concessions are also applied to fertilizers, in order to support agriculture, while tax concessions have been extended to exporters under the Export Expansion Grant (EEG).

### **Import prohibitions**

Import prohibition continues to be a major non-tariff tool for pursuance of trade policy. Comparison between 1998 and 2005 has seen the addition and withdrawal of items on the prohibition list. Since 1991, several items have been removed from the list. These include vegetable oils, processed wood, textile fabrics, furniture, fluorescent tubes, and lamp bulbs. Imports of motor vehicles that are over eight years old from date of manufacture, were also banned, but again reauthorized in January 1998. In 1993, imports of all types of meat were banned. In 1998, products under 23 HS four-digit codes were subject to import restriction. However, in line with the government's desire to scale down prohibitions, a number of prohibitions were replaced with high tariffs between 1999 and 2001. Since 2002, however, there has been a sharp reversal of policy. Thus, as at November 2004, agricultural and non-agricultural goods under some 218 HS four-digit codes, have been subjected to import restrictions, mainly for purposes of protecting domestic industries (Inye, 2006). Under the Export Prohibitions Act, certain agricultural products have also been placed under prohibition to enhance domestic food security and support local processing. These include raw hides and skin, timber (rough and sawn), unprocessed rubber latex and rubber lumps, rice, yam, maize,

and beans. Although opinions differ as to the impact of the measures taken on local production, there are indications that the aggregate index of agricultural production registered an increase of 6.1% in 2003, over the preceding year, with all subsectors contributing to growth. This upward trend has shown some measure of consistency between 2003 and 2005. It is noteworthy that, in addition to various other measures initiated by the federal government, the Central Bank of Nigeria (CBN) has attributed the success partly to the imposition of bans in the sector. Similarly, the CBN report cited subsectoral growth of livestock by 5% in 2003, up from 4.2% in 2002. There seems not to be a clear certainty in the manufacturing sector. Inye (2006) noted that, a 2005 trade policy review document indicates that import bans and lower tariffs on inputs for growth of businesses appear to have declined since 1999, in spite of the increased use of prohibition measures. The conclusion is that the manufacturing sector appears to have fundamental problems, which cannot be addressed by merely increasing effective rates of protection.

### **Sectoral distribution of tariffs**

The overall picture of the sectoral distribution of tariffs is one of wide dispersal, but with significantly higher levels of protection for agricultural products. The average MFN rate for agriculture (going by WTO definitions) was 50.2% , as against 32% in 1998. There was an even sharper rise in tariffs in 2002, particularly on several agricultural products. Indeed, tariff amendments introduced in 2002 led to tariff rates of 100% on several products, which fall under agriculture classification (Inye, 2006). The lowest recorded average agricultural rates are on cut flowers and plants (20.3%); oil seeds, fats and oils (34.1% ); and animals and animal products (34.5%). The highest rates apply to fruits and vegetables (98.2%); tobacco (89.4%), with rates of 150% on cigars and other 10 manufactured tobacco products; and beverages and spirits (75.3%), with rates of 150% on water. Given the relatively high level of protection for agricultural products, the overall tariff structure has displayed a mixed escalation, showing negative from the first to the second stages of processing and positive from the second stage to the third stage. In food processing and beverages, there is pronounced positive escalation from stages one to three of processing. This implies a high effective rate of protection to these industries, thus increasing the profitability of production in the sector and hence influencing the pattern of resource allocation in their favour. The most protected areas (subject to a tariff of 100%) include butter, cheese and curd; edible vegetables and certain roots and tubers; edible fruits and nuts; vegetable oil, margarine; processed meat products; confectioneries; and various food preparations containing chocolate, pastry and rice (Inye, 2006; NBS. 1990-2006).

Statistics on non-agricultural products for 2003 indicate that manufactures attracted an average applied MFN rate of 25.3% , up from 23.1% in 1998. Average MFN applied duties by product category range from 2.5% to 100% , with the lowest average rates on petroleum (11.3% ); non-electric products (13.9% ); and chemicals and photographic imports. The highest rates are textiles and clothing (42.7% ), followed by mineral products, precious stones and metals (28% ), fish and fish products, leather, rubber, footwear and travel goods (30% ) respectively. Interestingly, in industrial products too,

there is a wide dispersion of tariffs within each product group. Some chemicals attract tariffs of 2.5% while others attract rates as much as 100% (Inye, 2006).

### *Nigeria's trade policy on rice as a major carbohydrate staples*

Specifically, with respect to rice importation, Ogundele and Okoruwa (2006) identified the policy environment in the sub-sector. They outlined pre-ban, ban and post-ban periods with respect to rice. The pre-ban period was from 1971 to 1985, while the ban period was from 1986 to 1995. However, they maintained that illegal trade made the ban to be quantitative restriction instrument. Available data and literature support cross border trade during that period (FAO, 2000). But from 1995 to 2007, Nigerian Government has used tariff as main liberalization instrument. On the other hand cassava moved from non-tradeable to tradeable crop. From 1974 to 1989, it was a non-tradeable crop while from 1990 to date it is a tradeable crop. One can easily identify a trend from quantitative restriction to use of tariff during the period under study. Table 4 shows trade policy trend with emphasis on rice. The incessant government actions with respect to this commodity show its importance in the economy.

**Table 4: An outline of Nigeria's trade policy on rice as a major carbohydrate staples 1974-2006**

Period	Policy Measures
Prior to April 1974	66.6% tariff
April 1974-April 1975	20%
April 1975-April 1978	10%
April 1978-June 1978	20%
June 1978-October 1978	19%
October 1978-April 1979	Imports in containers under 50kg were banned
April 1979	Imports under restricted license (only Government Agencies)
September 1979	6-month ban on all rice imports
January 1980	Import licence issued for 200,000 tonnes of rice
October 1980	Rice under general import license with no quantitative restrictions
December 1980	Presidential Task Force (PTF) on rice was created and it used the Nigerian National Supply Company (NNSC) to issue allocations to customers and traders
May 1982	PTF commenced issuing of allocations directly to customers and traders in addition to those issued by NNSC
January 1984	PTF disbanded. Rice importation placed under general license restrictions
October 1985	Importation of rice (and maize) banned

*continued next page*

**Table 4 Continued**

Period	Policy Measures
July 1986	Introduction of SAP and the abolition of Commodity Boards to provide production incentives to farmers through increased producer prices
1995	100%
1996 -2000	50%
2001	85%
2002	100%
2003-2006	150%

Sources: UNEP, (2005) Tunji Akande (2001) and updated by the authors

## Trade policy reforms and exchange rate changes affecting agriculture in Nigeria

Agricultural trade policies with respect to SAP, can be divided into two phases, namely, pre-SAP, and SAP trade policies. The 1960s-1985 was the pre-SAP era, characterized with highly regulated exchange rate and quantitative restrictions. Import and export duties, as well as controlled exchange rate, were the major trade policy instruments prior to, and many years after, independence. Due to the suspension of dollar-gold convertible<sup>2</sup> on 15 August 1971, Nigeria adopted a new system of exchange rates with effect from 23 August 1971. This was classified into two, namely, contracts dominated by US dollars and contracts dominated by pound sterling. The Central Bank of Nigeria (CBN) initially maintained a fixed buying and selling rate for the naira which increased/improved with the oil boom (Table 4). The system of trying to fix exchange rate dominated the pre-SAP era; this policy tried to reduce the magnitude of changes of the exchange rate (Table 4). Adubi and Okunmadewa (1999) observed that exchange rate has experienced frequent changes and the main objectives of the policy were to operate independent exchange rate management system that will influence real economic variables in the economy. However, since the introduction of SAP, exchange rate changes have been more pronounced. This could have been affected by the devaluation of the naira. However, there has been gradual increase in exchange rate since the introduction of SAP from ₦2.02 at the end of 1986 to ₦127 to the dollar by the end of 2006; while during the pre-SAP era it was less than one naira to the dollar.

Pre-SAP era policies, not only served as source of revenue to government through import and export duties, but also were to promote domestic agricultural production for food security and exports to earn foreign exchange. The main explicit instruments were export duties, taxes and centralized marketing (marketing board).

Export duties ranged between 5% and 60% from 1960 to 1970. But by 1973, export duties were abolished in order to revive agricultural export, which was affected by the “Dutch disease” as a result of oil boom. Import duties on food commodities such as maize, rice, wheat and sorghum were raised to between 50% and 100% from 1978 to 1982. Government subsidies on fertilizers and other agrochemicals, improved seeds and capital equipment, particularly tractors, were about 50% for tractors and 85% for

others (Oyejide, 1986). Quantitative restriction in the form of import and export bans placed on certain agricultural commodities, as well as reinforced centralized marketing to improve government revenue characterized 1981 to early 1986.

The SAP era (1986-94) and afterwards featured the devaluation of the naira (Table 5), abolition of import and export licensing requirement, except for fertilizer, and few other commodities between 1986 and 1988. Foreign exchange control system by CBN was abolished but replaced with Bureaux de change as authorized dealers. The marketing board was scrapped in 1986. This was followed by further reduction in export duties and the removal of export prohibitions for many agricultural crops except food grains (cereals). The effect of customs and excise tariff consolidation decree of 1988 extended the list of banned imports by 1991 to about 20% of industrial and 30% of agricultural products (Soludo, 1995). Import duties were designed to discourage importation of non-essential raw materials as well as inputs of commodities that have local substitutes, especially in the agricultural sector. Import prohibition was thus shortened from 76 to 16 items (Falusi, 2005). This list favoured rice importation and some products of rice, maize and wheat (Ogunkola, 2003). Between 1989 and 1991 tariff rate rose from 100% to 300% on food stuffs, foot wears, transport equipment and chemicals (Soludo, 1995). Outright prohibition was on many food staples, excluding rice (Falusi, 2005).

