



MAFAP SPAANA

Monitoring African Food and Agricultural Policies
Suivi des politiques agricoles et alimentaires en Afrique

ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR CASSAVA IN NIGERIA

JULY 2013



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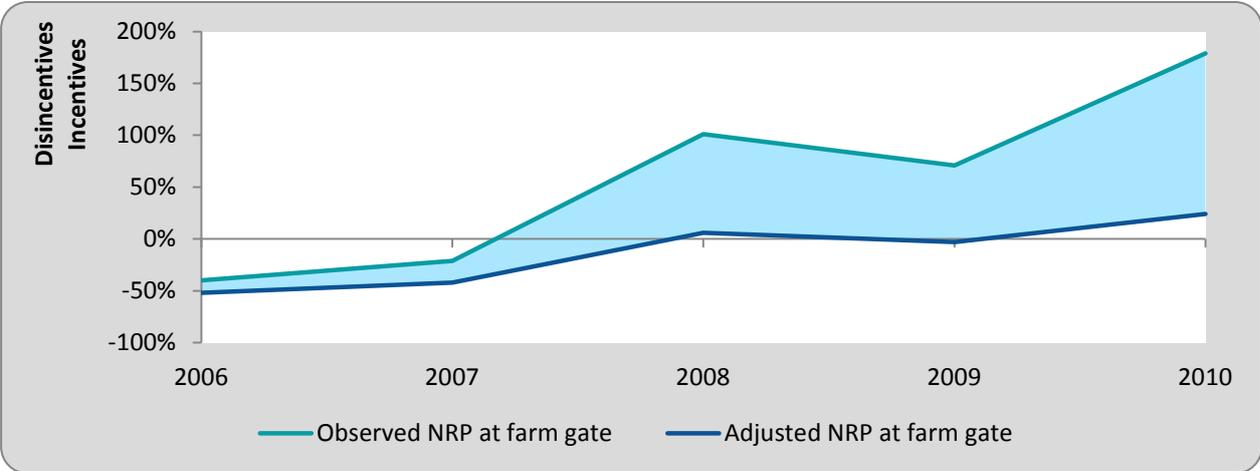
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SUMMARY OF THE NOTE

Product: Cassava
 Period analyzed: 2006-2010
 Trade status: Net exporter in all years

- Cassava is the most important crop in terms of production reaching 37.5millions tones in 2010.
- Nigeria is the world’s largest producer of cassava.
- As the cost of production is low, the commodity has a high poverty reduction potential.
- Cassava is considered as a non-traded commodity as imports and exports represent less than 1 % of the production.
- The Government has launched a national initiative from 2002 to 2007 in order to develop the production, processing and marketing.



The observed Nominal Rate of Protection (NRP, green line) indicates that cassava farmers have received disincentives (2006-2007) and incentives (2008-2010) under the prevailing cost structure in the value chain. The adjusted NRP (blue line) captures the effects of market inefficiencies on farmers. The area in red shows the cost that these inefficiencies represent for producers. In the case of Nigeria, when the inefficiencies are taken into account the incentives for cassava farmers decrease drastically.

- The low paced but steady increase in incentives can be explained by an effort of the government to push overall policy incentives in agricultural inputs specifically targeting Cassava
- Additional information is required to understand the evolution and the extent of the incentives.

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1. PURPOSE OF THE NOTE

This technical note aims to describe the market incentives and disincentives for Cassava in Nigeria.

For this purpose, yearly averages of farm-gate and wholesale prices are compared with reference prices calculated on the basis of the price of the commodity in the international market. The price gaps between the reference prices and the prices along the value chain indicate to which extent incentives (positive gaps) or disincentives (negative gaps) are present at farm-gate and wholesale level. In relative terms, the price gaps are expressed as Nominal Rates of Protection. These key indicators are used by MAFAP to highlight the effects of policy and market development gaps on prices.

The note starts with a brief review of the production, consumption, trade and policies affecting the commodity and then provides a detailed description of how the key components of the price analysis have been obtained. The MAFAP indicators are then calculated with these data and interpreted in the light of existing policies and market characteristics. The analysis that has been carried out is commodity and country specific and covers the period 2006-2010. The indicators have been calculated using available data from different sources for this period and are described in Chapter 3.

Outcomes from this research can be used by stakeholders involved in policy-making in the Food and Agricultural Sector. They can also serve as input for evidence-based policy dialogue at country or regional level.

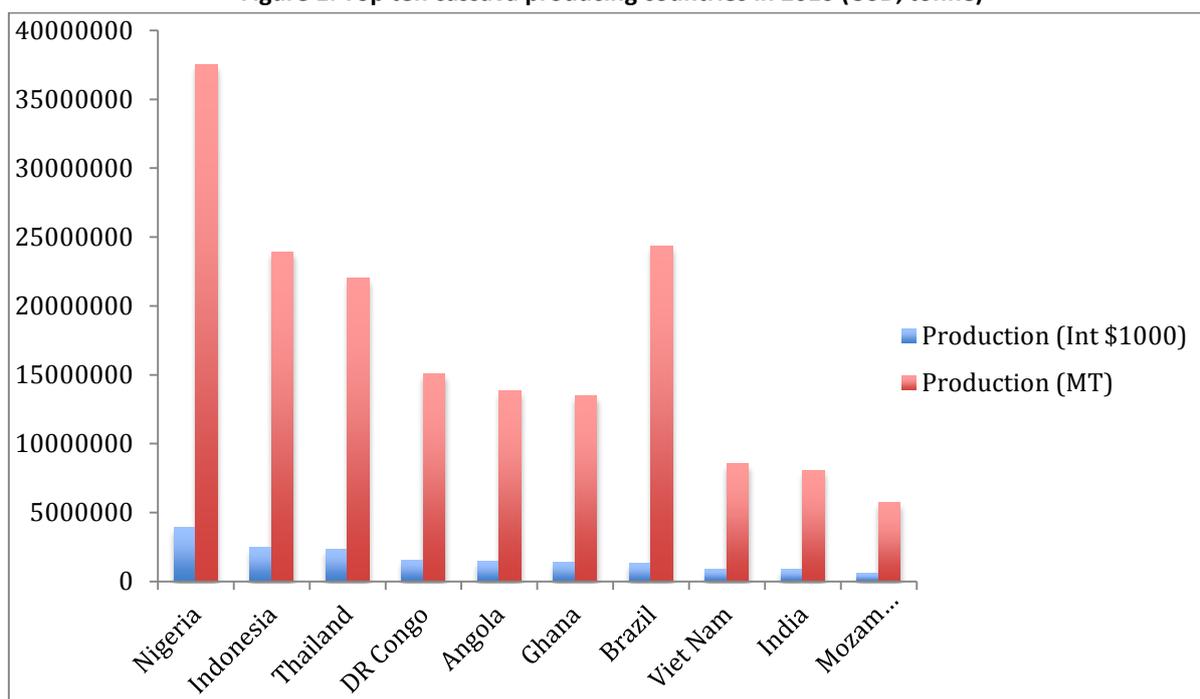
This technical note is not to be interpreted as an analysis of the value chain or detailed description of production, consumption or trade patterns. All information related to these areas is presented merely to provide background on the commodity under review, help understand major trends and facilitate the interpretation of the indicators.

All information is preliminary and still subject to review and validation.

2. COMMODITY CONTEXT

As a crop whose by products have a wide array of uses, cassava is the most important food crop for Nigeria by production quantity next to yam, which is the most important food crop by value (FAOSTAT, 2012). Nigeria is the world's largest producer of cassava with other top producers being Indonesia, Thailand, the Democratic republic of Congo and Angola (Figure 1). It has been estimated that in 2010 Nigeria's production of cassava reached 37.5 million tonnes (FAOSTAT, 2012). The country has consistently been ranked as the world's largest producer of cassava since 2005 (FAOSTAT, 2012). Nigeria is however not among the top 10 exporters of cassava worldwide and exported just about 0.55 million tonnes of its fresh/dried cassava in 2011 (UNCOMTRADE, 2012).

Figure 1: Top ten cassava producing countries in 2010 (USD, tonne)



Source: FAOSTAT 2012

Cassava is also seen to have a high poverty-reduction potential for Nigeria due to its low production cost (Nweke 2004, FAO 2005). Egesi et al (2006), argue that cassava has been transformed from a reserve commodity for support in times of famine into a rural staple, and subsequently a cash crop. A prior study conducted by Nweke et al (1997) shows that cassava accounts for 21 percent of the income of cassava producing households.

Constraints in cassava production include a wide range of technical, institutional and socioeconomic factors. These include pests and diseases, agronomic problems, land degradation, shortage of planting materials, access to markets, limited processing options and inefficient/ ineffective extension delivery systems.

Cassava is plagued by various diseases and insect pests. Pests and diseases including the ACMD, CBB, the mealybug (which has been greatly controlled), green spider mite (GSM) and the large grain borer which attacks dry chips of cassava in storage (FAO 2005). White ants (termites) destroy stems that are planted before they sprout. Some areas appear to be very prone to this problem. A higher plant population (12–13 000 plants/ha) is used to compensate for those that would be lost. Various

chemical control measures are recommended, but the need for safe use and high costs restricts their use among many small farmers who grow cassava in mixtures. Also the menace of rodents is a regular occurrence in the field (ibid.).

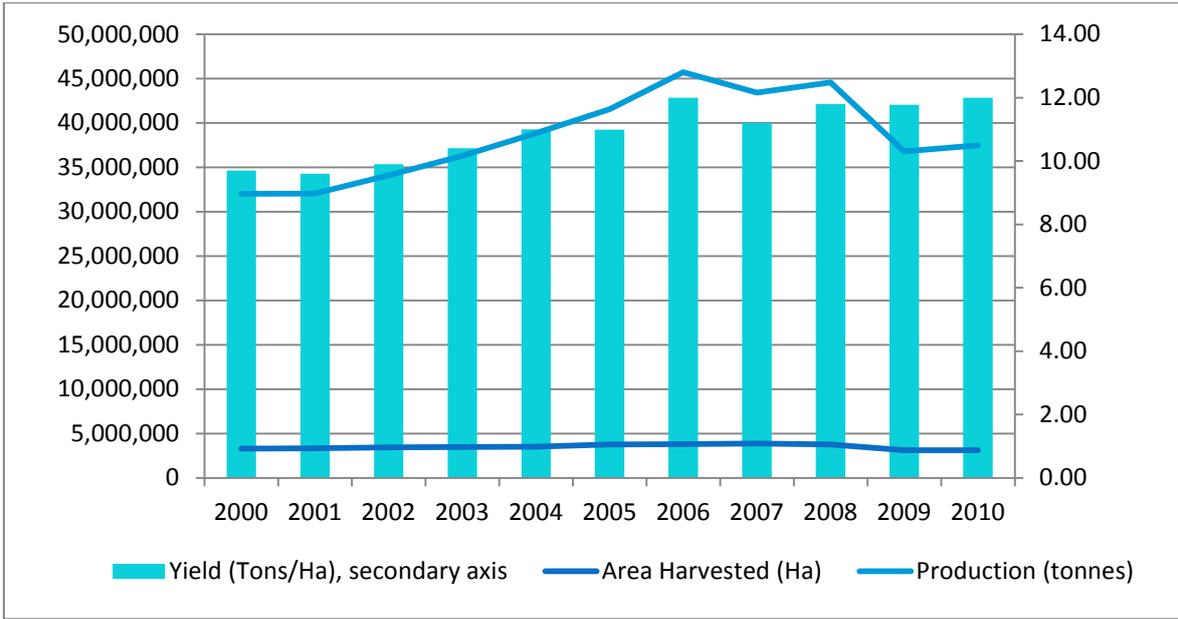
In terms of national policy objectives for the cassava sector, both the National Investment Plan (NAIP) and the Presidential Agricultural Transformation Agenda include cassava within their main focus crops. The NAIP (2011-2014), provides for increased input supply and distribution, by monitoring the quality standard of fertilizers in the country. The use of organic fertilizers is encouraged as a complement to inorganic fertilizers. The NAIP also promotes the export of cassava products by adopting measures including the US African Growth and Opportunity Act (AGOA) and the adoption of appropriate Sanitary and Phytosanitary Standards, in compliance with the Technical Barriers to Trade agreements of the World Trade Organization.

