MAFAP
SPAAA

Monitoring African Food and Agricultural Policies

Suivi des politiques agricoles et alimentaires en Afrique

ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR MAIZE IN GHANA

Draft Version

OCTOBER 2012

This technical note is a product of the Monitoring African Food and Agricultural Policies project (MAFAP). It is a technical document intended primarily for internal use as background for the eventual MAFAP Country Report. This technical note may be updated as new data becomes available.

MAFAP is implemented by the Food and Agriculture Organization of the United Nations (FAO) in collaboration with the Organisation for Economic Co-operation and Development (OECD) and national partners in participating countries. It is financially supported by the Bill and Melinda Gates Foundation, the United States Agency for International Development (USAID), and FAO.

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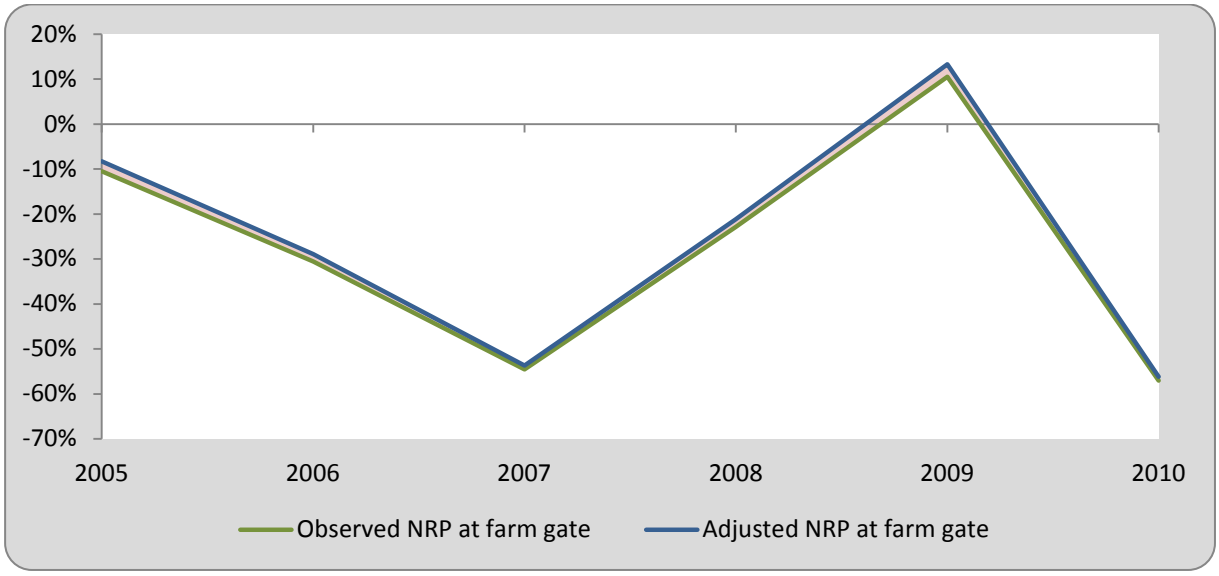
SUMMARY OF THE NOTE

Product: Maize
Period analyzed: 2005 – 2010
Trade status: Import in all years (negligible in years 2006, 2007, 2010)

- Most important cereal crop, accounting for 55 percent of total grain production;
- Total production from 550 000 tonnes in 1990 to 1 900 000 tonnes in 2010. Around 70 per cent of grown by smallholder farms;
- White maize is the type of maize produced in Ghana while the imported maize is yellow maize used mainly as poultry feed;
- Maize is one of the commodities, purchased by the National Food Buffer Stock Company (NAFCO) to build its operational and emergency stocks;
- Maize imports are subject to regular policy interventions by the Government, including an import duty of 20 percent (temporarily removed in 2008 and reinstated during the course of 2009) as well as other taxes and levies.



The observed Nominal Rate of Protection (NRP) (green line) indicates that farmers have not received price incentives except for year 2009 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.

- Our results show that disincentives, when they exist, arise from: 1) price dynamics; and 2) taxes and levies. Those related to market structure or excessive access costs could not be quantified due to the lack of data;
- Notwithstanding the disincentives, production has increased in most years due to high accessibility to seeds, technical assistance, equipment as well as the fertilizer subsidy programme;
- Actions to be taken to reduce disincentives could include: 1) carrying out a review of existing taxes, duties and levies; 2) identify the determinants of excessive access costs between the farm gate and the point of competition as well as the border and the point of competition; and 3) assess the impact of NAFCO purchasing policies on domestic maize prices.

CONTENTS

PURPOSE OF THE NOTE

This technical note is an attempt to describe the market incentives and disincentives for Maize in Ghana.

The note is a technical document and serves as input for the MAFAP Country Report.

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 the extent to which incentives (positive gaps) or disincentives (negative gaps) are present at the farm-gate and wholesale level. In relative terms, the price gaps are expressed as Nominal Rates of Protection (NRP). 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 commodity's production and consumption as well as trade and policies affecting the commodity. It also provides a detailed description of how the key components of the price analysis have been obtained. Using this data, the MAFAP indicators are then calculated and interpreted in light of existing policies and market characteristics. The analysis is commodity and country specific and covers the period 2005-2010. The indicators have been calculated using available data from different sources for this period and are described in Chapter 3.

The outcomes of this analysis can be used by those stakeholders involved in policy-making for the food and agricultural sector. They can also serve as input for evidence-based policy dialogue at the 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.