**Table 5: Trends in exchange rate trade liberalization variables and tradeable carbohydrate trade performance in Nigeria (1974–2006)**

Year	Exchange Rate	Price of Cassava Chips (In US\$)	Price of Rice (In US\$)	Quantity of Rice Imported (In '000 Metric Tones)	Cassava Export (In Metric '000 tones)	Nominal Protection Coefficient for Cassava	Nominal Protection Coefficient for Rice
1974-77	0.628	177.0	357.8	117.4	0.00	0.57	0.95
1978-81	0.589	145.0	404.8	559.6	0.00	1.11	1.32
1982-85	0.763	155.8	202.0	450.0	0.00	4.67	2.32
1986-89	4.491	151.5	265.5	305.0	0.00	7.60	2.83
1990-93	19.925	166.3	289.3	316.5	10.40	1.10	8.0
1994-97	81.100	145.3	307.8	423.6	200.50	0.90	2.02
1998-2001	95.783	97.3	231.8	990.7	18.00	1.50	1.51
2002-2006	128.27	82.6	227.0	1438.1	1338.30	1.32	1.19

Source: Calculated from ESCB/FAO (2000); The Guardian (2007); NBS Trade Summary

The Nigerian government had de-emphasized the use of import prohibitions since 1995 by replacing it with a new seven-year tariff reform with frequent adjustment and changes in the tariff structure. The high import duties in 1995 were reduced after 1999 (Falusi, 2005). But by 2004 the tariff rate averaged about 25% with some exceeding 100%. The introduction of ECOWAS common tariff has further reduced tariff structure from 100% to 25% (FGN, 2004). Nigeria maintained a 150% ceiling rate binding on all agricultural products. In general, recourse to quantitative restriction on imports is on the decline though the ban on importation of maize, sorghum, millet, wheat flour, vegetables, plastic articles and all types of meat exist (Ogunkola, Bankole and Adewuyi, 2005). On the other hand, the government has been trying to expand export with the establishment of NEPC. As mentioned earlier, one of the food crops that benefited from this arrangement since 1990 is cassava.

## Components of trade liberalization in different countries

Trade liberalization has taken many forms among nations. The essential components are presented in Table 6.

**Table 6: Illustrations of components of trade liberalization 1950-1990**

Country	Features of liberalization episode
<b>Argentina</b>	
1967-70	Average tariff reduction from 94% to 49% increased variance of tariffs
1976-80	Increase in effective exchange rate; exchange rate devaluation; export promotion
1987-1988	Coverage of quarter reduction reduced; production in import licensing; reduction in average tariffs; reduction in variance of tariffs
<b>Brazil</b>	
1965-73	Tariff reductions duty drawback scheme; tax exemptions and subsidies for exports; exchange rate devaluation
1988	Lowered tariff rates; elimination of tariff exemptions; reduction in non-tariff measures
<b>China</b>	
1978-1987	Creation of export processing zone; reduction of taxes on export
<b>New Zealand</b>	
1951-6	Tariff reduction import licence reductions
1964-81	Tariff compensation
<b>Nigeria</b>	
1982-4	Greater exchange rate flexibility
1986-1987	Import licensing system abolished, import levy discontinued, cuts in import tariffs, import deposits abolished, exchange rate reforms
<b>Kenya</b>	
1980-86	Reduction in import duties; reduction in non-tariff barriers; exchange rate depreciation
<b>Tanzania</b>	
1984-1989	Exchange rate adjustment, reduction in import restrictions, rationalization of tariffs, export promotion.
<b>Indonesia</b>	
1950-1	Rationalized tariff structure; elimination of import license restrictions
1966-75	Reduced use of quota restriction, but pervasive control remained; simplification of export restriction; exchange rate devaluation; and unification of foreign exchange market.

Adopted from Collier et al. (1999)

It is evident that reduction in import duties, reduction in non-tariff barriers, exchange rate policies and use of tariff are the major components.

### 3. Literature review

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Trade liberalization or free trade has, throughout history, been characterized with reduction in trade barriers/tariffs, which are applied on some commodities rather than a general rule to all commodities (Encyclopedia Britannica, 1998). For numerous reasons, governments, generally choose to erect barriers ranging from simple tariffs, through sundry reforms of regulations, to outright prohibition to trade. Common motives of such barriers include revenue generation from tariffs, protection of domestic industry, national defence, and a desire for self-sufficiency or autarky, and persistent imbalance in international exchange. The removal of these restrictions to ease trade is liberalization. On the other hand, ‘static and dynamic gains’ are often used to designate benefits of trade liberalization. The static gains arise from trade liberalization as a result of removal of static inefficiencies. Such inefficiencies include tariffs, prohibitions, and quotas while dynamic gains comprise trade-induced growth in productivity. According to Yang and Hwang (2001a) and Yang and Hwang (2001b), static gains include benefits through improved resource allocation within and across industries and dynamic gains include technical change, learning and growth leading to improved productivity growth. More importantly, with respect to developing economies, trade liberalization can foster domestic competition for resource allocation as a result of price differential. For consumers, advantages of trade liberalization, with respect to their welfare, have to include reduction in prices and increase in variety of goods.

The price differential induced by trade may result in the “Dutch disease” phenomenon. “Dutch disease” refers to a situation in which one or a few sectors of the economy are booming while other sectors are in accelerating recession. The Dutch disease phenomenon was developed from the experience of Netherlands economy characterized by shrinking of other sectors of the economy as a result of boom in natural gas export (Gregory, 1976). Models of the Dutch disease phenomenon have been used to analyse the effects of a resource boom, particularly on the relative size of sectors, sectoral prices, the wage rate and the real exchange rate (Oyejide, 1986). The basic concept is that the world prices of importable and exportable are exogenous to a small open economy producing three types of goods, namely, importable, exportable and non-tradeable and any change in the world prices can be a source of resource boom that will affect the prices of non-tradeable, hence, volume of resources allocated in their production when the country engages in trade. Unnecessary false alarm may have been made of the advent of the Dutch disease in Uganda and Tanzania, which led to reduced or extremely cautious approach to access to, and use of, donor funds. On the other hand, Nigeria has continued to attract the highest volume of FDI in Africa (Ogunkola and Jerome, 2007). Although

the oil boom affected Nigerian economy, agriculture has continued to strive, contributing about 47% of the GDP; presently, information and communications technology is a growing sector which may help in the spread of agricultural as well as price information.

Exchange rate differential can accelerate the effect of the Dutch disease through the exchange rate pass through concept. The theoretical foundation on which the relationship between prices and exchange rate is based evolve from the concept of Purchasing Power Parity (PPP), an offshoot of the Law of One Price (LOP), with the assumptions that there are no trade barriers and transport cost. The understanding of the background knowledge of price determination in Nigeria informs the specification of the model. It should be acknowledged that the consumption basket used to construct the domestic price level or consumer price index in a given country consists of finished imported goods and domestically produced import-competing goods. Hence, the extent of exchange rate pass-through will depend on the rate of pass-through to import prices, the share of imports in consumption basket, and the response of domestically produced goods to movements in the exchange rate. The framework adopted here follows partly from the studies of Blavy (2004) and Ameyaw (2004). The price system can, therefore, be assumed to consist of the average of the prices of tradeable goods and non-tradeable goods which can be expressed as:

$$TP = (P^T)^\lambda (P^N)^{\lambda-1} \quad (1)$$

Where:  $\lambda$  represents the share of tradeable goods in total consumption basket.

$P^T$  = price of tradeable crop;  $P^N$  = price of non-tradeable crop,  $TP$  = total price of the basket of goods.

The basic relationship in (1) follows from the Law of One Price (LOP), which states that, at equilibrium, the price of tradeable goods in two markets cannot differ when expressed in the same currency thus, guaranteeing a complete pass-through.

Besides the theoretical underpinnings of Exchange Rate Pass Through (ERPT) in general, a more differentiated analysis regarding ERPT at different stages of the distribution chain is of great interest. Exchange rate shocks may affect prices at different stages both directly and indirectly through previous price stages. To be more specific, exchange rate movements are transmitted through two channels: (i) prices of imported intermediate goods, which is reflected by the share of imports and (ii) prices of domestically produced goods, which resources for their production competed with the exportable.

Theoretical perspectives of the effects of trade liberalization on prices have been documented with respect to perfect competition in a developing economy and monopolistic competition in a developed economy. In a monopolistic competition in which a monopolist faces price competition with a differentiated imported product; the demand for both goods are a function of their prices. But a monopolist will sell at a higher price before liberalization. With trade liberalization the monopolist may face price competition with large scale firms/farms which can afford to sell at a lower price. The price of the imported product will cause a reduction in the price of the monopolist

(Yang and Hwang, 2001a). This model was applied in Korea's chemical industries, where capital/labour ratio is high. This will not be applicable to the carbohydrate subsector in Nigeria characterized by perfect competition. Perfect competition best suits the subsector due to large number of buyers and sellers, high degree of homogeneity of each of the output of the crops besides the ease of entry and exist into the market.