The country's Presidential Agricultural Transformation Agenda (2011-15), intends to create 3.5 million jobs along key agricultural product value chains. Furthermore, the Agenda provides for improved mechanisms for the supply of quality inputs, such as subsidized fertilizers and seeds to farmers, as well as guaranteed farm-gate minimum prices for many crops. The presidential council, which is in charge of implementing the Agenda, also intends to increase cassava production up to 50 million tonnes by 2015, while supporting its export.

PRODUCTION

There are two main categories of cassava varieties produced in Nigeria: *Manihot palmata* and *Manihot aipi*, or bitter and sweet cassava respectively (Nwabueze, 2009). Cassava production, yield and area data are shown in Figure 2 below. In 2010 production values reached about 37.5 million tonnes while yield and area values reached 12 tonnes per hectare and 3.13 million hectares respectively. The figure also shows that while area harvested remained overall stable during the past decade, production saw an increase of 15 percent between 2000 and 2006, with yields developing in correlation to production trends.

Figure 2: Main production figures for cassava in Nigeria (2000-2010)

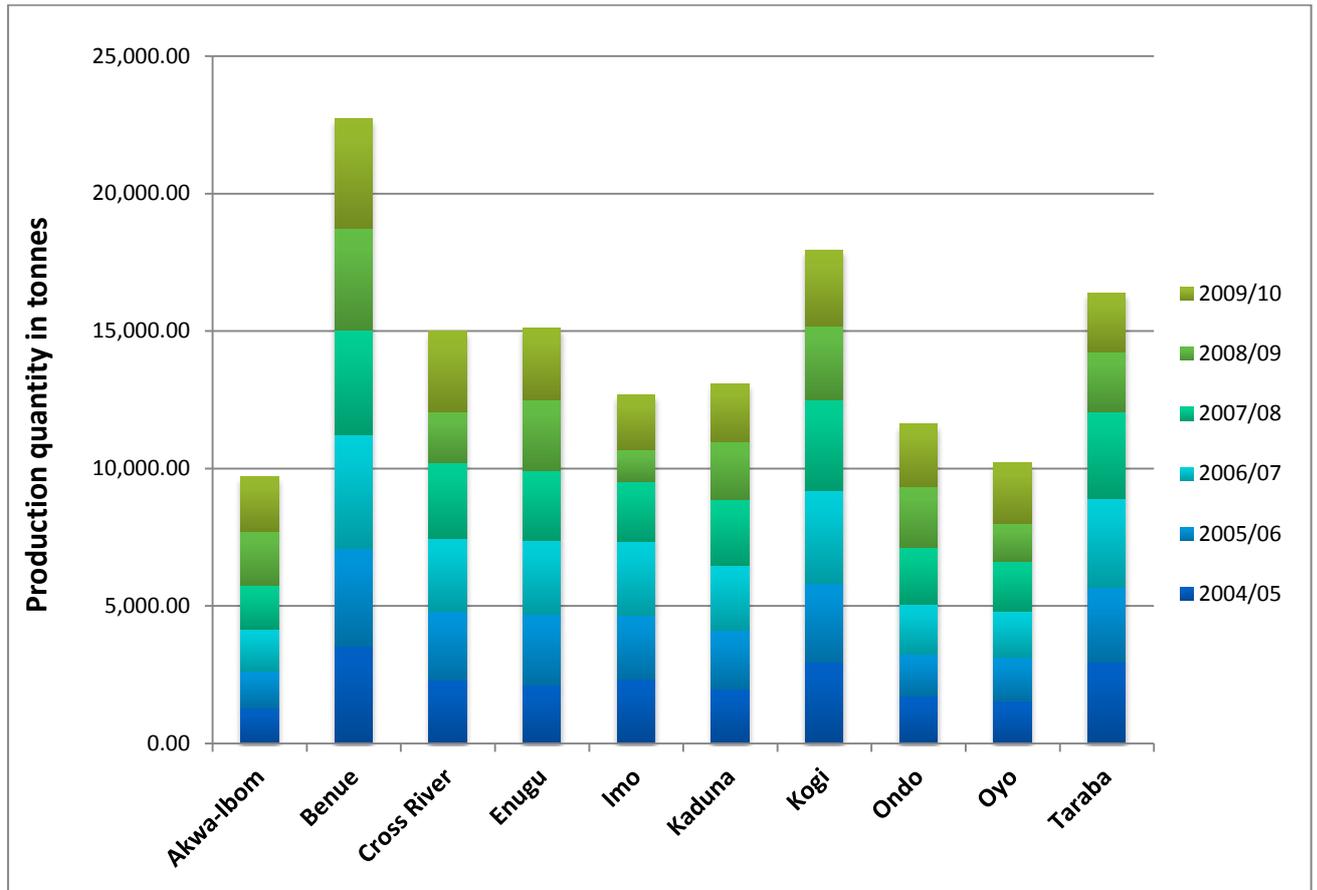


Source: FAOSTAT 2012

Cassava production by state

Over 90 percent of cassava cultivation in Nigeria is cultivated by small-holder farmers (DADTCO, 2012). In Nigeria, cassava production is widespread across all regions of the country although the highest producing states in 2010 were Benue, Kogi and Taraba, as shown in Figure 3 below (NBS, 2012), producing respectively 3,788, 2,988, and 2,730 tonnes of cassava per year.

Figure 3: Top ten cassava producing states, 2004/5-2009/10

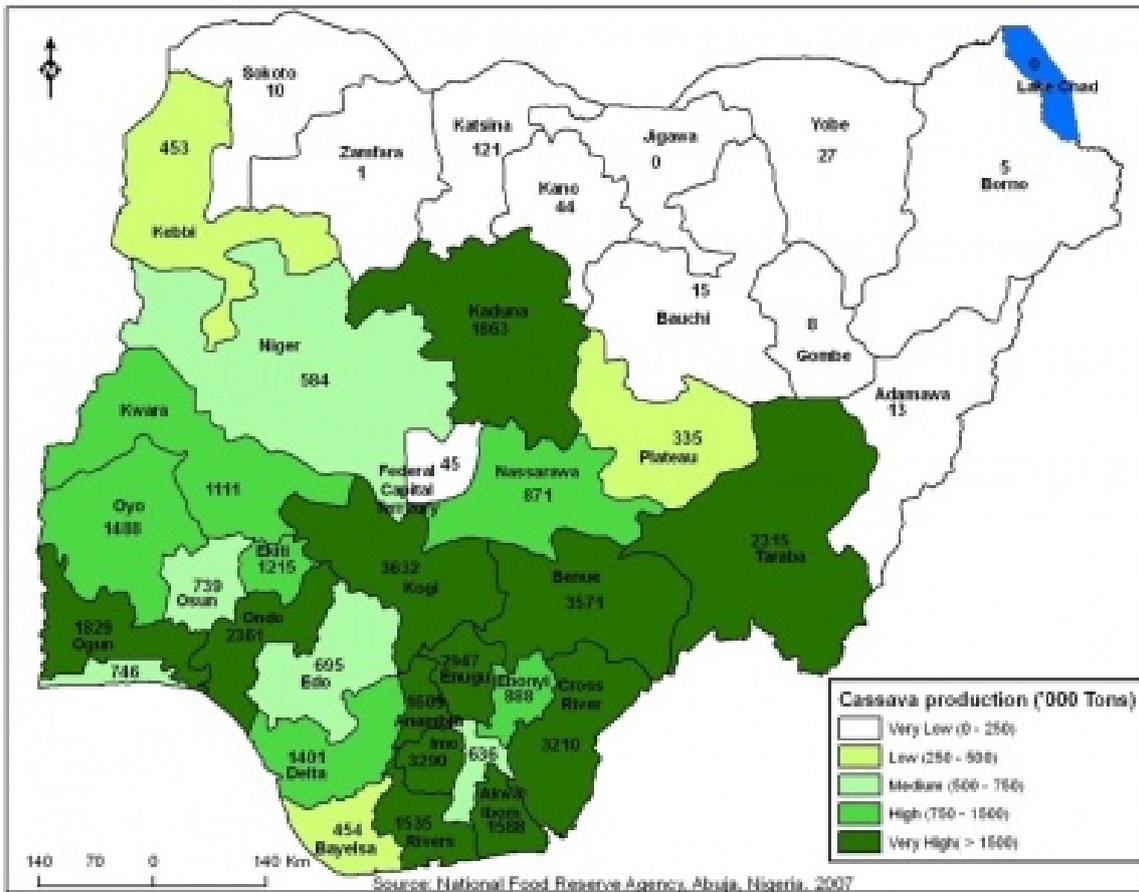


Source: Nigeria National Bureau of Statistics (2012)

Cassava distribution in Nigeria

As illustrated in Figure 4 below, in Nigeria, the highest cassava producing states are located in the South Western part of the country followed by the South Eastern and interior sections. Only negligible quantities are produced in the Northern part of the country.

Figure 4: Distribution of cassava production in Nigeria



Source: National Food Reserve Agency (2007)

Commodity balance sheet

There is conflicting information over the use of cassava in the country. According to FAOSTAT commodity balances (Table 1) cassava produced in Nigeria goes mainly to feed and food (on average 45.6 percent and 45.7 percent respectively in the period 2000-2007) while the rest of it goes to waste (average 11.7 percent). According to the data, less than 1 percent of cassava in Nigeria is processed for industrial purposes (starch, ethanol etc) although most cassava consumed in Nigeria is processed via traditional methods into gari, flour etc. However, according to IITA (Akinpelu 2011, IITA 2007), over 90 percent of the country’s cassava is consumed as food, and very little is left for industrial processing. In addition, the machinery and tools for the industrial processing of cassava is also very limited. (IITA, 2007).