COMMODITY CONTEXT

PRODUCTION

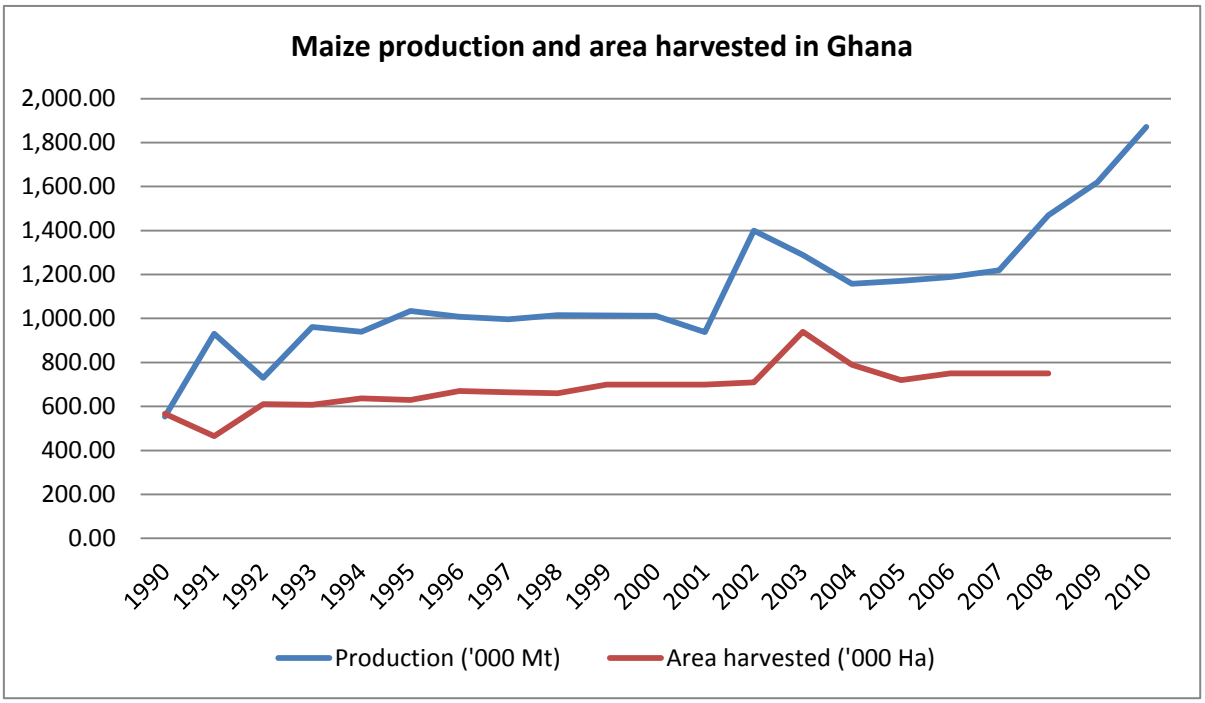
Maize is the most important cereal crop on the domestic market in Ghana however it is only the 7th largest agricultural commodity in terms of value of production over the period 2005-2010 accounting for 3.3 percent of total agricultural production value (FAOSTAT, 2012). Root crops such as yam, cassava and cocyam, together with plantains are by far more relevant in terms of production value due to their paramount importance in the Ghanaian diet.

Maize accounts for 55 percent of grain output followed by paddy rice (23 percent), sorghum (13 percent) and millet (9 percent). Maize is also an important component of poultry feed and to a lesser extent the livestock feed sector as well as a substitute for the brewing industry.

Maize average yield registered by the Ministry of Agriculture in 2010 was 1.9 Mt/ha against an estimated achievable yield[1] of around 2.5 to 4 Mt/ha (Ministry of Food and Agriculture, 2010).

Maize production over the period 1990-2010 (Figure 1) shows significant increases starting from year 2008. However, it was not possible to explain to what extent the production increase was due to the favorable rain patterns, the introduction of the fertilizer subsidy in 2008, the high food prices which could have stimulated domestic production over the period 2008-2010.

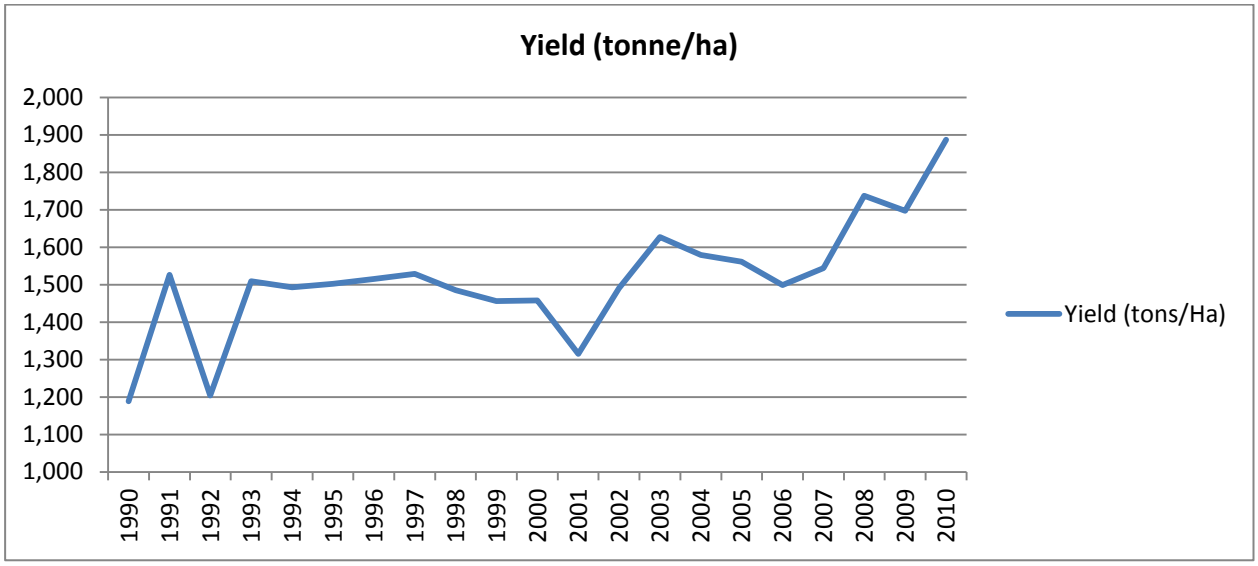
Figure1: Maize area and production trends in Ghana (1990-2010)



Source: Data on production are from the Ministry of Food and Agriculture, Statistics, Research and Information Directorate (SRID, 2011) and Ghana Statistical Service (2012).
Data on area harvested are from FAOSTAT, 2012

1 If required investment in inputs and adoption of improved practices were in place.

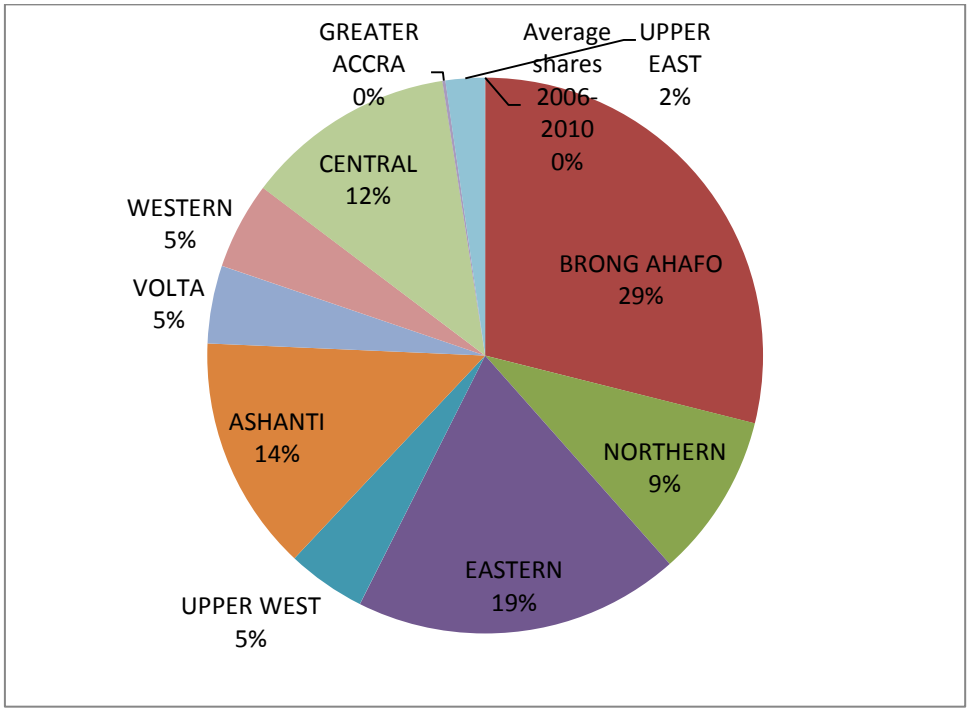
Figure 2: Maize yields in Ghana 1990-2010 (tonne/ha)



Source: FAOSTAT, 2012

Maize is grown throughout Ghana however the leading producing areas are mainly in the middle-southern part (Brong Ahafo, Eastern and Ashanti provinces) where 84 percent of the maize is grown, with the remaining 16 percent being grown in the northern regions of the country (Northern, Upper East and Upper West provinces).