Haouas et al. (2003) did describe the effects of trade liberalization and possible assumptions for a developing economy. Their model assumes a small open economy with capital and labour for the production of three types of goods, namely, exportable, importable and non-tradeable. The short-run capital was found to be immobile between sectors while labour was found to be mobile and aggregate factor supply was inelastic. The capital /labour ratio for importable was greater than that of non-tradeable and the capital /labour ratio for non-tradeable was greater than that for the exportable sector. There was the existence of imperfect specialization in production. This is summarized in Table 7:

**Table 7: Possible effects of trade liberalization on production**

Sector	Short-run production	Long-run production
Exportable	Increasing	Increasing
Importable	Decreasing	Decreasing
Non-tradeable	Ambiguous	Increasing

Source: Haouas et al. (2003)

Since, in a perfect competitive market, production/supply is directly related to price, it is possible to associate changes in production with prices. Thus, increase in the production of exportable indicated an increase in its relative price to non-tradeable while the long-run effects of a fall in the relative price of importable due to liberalization are in line with the prediction of Stoper-Samuelson documented by Haouas et al. (2003). The decrease in the production of importable may be due to decrease in the relative price of importable to exportable. Thus, farmers will maximize their profit by producing more of the exportable. As market improves and substitutions increase (in the long run) the production/price of non-tradeable increases. Although the above perspective deals with the general economy, within the sub-sector where capital and labour are mobile (as in the carbohydrate sub-sector) the concept may not strictly be applied, but other assumptions such as low capital/labour ratio make the theory applicable to the sub-sector, especially, in developing economies.

The effects of trade liberalization have been categorized into short and long-run effects. The short- and long-run effects with respect to production sector lead to increase in exportable and decrease in importable. With respect to non-tradeable, there are ambiguous effects in the short run, and increase in the production of non-tradeable in the long run. Particularly, in a subsector where the resource good (exportable) and non-tradeable use the same factors of production, resource boom in the exportable good can cause a shift in factors of production from non-tradeable to exportable. The resulting low output of non-tradeable may attract higher price due to shortfall in its supply. The possibility of substitution with import and individual preferences can also affect (increase or reduce) the price of non-tradeable. Hence, Oyejide (1980) aptly noted that the total effect of a resource boom could be ambiguous.

The decrease in the importable is as a result of a fall in its relative price, while the increase in the exportable is as a result of increase in its relative price. If goods are substitutes in both consumption and demand of resources for production and substitution effects dominates income effects, the non-tradeable prices will decrease relative to exportable but increase relative to importable (Haouas et al., 2003; Adewuyi and Adeoye, 2007).

Trade liberalization/SAP theory, which aimed at devaluation of domestic currency to encourage domestic output for possible export and minimization of imports due to possible higher cost, was the basic theory that underlined a number of studies involving international trade in many African countries. Although this theory succeeded with respect to agriculture generally, many results differed from country to country due to their economic structure, taste and per capital income, among others (Soludo, 1995). It was expected that the importation of a commodity with scarce foreign exchange would lead to increase in its price and may positively affect that of its close substitute in an economy with devalued domestic currency. With respect to importation of inputs and machineries with scarce foreign exchange that may tend to increase the cost of production, this does not apply to the agricultural sector because small-scale farmers who are the major producers use low external and non-tradeable technology and in many instances, governments subsidized agricultural capital inputs. However, the SAP policies encouraged export of some agricultural products which positively affected their prices in domestic markets as shown in the empirical literature.

Asuming-Brempong (1994) argued that trade liberalization results in input subsidy removal and competition of domestic carbohydrate staple with imported one. The input subsidy removal can increase the cost of production which is expected to reflect increase in the price but competition with imported substitutes can suppress price. Hence, in line with the model in Table 6, the effect of trade liberalization on non-tradeable is ambiguous at least in the short run. But the price of the tradeable can be increased due to higher demand and effects of exchange rate differential, where applicable, while increase in the volume of imports will lower prices of non-tradeable crops and generate substitution due to price difference.

## Empirical literature

Mwase (1998) noted that privatization and liberalization of agricultural marketing were a major U-turn in Tanzania's cashew economy. Privatization reduces the role of Cashew Board of Tanzania (CBT) and the cooperatives. During the exercise, production went down by 89% and 12 privatized factories were closed. However, increase in competition due to liberalization pushed farm gate prices of cashew up by 40% between 1994 and 1996. The producer prices as proportions of export were a mere 25%-37% in the 1985/86 to 1988/89 periods. This proportion rose and remained at 74% over the next two years; it declined to 68% in 1991/92 and 60% in 1992/93 and rose again to 73% in 1993/94, and to 70-80% in 1994/95. In real terms, farm gate prices were increased with trade liberalization. The study reported that positive aspects of structural adjustment included easier access to foreign exchange and inputs, privatization of input purchases, processing and export of cashew which enhanced competition, increased

producer prices and prompt payment to farmers. Kidane (1999) noted that, in Ethiopia coffee farmers responded positively to devaluation via increase in Real Exchange Rate (RER). The effects of the currency devaluation by 242% were new planting through intensive cultivation and uprooting old trees in order to increase output. They diverted both human and material resources at their disposal to the production of coffee, which had continued to be the major source of foreign exchange. The parallel market, and resultant coffee smuggling, were reduced and income of farmers increased. Kwanashie et al. (1997) reported that, in Nigeria, structural adjustment policies do not instill confidence in the ability of such policies to attain the sectoral goals of the agricultural sector. Their result indicated a persistent excess demand for food. The expansion of cross-border trade with some processed and improvised food crops, such as garri and grains, has become a source of foreign currency but worsen the output-consumption imbalance. Kwanashie et al. (1998) noted that non-tradeable crops appear to have responded more positively, and significantly, to institutional change during SAP than to the price support and food importation. Food is less sensitive to external factors but more responsive to domestic prices and policy than non-tradeable crops. Adubi and Okunmadewa (1999) noted that, exchange rate volatility had a negative effect on Nigerian agricultural exports; while price volatility had a positive effect. The more volatile the exchange rate changes, the less the income earning capacity of farmers, which substantially led to a decline in output and volume of export. The SAP era was beneficial in terms of price increase of agricultural exports in Nigeria. Positive relationships between price and export were documented.

With the introduction of SAP, exchange rate liberalization and policies to effect growth of traditional non-oil exports have resulted in appropriate and appreciable increases in export of non-oil commodities such as groundnuts, cocoa, beans, palm oil and palm kernel, cotton, rubber, ginger, hides and skins, timber, zinc, columbite, tin and lead (Adubi and Okunmadewa, 1999) as well as cassava (Okoli and Okoye, 2005). The studies found positive relationship between international price and quantity of export. With regard to imports, exchange rate overvaluation in the 1960s and 1970s helped to cheapen imports of competing food items. For example, it was cheaper to import maize for domestic uses than to grow it locally (Adubi and Okunmadewa, 1999). This indicates gross inefficient use of resources that exchange rate liberalization can address. The results discussed above were influenced by theories that underline SAP policies.

Asuming-Brempong (1994) reported that, liberalization policy resulted in the erosion of protection enjoyed by cereal producers in Ghana. The effects of liberalization and input subsidy removal on cereals in Ghana were mixed. Whereas the competitiveness of sorghum and millet improved, that of maize and rice deteriorated at the wholesale price level. The relative cereals price showed that policies which tend to protect the importable rice, adversely affected production of exportable maize. The study showed that the domestic price of sorghum (a non-tradeable crop) relative to maize (a tradeable crop) would increase by 0.52% as a result 1% increase in the domestic price of rice (an importable) relative to maize (an exportable). Similarly, the domestic price of millet, relative to maize, will rise by 0.80% as a result of 1% increase in the domestic price of rice (an importable) relative to maize (Asuming-Brempong, 1994). Similarly, the study by Oyejide (1986) noted that, 1% increase in the price of importable relative to

exportable would result to at least 85%, 83% and 83% increases in house rent, food price, and minimum wage rate, respectively. Considering a developing economy, with low capital/labour ratio that favours production of exports, it is easy to understand why export is encouraged. This result is influenced by the theoretical framework similar to the one described by Haouas et al. (2003) when the limitations are considered.

## Methodology review

Measuring the effects of trade policy on an economy or sub-sectors of the economy has been approached using different methods. With respect to trade liberalization, a dummy variable can be used. But quantitative recommendation can hardly be made based on the result. Other methods are Computable General Equilibrium (CGE) Model, Cross Section Analysis and Time Series Analysis. The CGE model allows systematic evaluation of alternative liberalization scenarios depending on the model dimensionality. It can offer the prospect of assessment of a given liberalization on all targets identified. However, reliance on the model is not feasible. Apart from the fact that we lack the capacity for multi-country model building exercise, the approach is fundamentally experimental because it investigates the impact of liberalization scenarios rather than the actual liberalization, which we are interested in; because of these limitations, it does not suit the objective of this study. But Collier et al. (1999) outlined studies in which the CGE models were used, majority of them involving tariff adjustment.

The cross section analysis involves the comparison of experiences of countries that have undergone liberalization with those that have not. Although it had a long tradition in applied economics, it is beset with difficulties in finding reliable comparators for the countries involved. Often a proxy for this may be comparing results across countries. The time-series analysis may be potentially helpful especially when it is adopted with before and after approach. This gives the tracks of the series concerned (Collier et al., 1999).

The time series approach may involve the use price relatives. The approach may involve the application of LOP in derivation of price relatives. This approach has been applied by Oyejide (1986), Asuming-Brempong (1994), and Reinika (1994).