Table 1: Cassava Commodity Balance for Nigeria (2000-2007)

	2000	2001	2002	2003	2004	2005	2006	2007
Production (tonnes) (I)	32010000	32068000	34120000	36304000	38845000	41565000	45721000	43410000
Import Quantity (tonnes) (II)	0	0	0	225	225	25	25	25
Stock variation (III)								
Export Quantity (tonnes) (IV)	0	0	11500	10975	375	6235	3970	8365
Domestic supply quantity (tonnes) (V: I+II+III+IV)	32010000	32068000	34108500	36293250	38844850	41558790	45717055	43401660
Feed (tonnes) (VI)	10755360	10774850	16923519	18006779	19267119	20616240	22677620	21531360
Waste (tonnes) (VII)	3928265	3935385	3914245	4164800	4456305	4768340	5245115	4979995
Processing (tonnes) (VIII)	0		1	5	1	0		0
Food (tonnes) (IX: V-VI-VII-VIII)	17326375	17357772	13270735	14121666	15121425	16174210	17794324	16890305

Source: FAOSTAT 2012

Cassava planting seasons, pests and diseases

There are four planting seasons in Nigeria, which vary according to the geo-ecological zone; these are from March to November in the rain forest, April to August in the derived savanna, May to July in the Southern Guinea savanna (SGS) and July to August in the Northern Guinea savanna (IITA, 2005). In Nigeria, the application of fertilizer for cassava production is very limited due to unavailability and high cost (IITA 2007). Roots can be harvested between 6 months and 3 years after planting (IITA, 2007).

Pests and diseases are a concurrent cause of low cassava yields in Nigeria. The main pests affecting yields include the cassava green mite, the cassava mealybug, and the variegated grasshopper (PIND, 2011). The main diseases impacting the productivity of cassava are the cassava mosaic disease, cassava bacterial blight, cassava anthracnose disease, and root rot (PIND, 2011).

CONSUMPTION/UTILIZATION

In Africa, cassava is an important staple crop particularly in the more tropical countries as the crop has a high potential of feeding rapidly increasing population and is generally more affordable if compared to other staples. In Nigeria, it is the third most consumed crop in the country (FAOSTAT) after Sorghum and millet, followed by rice, yams and maize (see Table 2, below).

Table2: Food Crops Consumption (Kcal/capita/day)

	2000	2001	2002	2003	2004	2005	2006	2007	Average
Sorghum	351	309	330	334	335	341	357	343	337
Millet	285	250	260	272	284	282	284	320	280
Cassava	295	288	223	232	242	253	272	252	257
Rice (Paddy Equivalent)	219	246	221	224	233	222	220	211	224
Yams	201	197	204	201	200	200	194	219	202
Maize	152	169	176	183	193	202	193	219	186

Source: FAOSTAT

Akinpelu et al (2011) mention that the consumption of cassava for poor households in urban areas is double that of non-poor households while in rural areas, the consumption of cassava by poor households is triple that of non-poor households. In Nigeria, cassava is consumed in all regions of the country. Although cassava is rich in carbohydrates, it is very poor in proteins and vitamins and as such, several projects are underway to improve the nutrition potential of cassava (via the introduction of Vitamins A) so as to make the crop more suitable for combatting hunger and food security issues (HarvestPlus, 2012).

In Nigeria, cassava products can be grouped into five categories. These are: fresh root, dried roots, pasty products, granulated products and cassava leaves. A wide array of products can also be processed from cassava. Firstly, the freshly peeled tubers can be either boiled or roasted for food. Boiled tubers can also be further pounded or added to soups and stews. To prevent rapid deterioration, nonfood products such as starch and chips (animal feed) can also be produced from the tubers. Chips can also be further grounded into a flour for human consumption (for the baking of pastries, pasta production etc). Fermented cassava can also be used for alcohol production or further processed into biogas (Kenyon et al., 2006). Most advanced processing forms can transform cassava into biodegradable packaging, starch sweeteners, etc.

MARKETING AND TRADE

On the international market, Thailand is the largest exporter of industrial cassava products and hence is the world market price setter (IFPRI, 2011). Thailand and Vietnam also presently dominate the cassava starch market, with Thailand controlling over 90 percent of market, while Vietnam is slowly gaining a foothold (IFPRI, 2011). Chips production remains the easiest entry point into the cassava global value chain. Presently, China, which uses cassava chips as ethanol feedstock is the most important global market for chips, where they are used as ethanol feedstock (Tijaja, 2010).

Although Nigeria is the main cassava producing country in the world, both import and export flows are negligible (less than 1 percent of production, see Table 1), suggesting that cassava in Nigeria is a non-traded commodity. However, formal export flows are higher than import flows, and the available literature (although limited) indicates a well established informal export market (particularly towards neighboring countries such as Mali, Burkina Faso, Cameroon, and Benin). Additionally, Nigeria formally exports dried/fresh (as described by HS code) cassava and starch to

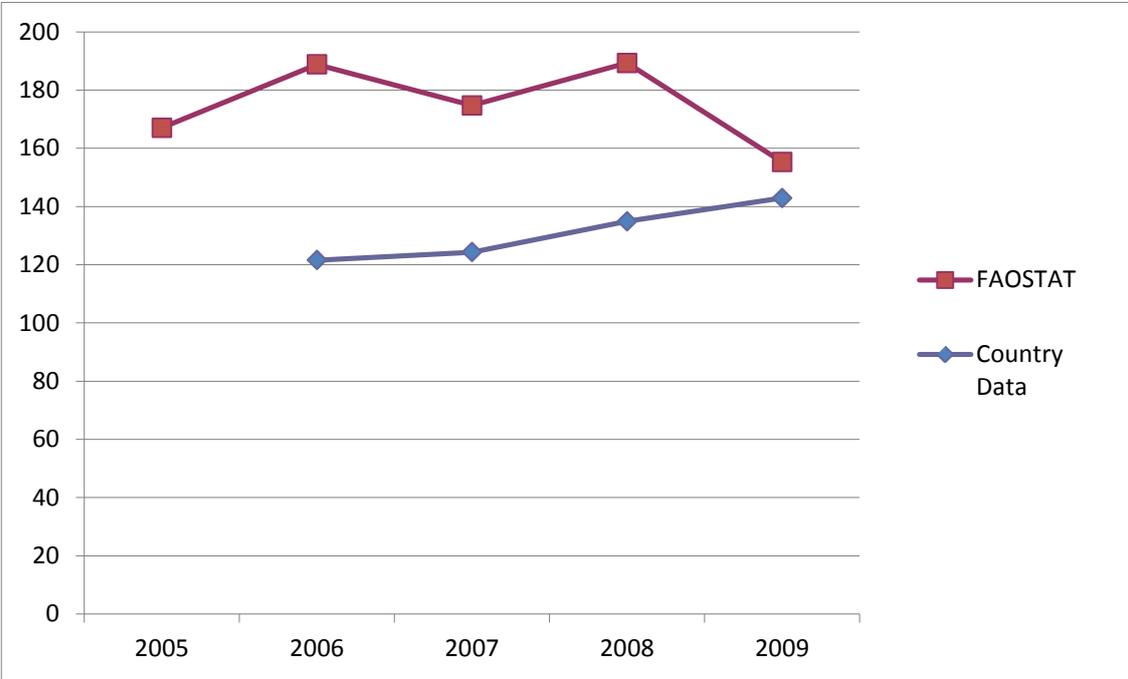
other African countries (such as Niger, Togo, Cote D'Ivoire) and European (Netherlands, Norway, and Belgium) and American states (US and Canada). Therefore, although estimates of volumes exported (comprehensive of both formal and informal exports) are not available, for the purpose of this note, Nigeria is considered as a net exporting country of cassava for all the years under review (2005-2010).

In the domestic market, cassava is mostly traded in some processed form, which is usually gari. According to IITA (2007), about 70 percent of the cassava produced in Nigeria is processed into gari and as such gari is the most commonly traded cassava product (IITA, 2007). The price of gari thereby serves as a reliable indicator for the demand and supply of cassava. The traditional market for cassava products is targeted at low-income consumers.

There are four major emerging markets for the industrial processing of cassava. These are: the cassava flour market; the chips or pellet market for animal feed; the food grade ethanol market; and the starch market.

The five-year price figure for cassava in Nigeria is displayed in Figure 5 below. Prices below are expressed in fresh cassava terms, since farm gate prices of gari are not available. Although the price of cassava fluctuates according to seasonality and supply, in comparison to other countries, the prices of cassava products in Ghana are close to those in Nigeria while those in Bénin are typically lower (IITA, 2009) suggesting that there is some informal import of cassava from Benin into Lagos (IITA, 2009).

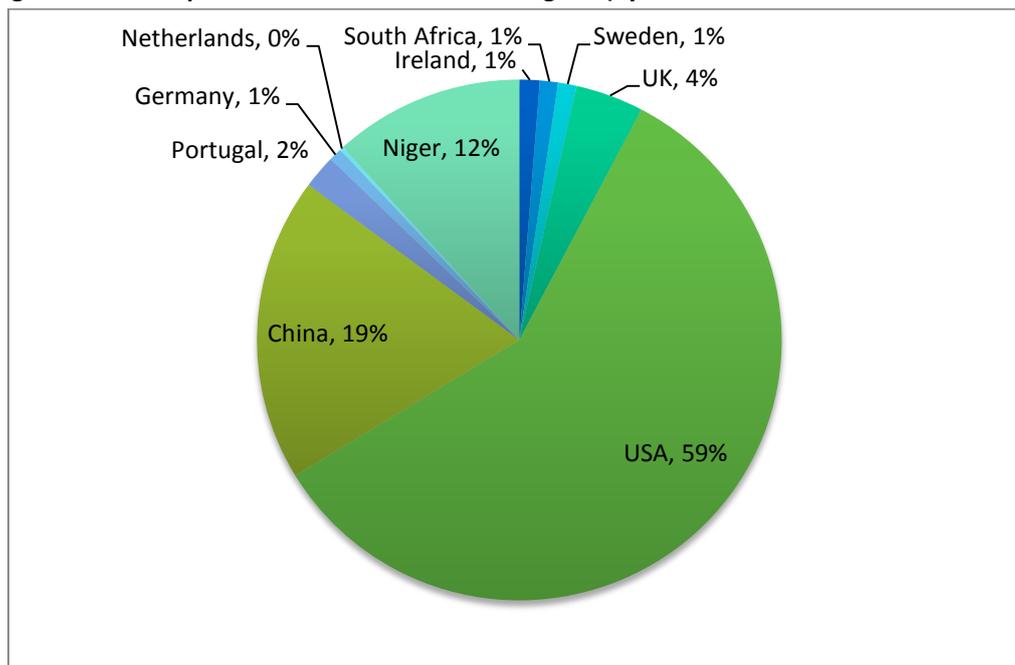
Figure 5: Average yearly prices of fresh cassava in Nigeria, USD/ton. Comparison of Farm Gate Prices as reported by FAOSTAT and by the Nigerian National Bureau of Statistics



Source: FAOSTAT and Nigeria National Bureau of Statistics

As evidenced in Figure 6 below, the main countries that import dried cassava from Nigeria are the USA, China and Niger while the main importers of starch from Nigeria are Togo, the USA Netherlands and South Africa.