Figure 3: Distribution of production of maize in Ghana by region over the period 2006-2010.



Source: Ministry of Food and Agriculture, Statistics, Research and Information Directorate (SRID, 2011)

CONSUMPTION/UTILIZATION

Domestic maize production seems to be meeting the local demand for human consumption. The maize supply in Ghana has been increasing steadily over the past few years with an average supply at 1.4 million MT over the period 2005-2010.

However, human consumption is competing with the poultry industry and to a lesser extent the livestock industry. While there is no reliable data for maize used in animal feed, the Government of Ghana estimates that 85 percent of all maize grown in Ghana is destined for human consumption and the remaining 15 percent is used for the animal feeding sector (mainly poultry). Data obtained from major feed mills in Ghana indicates that about 250 000 MT of maize is used for poultry feed annually. This is in line with the data on consumption of white maize in 2006 where the poultry industry absorbed 170 000 MT (Table 1) of domestic production. Figure 5 below shows a deficit of around 110 000 metric MT in 2006 which most probably was compensated mainly with informal imports of maize given the negligible volumes of formal imports in 2006.

The same deficit of around 115 000 metric tons has been registered in year 2010 (Table 2).

In the North, millet and sorghum are the main cereals produced and consumed, but in times of scarcity maize, which is usually a surplus crop, is used as a substitute for these grains.

Table 1: Estimates* on consumption of white maize produced in Ghana in 2006

MT	Production/Consumption	% of total consumption
1 189 000	Total national production (2006)	100%
675 000	Household consumption at a subsistence level	57%
150 000	Poultry and fish feed	13%
170 000	Formally imported for human consumption (wholesale)	14%
194 000	Informally imported for human consumption	16%

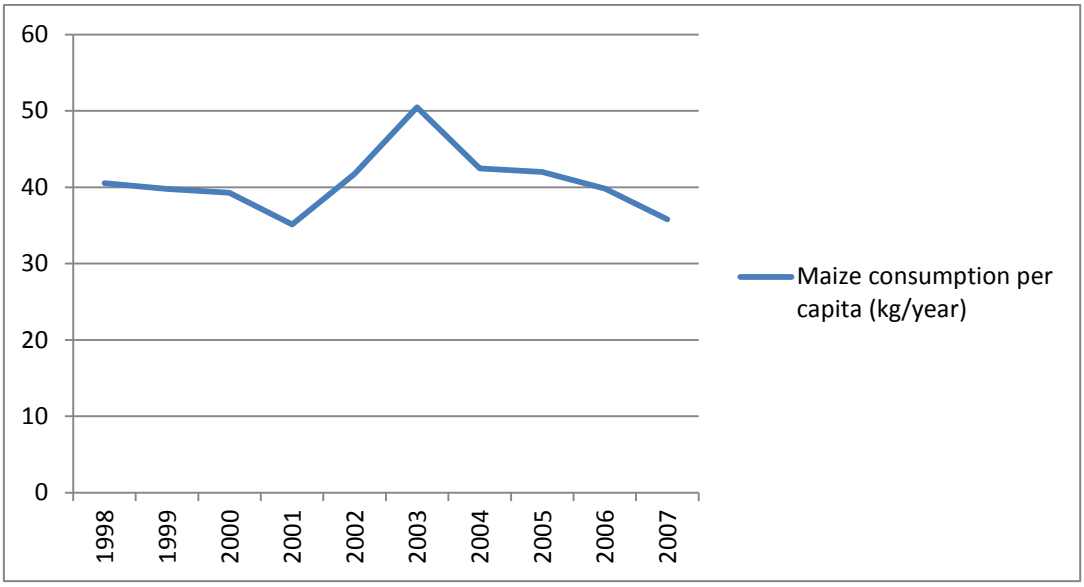
Source: *Based on interviews undertaken in the framework of a maize value chain study (WABS consulting Ltd. 2008)

Table 2: Maize Balance Sheet (2009/2010)

Gross Biological Production (MT)	1,620,000
Available Total Domestic Production Available for Human Consumption* (MT)	1,134,000
Total Imports of Commodity (MT)	34,000
Total Exports of Commodity (MT)	150
Total Supply of Commodity (MT)	1,167,850
Per Capita Consumption (Kg/Annum)	43.8
Estimated Net Consumption of Commodity-ties ('000MT)	1,052,100
Net Deficit/ Surplus (MT)	**115,750**

Source: SRID-MoFA, 2010

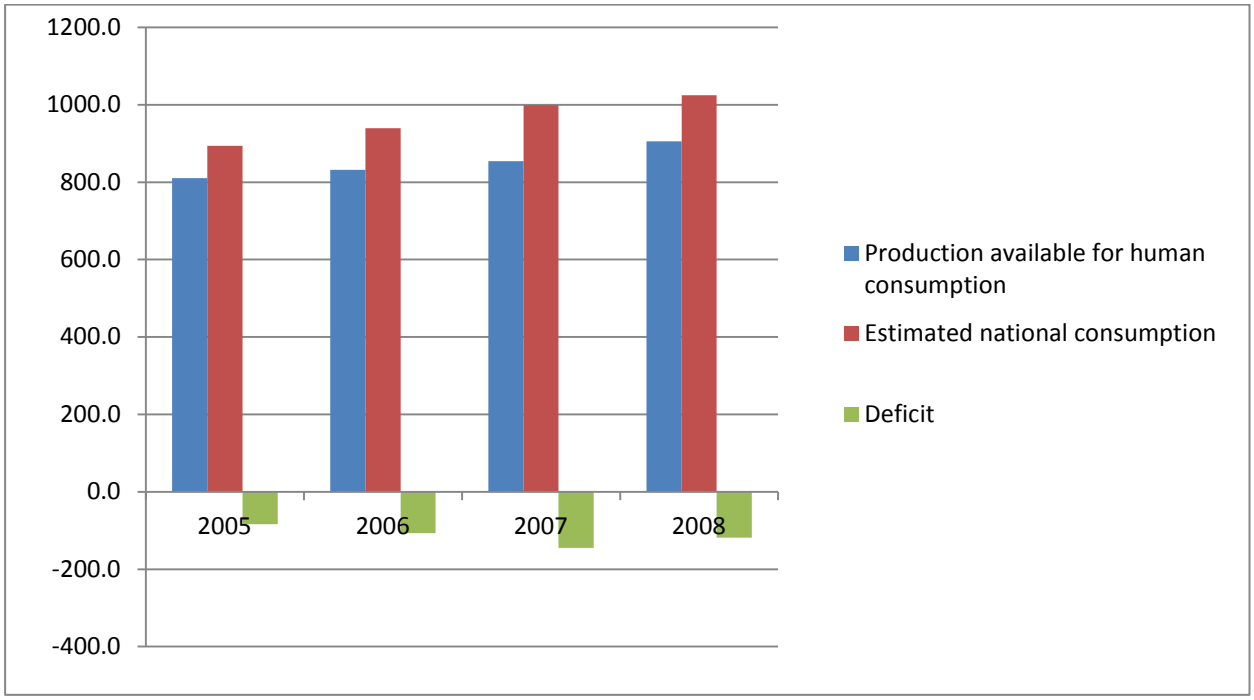
Figure 4: Ghana maize consumption per capita, 1998-2007 (kg/year)