Oyejide (1986) used three variables as proxies for home goods (non-tradeable) namely price index for housing ( $P_{H1}$ ), Food  $P_{H2}$  and Minimum wage rate ( $P_{H3}$ ), while  $P_m$  and  $P_{xc}$  were the prices of importable and exportable, respectively. The models could be presented as:

$$\ln \frac{P_m}{P_{xc}} = \ln \frac{P_{H1}}{p_{xc}} \ln Y \quad BT \quad (2)$$

$$\ln \frac{P_m}{P_{xc}} = \ln \frac{P_{H2}}{p_{xc}} \ln Y \quad BT \quad (3)$$

$$\ln \frac{P_m}{P_{xc}} = \ln \frac{P_{H3}}{P_{XC}} \ln Y \quad BT \quad (4)$$

Where: BT =Trade balance; Y= income

The models were applied to agricultural export generally, and oil exports but specifically to crops like cocoa, groundnuts and palm kernel, respectively.

On the other hand, Asuming-Brempong, (1994), studied effects of liberalization on cereals. The price of export ( $P_x$ ) was the price of tradeable maize, the price of importable rice was  $P_y$  and the prices of non-tradeable sorghum and millet were  $P_{z1}$  and  $P_{z2}$ , respectively.

The model can be specified as

$$\ln \frac{P_{z1}}{P_x} = \ln \frac{P_y}{P_x} \ln PCY \quad (5)$$

$$\ln \frac{P_{z2}}{P_x} = \ln \frac{P_y}{P_x} \ln PCY \quad (6)$$

Where: PCY = per capita income.

Major divergence between the two studies is their choice of price of non-tradeable good. The study by Oyejide (1986) involved the whole economy, which may be why the price indices were appropriate; while the study by Asuming-Brempong (1994) was on a sub-sector, which justified the use of the prices of non-tradeable crops. However, both studies converge on the premise that they examined the effects of trade on an economy or some aspect of the economy. It is pertinent to note that both studies may have been marred by spurious regression because the studies did not make use of Augmented Dickey–Fuller (ADF) unit root test and possible cointegration analysis.

Trade intensity measure, also known as degree of openness which is the ratio of import plus export to gross domestic product, is another trade liberalization measure. Collier et al. (1999) noted that, one objection to the use of this variable is that imports can be financed by export revenue and capital inflows. Its ability to reflect trade liberalization easily makes it unfit for use in areas where there has been no policy change. But in this case there is change in the policy and its use will aid reflection on substitution effects (Collier et al., 1999).

## 4. Theoretical/analytical framework and methodology

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It is true that both farm gate prices and domestic prices are distorted by agricultural and trade policies. Trade policies under liberalization exercise affect farm gate prices more than agricultural policies because government policies will remove subsidies to farmers, which will expose farmers to market forces which trade policies influence. With respect to Nominal Protection Coefficient (NPC), trade policy can be classified as protective or otherwise. The NPC measures the deviation of domestic price from border price. It is not necessarily tariff but a composite designation of government's interventions that can influence prices such as legislative prohibition, tariffs, exchange rate, and so on. When the value of NPC is one, it implies liberalization and efficient use of resources in the sub-sector. The NPC can indicate liberalization or otherwise as a result of government intervention (see Equation 19 in the Appendix for methods of its calculation).

Sectoral and sub-sectoral agricultural trade policy have been characterized by a trend from quantitative restriction to use of tariff during the period under study. An index can be constructed with respect to liberalization exercise in the country. Its interpretation will be possible and more encompassing and informative in measuring episodes than use of dummy variable. The sub-sector also witnessed the use of exchange rate and prices as trade policy variables that have played parts in the sub-sector besides some level of trade protection.

With a small open economy producing three types of goods in the carbohydrate crop family, namely, exportable crops, importable crops and non-tradeable crops; foreign prices, nominal exchange rates, export subsidies/taxes and import duties determine the domestic nominal prices of exportable ( $P_x$ ) and importable ( $P_y$ ); while supply and demand factors (which are a function of trade and exchange rate policies) determine the domestic nominal prices of non-tradeable goods,  $P_z$ . The economy is characterized with low capital/human ratio. This paper adopted the use of price relative approach as employed by Oyejide (1986), Asuming-Brempong, (1994), Reinika (1994), Tshibaka, (1986). and advocated by Collier et al. (1999). One of the advantages of the use of price relatives in the context of LOP is the ability of the law to reflect the effects of exchange rate on prices if the world prices are expressed in domestic currency. But to reflect the effect of exchange rate, the study has carefully expressed the price of the tradeable crops in their foreign currency. The basic regression model is presented as follows (the statistical suitability of inclusion of these variables, namely, NPC, OP, Ex and ID in the model is seen from the fact that the estimated results have tolerable Durbin Watson statistics and the coefficient of determinations is not very high):

$$\ln P_z/P_x = a_0 + b_0 \ln \frac{P_y^*}{P_x^*} + C_0 \ln \frac{NPC_y}{NPC_x} + D_0 \ln OP +$$

$$E_0 \ln Ex + F_0 \ln ID + G_0 \ln PCY + e \quad (7)$$

Where:  $W = b_0$  and  $C_0$

- $P_x^*$  = World price of exportable crop in foreign currency  
 $P_y^*$  = World price of importable crop in foreign currency  
 $PCY$  = Per capita income measured in US dollar  
 $NPC_y$  = Nominal protection coefficient of local rice  
 $NPC_x$  = Nominal protection coefficient of exportable cassava  
 $P_{z1}^d$  = Farm gate prices of non-tradeable expressed in US dollar.  
 $P_j^d$  = The domestic price of commodity,  $j$   
 $P_j^b$  = The border price of commodity,  $j$ , expressed in domestic currency  
 $Op$  = trade intensity (rice import + cassava export)/ GDP of agricultural crop sub-sector  
 $Ex$  = exchange rate  
 $ID$  = sum of liberalization index with respect to sub-sector (effective ban without documentation of illegal trade=0, quantitative restriction or ban with documentation of illegal trade =1, use of tariffs = 2. This variable is important given that the use of tariff has been at ad valeom ).  
 (For detailed theoretical derivation of the model, see Appendix ).

Equation 7 was applied to five different non-tradeable crops, namely, maize, millet, sorghum, local rice, and yam; their prices were presented as  $P_{z1}$ ,  $P_{z2}$ ,  $P_{z3}$ ,  $P_{z4}$ , and  $P_{z5}$ , respectively. The variables are all logarithmic transformation. PC-GIVE statistical software was used in the analysis. The analysis began with examination of time series properties of the variables used in the study. The time series properties were investigated and their order of integration determined using the Augmented Dickey-Fuller (ADF) unit root test. The ADF regression takes the form:

$$DX_t = \beta_0 + \beta_1 X_{t-1} + \beta_i \sum DX_{t-i} + \ell \quad (8)$$

$D$  = difference operator/ difference term

$X$  = individual variable at a time  $t$

$\beta$  = coefficient;  $\ell$  = error term

The null hypothesis is that  $\beta_1 = 0$ . Rejection of the null hypothesis suggests that the series

is non-stationary; and has to be differenced at least once in order to make it stationary. The ADF test was performed up to 2-lag length. Next was the ADF and Johansen test for cointegration relation (Johansen, 1992). Where cointegration exist, error correction model (ECM) is estimated. If not, the analysis continues without the ECM mechanism.

The values of the regression coefficients have to indicate nature of the effects of trade liberalization variables (measured as price relatives of importable to exportable, and nominal protection coefficients) and per capita income on prices of non-tradeable relative to price of cassava, which were the aim of the study.

## Coverage

The study covered a period of 32 years, from 1974 to 2006, with importation price of rice, exportation price of cassava, and the prices of the following non-tradeable crops: maize, millet, sorghum, local rice, and yam.

## Data collection

Secondary data were obtained from International Centre for Trade and Statistics Data Base (COMTRADE), UNCTAD's Trade Analysis and Information System (TRAINS). This was used to guide the authors with respect to HS-Code. The FAO Statistics Data Base, Publications of Central Bank of Nigeria, Nigerian Ports Authority, National Bureau of Statistic, Nigerian Export Promotion Council, and The Guardian were used to trace information on trade and marketing of carbohydrate staples. These helped provide information on HS-6 tariff line. Data such as domestic and border prices were collected for the following crops: maize, millet, sorghum, local rice, foreign\ imported rice, cassava, yam, and cocoyam. Data on trade regime policies such as tariff structures, cost of insurance and freight, and in cases where free on board were applied, were also sourced.

## 5. Data analysis

### Normality test

Normality test was carried out to determine the reliability of the emerging result. The normality test shows that all the variables had normal distribution. This is because the Chi-square values are significant at 5% probability level. The results are presented in Table 8.

**Table 8: Results of normality test of the data**

Variables	Chi-square Value	Level of Significant
$P_y^* / P_x^*$	8.0569	0.0001**
$NPC_y / NPC_x$	6.0981	0.0476*
Open	39.734	0.000**
$P_{z1} / P_{xt}$	50.343	0.0000**
$P_{z2} / P_{xt}$	29.820	0.0000**
$P_{z3} / P_{xt}$	21.481	0.0000**
$P_{z4T} / P_{xt}$	6.2544	0.0438*
$P_{z5T} / P_{xt}$	18.013	0.0001**
Exchange rate	21.413	0.000**
Index	43.465	0.000**
PCY\$	23.813	0.0000**

Source: Computed from field data; \*, \*\* = Sig. at 5% and 1 % levels, respectively.

## Time series property

The unit root tests are presented in Table 9. They showed the order of stationary of the variables for different periods in years that the variables were used for the analysis. Since the variables are of the order of integration, it requires text for establishment of proper criteria for inclusion of error correction mechanism in the model.