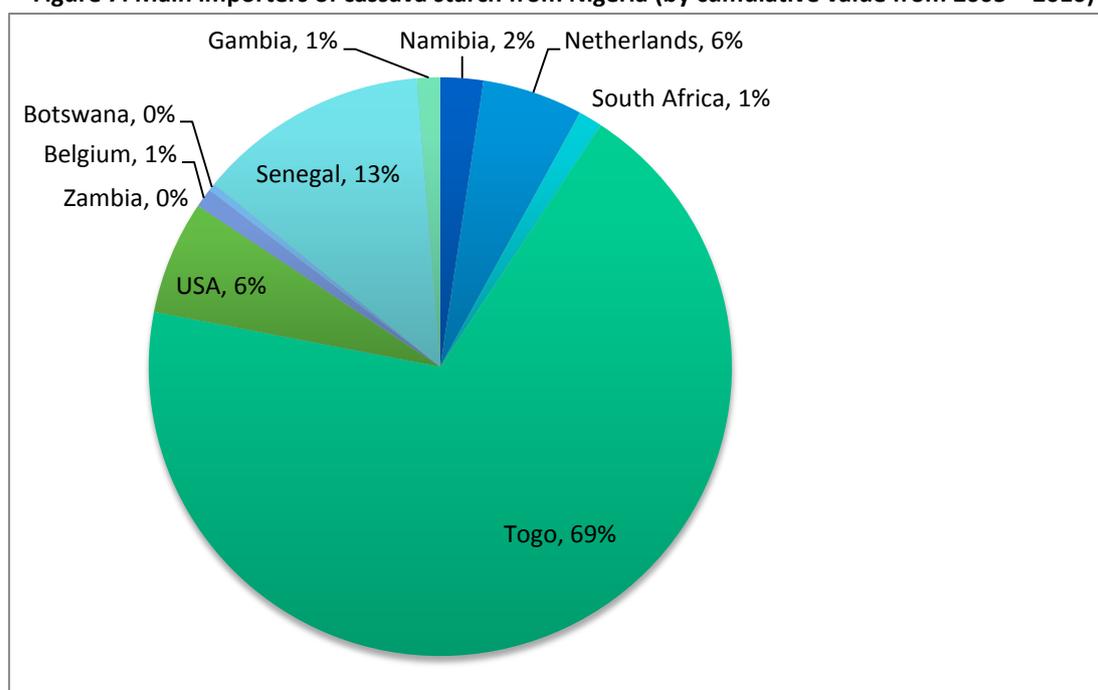
Figure 6: Main importers of dried cassava from Nigeria (by cumulative value from 2005 – 2010)



Source: UNCOMTRADE 2012

Average exports of cassava starch are 30 percent less than the average exports of dried/fresh cassava between the years 2005 and 2010. However, since the HS classification for cassava only includes either starch or dried/fresh cassava, it is difficult to clearly assess what is included in the latter definition. A diverse range of products (in terms of value, use, and weight) including flour, dried chips, pellets and fresh are included in the “dried/fresh” category, posing difficulties in the analysis of export flows.

Figure 7: Main importers of cassava starch from Nigeria (by cumulative value from 2005 – 2010)

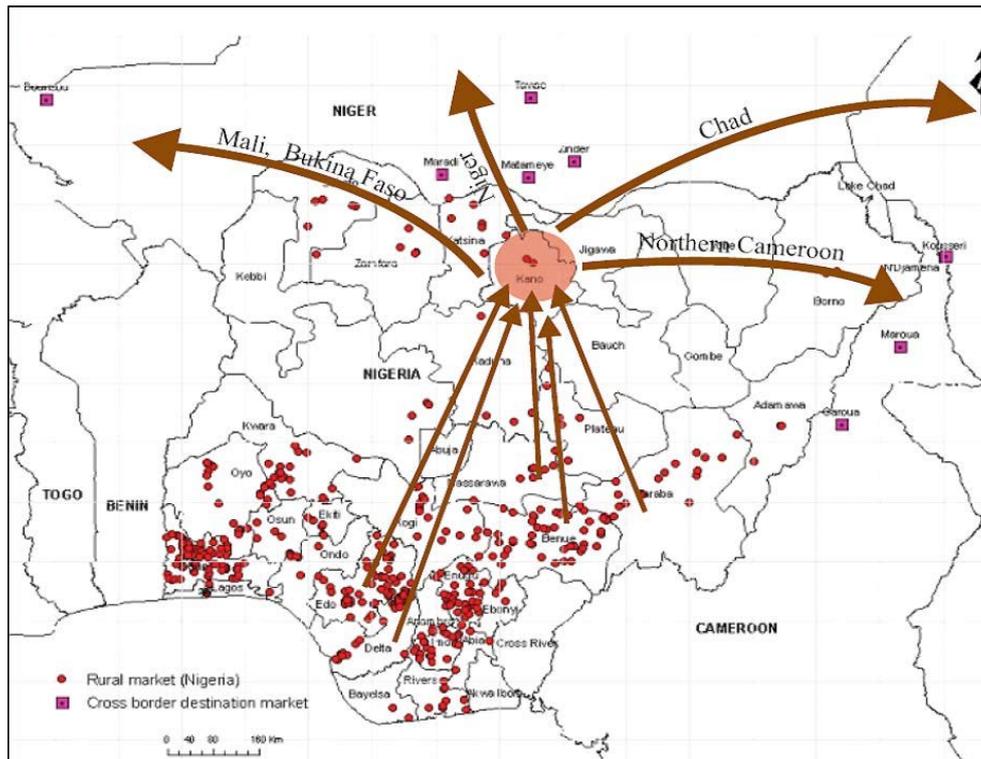


Source: UNCOMTRADE 2012

Factories in Nigeria that export cassava products include: starch to Côte d'Ivoire (Matna Company); cassava flour and instant fufu flour to the USA, UK, Ireland, and Italy (Aquada Investment and Olu Olu Industries) (IITA, 2009). Formal exports to European and Asian destinations such as the Netherlands, Belgium, and China take place from either Lagos or Kano (IITA, 2009).

Since 2003, the cross border trade of cassava products from Nigeria within the West African sub-region has also been growing, especially to land-locked countries such as Niger, Mali, and Burkina Faso, mainly from Kano (IITA, 2009) (Figure 8).

Figure 8: Cassava distribution flow from Nigeria to neighbouring African countries



IITA, 2007

Poor infrastructure also makes movement of goods and people difficult. This is more so during the rainy season when many parts of the rural area are inaccessible. The roads linking the major towns are usually quite good. Though the farmer market access food network is better in Nigeria than in other countries, the rural feeder road networks are poorly developed and absent in some places. This has significant implications for marketing, cost of inputs, access to health facilities and other social services and may therefore have adverse effects on production and rural standards of living.

The low profitability of cassava is mainly due to high labour costs, high harvesting and transport costs; as well as unreliable supply and high cost of utilities. The domestic and regional use of chips as animal feed in addition to local and regional foods such as gari and fufu or cassava flour as a substitute for wheat flour are high potential growth areas.

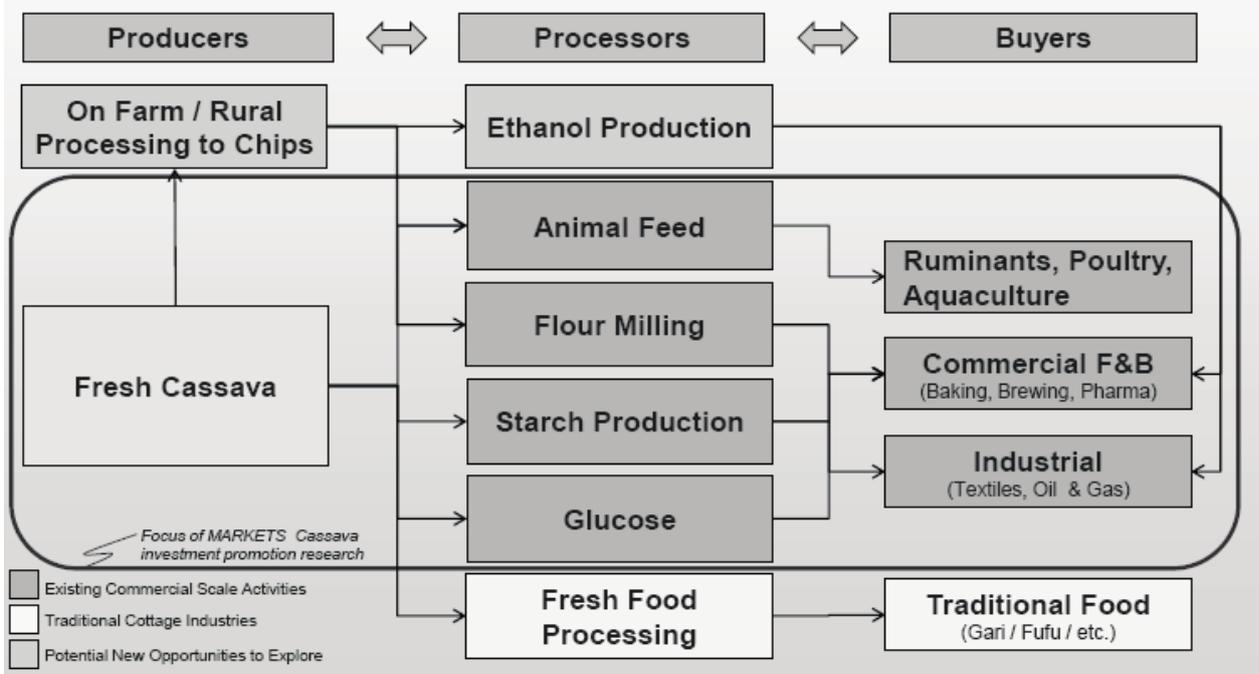
In Nigeria, the supply of cassava greatly affects its price (Nweke et al, 1994). In addition to this, the processing of cassava also increases the value of the crop (IITA, 2007). However, as fresh cassava has a short shelf life, cassava farmers are often unable to process harvested roots and have to sell their crop at a very low price to middlemen who are willing and able to reach them (IITA, 2007). In

addition to this, due to the heavy weight of the fresh product, transportation costs of fresh products from the farm to a processing site are high (IITA, 2007). Processing and storage for periods of scarcity would thus increase the profitability of the crop for farmers. However, acquiring the investment for processing is out of reach for most farmers due to inadequate credit facilities and high interest rates (IITA, 2007).

DESCRIPTION OF THE VALUE CHAIN AND PROCESSING

In Nigeria, there are six main actors in the cassava value chain. These are the producers, processors, industrial processors, wholesale traders/transporters, retailers, and consumers. Figure 9 summarizes the main steps along the value chain of different cassava-based products that will be discussed more in detail below. As earlier mentioned, small scale farmers cultivate about 90 percent of the cassava produced in the country (DADTCO, 2012). Between the farmer and the final consumer, there are at least three different intermediaries – the processor, the semi-wholesaler and the retailer (Enete, 2009).

Figure 9: Value chain for cassava production in Nigeria



Source: Markets, 2009

Fresh and dried cassava

Typically farmers either market their fresh produce to middlemen who then process the crop or farmers also directly process the fresh tubers into pellets, flour or gari. Most of the cassava is also processed at the village-level into a wide array of products using simple tools and techniques. In general, there are three main avenues by which cassava and its by-products reach the end markets: small-scale production for traditional food; medium scale production for more processed food products; and large-scale production for industrial products. Over 80 percent of the fresh tubers pass through the traditional channel while just about 10 percent go through the large-scale production channel (PIND, 2011). The main products produced from large-scale production are ethanol, starch and glucose (PIND, 2011). Most small-scale processing of cassava is done by women while men tend

to own mechanized equipment for processing (graters and grinders) (IITA, 2007). In many parts of Nigeria, farmers and traders also assume the role of the processor due to the lack of advanced processing technology and the short shelf life of the fresh tuber (IITA, 2007).