Source: FAOSTAT

White maize consumption is projected to increase due to population growth and increasing per capita income. Based on the most recent domestic production data, the shortfall between domestic production and domestic consumption would reach 267 000 Mt by 2015 in case there is no productivity improvement (MOFA, 2011). This deficit will mostly affect consumers in urban areas and the poultry industry.

Figure 5: Domestic Food Supply and Demand for Maize in Ghana (2005-2008, '000 Mt)



Source: MOFA – SRID

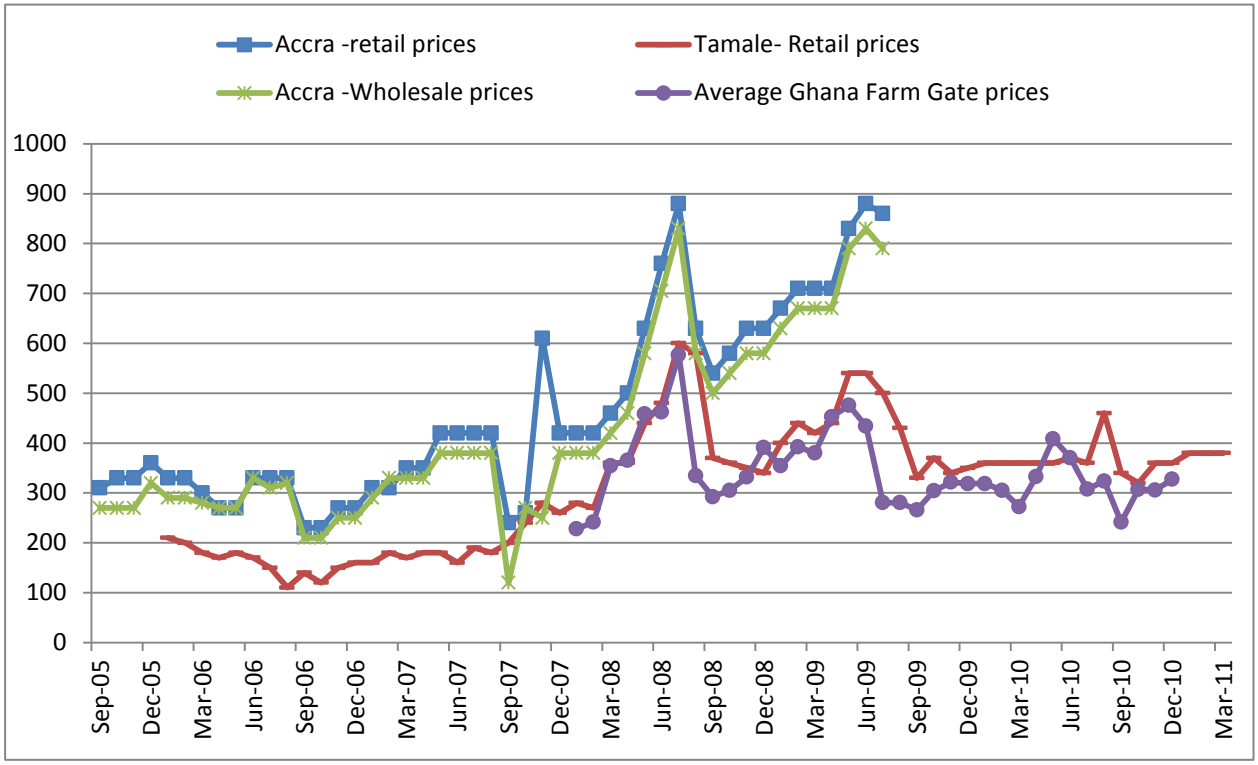
MARKETING AND TRADE

Domestic maize trade relies largely on a network of traders linked by personal and ethnic ties. The so-called "market queens", women engaged in maize trading, dominate the local and regional markets while larger groups of wholesalers engage in spatial arbitrage across regions/districts. In the Techiman district wholesalers normally obtain their maize either directly from farmers with whom they have long standing relationships or from district assemblers. The local wholesalers then sell to long-distance traders serving urban markets throughout the country (FAO, 2006). Techiman serves as one of the main feeder markets in Ghana because of the maize coming from the main producing areas in Brong-Ahafo. From Techiman the maize is then directed to Accra and/or Bolgatanga, at the border with Burkina Faso, and/or Cote d'Ivoire.

The other important feeder market for maize is Tamale located in the Northern region.

Despite the unavailability of the whole time series for the different prices, the graph (Figure 6) is quite informative in showing the significant correlation between one of the major rural feeder markets for maize, Tamale, in the Northern region, and the average farm gate prices. It also seems that the spread between prices in Accra and the rural wholesale and farm gate prices is widening. This can be a consequence of both the increasing maize deficit in Accra that might generate some degree of speculation but also the impact of rising market access costs between remote rural areas and main urban centers. The distance between Tamale and Accra is 450 km.

Figure 6: Monthly prices of white maize from selected markets in Ghana (Cedis/tonne)



Source: Accra wholesale and retail prices; Tamale (Northern region) retail prices are from FAO GIEWS. Farm Gate prices are from the Ghana Statistical Service and MOFA-SRID