**Table 9: ADF unit root test**

Variable	Constant Added	No Constant
	1974-2006	1974-2006
$DL \frac{P_y^*}{P_x^*}$	-4.6662 ** I(1)	-4.8778** I (1)
$\frac{NPC_y}{NPC_x}$	-4.9032** I (1)	-4.6715* I (1)
$P_{z1} / P_{XT}$	-3.7239** I (1)	-3.7733** I (1)
$P_{z2} / P_{XT}$	-3.5621 * I (1)	-3.6325* I (1)
$P_{z3} / P_{XT}$	-3.4253** I (1)	-3.7719** I (1)
$P_{z4T} / P_{XT}$	-5.5804** I (1)	-5.5748 ** I (1)
$P_{z5T} / P_{XT}$	-5.5789* I (1)	-4.6154** I (1)
DL Open	-4.7855* I (1)	-4.8998** I (1)
DD Exchange Rate	-5.3758* I (1)	-5.4823** I (1)
DL Index	-3.5355* I (1)	-3.6056 I (1)
PCY\$	-3.2024 * I (1)	-2.8581 ** I (1)

Critical values: when constant is included, 5%= 3.1; 1%= 4.011; When no constant is included: 5%=1.954; 1%= 2. 649. Source: Calculated from data

## Determination of appropriate condition for inclusion of Error-Correction Mechanism

Table 10 show the variables whose Augmented Engle-Granger Test supported cointegration. All the residual variables for the period 1974-2006 were stationery and their ADF supported cointegration. Thus, appropriate conditions for cointegration relationship between dependent variables and corresponding independent variables has been ascertained for estimation of error correction model where necessary (Johansen, 1992).

**Table 10: ADF unit root test for determination of variables whose ADF values support cointegration test (Augmented Engle-Granger Test for cointegration)**

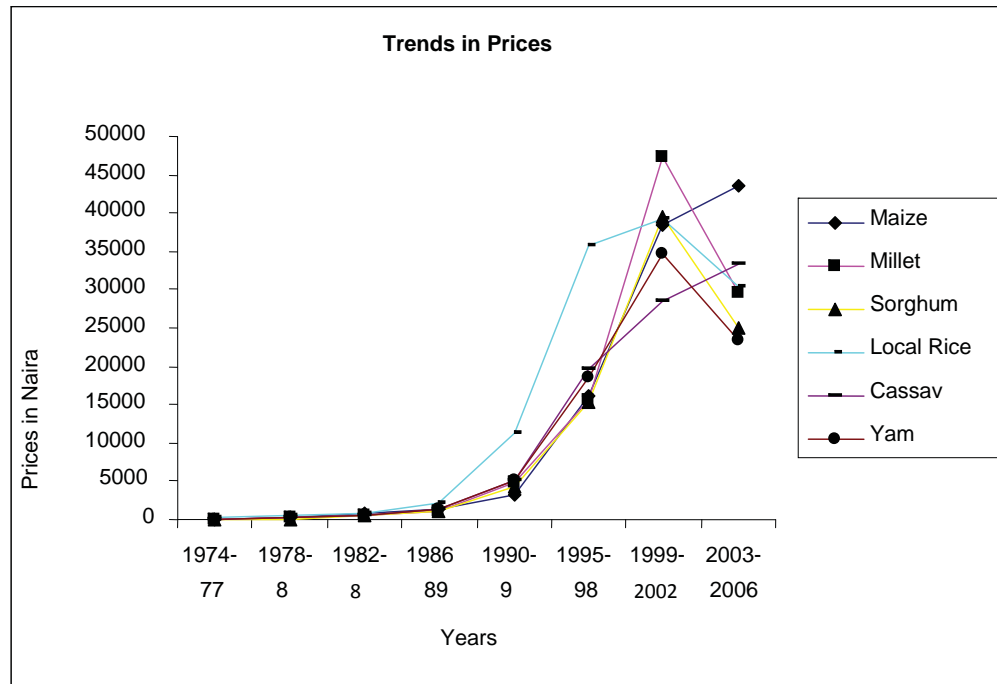
Variables in the equations whose Residuals were tested and described	ADF (Constant added)	No Constant
$\ln P_{Z1T} / P_{XT} \ln PY^* / PX^* \ln \frac{NPC_Y}{NPC_X}; \ln \text{Open};$ lnIndex, ln PCY	-3.4286* 1(0)	-2.8515***1(1)
$\ln P_{Z2T} / P_{XT} \ln PY^* / PX^* \ln \frac{NPC_Y}{NPC_X}; \ln \text{Open};$ lnIndex, ln PCY	-2.9021*1(1)	-2.5589***1(1)
$\ln P_{Z3T} / P_{XT} \ln PY^* / PX^* \ln \frac{NPC_Y}{NPC_X}; \ln \text{Open};$ lnIndex, ln PCY	-2.9801*1(0)	-2.5462*1(1)
$\ln P_{Z4T} / P_{XT} \ln PY^* / PX^* \ln \frac{NPC_Y}{NPC_X}; \ln \text{Open};$ lnIndex, ln PCY	-3.3492* 1(1)	-3.4111***1(1)
$\ln P_{Z4T} / P_{XT} \ln PY^* / PX^* \ln \frac{NPC_Y}{NPC_X}; \ln \text{Open};$ lnIndex, ln PCY	-2.9881*1(1)	-2.3947*1(1)

Critical values 5%= 3.1; 1= 4.011; when constant is included: when no constant is included 5%=1.954; 1%= 2. 649; \*, \*\*, \*\*\* = support for co integration

Source: Calculated from data

## Descriptive statistics results

An examination of the price changes, in line with the major economic policy changes which can be grouped under pre-SAP, during SAP and post-SAP is presented graphically in Figure 1. The pre-SAP era witnessed the introduction of the marketing boards. From 1974 to 1985 (before the introduction of SAP in 1986), there were minimal price changes in all carbohydrates staples in Nigeria. From 1986 to 1994 – during the SAP era - the prices increased gradually, with the price of local rice above others. The immediate post-SAP era (from 1995 to 1999) witnessed greatest increase in prices of the commodities, with the price of millet exceeding others. This period is followed by a gradual decrease in the prices of millet, sorghum and yam while the prices of maize and cassava increased slightly.

**Figure 1: Trends in prices of carbohydrates staples in Nigeria (1974-2006)**

Expectedly, the SAP era witnessed an increase in prices of major carbohydrate staples due to abolishment of commodity marketing boards that led to liberalization of domestic market, which exposed farmers to real force of demand and supply. But the post-SAP liberalization led to a decrease in prices of the carbohydrate staples. This is in consonance with Haouas et al.(2003) concept that effects of trade liberalization on non-tradeable could be ambiguous.

## Estimated results

### *Effects of trade liberalization and exchange rate changes on price of non-tradeable maize*

The regression equation for estimation of the effects of trade liberalization and exchange rate changes on prices of non-tradeable maize in Nigeria is presented in Table 1. The F-ratio,  $R^2$  and Durbin-Watson are 3.066, 0.48, and 1.85 respectively. These show that the result is acceptable because these statistics are within the acceptable limits. The significant explanatory variables are price of imported rice relative to price of exportable cassava and nominal protection coefficient of non-tradeable rice relative to that of exportable cassava.

**Table 11: Effects of trade liberalization and exchange rate changes on price of non-tradeable maize**

Independent variable	Coefficients/ Marginal effects and t-values of the independent variables			
	$D \ln P_{ZIT} / P_{XT}$	Stand. Error	t-value	Sig. level
Maize				
$D \ln PY^* / PX^*$	0.51657	0.26076	1.921	5%
$D NPC_y / NPC_x$	-0.49851	0.28661	1.739	5%
DLn Open	-0.10713	0.13497	0.794	NS
DDlnEX	-0.0693	0.47744	0.020	NS
Dln Index	0.16156	0.48107	0.336	NS
$D \ln PCY$	0.020086	0.11131	0.180	NS
Ecm-1	-0.61877	0.18587	3.290	1%
Constant	0.071012	0.11101	0.640	NS
F-ratio	3.066			1%
R <sup>2</sup>	0.48			
Durbin-Watson	1.85			
a0	0.5447			
RSS	6.825			

Source: Calculated from data: 1974-2006; D= Deference Operator; ln=log ns= no significant.

Price of imported rice relative to price of exportable cassava ( $PY^*/PX$ ) has a positive effect on the price of non-tradeable maize. This will reduce price incentive for production of cassava. Thus, farmers will prefer the production of maize to cassava. The result confirms the alternate hypothesis that trade liberalization can affect prices of non-tradeable. A similar result was obtained in Ghana by Asuming-Brempong (1994). He reported that the domestic price of sorghum, relative to maize, will increase by 52% as a result of 1% rise in domestic price of rice relative to maize (both of which are tradeable cereals).

The nominal protection coefficient of non-tradeable rice relative to that of tradeable rice ( $NPC_Y/NPC_X$ ), had a negative impact on the price of non-tradeable maize. Increase in the nominal protection of non-tradeable rice will tend to reflect an increase in its price over maize but such price differential will be at the detriment of non-tradeable maize. It implies that people would tend to prefer the consumption of non-tradeable rice to maize given price competition. This could be because local rice is a closer substitute to imported rice than maize. In other words, if government limits importation of foreign rice, its price will increase, and price of local rice (the closest substitute) will increase while price of maize will decrease due to consumption preferences.

The significant error correction mechanism shows that the speed of price adjustment in the long run is 62%. It implies that maize has a fairly high speed of adjustment to trade policies.

### *Effects of trade liberalization and exchange rate changes on prices of non-tradeable millet*

The regression equation for estimation of the effects of trade liberalization and exchange rate changes on price of non-tradeable millet in Nigeria is presented in Table 12. The result is acceptable because the F-ratio,  $R^2$  and Durbin-Watson are, respectively, 2.4598, 0.43 and 1.61, which are within the acceptable limits. The significant explanatory variables are degree of openness and trade liberalization index.