There are two main types of wholesale traders. The first group is those that travel to the various rural/assembly markets, buy cassava (fresh or processed) from the farmers or processors, and transport the produce to urban markets (IITA, 2005). The second group of wholesalers on the other hand relies on the traveling wholesalers. This group buys cassava produce in bulk from the itinerant wholesale traders and eventually sells to retailers (IITA, 2005).

Retailers can also be put into two groups: those in the urban markets and those in the rural markets. Retailers in rural markets often set up their goods in the open market; retailers in the urban market can further be classified into three groups. Those that operate similarly to those in rural markets (i.e. sell in the open market); those that own the stall or have long leases from local authorities; and those who rent from the stall owners/tenants. Those who own stalls may be more affluent and hence their ability to obtain market stalls in the first instance, while other traders may be poorer or operating on a smaller scale. Retailers buy from wholesalers and sell to urban consumers (IITA, 2005).

Gari

The market channel for gari, the most commonly processed form of cassava, on the other hand consists of three main channels (IITA, 2007). The first is from village gari producers through the rural wholesale/assemblers and rural retailer to the rural consumer while the second is from gari producers to the rural assembler to the long distance trader who delivers to urban retailers or directly to urban consumers (IITA, 2007). The third channel is the traffic from gari producers directly to distance traders, through the local assembler (IITA, 2007).

Retailers that for instance sell gari along the road pay for space to the council. This fee is typically about N20/day, which allows them to obtain a ticket from the council officials to permit them to display their wares in the market (IITA, 2005).

Retail and wholesale traders obtain information about market prices from other markets through informal meeting points or from one colleague/friend in the market to another or from transporters/drivers (IITA, 2005). Spy visits are sometimes undertaken for this purpose. Channels of information are personal communication, now frequently using mobile phones, either owned by traders or through patronizing kiosks (IITA, 2005).

Starch

Nigeria produces very small quantities of starch which is shipped to other African countries such as Namibia, South Africa, Togo etc and European and North American locations. In 2010, Nigeria shipped just about 40 000 kg of starch to importing countries (UNComtrade, 2012).

Marketing margins and transportation of cassava products

The margins for granules are significantly lower than those of dried roots not only due to the significant differences in processing but also as a result of differences in marketing costs and demand

(Enete, 2007). Hence investments towards improving market access conditions and in cost saving processing technologies for the production of granules are needed for the improvement of the marketing efficiency of cassava (Enete, 2007).

POLICY DECISIONS AND MEASURES

Subsequently to the relatively low agriculture expenditure in the post-structural adjustment period, different government initiatives lead to the revision of the National Agricultural Policy in 2005. The new policy initiatives include the Special Programme for Food Security (SPFS, 2001), the Fadama II Programme (2003-2009) and the recapitalization of the Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB, 2004). The National Food Security Programme (NFSP) includes trade policies, such as import substitution, marketing/price policies, and the promotion of modern agricultural practices. Overall agricultural policies build on the regional New Partnership for Africa's Development (NEPAD, 2001) and the Comprehensive Africa Agriculture Development Programme (CAADP, 2003). The overall thrust of Nigerian policy decisions and measures is to increase food production, commercialization, and develop the agribusiness sector.

Policies specifically targeting the cassava subsector

Since independence various policies towards the development of the cassava sub sector have also been implemented. Policies specifically targeting the cassava subsector are introduced below.

The Presidential Initiative on Cassava launched in July 2002 is geared towards the expansion of the production of cassava to meet domestic demand and also make cassava a foreign exchange earner through its export (IITA, 2009). The Presidential Initiative centred its activities on the development of production, processing, and marketing of the processed products (IITA, 2009). The expected timeline of the programme was 2002 to 2007. Specific outputs the initiative expected to achieve included increasing the cassava cultivation area to 5 million ha, increasing production levels to 37.5 million tonnes, and attaining export revenue levels of US 5 billion annually. Investments developed within the programme include the production of 9.2 million bundles of breeder stock by the year 2007 by the National Root Crops Research Institute (NRCRI); production of 73.2 million bundles of foundation stock by the Root and Tuber Expansion Programme (RTEP); production of 250.0 million bundles of certified stock by the year 2007 by the State Agricultural Development Programme.

The government has also put in place a policy on mandatory substitution of 10 percent wheat flour with high quality cassava flour in the baking industry (USDA 2012). In addition to this, there is a policy on the blending of 10 percent Ethanol in fuel, which will boost the production of ethanol from cassava (Awoyinka, 2009).

As a result of the above policy, private sector players set up over 500 micro-processing centers and 100 small and medium enterprises for the manufacturing of cassava intermediate products. Significant investments in new factories for the manufacture of glucose syrup, starch, and high quality cassava flour were also made (IITA, 2009).

The Policy on national strategic food reserve, aiming at ensuring food security, has added gari to its commodity list. Although comprehensive information on reserve stocks are not available, the policy prescribes, the provision of food, industrial raw materials and livelihoods for the rural labor force (Awoyinka, 2009).

In 2004 the Federal Government of Nigeria put in place a Presidential Committee on Cassava for Export Promotion with the mandate to ensure increased production, processing, packaging and export of cassava and cassava product to satisfy both domestic and export markets. The ultimate objective is to make cassava a major non-oil foreign exchange earner, employment generator, import substitute, poverty alleviator and eventually a substantial contributor to the national food security situation.

This favorable policy environment, encouraged cassava development leading to a new orientation in the research-extension-farmers linkage, especially in the IFAD-assisted Cassava Multiplication Programme (CMP); and subsequently in the Roots and Tubers Expansion Programme (RTEP) (Dambatta, 2004). The Raw Material Research and Development Council (RMRDC) sponsors research projects on cassava processing equipment fabrication (Abdullahi, 2003).

General agricultural policies

Other general agricultural policies that also affect cassava products are trade liberalization measures which include the abolition of commodity marketing boards; the abolition of a number of import levies; reduction of a number of excise and export duties; as well as a reduction in the number of prohibited import items (Awoyinka, 2009). The promotion of the export of non-oil goods as well as the financing of exports by commercial banks has also been implemented (Awoyinka, 2009). The abolition of the import substitution reform, which restricts or bans the importation of a number of food and industrial raw materials so as to encourage their local production, is also in force (Awoyinka, 2009). Storage systems and reserves have also been put in place and an export Processing Zone also established (Awoyinka, 2009).

Trade Policies

While the typology of trade restriction on exports of cassava is unclear, WITS database reports a tariff of 20 percent on the import of the commodity for the years 2005-2010 (information on the year 2007 is not available, WITS 2012).

3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

TRADE STATUS OF THE PRODUCTS

To calculate the indicators needed to estimate incentives or disincentives to production (NRPs) as well as Market Development Gaps (MDGs), several types of data are needed. They were collected and are presented and explained hereafter.

The analysis of price incentives and disincentives for cassava in Nigeria will be undertaken with reference to dried cassava chips (HS code: dried/fresh cassava), which is the main exported item. The analysis will cover the period 2006-2010.

TRADE STATUS OF THE PRODUCTS

Although Nigeria is the main cassava producing country in the world, both import and export flows are negligible (less than 1 percent of production), as shown in Table 3 below. Therefore, cassava is a non traded commodity, which will be treated as an exported commodity for the purposes of the MAFAP analysis only. Since formal export flows are higher than the imported, and since the literature examined above (see Chapter 2) indicates a well established informal export market (particularly towards neighboring countries at the Northern borders), though comprehensive estimates of volumes are not available, our analysis will consider Nigeria as a net exporting country of cassava for all the years under review (2005-2010).

Table 3: Nigeria exports and imports of dried cassava (tonnes)

	2000	2001	2002	2003	2004	2005	2006	2007
Production (tonnes)	32,010,000	32,068,000	34,120,000	36,304,000	38,845,000	41,565,000	45,721,000	43,410,000
Import Quantity (tonnes)	0	0	0	225	225	25	25	25
Export Quantity (tonnes)	0	0	11,500	10,975	375	6,235	3,970	8,365
Export as % of production	0.0000	0.0000	0.0003	0.0003	0.0000	0.0002	0.0001	0.0002

Source: FAOSTAT, 2012

UNcomtrade provides information on main partners importing dried cassava from Nigeria. Although recorded quantities remain very low, among all, the main recipients are the US and UK. Specific information on the unit value is reported in Table 4 below.

Table 4: Imported quantities of dried cassava from Nigeria as reported by the US and the UK (tonnes)

	2005	2006	2007	2008	2009	2010
Cassava imported from Nigeria by US	184	139	104	88	293	109
Cassava imported from Nigeria by UK	n/a	4	25	10	16	2

Source: UNComtrade

As for the point of competition, Apapa Port in Lagos was taken as the border and as the point of competition, where domestic production competes in the international market.. While there is no detailed information on the value chain of cassava chips for the export market, the relatively short distance (less than 100 km) between the Apapa Port and one of the main producing areas of semi-industrial cassava (Llaro, in Ogun state), suggests that cassava for the export market is sourced directly from farmer/main transformation point and directed towards the export channels.

BENCHMARK PRICES

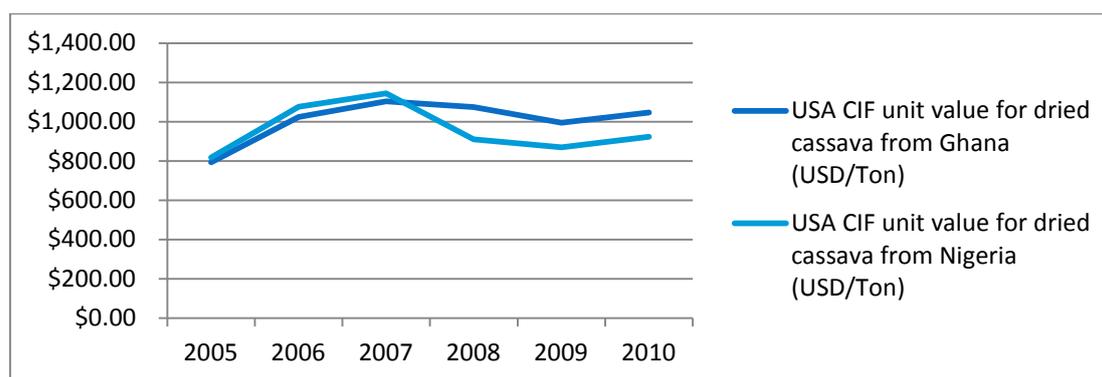
Observed

The FOB unit value of exported cassava dried chips as reported by Nigeria on UNComtrade presents gaps and inconsistencies; furthermore FAOSTAT does not provide any relevant data on exported Cassava. International prices for Cassava are also not available.

National data reported by the National Custom Service (NCS) is incomplete, providing numbers only for the years 2007, 2008 and 2010, and it is based on very few trade flows (Table 6).