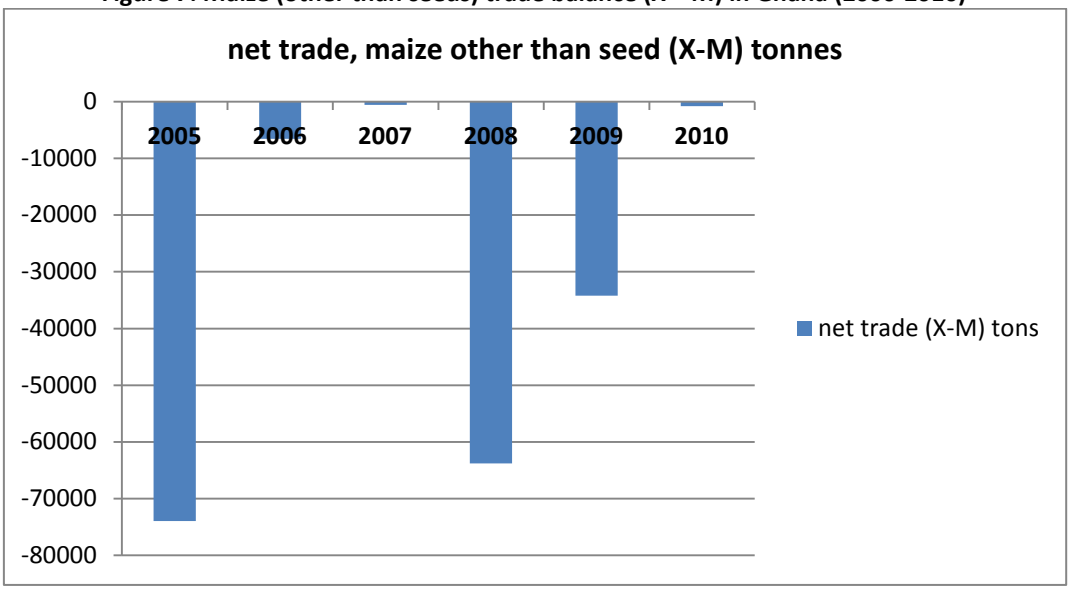
Ghana is almost self sufficient in white maize. The small volumes imported are mainly if not entirely constituted by yellow maize which is used in the poultry feed industry which absorbs roughly 250 000 Mt of maize annually. Maize is also exported, but often through informal channels, and hence not captured by official data.

Table 3: Maize production, import and export* in Ghana (2004-2010)

	2005	2006	2007	2008	2009	2010
Production ('000 Mt)	1,171.40	1,188.80	1,219.60	1,470.08	1,619.59	1,871.70
Imports ('000 Mt)	73.95	6.55	0.60	63.87	34.23	0.89
Exports ('000 Mt)	0.02	0.01	0.02	0.11	0.01	0.05
Exports share on production	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%
Trade Intensity (X+M)/P	0.06	0.01	0.00	0.04	0.02	0.00
Food Aid Imports ('000 Mt)	1.70	2.17	n.a.	2.06	1.13	0.95

Source: UN COMTRADE data refers to maize other that seed

Figure 7: Maize (other than seeds) trade balance (X – M) in Ghana (2000-2010)

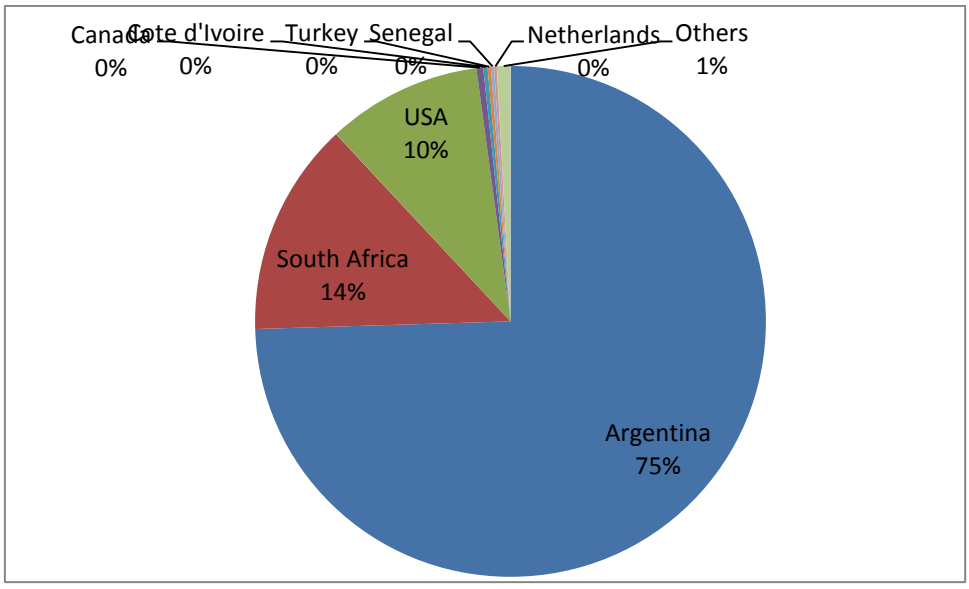


Source: UNCOMTRADE

Ghana main trade partner within the West Africa region is Cote d'Ivoire to which 83 percent of Ghana maize exports are directed. However, it should be noted that informal intra-regional trade in agriculture between West Africa countries is estimated to be around 15 percent of total volume (USDA-GAIN report, 2011).

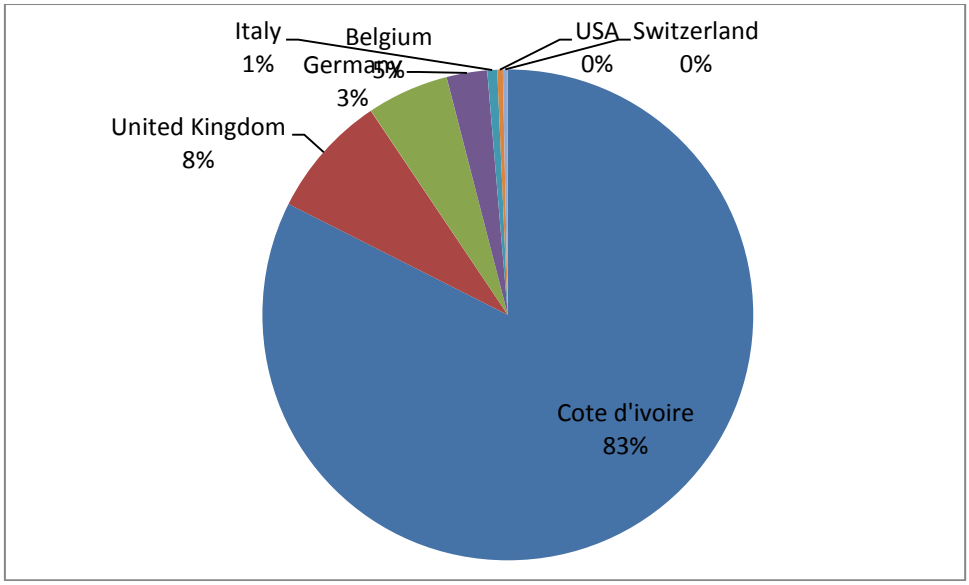
Over the period 2005-2010, 75 % of Ghana imports originated from Argentina.

Figure 8: Maize (maize corn, other than seed) imports, share by country of origin (average trade quantity, 2005-2010)



Source: UN Comtrade, 2012.