The degree of openness is negatively related to the price of non-tradeable millet. It indicates that, as trade in the sector increases, substitution of millet with imported rice adversely affects the price of millet. It implies that, peoples' consumption preference shifts from millet, thus, a reduction in the price of millet.

Trade liberalization index, which is used to designate a shift from quantitative restriction to use of tariffs, had a positive impact on price of non-tradable millet. As tax (tariff) on a commodity tends to push its price upwards, millet can benefit from such price increase of imported rice.

The significant error correction mechanism shows that the speed of price adjustment in the long run is 42%. This means that the adjustment of price of millet to trade polices is relatively slow.

**Table 12: Effects of trade liberalization and exchange rate changes on price of non-tradeable millet**

Independent variable	Coefficients/ Marginal effects and t-values of the independent variables			
Millet	$D \ln P_{ZT} / P_{XT}$	Stand. Error	t-value	Sig. level
$D \ln PY^* / PX^*$	0.16562	0.44958	0.368	NS
$D \ln NPC_y / NPC_x$	-0.11464	0.22738	0.5042	NS
DLn Open	-0.045178	0.02848	1.816	5%
DDlnEX	-0.52756	0.38863	0.136	NS
Dln Index	0.63130	0.38516	1.639	5%
$D \ln PCY$	0.072657	0.08845	0.821	NS
Ecm-1	-0.42151	0.17443	2.496	5%
Constant	0.06310	0.088379	06.4	NS
F-ratio	2.4598			5%
$R^2$	0.43			
Durbin-Watson	1.61			
a0	0.4103			
RSS	3.7039			

Source: Calculated from data: 1974-2006 D= Deference Operator; ln=log ns= no significant.

### *Effects of trade liberalization and exchange rate changes on price of non-tradeable sorghum*

The regression equation for estimation of the effects of trade liberalization and exchange rate changes on price of non-tradeable sorghum in Nigeria is presented in Table 13. The result is acceptable because the F-ratio,  $R^2$  and Durbin-Watson are 3.473, 0.51 and 1.77, respectively, which are within the acceptable limits. The significant explanatory variables are degree of openness and trade liberalization index. This result is similar to what was obtained in the case of millet; hence similar explanation may hold for sorghum. The significant error correction mechanism shows that, the speed of price adjustment in the long run is 36%. This means that the adjustment of price of sorghum to trade policies is relatively slow. It may be informative to note that the cultivation and consumption of millet and sorghum in Nigeria do not cut across all cultures.

**Table 13: Effects of trade liberalization and exchange rate changes on prices of non-tradable sorghum**

Independent variable	Coefficients/ Marginal effects and t-values of the independent variables			
	$D \ln P_{ZT} / P_{XT}$	Stand. Error	t-value	
Sorghum				
$D \ln PY^* / PX^*$	0.161725	0.41881	0.380	NS
$D \ln NPC_y / NPC_x$	-0.05879	0.2171	0.270	NS
DLn Open	-0.02066	0.01064	2.021	5%
DDlnEX	-0.38998	0.36945	1.056	NS
Dln Index	0.69699	0.35581	1.959	5%
$D \ln PCY$	0.09367	0.082124	1.173	NS
Ecm-1	-0.35509	0.17234	3.546	1%
Constant	0.06603	0.081838	0.046	NS
F-ratio	3.473			1%
$R^2$	0.51			
Durbin-Watson	1.77			
a0	0.40131			
RSS	3.7039			

Source: Calculated from data: 1974-2006; D= Deference Operator; ln=log ns= no significant.

### *Effects of trade liberalization and exchange rate changes on prices of non-tradeable rice*

The regression equation for estimation of the effects of trade liberalization and exchange rate changes on price of non-tradeable rice in Nigeria is presented in Table 14. The

result is acceptable because the F-ratio,  $R^2$  and Durbin Watson are 5.24, 0.62 and 1.65 respectively, which are within the acceptable limits. The significant explanatory variables are price of imported rice, relative to price of exportable cassava ( $PY^*/PX$ ), and nominal protection coefficient of non-tradable rice relative to that of exportable cassava ( $NPCY/NPCX$ ), exchange rate (EX), and trade liberalization index (Index).

Price of imported rice relative to price of exportable cassava ( $PY^*/PX$ ), has a direct effect on the price of non-tradable rice. This will reduce price incentive for production of cassava. Thus farmers will prefer the production of non-tradable rice to cassava. The result confirms the alternate hypothesis that trade liberalization can affect prices of non-tradable. Asuming-Brempong (1994) also had a similar report. He noted that, the domestic price of millet, relative to maize, will increase by 0.80% as a result of 1% rise in the domestic price of imported rice relative to maize.

The nominal protection coefficient of non-tradeable rice, relative to that of tradeable rice ( $NPCY/NPCX$ ) also had a positive effect on the price of non-tradeable rice. Increase in the nominal protection of non-tradable rice will tend to reflect on increase in its price and decrease in the relative price of exportable cassava. This is in line with Oyejide's report that much of the protection for import competing activities has been at the expense of the exportable sector (Oyejide, 1986).

**Table 14: Effects of trade liberalization and exchange rate changes on price of non-tradeable rice**

Independent variable	Coefficients/ Marginal effects and t-values of the independent variables			
	$D \ln P_{ZAT} / P_{XT}$	Stand. Error	t-value	Sig. level
LOCAL RICE				
$D \ln PY^* / PX^*$	0.62435	0.2743	2.277	5%
$D \ln NPC_y / NPC_x$	0.17693	0.10352	1.733	5%
DLn Open	0.018859	0.65510	0.288	NS
DDlnEX	0.14450	0.06210	1.851	5%
Dln Index	0.23774	0.11851	1.885	5%
$D \ln PCY$	-0.00228	0.053589	0.048	NS
Ecm-1	-0.81855	0.23081	3.546	1%
Constant	0.00245	0.05381	0.046	NS
F-ratio	5.2401			1%
$R^2$	0.62			
Durbin-Watson	1.65			
a0	0.2623			
RSS	1.5826			

Source: Calculated from data: 1974-2006; D= Deference Operator;  $\ln = \log$  ns= no significant.

During some religious festivals such as the Holy month of Ramadhan, for example, the consumption of rice becomes critical for fasting Muslims. Astronomical increases in prices exist even in liberalized economies like Zanzibar, Tanzania, Muscat, Oman and Nigeria. MTND (2009) noted that government interventions have been used to stop retailers from increasing prices in Muscat. Similarly, the state has intervened in Zanzibar and Tanzania. But in Nigeria, the government does not intervene during religious festivals. It is noteworthy that the government intervened during the global finance and food crises by giving tax holiday to rice importers in order to reduce price.

Exchange rate (EX) has a positive relationship with the price of non-tradeable rice. This crop (non-tradeable rice) is the closest substitute to tradeable rice. Thus, it is expected that exchange rate pass-through will be fully expressed in this case. This could be through prices of imported intermediate goods, which are reflected by the share of imports and through prices of domestically produced goods whose resources for their production competed with the exportable. Kwanashie et al. (1998), Adubi and Okunmadewa (1999), Kidane, (1999), as well as Okoli and Okoye (2005) have noted that exchange rate was a major determinant of exports. This study upholds the concept of exchange rate pass-through.

Trade liberalization index (Index), which is used to designate a shift from quantitative restriction to use of tariffs, had a positive effect on price of non-tradeable rice. As tax (tariff) on a commodity tends to push its price upwards so, non-tradeable rice can benefit from such price increase. The result upheld the alternate hypothesis that exchange rate and trade liberalization affects prices of carbohydrate staples.

The significant error correction mechanism shows that the speed of price adjustment in the long run is 82%. This means that the adjustment of price of non-tradeable rice to trade policies is very fast, hence it is the closest substitute to tradeable rice.

### ***Effects of trade liberalization and exchange rate changes on price of non-tradeable yam***

The result is acceptable because the F-ratio,  $R^2$  and Durbin-Watson are 3.5, 0.52 and 1.57, respectively, which are within the acceptable limits. The significant explanatory variables are degree of openness and trade liberalization index. This result is similar to what was obtained in the case of millet and sorghum; hence similar explanation may hold for yam as shown in Table 15.

Increase in the nominal protection of imported rice over exportable cassava negatively affected the price relative of non-tradeable yam. It implies that increase in the nominal protection coefficient of imported rice leads to a decrease in the price incentive for production of non-tradeable yam, and an increase in the price incentive for production of exportable cassava. The result illustrates that the nominal protection coefficient is eroded by trade liberalization exercise except in non-tradeable rice and cassava, which has taken advantage of world price. This has indicated a shift in resource allocation to favour cassava production and export as well as non tradeable rice. The result is in consonance with the result of the study by Asuming-Brempong (1994), which shows that the effects of trade liberalization in Ghana were mixed because some crops were

favoured while some were not. Increase in the protection of importable crop tends to increase the relative price of non-tradeable, which would tend to decrease the price incentive for production of exportable.

**Table 15: Effects of trade liberalization and exchange rate changes on prices of non-tradeable yam**

Independent variable	Coefficients/ Marginal effects and t-values of the independent variables			
Yams	$D \ln P_{Z5T} / P_{XT}$	Stand. Error	t-value	Sig. level
$D \ln \frac{PY^*}{PX^*}$	0.080035	0.36831	0.217	NS
$D \ln \frac{NPC_y}{NPC_x}$	-0.3835	0.18544	2.068	5%
DLn Open	-0.01753	0.008470	1.980	5%
DDlnEX	-0.13934	0.33151	0.420	NS
Dln Index	0.24061	0.30874	0.779	NS
$D \ln PCY$	0.04711	0.71729	0.568	NS
Ecm-1	-0.61622	0.21258	2.899	5%
Constant	0.3194	0.072196	0.442	NS
F-ratio	3.55			1%
R <sup>2</sup>	0.52			
Durbin-Watson	1.57			
a0	.35125			
RSS	2.8379			

Source: Calculated from data: 1974-2006; D= Deference Operator; ln =log ns= no significant.