As a consequence the CIF unit value of dried/fresh cassava chips as reported by the main recipient country (US) was used to construct the benchmark, with the subtraction of freight and insurance. To validate this choice, the CIF unit value as reported by US for cassava chips imported from Nigeria was compared with the CIF for chips imported by the US from Ghana (another main exporter in the region), as shown in Figure 10 below. The correlation between the two prices validates the choice of constructing the benchmark based on CIF prices as reported by US.

Figure 10: Unit Value CIF Prices in the US for Dried Cassava Imports from Nigeria and Ghana (USD/tonne)



Source: UNComtrade

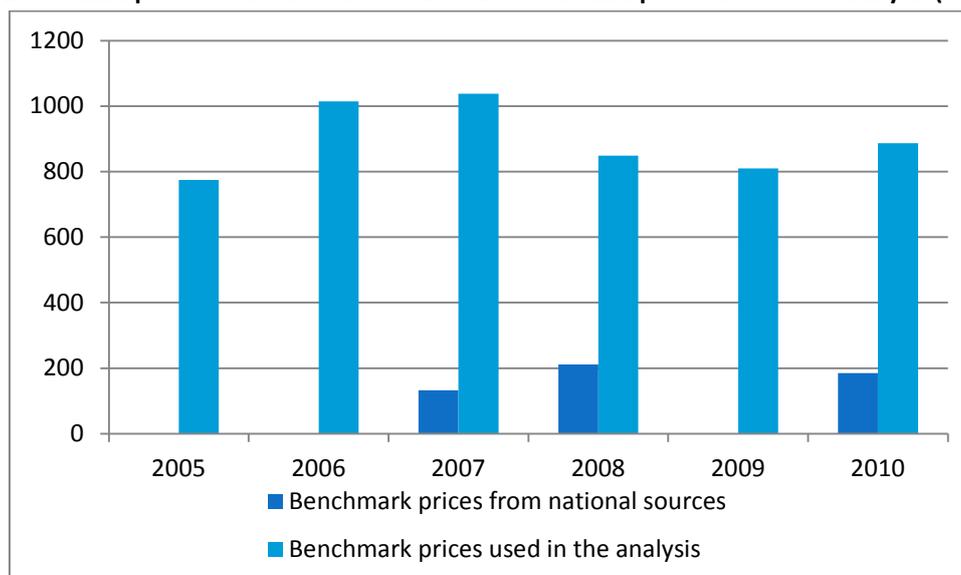
Since freight costs for cassava shipped from the US Gulf to Nigeria are not available, the freight costs of maize shipped from the US Gulf to South Africa (as reported by the International Grain Council) were used as the best available proxy. Freight costs and insurance (1 percent of FOB) were subtracted from the CIF price, thus obtaining the benchmark, as shown in Table 5 below.

Table 5: Calculation of Benchmark Prices

	2005	2006	2007	2008	2009	2010
USA CIF unit value for dried cassava (USD/tonne)	817.66	1,075.90	1,144.01	910.20	869.72	923.49
Maize Freight Costs Gulf to South Africa	35.00	51.00	96.00	53.00	52.00	49.00
Insurance (1% of FOB)	7.75	10.15	10.38	8.49	8.10	8.66
Nigeria FOB price for dried cassava (USD/tonne)	774.91	1,014.75	1,037.63	848.71	809.63	865.83

Source: own calculations, based on UNCOMTRADE (Unit Values) and IGC (freight value)

Table 6: Benchmark prices from national resources vs benchmark prices used in the analysis (USD/tonne)



Source: NCS 2012; own calculations

Adjusted

Since all relevant price components of the benchmark were included in the observed price, no adjustment was necessary.

DOMESTIC PRICES

Farm Gate Prices

Although the literature suggests that, due to the short life cycle of fresh cassava, the tuber is normally transformed directly at farm level, farm gate prices were available in fresh roots terms only, provided by the Bureau of Statistics for the years 2006-2009 (see Table 7 below). Average cassava prices in Ogun state (one of the main producers states of cassava) were chosen for the analysis, given its proximity to Apapa Port (92 km) and to the fact that according to value chain studies on dried chips Ogun hosts the highest number of markets of dried cassava supplying Lagos State, suggesting that it is a convenient source for cassava chips for export purposes.

Ogun Farm Gate Prices for the year 2010 were obtained by dividing the retail price of gari in Ogun in 2010 by the average ratio between Ogun retail prices of gari and farm gate prices of fresh cassava in the available years (2007-2009), as documented in Table 6 below. Year 2005 did not allow for any estimate due to the unavailability of data both at the retail and farm gate level.

Table 7: Nigeria cassava farm gate prices (Naira/tonne)

	2005	2006	2007	2008	2009	2010
Ogun Farm Gate, (Fresh)	n/a	15,870	19,040	21,450	26,360	36,102
Ogun Retail Prices (Gari)	n/a	n/a	40,815	61,804	91,066	102,044
Ratio Ogun Retail/Farm Gate Prices	n/a	n/a	2.14	2.88	3.45	

Source: Nigeria National Bureau of Statistics

Since there is no specific information on wholesale and retail prices for exported dried chips and fufu, the analysis assumes that the value chain for exported cassava has a different structure when compared to cassava derived products for local consumption. The analysis assumes that there is no wholesale market, and that cassava chips are purchased directly by exporters instead of being traded on the domestic wholesale markets.

EXCHANGE RATES

Observed

Exchange rate for the years under review is shown in Table 8, below. Although there is a possibility that the exchange rate might be overvalued (WTO Trade review and IMF, 2011), more information is required to adjust the exchange rate accordingly.

Table 8: Nigeria Exchange Rate, Naira/USD

	2005	2006	2007	2008	2009	2010
Exchange Rate Observed	131.27	128.65	125.81	118.55	148.90	150.30

Source: IMF, Annual Average

ACCESS COSTS

Observed

Observed Access costs between farm gate and point of competition

Since comprehensive value chain analysis and mapping was not available for the market of dried chips for export, the access costs along the value chain of fufu were converted into dried chips terms and used as a proxy. Particularly, access costs of fresh cassava produced in Llaro and processed into fufu in the Ifo market area (Ogun State) were used. Transport costs of processed cassava (from the processing area to Apapa port) were adjusted to take into account the weight ratio between fufu and dried chips (2:1) and the distance between the processing facilities and the Apapa port (92 km). In the absence of specific information on the value chain for exported cassava, exporters' margins were assumed as 5 percent of farm gate, since importers margins are 5 percent of FOB (UNCTAD, 2000). Total access costs calculated include: transport of fresh cassava from farm gate in Llaro to the processing facilities in the proximity of Ifo market, processors' margins, transportation cost (of processed chips) from processing to Port, and exporters' margins (PIND 2011, IITA 2008).

Since there is no specific information on wholesale and retail prices for dried chips and fufu, the analysis assumes that wholesalers in the fufu markets operate as traders in the export market. Additionally, access costs are considered as one leg from farm gate to point of competition, which in this specific case is Apapa port, where cassava is stocked for export.

Table 9: Observed Access Costs

	2006	2007	2008	2009	2010
Ogun Farm Gate Price, fresh cassava, Naira/ton	15,870	19,040	21,450	26,360	36,102
Transport cost of fresh cassava from farm gate to processing (Llaro to Ifo)	1,667	1,667	1,667	1,667	1,667
Processor Margin (60%)	9,522	11,424	12,870	15,816	21,661
Transportation cost of dried cassava chips from processing to port (Ifo to Apapa)	13,978	13,978	13,978	13,978	13,978
Exporter's margins (5%)	793.5	952	1072.5	1318	1805.0964
Observed Access Costs Farm gate to point of competition	25,961	28,021	29,588	32,779	39,111

Source: Own calculation based on PIND (2011) and IITA (2008)

Adjusted

Adjusted Access costs between farm gate and point of competition

Access costs were adjusted to account for marketing inefficiencies between farm gate and border. Specifically, the Prices were adjusted to take into account the excess margin of processors (50 percent, which is the result of the actual margin of 60 percent minus the “normal” margin of 10 percent), as shown in Table 9 below.

Table 10: Adjusted Access Costs

	2006	2007	2008	2009	2010
Ogun Farm Gate Price, Naira/ton	15,870	19,040	21,450	26,360	36,102
Transport cost from farm gate to processing (Llaro to Ifo, fresh)	1,667	1,667	1,667	1,667	1,667
Normal Processor Margin (10%)	1,587	1,904	2,145	2,636	3,610
Transportation cost from processing to port (Ifo to Apapa)	13,978	13,978	13,978	13,978	13,978
Exporter's margins 5%	1,587	1,904	2,145	2,636	3,610
Adjusted Access Costs Farm gate to point of competition	18,819	19,453	19,935	20,917	22,866

EXTERNALITIES

No specific externality is recorded.

BUDGET AND OTHER TRANSFERS

Although input support (mainly fertilizer) policies are in place, we are not aware of their specific disaggregation and impact on the cassava sector.

QUALITY AND QUANTITY ADJUSTMENTS

A quantity adjustment was included in the analysis to account for the transformation of fresh cassava roots into chips, since benchmark prices are expressed in dried chips terms and the farm gate prices are expressed in fresh cassava terms. Conversion factors might vary according to the starch and water content of the roots. The analysis selected 2.5 : 1 as conversion factor (IITA, 1998).

DATA OVERVIEW

Following the discussions above here is a summary of the main sources and methodological decisions taken for the analysis of price incentives and disincentives for Rice in Nigeria.

Table 11: Summary table for data description in MAFAP technical notes

<i>Concept</i>		<i>Description</i>	
		<i>Observed</i>	<i>Adjusted</i>
Benchmark price		<ul style="list-style-type: none"> ▪ CIF unit value of dried cassava exported from Nigeria as reported by US, minus freight rate of maize from US Gulf to South Africa and insurance to obtain the FOB price 	N.A.
Domestic price at point of competition		<ul style="list-style-type: none"> ▪ N/A 	N.A.
Domestic price at farm gate		<ul style="list-style-type: none"> ▪ Ogun Farm Gate Price (NBS) 2006-2009. 2010 calculated by dividing average Ogun retail prices of gari in 2010 by the average ratio between Ogun retail and farm gate prices in the available years (2007-2009), 	N.A.
Exchange rate		<ul style="list-style-type: none"> ▪ Annual average of exchange rate as reported by IMF 	N.A.
Access cost point of competition		<p><i>Since there is no specific information on wholesale and retail for dried chips and fufu, the analysis assumes that there is no wholesale for the value chain of exported cassava. Access costs are considered as one leg from farm gate to point of competition, which in this specific case is Apapa port, where cassava is stocked for export.</i></p>	
Access costs from farm gate		include: transport from farm gate in Llaro to processing in proximity of Ifo market, Processors' margins, transportation cost from processing to Port, and exporters' margins	<ul style="list-style-type: none"> ▪ Observed minus excess margins of processors
QT adjustment	Bor-Wh	0.4	N.A.
	Wh-FG	N.A.	N.A.
QL adjustment	Bor-Wh	N.A.	N.A.
	Wh-FG	N.A.	N.A.