Figure 9: Maize (maize corn, other than seed) exports, share by country of destination (average trade quantity 2005-2010)



Source: UN COMTRADE 2012

DESCRIPTION OF THE VALUE CHAIN AND PROCESSING

The share of smallholder farming on Ghanaian agriculture is significant especially for what concerns cassava, maize and cocoa production. More than 70 percent of Ghanaian farms are three ha or below. Maize together with cassava is present in the majority of Ghanaian household portfolios. 12 percent of total households only grow maize and/or cassava and these have an average size of 1.7 ha and a median size of 0.8 ha (Chamberlin, 2007)[2]. For farms of up to two hectares, maize and cassava are also the most important crops. Their importance for food security for the smallholders is also evident from the shares of commercialized product by holding size and crop. Given the current levels of commercialization by smallholder farmers any profitability analysis will have to take into account the share of product that is currently commercialized. As it can be seen in Table 3, maize is a crop that is commercialized by famers irrespectively of their farm size, with more than one out of two farmers selling some maize outside the household.

Table 4: Market participation* for selected crop producers

holding size	maize	rice	sorghum	millet
<0.5 ha	53%	26%	62%	15%
0.5-1.0 ha	55%	39%	33%	12%
1-2 ha	56%	43%	30%	11%
2-3 ha	58%	52%	55%	34%
3-4 ha	58%	65%	67%	29%
4-5 ha	63%	62%	61%	40%
> 5 ha	59%	62%	69%	46%
all	57%	54%	54%	27%

* Share of producing households who market some proportion of their production

Source: IFPRI-GSSP on data from Ghana Statistical Service, 2007

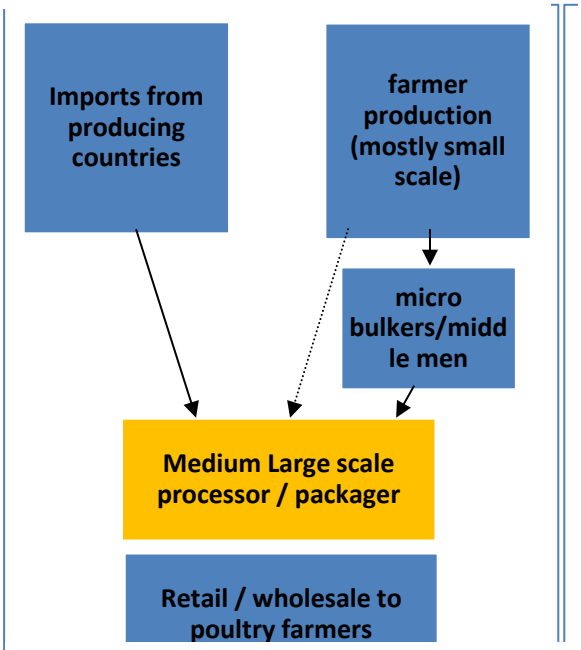
[2] IFPRI Ghana Strategy Support Programme, Background paper N. 0006.

There are at least four different supply chains for maize in Ghana that can be distinguished according to the end product, the actors involved and transaction costs and margins as a consequence.

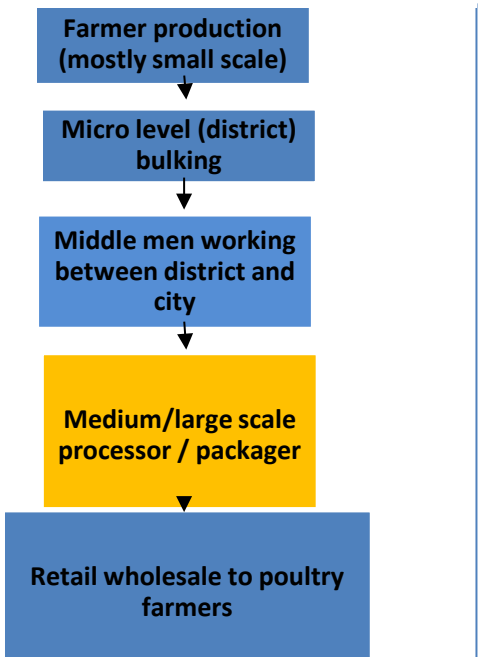
The common trait is that all these structures rely totally or partially on smallholders supply to markets. Except for the imported yellow maize all other supply chains are characterized by two or even three stages at the wholesale level, excluding processing, before they reach the retail market.

Figure 10: Structure of four selected value chains for maize in Ghana

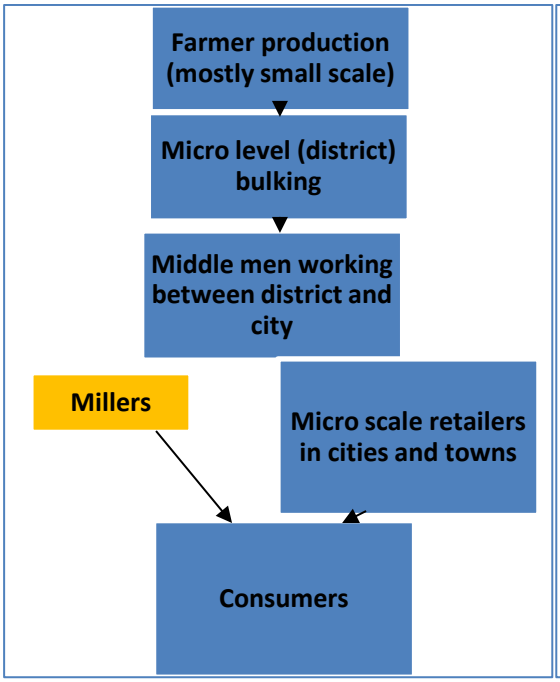
1. Yellow maize for poultry feed



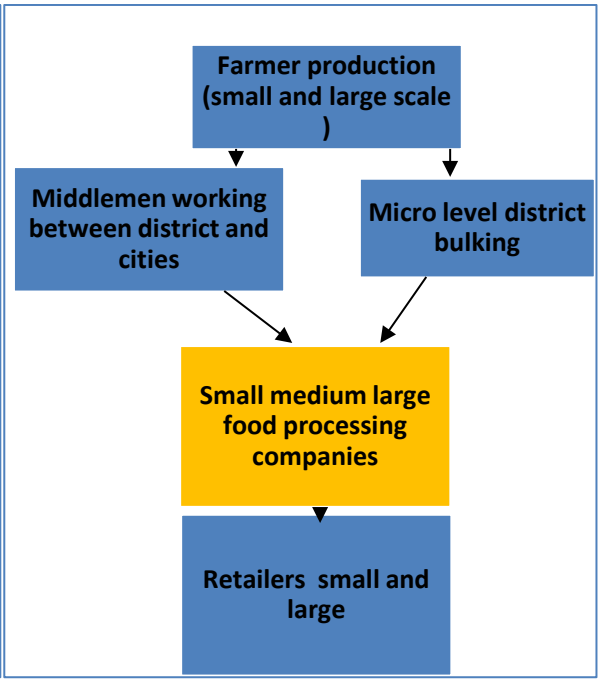
10b. White maize for poultry feed



10c. White maize (low value) for human consumption (wholesale and retail at small scale level)



10d. White Maize (high value) for human consumption



Source: WABS Consulting Ltd (2008)

The four flow charts presented above are in line with IFPRI and the Natural Resources Institute of the University of Greenwich (NRI) conclusions about the existence of a two stage wholesale market especially for maize for human consumption. A breakdown of the transaction costs between each segment of the value chain draws from the IFPRI/NRI findings. In the price incentives and disincentives analysis described in the following paragraphs it was found that the average shares of overall access costs as the difference between observed wholesale and farm gate prices over the period 2005-2010 are the same as 2007.