Increase in the trade intensity has a negative impact on the prices of non-tradeable yam. This indicates that as the volume of imported substitute (rice) increases, people will prefer its consumption to that of the mentioned non-tradeable yam.

The results do not reveal much on the consumption preference of the population. It could be that income of the majority has not been able to allow them make substantial substitution given the poverty level of the country; besides, these food crops are staples and it is expected that their demand will be income inelastic, as it is with many agricultural crops.

The significant error correction mechanism shows that the speed of price adjustment in the long run is 62%. This means that the adjustment of price of non-tradeable rice to trade polices is fast, and hence it is affected by trade policy.

## 6. Conclusion

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The macroeconomic environment generated under the SAP and its effects on small-holder farmers, who produce the bulk of Nigeria's agricultural output, have direct implications for resource allocation and aggregate agricultural output. The results illustrated the Nigerian experience of trade liberalization in the carbohydrate sub-sector. The findings are in line with existing theory that, effects of trade liberalization on prices of non-tradeable crops is ambiguous in the short run. Nigeria's Structural Adjustment Programme (SAP) has focused on liberalization of commodity markets in all sectors of the economy. Particularly, in the liberalization and growth phase of adjustment process which started in 1986, flexible exchange rates for the naira were affected, and administrative prices for major tradeable crops were abolished. This study has provided empirical evidence of the policy and price linkages in the carbohydrate sub-sector of Nigeria's economy. More specifically, the effects of trade liberalization and exchange rate changes on prices of carbohydrate staples in Nigeria have been examined.

Effects of trade intensity and exchange rate changes on prices of carbohydrate staples and impact of price and other economic variables associated with trade liberalization on prices of non-tradeable carbohydrate staples, were identified through the examination of the effects of trade intensity and exchange rate changes on prices of carbohydrate staples, and determination of the impact of price of importable rice relative to the price of exportable cassava on prices of carbohydrate staples. Using secondary data, the study shows that trade liberalization and exchange rate changes, together with other trade policies e.g., nominal protection coefficient, tariffs, and price relative have had substantial impact on prices, and by implication, on resource allocation among carbohydrate staples in Nigeria.

There was absolute increase in output from 1986-1989 to 2002-2006. This is indicative of the impact of trade liberalization policy which characterize the periods from 1986 to 2006. In terms of pricing, there was a gradual increase in absolute prices and the per capital income which are similar to increased exchange rate changes during the period. This is indicative of relative decreases in prices and per capital income due to devaluation of the naira, increased production cost, and abolition of marketing boards which encouraged export drive (increased output), but discouraged absolute increases in output and income as a result of high cost of marketed (or purchased) inputs e.g., fertilizers.

In terms of price relatives, the effects of trade liberalization and exchange rate changes on prices of carbohydrate staples in Nigeria have been mixed. Trade liberalization accounted for most of the changes in the prices of non-tradeable maize and local rice but not a determinant of price of non-tradeable yam, increase in the nominal protection

coefficient for rice over exportable cassava negatively affected the price relative for non-tradeable maize and yam. It is also a positive determinant of the price of non-tradeable rice. Increase in trade intensity has a negative impact on prices of non-tradeable millet, sorghum and yam. There may not have been much revelation on the consumption preference of the populace as indicated by the insignificant effect of consumer price index.

Therefore, maize and local rice farmers can increase prices of their products with increase in price of imported rice while yam farmers may not take such an advantage. The implication of increase in nominal protection coefficient for imported rice is a decrease in the price incentive for the production of non-tradeable maize and yam and an increase in price incentive for the production of exportable. Protection is eroded by trade liberalization exercise except in non-tradeable rice and cassava which have taken the advantage of world prices. A panacea for falling prices of non-tradeable millet, sorghum and yam as a result of increased trade intensity can be through moving from quantitative restriction to use of tariffs indicated by the trade liberalization index which had a positive effect on prices of the stated non-tradeable crops. Low per capita income of consumers has not permitted substantial demand; besides, these food crops are staples and it is expected that their demand is income inelastic as it is with many food crops. It might be useful to note that, notwithstanding pockets of protectionism (witnessed in the hurdles that have prevented successful conclusion of Doha Round) there is worldwide movement towards trade liberalization. This shows that governments can change their stands in trade negotiations as they deem it necessary to continue serving the best interest of their citizens.

Based on the findings from the study, it is recommended that:

- Government initiatives on cassava and rice production should be extended to the studied non-tradable carbohydrate staples in order to increase their output and processing for possible exportation so that such crops can take advantage of international prices.
- The liberalization exercise should be intensified through the relaxation of quantitative restriction to use of tariff in order to correct the negative impact of increased trade intensity and erosion of nominal protection on prices of the non-tradeable crops.

This study has focused solely on the supply-side of the effects of trade liberalization and exchange rate changes on prices of carbohydrate staples in Nigeria. Another study focusing on the demand-side of the problem needs to be done. This will address the issue of agricultural input subsidy removal and its effect on the demand, productivity and competitiveness of carbohydrate staples in Nigeria. Such a study is pertinent because it will help to bring out a comprehensive picture of the interactive linkages between input demand and output supply prices when compared with the results emerging from the present study. It will also show how market forces can be used as a mechanism for achieving appropriate resource allocation for farmers in the subsector.

# Notes

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1.
  - 1.Eradicate Extreme Poverty and Hunger;
  - 2.Achieve Universal Basic Education;
  - 3.Promote Gender equality;
  - 4.Reduce Child Mortality;
  - 5.Improve Maternal Health;
  - 6.Combat AIDS, Malaria and Other Diseases;
  - 7.Ensure Environmental Sustainability; and
  - 8.Develop a Global Partnership for Development.
  
2. U.S. economic policies had an important effect on the fall of dollar that led to “Nixon dollar coup”. While the OPEC boycott was an immediate trigger, historians increasingly see the crisis as being rooted in American economic policies. Oil, especially from the Middle East, was paid for in United States dollars, at prices fixed in dollars. U.S. President Richard Nixon had inherited an economy in which growth was already sluggish, in which inflation was already troubling. By the summer of 1971, the president was under strong public pressure to act decisively to end the dilemma of rising prices and general economic stagnation. Nixon thus released the dollar from the fluctuating gold standard that had controlled its worth since the signing of the Bretton Woods pact at the end of World War II, allowing its value to fall in world markets. The United States suspended convertibility of the dollar on 15 August 1971; the dollar was devalued by 8% in relation to gold in December 1971, and devalued again in 1973.

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# Appendix

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## Derivation of the model

In the context of our study, Cassel's law can be mathematically represented as follows:

$$P_x = P_x^* E_o (1 - t_x) \quad (1)$$

$$P_y = P_y^* E_o (1 + t_y) \quad (2)$$

Where:  $P_x$  Price paid to the exportable crop producer in domestic currency (domestic currency influenced by exchange rate liberalization).

$P_x^*$	=	World price of exportable crop in foreign currency
$E_o$	=	Nominal/official exchange rate
$t_x$	=	Export tax (export tariff rate)
$P_y$	=	Price paid to importable crop producer in domestic currency
$P_y^*$	=	World price of importable crop in foreign currency
$t_y$	=	Import tariff rate.

With a small open economy producing three types of goods in the carbohydrate crop family, namely, exportable crops, importable crops and non-tradeable crops, foreign prices, nominal exchange rates, export subsidies/taxes and import duties determine the domestic nominal prices of exportable ( $P_x$ ) and importable ( $P_y$ ); while supply and demand factors (which are a function of trade and exchange rate policies) determine the domestic nominal prices of non-tradeable goods,  $P_z$ . Establish a relative price structure from (1) and (2) by introducing farm gate prices of non-tradeable commodities ( $P_z$ ):

$$P_x / P_z = \left( P_x^* / P_z^* \right) E_o (1 - tx) \quad (3)$$

$$P_y / P_z = \left( P_y^* / P_z^* \right) E_o (1 + ty) \quad (4)$$

Equations 3 and 4 indicate that the real exchange rate and tariff provide a measure of the relative price of importable and exportable to home goods in the Nigerian economy. Demonstrate that domestic prices of importable crops relative to exportable crops depend on world prices, trade regimes and tariff rate or other policy measures by dividing (4) with (3).

$$P_{y_z} / P_x = \left( \frac{P_y^*}{P_x^*} \right) \frac{1 + t_y}{1 - t_x} \quad (5)$$

Equation 5 illustrates that price relatives of importable to exportable in domestic currency is a function of world prices and trade policy-tariffs. If the ratio  $\frac{P_y^*}{P_x^*}$  is a constant and the exchange rate is fairly stable each year, which can lead to internal equilibrium, then the following conditions will hold

$$Q_T = Q_x \left( \frac{P_x}{P_z} \right) + Q_z \left( \frac{P_y}{P_z} \right) \quad (6)$$

where  $Q_x^1 > 0$  and  $Q_z^1 < 0$

$Q_T$  = Total output  
 $Q_x$  = output of exportable  
 $Q_z$  = output of importable

$$Q_z \left( \frac{P_y}{P_z} \right) = Q_z \left( \frac{P_x}{P_z} \right) \quad (7)$$

Where  $C_z$  = consumption of non-tradeable

In order to improve internal equilibrium, government may manipulate trade policy instrument (tariff) by introducing distortions/subsidy such that differences exist between  $t_x$  and  $t_y$ . If import duties are higher than export duties, the equilibrium price  $P_z$  of non-tradeable will rise by an amount that is less than  $t_y$  but greater than  $(t_y > \hat{P}_z > t_x)$ . The difference between  $t_y$  and  $t_x$  can be decomposed into  $(t_y - d)$  and  $(d - t_x)$  as:

$$t_y - t_x = (t_y - d) + (d - t_x) \quad (8)$$

It implies that, producers in the import competing sector receive an implicit subsidy given by  $(t_y - d)$  rather than dealing with nominal import tariff rate  $t_y$ , where as  $(d - t_x)$

represents implicit tax (subsidy) associated with export;  $d$ , represents increase in the price of non-tradeable. The import and export duties will determine relative prices which will induce substitution to give  $\hat{P}_Z$ . Since  $P_Z$  existed at  $t_x$ , and change in  $\hat{P}_Z$  is as a result of increase in  $t_y$ , then  $d$  is represented as

$$d = t_x + w(t_y - t_x) = wt_y + t_x (1-w)t_x \quad (9)$$

Where  $w$  is a parameter measuring substitution with respect to prices, which will be discussed later.