The data used for the analysis is summarized in the following table:

Table 12: Data used for analysis

		Year	2006	2007	2008	2009	2010
		trade status					
DATA	<i>Unit</i>	<i>Symbol</i>					
Benchmark Price							
Observed	USD/TON	$P_{b(int\$)}$	1,014.75	1,037.63	848.71	809.63	865.83
Adjusted	USD/TON	P_{ba}					
Exchange Rate							
Observed	Naira/USD	ER_o	128.65	125.81	118.55	148.90	150.30
Adjusted	Naira/USD	ER_a	128.65	125.81	118.55	148.90	150.30
Access costs border - point of competition							
Observed	Naira/USD	AC_{owh}					
Adjusted	Naira/USD	AC_{awh}					
Domestic price at point of competition	Naira/USD	P_{dwh}					
Access costs point of competition - farm gate							
Observed	Naira/USD	AC_{ofg}	25,960.66	28,021.16	29,587.66	32,779.16	39,111.41
Adjusted	Naira/USD	AC_{afg}	18,819.16	19,453.16	19,935.16	20,917.16	22,865.55

Farm gate price	Naira/USD	P_{dfg}	15,870	19,040	21,450	26,360	36,102
Externalities associated with production	Naira/USD	E					
Budget and other product related transfers	Naira/USD	BOT					
Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}					
Quality conversion factor (border - point of competition)	Fraction	QL_{wh}					
Quantity conversion factor (point of competition – farm gate)	Fraction	QT_{fg}	0.40	0.40	0.40	0.40	0.40
Quality conversion factor (point of competition – farm gate)	Fraction	QL_{fg}					

CALCULATION OF INDICATORS

The indicators and the calculation methodology used is described in Box 1. A detailed description of the calculations and data requirements is available on the MAFAP website or by clicking [here](#).

Box 1: MAFAP POLICY INDICATORS

MAFAP analysis uses four measures of market price incentives or disincentives. *First*, are the two observed nominal rates of protection one each at the wholesale and farm level. These compare observed prices to reference prices free from domestic policy interventions.

Reference prices are calculated from a benchmark price such as an import or export price expressed in local currency and brought to the wholesale and farm levels with adjustments for quality, shrinkage and loss, and market access costs.

The **Nominal Rates of Protection - observed (NRPo)** is the price gap between the domestic market price and the reference price divided by the reference price at both the farm and wholesale levels:

$$NRPo_{fg} = (P_{fg} - RPo_{fg})/RPo_{fg}; \quad NRPo_{wh} = (P_{wh} - RPo_{wh})/RPo_{wh};$$

The $NRPo_{fg}$ captures all trade and domestic policies, as well as other factors which impact on the incentive or disincentive for the farmer. The $NRPo_{wh}$ helps identify where incentives and disincentives may be distributed in the commodity market chain.

Second are the **Nominal Rates of Protection - adjusted (NRPa)** in which the reference prices are adjusted to eliminate distortions found in developing country market supply chains. The equations to estimate the adjusted rates of protection, however, follow the same general pattern:

$$NRPa_{fg} = (P_{fg} - RPa_{fg})/RPa_{fg}; \quad NRPa_{wh} = (P_{wh} - RPa_{wh})/RPa_{wh};$$

MAFAP analyzes market development gaps caused by market power, exchange rate misalignments, and excessive domestic market costs which added to the NRPo generate the NRPa indicators. Comparison of the different rates of protection identifies where market development gaps can be found and reduced.

Table 13: MAFAP price gaps for Cassava in Nigeria 2006-2010 (Naira per Mt)

	2006	2007	2008	2009	2010
Trade status for the year	x	x	x	x	x
Observed price gap at farm gate	-10,389	-5,156	10,793	10,917	23,160
Adjusted price gap at farm gate	-17,531	-13,724	1,141	-945	6,914

Source: Own calculations using data as described above.

Table 14: MAFAP nominal rates of protection (NRP) for Cassava in Nigeria 2006-2010 (Naira per Mt) in %

	2006	2007	2008	2009	2010
Trade status for the year	x	x	x	x	X
Observed Nominal rate of protection at farm gate	-40%	-21%	101%	71%	179%
Adjusted Nominal rate of protection at farm gate	-52%	-42%	6%	-3%	24%

Source: Own calculations using data as described above.

Table 15: MAFAP Market Development Gaps for Cassava in Nigeria 2006-2010 (Naira per Mt)

	2006	2007	2008	2009	2010
International markets gap	0	-	-	-	-
Exchange policy gap	0	-	-	-	-
Access costs gap to point of competition	0	-	-	-	-
Access costs gap to farm gate	-7141.5		-9652.5	-11862.0	-16245.9
Externality gap	0	-	-	-	-
Market Development Gap	-7141.5	-	-9652.5	-11862.0	-16245.9
	-0.21		-0.48	-0.43	-0.56

Source: Own calculations using data as described above.

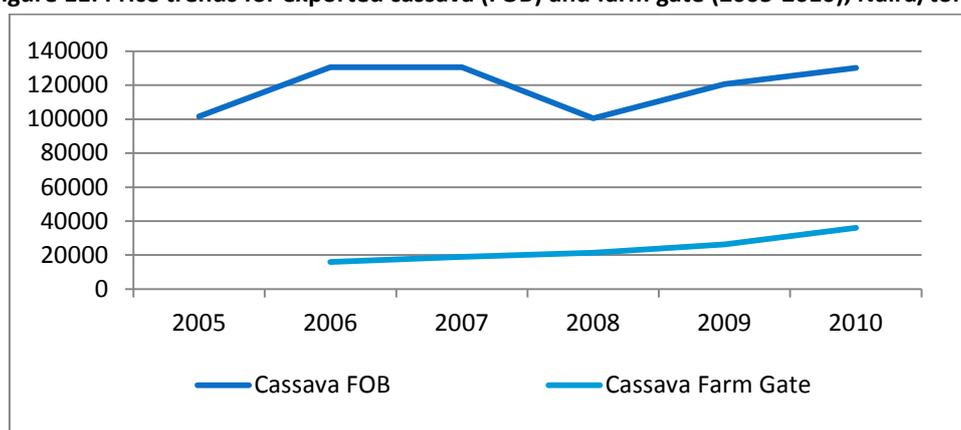
4. INTERPRETATION OF THE INDICATORS

Given that (according to formal statistics) exported chips represent less than 0 percent of cassava production in Nigeria, the indicators generated from the price incentives and disincentives analysis can be considered as representative of a marginal portion of the cassava sector in the country. Similarly, considering that no wholesale market is assumed for exported cassava, the analysis will not interpret indicators at traders' level.

Figures 12 and 13, below, show observed and adjusted price gaps at production level, as well as observed and adjusted nominal rates of protection at farm level. Based on these indicators, MAFAP methodology observes incentives and disincentives for producers, depending on national policies and domestic and international prices.

Observed price gaps and nominal rates of protection are negative for the year 2006 and 2007 and positive for the years 2008 to 2010 (Figure 12), showing a disincentive in 2006-2007 and raising incentives for the following years. When inefficiencies in the market are taken into consideration the incentives for farmers decrease, as shown by the decrease of the price gap in the adjusted domain. Such difference between observed and adjusted price gaps is particularly evident in the year 2009, when the observed gap is positive (10, 917Naira/ton, showing an incentive for farmers) and the adjusted is negative (-945 Naira/ton, indicating a disincentive for farmers). While overall policy incentives on agricultural input can explain the general incentives on the farmers' side, there is no evident explanation for the difference between negative and positive gaps between the year 2006/2007 and the following years. One potential explanation for the incentive since 2008 might take into account the substitution effect between maize and cassava for feed purposes, as well as the substitution between cassava and both maize and rice in terms of food security. Figure 11, below, compares the trends for FOB and farm gate prices of cassava in the years 2005-2010.

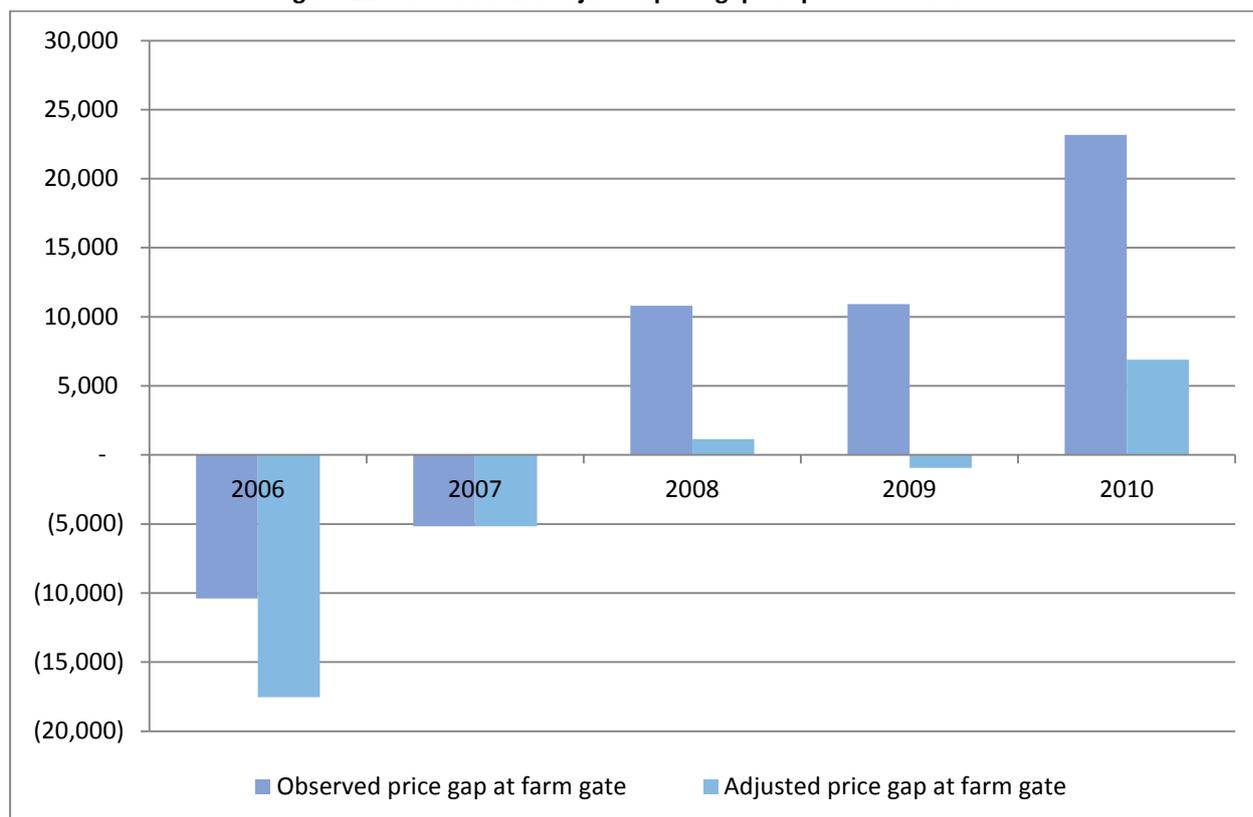
Figure 11: Price trends for exported cassava (FOB) and farm gate (2005-2010), Naira/tonne



Source benchmark price calculations and NBS

Since 2008, the demand for cassava has grown in response to the increase in the price of imported food staples (particularly rice and maize), to use both as food security crop as well as for the growing feed sector (for example the poultry industry). Although cassava grown for food security purposes does not have a direct impact on that grown for exports, it might have generated economies of scale, which benefited cassava growing farmers.