Table 5: Typical Marketing Costs in the Ghanaian Maize Value Chain

	USD per 100kg bag	%	Transaction costs and agents' margins per value chain segment (%)
Farm gate price	17.3	55.8	55.8
Handling and other costs	1.7	5.5	17.7
Transport	0.6	1.9	
Commission and Mktg Fee	0.3	1	
Storage, Interest, Losses	1.1	3.5	
Wholesale Agent Fee	0.3	1	
Wholesale Profit	1.5	4.8	
Techiman Wholesale Price	22.8	73.5	73.5
Handling, Marketing Fee, other	0.8	2.6	13.3
Transport	1.7	5.5	
Storage, interest, losses	0.9	2.9	
Wholesale Profit	0.7	2.3	
Accra wholesale price	27	87.1	87.1
Transport, Handling Marketing Fee	1.2	3.9	12.9
Storage Interest and losses	0.9	2.9	
Retailer Profit	1.9	6.1	
Accra Retail price	31	100	100

Source: NRI, IFPRI and World Bank 2007, own calculations

POLICY DECISIONS AND MEASURES

The strategic document "Food and Agricultural Sector Development Policy" (FASDEP II) which consists in a revision of the first "Food and Agriculture Sector Development Policy (FASDEP)" developed in 2002 has among its main objectives to modernize agriculture and to increase the productivity of the Ghanaian farmer. The FASDEP II elaborated by the Ministry of Agriculture, introduced a number of programs, projects and initiatives.

The maize sector attracts the following interventions: fertilizer subsidy, mechanization programme, block farms programme and the buffer stock scheme. For now the note only describes the main characteristics of each program and their existence is used to interpret the results. However, at a later stage, we expect to identify a suitable allocation key that will allow including part of the program cost as budget and other transfers (BoT) for the commodity and thus calculating also Nominal Rates of Assistance.

A part from these direct support programs, trade policy in Ghana makes maize imports subject to import duties and other fees described in the following paragraphs.

Fertilizer Subsidy

The Government of Ghana introduced a 50 percent subsidy for fertilizer in 2008 to make it affordable for producers and increase fertilizer use. Fertilizer agents are required to sell their fertilizer at a fixed price defined for each region in agreement with the Government. The rationale behind the introduction of this subsidy is to absorb the operational cost of fertilizer - port handling charges, loading and transport costs as well as commissions and margins for the actors - to make it affordable for the farmers. The programme has been revised in 2010 by replacing the voucher based system with the waybill system due to the high overhead and administrative costs that the Government was incurring under the voucher scheme.

In 2010/2011 the GOG made GH¢37 million available to support the fertilizer subsidy program (GAIN report, 2011).

Table 6: Fertilizer Subsidy Program Costs

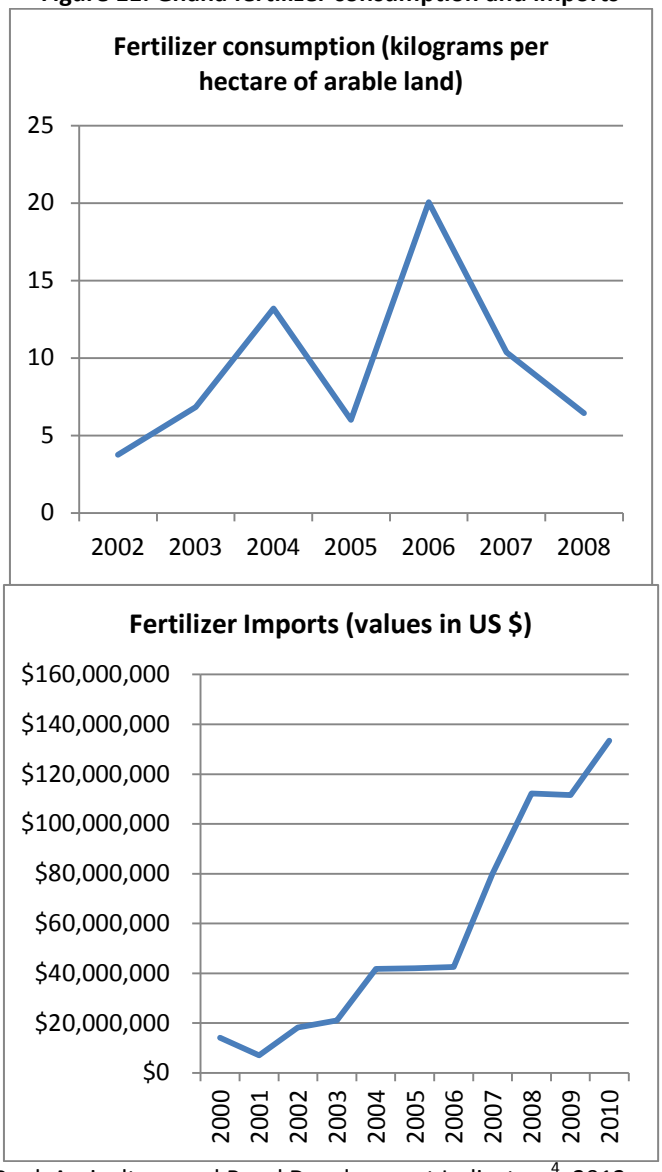
	2008	2009	2010
Subsidized Fertilizer cost delivered at rural depots/warehouses (USD/Mt)	467.3	366.2	363.6
Fertilizer transport cost, clearing charges plus Incidentals (USD/Mt)	467.3	366.2	223.8
Overall fertilizer (private retailer) cost (USD/Mt)	934.6	732.4	587.4
Total cost of subsidy program (USD million): Planned	32.7	35.2	24.5
Total cost of subsidy program (USD million): Actual	27.1	33.8	31.4
Govt expenditure on the subsidy (USD million)	0.0	0.0	0.0
Donor expenditure on subsidy (USD million)	27.0	33.1	25.2
Total program cost (USD million)	27.0	33.1	25.2
GDP (USD million)	16,085.7	15,314.6	n.a
Total Agric. Expenditure ((USD million)	118.4	116.2	n.a
Total Govt. Expenditure (Budget) (USD million)	7,485.5	5,877.1	n.a
Program cost as % Agric Expenditure	22.9	29.1	--
Program cost as % national budget	0.4	0.6	--
Program cost as % GDP	0.2	0.2	--

Sources: NEPAD, 2011.

[a] Data file of Agricultural Extension Services Directorate, Accra; [b]Data file PPMED, Accra. Exchange rates: GHC1.07/USD for 2008, GHC1.42/USD for 2009 and GHC1.43/USD for 2010.