Recall that from (7), demand/consumption of non-tradeable equals its output.  $Q_Z$  and  $C_Z$  can also be defined as:

$$Q_Z = q_z \left( \frac{P_y}{P_Z}, \frac{P_x}{P_Z}, K, L, T \right) \quad (10)$$

$K$ ,  $L$ , and  $T$  represent the productive capacity of the economy, while  $Y$  pays for what is produced. They can be held together as constant to examine the comparatively static properties of the model where the primary interest is the movement of relative price. Thus, after an initial displacement, the system achieves a new equilibrium where:

$$Q_Z = C_Z = (\eta_Y - E_Y) \left( \frac{\hat{P}_Y}{\hat{P}_Z} \right) + (\eta_X - E_X) \left( \frac{\hat{P}_X}{\hat{P}_Z} \right) = 0 \quad (12)$$

Where:  $\eta_Y$  and  $\eta_X$  = demand elasticity for non-tradeable with respect to the prices of importable and  $E_Y$  and  $E_X$  the corresponding supply elasticity (supply elasticity of non-tradeable) with respect to the price of importable and exportable, respectively.

$\hat{\phantom{x}}$  = Proportion change

Equation (12) can be simplified as:

$$\psi_y (\hat{P}_Z - \hat{P}_Y) + \psi_x (\hat{P}_Z - \hat{P}_X) = 0 \quad (13)$$

$$\text{where } \psi_y = \eta_Y - E_Y; \psi_x = \eta_X - E_X$$

But change in domestic consumption includes:,  $\psi_y (\hat{P}_Y - \hat{P}_X)$  because total consumption  $C_T$  in the economy is given as:

$$C_T = C_Y \left( \frac{P_Y}{P_Z} \right) + C_Z \left( \frac{P_Y}{P_Z} \right) + C_X \left( \frac{P_X}{P_Z} \right) \quad (14)$$

Where:  $C_Y$  = Consumption of importable  
 $C_Z$  = Consumption of non-tradeable  
 $C_X$  = Consumption of exportable

The  $C_T$  is affected by demand and supply elasticities as a result of substitution among the carbohydrate staples, such that:

$$\psi_y(\hat{P}_z - \hat{P}_y) + \psi_x(\hat{P}_y - \hat{P}_x) = 0 \quad (15)$$

So that by rearranging and simplifying (15), it gives

$$(P_z - P_x) = W(P_y - P_x) \quad (16)$$

where  $W = \psi_y + \psi_x$  (with  $0 \leq w \leq 1$ ) is the parameter representing substitution coefficient referred to in (9). Equation 16 has captured the effects of possibility of substitution on price competition. Equation 16 can be rewritten as:

$$D \ln \left( \frac{P_z}{P_x} \right) = W D \ln \left( \frac{P_y}{P_x} \right) \quad (17)$$

Where: D represent the derivative of the natural logarithm of the variables in bracket. Integrating (17) and assuming that  $w$  is a constant gives:

$$\ln \left( \frac{P_z}{P_x} \right) = A_0 + W \ln \left( \frac{P_y}{P_x} \right) + e \quad (18)$$

Where:  $A_0$  = constant;  $e$  = error term

Equation 18 captured the substitution effect as a result of price competition between importable commodity and non-tradeable in the presence of exportable crop. Per capital income (PCY) has to be introduced to capture some income effects on prices. Other variables that affect prices are exchange rate, trade intensity, index of the liberalization exercise and the Nominal Protection Coefficient (NPC). The Nominal Protection

Coefficient (NPC) may denote the interaction between tariffs and exchange rate as it measures the deviation of domestic wholesale price from world market price. NPC is presented as:

$$NPC_j = \frac{P_j^d}{P_j^b} \quad (19)$$

where:  $P_j^d$  = The domestic price commodity  $j$

$P_j^b$  = The border price of commodity,  $j$ , expressed in domestic currency.

When these variables are taken into account the estimable equation becomes:

$$\ln P_z / P_x = a_0 + b_0 \ln \frac{P_y^*}{P_x^*} + C_0 \ln \frac{NPC_y}{NPC_x} + D_0 \ln OP + E_0 \ln Ex + F_0 \ln ID + G_0 \ln PCY + e \quad (20)$$

PCY = Per capita income

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# Contents

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List of tables

List of figures

List of abbreviations and acronyms

Abstract

Acknowledgement

1.	Introduction	1
2.	Carbohydrate staples in Nigeria	7
3.	Review of the literature	20
4.	Theoretical/analytical framework and methodology	27
5.	Data analysis	30
6.	Summary and conclusion	40
	Notes	42
	References	43
	Appendix	47
	A. Derivation of the model	47

## List of tables

---

1	Average output of major carbohydrate staples in Nigeria in '000 metric tones (1970–2006)	8
2	Average prices of major carbohydrate staples in Nigeria in naira/metric tone (1974–2006)	8
3	Agricultural commodities in which development domains have comparative advantage in the domestic, regional, or world market by development domain	10
4	An outline of Nigeria's trade policy on rice as a major carbohydrate staples (1974-2006)	16
5	Trends in e Trends in exchange rate trade liberalization variables and tradeable carbohydrate trade performance in Nigeria (1974–2006)	18
6	Illustrations of components of trade liberalization 1950-1990	19
7	Possible effects of trade liberalization on production	22
8	Results of normality test of the data	30
9	ADF unit root test	31
10	ADF unit root test for determination of variables whose ADF values support cointegration test	32
11	Effects of effects of trade liberalization and exchange rate changes on prices of non-tradeable maize	34
12	Effects of trade liberalization and exchange rate changes on prices of non-tradeable millet	35
13	Effects of trade liberalization and exchange rate changes on prices of non-tradeable sorghum	36
14	Effects of trade liberalization and exchange rate changes on prices of non-tradeable local rice	37
15	Effects of trade liberalization and exchange rate changes on prices of non-tradeable yam	39

## List of figures

---

1.	Trends in prices of carbohydrate staples in Nigeria	33
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## List of abbreviations and acronyms

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ADF	Augmented Dickey–Fuller
CBN	Central Bank of Nigeria
CGE	Computable General Equilibrium
CMB	Commodity Marketing Board
ECOWAS	Economic Community of West African States
EEG	Export Expansion Grant
ERPT	Exchange Rate Pass Through
GDP	Gross Domestic Product
IFPRI	International Food Policy Research Institute
LBA	Licensed Buying Agents
LOP	Law of One Price
MFN	Most Favoured Nations
NEEDS	National Economic Empowerment Development Strategy
NNSC	Nigerian National Supply Company
NEPAD	New Economic Partnership for African Development
NPC	Nominal Protection Coefficient
NPMB	Nigerian Produce Marketing Board
PCY	Per Capita Income
PTF	Presidential Task Force
RER	Real Exchange Rate
SAP	Structural Adjustment Programme
WARDA	West African Rice Development Agency
WTO	World Trade Organization

# Abstract

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A number of government programmes and projects aimed at increasing domestic food crops production have not yielded the desired result, despite the fact that the agricultural sector employs the largest labour force in Nigeria. This study examines the effects of trade liberalization and exchange rate changes on carbohydrate staples in Nigeria. The need to determine the efficiency of resource use in the production of carbohydrate food crops and the effectiveness of protection conferred on local producers by quantitative restriction and tariff structures motivated this study. Secondary data, published from 1974 to 2006, on cassava exports and rice imports, as well as non-tradeable carbohydrate staples, were used. It is hypothesized that exchange rate changes and trade liberalization, via price relatives, trade intensity and nominal protection coefficient have not affected prices of carbohydrate staples in Nigeria. The hypothesis is tested with results of empirical data analysed using appropriate econometric techniques. Results show that the effects of trade liberalization on prices of non-tradeable carbohydrate staples are mixed. Trade liberalization accounts for most changes in the price of non-tradeable rice than other crops. World prices positively affected the prices of maize and non-tradeable rice which is the only crop the exchange rate changes had a positive effect on its price. The intensification of liberalization exercise, from the removal of quantitative restriction to use of tariff, among other recommendations, should be encouraged because it can be a remedy to the negative impact of increase in the trade intensity and erosion of nominal protection coefficient on prices of the non-tradeable crops.

**Keywords:** *Trade liberalization,; price Relatives, carbohydrate staples, Nigeria*

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