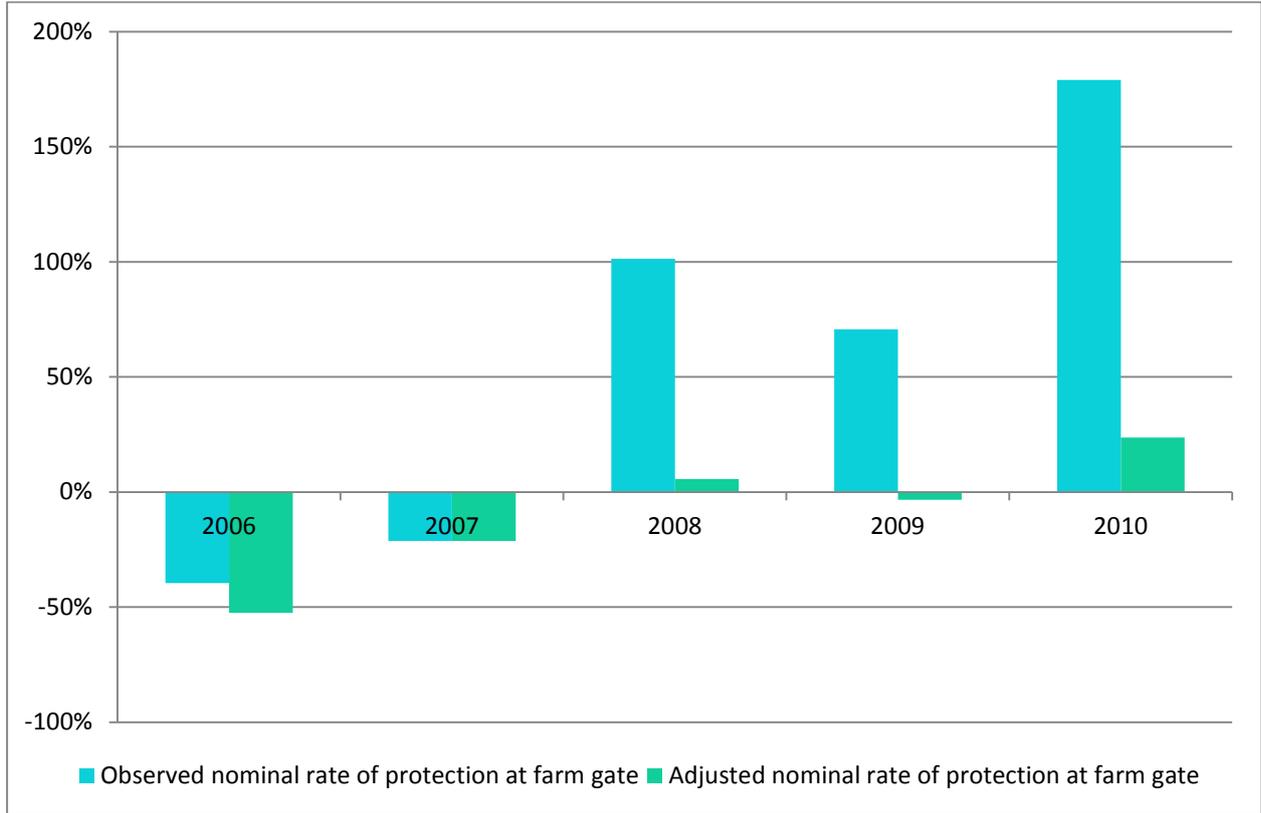
Figure 12: Observed and adjusted price gaps at producer level



SOURCE: calculation of indicators

The trends in Nominal Rates of Protection are similar to those in the price gap. The observed NRPs are negative in 2006 and 2007 and positive between 2008 and 2010, while the adjusted are negative in 2006, 2007 and 2009, and positive in the other years. NRPs are particularly prominent in 2008 and 2010, and additional information is required to explain the extent of the positive incentives in those years, since specific policies and tariffs on exported cassava are not clear.

Figure 13: Observed and adjusted nominal rates of protection at farm level



SOURCE: own calculations based on indicators

5. PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

MAIN MESSAGE

The negative price gap and NRPs show a disincentive for farmers in 2006-2007, while the positive price gaps and NRPs show an incentive for the years 2009-2010. This suggests that current policy intervention seem to have a positive effect on producers.

However the size of the export sector is limited (less than 0 percent of production) and results cannot be applied to the overall cassava sector in Nigeria.

PRELIMINARY RECOMMENDATIONS

While overall input policies have a beneficial effect over farmers' incentives since 2008, the substitution effect between cassava and rice and corn might be playing a role in creating incentives across the value chain. While developing specific policies for the cassava sector, it would be useful to disaggregate potential incentives by specific cassava product, destination (import and export) and end use, to develop ad hoc policies according to specific sub-sector, for example as a substitute of maize in the feed industry or as an export crop.

LIMITATIONS

Scarce detailed information on:

- Trade;
- Export tariffs.

Lack of information on:

- The specific pathways and functioning of the value chain for exported cassava
- Specific prices and specifications for exported cassava
- Farm gate for the years 2005 and 2010;
- Detailed information on informal trade, including: pathways, value and volumes of informal cross-border trade.

FURTHER INVESTIGATION AND RESEARCH

Considering the data gaps on prices, and the conflicting and partial information on trade flows (imports and exports) and tariff barriers, more accurate data could provide a better understanding of incentives and disincentives at farm gate and at the point of competition.

Additionally, more information on informal cross-border trade could provide further insight to the analysis. Further investigation should include research on the pathways, quantity and value of informally traded cassava, as well as on alternative point/s of competition between imported and local cassava, when informal trade is taken into account.

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ANNEX I: Methodology Used

A guide to the methodology used by MAFAP can be downloaded from the MAFAP website or by clicking [here](#).

ANNEX II: Data and calculations used in the analysis

DATA		Unit	Symbol	Year trade status	2005	2006	2007	2008	2009	2010
					x	x	x	x	x	x
Benchmark Price										
1	Observed	XXX/TON	$P_{E(intS)}$		774.91	1,014.75	1,037.63	848.71	809.63	865.83
1b	Adjusted	XXX/TON	P_{ba}							
Exchange Rate										
2	Observed	YYY/XXX	ER_a		131.27	128.65	125.81	118.55	148.90	150.30
2b	Adjusted	YYY/XXX	ER_a		131.27	128.65	125.81	118.55	148.90	150.30
Access costs border - point of competition										
3	Observed	YYY/TON	$AC_{o,wh}$							
3b	Adjusted	YYY/TON	$AC_{a,wh}$							
4 Domestic price at point of competition										
Access costs point of competition - farm gate										
5	Observed	YYY/TON	$AC_{o,fg}$			25,960.66	28,012.16	29,587.66	32,779.16	39,111.41
5b	Adjusted	YYY/TON	$AC_{a,fg}$			18,819.16	19,453.16	19,935.16	20,917.16	22,855.55
6 Farm gate price										
6		YYY/TON	P_{dfg}			15,870.00	19,040.00	21,450.00	26,360.00	36,102.00
7 Externalities associated with production										
7		YYY/TON	E							
8 Budget and other product related transfers										
8		YYY/TON	BOT							
		Fraction	QT_{wh}							
		Fraction	QL_{wh}							
		Fraction	QT_{fg}		0.40	0.40	0.40	0.40	0.40	0.40
		Fraction	QL_{fg}							

CALCULATED PRICES				2005	2006	2007	2008	2009	2010
		Unit	Symbol						
Benchmark price in local currency									
9	Observed	YYY/TON	P _{b(locS)}	101,722.44	130,547.59	130,544.23	100,614.57	120,553.91	130,134.25
10	Adjusted	YYY/TON	P _{b(locS)a}	101,722.44	130,547.59	130,544.23	100,614.57	120,553.91	130,134.25
Reference Price at point of competition									
11	Observed	YYY/TON	RP _{o_{wh}}	101,722.44	130,547.59	130,544.23	100,614.57	120,553.91	130,134.25
12	Adjusted	YYY/TON	RP _{a_{wh}}	101,722.44	130,547.59	130,544.23	100,614.57	120,553.91	130,134.25
Reference Price at Farm Gate									
13	Observed	YYY/TON	RP _{o_{fg}}	40,688.97	26,258.38	24,205.53	10,658.17	15,442.40	12,942.29
14	Adjusted	YYY/TON	RP _{a_{fg}}	40,688.97	33,399.88	24,205.53	20,310.67	27,304.40	29,198.15

INDICATORS				2005	2006	2007	2008	2009	2010
		Unit	Symbol						
Price gap at point of competition									
15	Observed	YYY/TON	PG _{o_{wh}}	(101,722.44)	(130,547.59)	(130,544.23)	(100,614.57)	(120,553.91)	(130,134.25)
16	Adjusted	YYY/TON	PG _{a_{wh}}	(101,722.44)	(130,547.59)	(130,544.23)	(100,614.57)	(120,553.91)	(130,134.25)
Price gap at farm gate									
17	Observed	YYY/TON	PG _{o_{fg}}	(40,688.97)	(10,388.38)	(5,165.53)	10,791.83	10,917.60	23,159.71
18	Adjusted	YYY/TON	PG _{a_{fg}}	(40,688.97)	(17,529.88)	(5,165.53)	1,139.33	(944.40)	6,903.85
Nominal rate of protection at point of competition									
19	Observed	%	NRPO _{wh}	-100%	-100%	-100%	-100%	-100%	-100%
20	Adjusted	%	NRPA _{wh}	-100%	-100%	-100%	-100%	-100%	-100%
Nominal rate of protection at farm gate									
21	Observed	%	NRPO _{fg}	-100%	-39.56%	-21.34%	101.25%	70.70%	178.95%
22	Adjusted	%	NRPA _{fg}	-100%	-52.48%	-21.34%	5.61%	-3.46%	23.64%
Nominal rate of assistance									
23	Observed	%	NRA _o	-100%	-0.395621397	-0.213402957	1.012540954	0.706988241	1.789460066
24	Adjusted	%	NRA _a	-100.00%	-52.48%	-21.34%	5.61%	-3.46%	23.64%

Decomposition of PWAfg			Unit	Symbol	2005	2006	2007	2008	2009	2010
25	International markets gap		YYY/TON	IRG	-	-	-	-	-	-
26	Exchange policy gap		YYY/TON	ERPG	-	-	-	-	-	-
27	Access costs gap to point of competition		YYY/TON	ACG _{wh}	-	-	-	-	-	-
28	Access costs gap to farm gate		YYY/TON	ACG _{fg}	-	(7,141.50)	-	(9,652.50)	(11,862.00)	(16,255.86)
29	Externality gap		YYY/TON	EG	-	-	-	-	-	-
	Market Development Gap		YYY/TON	MDG	-	(7,141.50)	-	(9,652.50)	(11,862.00)	(16,255.86)
	Market Development Gap		%	MDG	-	(0.21)	-	(0.48)	(0.43)	(0.56)

Total values			Unit	Symbol	2005	2006	2007	2008	2009	2010
30	Production volume		tons							
	Market price support									
31		Observed	YYY	MPSo	-					
32		Adjusted	YYY	MPSa	-					



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