The use of fertilizer shows a significant drop starting from 2006 (Figure 11). Unfortunately, information is only available up to 2008, the year when the fertilizer subsidy was introduced. However, fertilizer imports have grown exponentially from 2007 onwards[3]. A more in-depth assessment of the share of the subsidy used for maize as opposed to other crops will have to be carried out to understand the level of incentive it creates for different types of maize producers and their current levels of commercialization of maize especially in those areas where this crop is crucial for food security.

Figure 11: Ghana fertilizer consumption and imports



Source: World Bank Agriculture and Rural Development Indicators[4], 2012 and UN Comtrade

[3] Data on imported volumes of fertilizer are not available.

[4] Fertilizer products cover nitrogenous, potash, and phosphate fertilizers (including ground rock phosphate). Traditional nutrients--animal and plant manures--are not included. For the purpose of data dissemination, FAO has adopted the concept of a calendar year (January to December). Some countries compile fertilizer data on a calendar year basis, while others are on a split-year basis. Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded.

In combination with the introduction of the fertilizer subsidy the Government of Ghana has liberalized the fertilizer market. This means that all companies are entitled to operate under the waybill system as long as they have registered to the programme.

The Harmonized System and Customs Tariffs Schedules, issued by the Ministry of Finance and Economic Planning in 2007, shows that there is no import duty and VAT on all types of fertilizers, but there are administrative fees and levies: an inspection fee (1 percent of CIF), a processing fee (1 percent of CIF for zero rated products), a network charge – GCNet[5] (0.40 percent of FOB), National Health Insurance levy (2.5 percent of CIF), an ECOWAS levy (0.5 percent of CIF) and an EDIF (Export Development and Investment Fund Levy) (0.5 percent of CIF), which in total represent approximately 5.9 percent of the fertilizer value which, together with other transaction costs, should be covered by the Government subsidy. It was estimated that the current subsidy to fertilizer amounts on average to 40 percent of the retail price of fertilizer (NEPAD, 2011).

Mechanization programme

The Government of Ghana is providing tractors to producers for mechanized farming. According to the GOG, this direct intervention could increase yields to 2.5 MT in 2011/2012 up from 1.89 MT in 2010. The provision of tractors is made through the so called Agricultural Mechanization Services Enterprises Centers (AMSEC) to assist the private sector to take a lead role in the provision of well-organized and commercially viable agricultural mechanization services.

The high initial capital investment needed to purchase farm machinery and related equipment together with the prohibitive costs of borrowing underscored the need for the Government to facilitate private sector access to some agricultural machinery through the establishment of mechanization services centers. It is against this background that AESD facilitated the establishment and operation of eighty four (84) AMSEC companies to make agricultural mechanization services readily available in a timely and affordable manner to farmers. The machinery/equipment allocated to AMSEC operators included tractors and its matching implements, maize shellers, and water pumps. The allocations were based on machinery requirements of the AMSECs operators and their ecological locations. It is planned that all districts in the country will have at least one functional AMSEC in future. Since 2009, MOFA through AESD has introduced and deployed over 45 combine harvesters including maize and rice harvesters. China is one of the main providers of farm machinery.

Block Farms

The introduction of block farms program has the main objective for mechanization and extension services to be spread out to cover a large acreage and a large number of farmers.

The block farms program (BFP), was piloted in 2009 in six regions (Ashanti, Brong-Ahafo, Central, Northern, Upper East, and Upper West). The programme aims at promoting farming as a business by targeting large areas of arable land (in blocks) in different locations for the production of selected commodities which are suitable for specific agro-climatic conditions. This in turn allows bringing several beneficiaries together onto one large production area to provide them with a range of services, including those provided by programmes such as the fertilizer subsidy or the mechanization

[5] GCNet (Ghana Community Network Services Limited) operates an electronic system for processing trade and customs documents in Ghana.

programme and reduce transaction costs. The credit is expected to be paid back in kind at the time of harvest. One of the main objectives of the programme is to: generate employment among the rural poor especially the youth, increase productivity, improve incomes among farmers, and increase food security. The program targets the following crops including: maize grain and seed, rice grain and seed, soybean, sorghum, tomato, and onions (IFPRI, 2011).

Food stocks

In March 2010, the Government of Ghana set up the National Food Buffer Stock Company (NAFCO), a completely state-owned-enterprise that is intended to buy, preserve, store, sell, and distribute excess grains (including maize) in warehouses across the country. The creation of NAFCO is part of the strategy to reduce post-harvest losses, ensure price stability and establish emergency grain reserves.

Specifically, NAFCO mandate consists in: guaranteeing an assured income to farmers by providing a minimum guaranteed price and ready market for farmers in order to reduce post harvest losses resulting from spoilage due to poor storage; purchasing, selling, preserving and distributing food stuffs in times of crisis; employing a buffer stock mechanism to ensure stability in demand and supply; expanding the demand for food grown in Ghana by selling to state institutions such as the military, schools, hospitals, prisons; acting as a foreign exchange earner as increased food production resulting from MOFA's interventions and storage by NAFCO will afford the country the opportunity to export surplus food items when the local food requirement has been met.

NAFCO keeps two kinds of stocks, operational stocks and emergency Government stocks. Operational stocks are the stocks used to run and operate the company, and the emergency Government stocks, are stocks held for the Government for use in emergency situations. The target quantities for 2012 for maize are 15 000 Mt of white maize and 15,000 Mt of yellow maize; 15 000 Mt of paddy rice; 1 000 Mt of soya. The Emergency Government Stocks include: 10 000 Mt of white maize; 10 000 Mt of milled rice; 1 000 Mt of soya. The share of these stocks in an estimated production of 1.7 Million Mt is of around 3 percent.

Given the difficulty of NAFCO to reach farmers in remote areas, 73 Licensed Buying Companies (LBCs)are mandated by NAFCO to purchase maize and rice from farmers in the various villages at a minimum purchasing price (i.e. floor price) determined by NAFCO in consultation with the post-harvest committee within MOFA (IFPRI, 2011). The committee takes into consideration factors like transportation, sacks, drying, bagging, sewing and handling to come up with this margin. The Farm gate prices are calculated on the basis of the production costs described above plus a 15 percent profit margin in the case of maize. The farm gate price for maize in 2011 was Gh¢ 480/tonne.

The maize price paid to LBC in 2011 was Gh¢ 750/tonne.

The floor price is the same for all regions in Ghana and if compared with the average rural wholesale market prices at the time, NAFCO was giving to maize producers around GHS 250 (or a subsidy equivalent to 27 percent of the market price) on each tonne of maize sold. The main buyers are poultry farmers, schools and other public institutions.

NAFCO operations are wholly financed by the Government of Ghana for an amount of 15 million Ghana Cedis, five million from the Government of Ghana and 10 million from Donors through the Highly-Indebted Poor Country grants.

What needs to be further analyzed is the impact of NAFCO price announcements on the open market price setting especially in those regions and areas that are close to NAFCO storage facilities. The second aspect is related to maize sales to the poultry farmers. Essentially, NAFCO creates an incentive for poultry farmers to buy local maize as opposed to imported one. An analysis of how local maize competes with imported maize will be possible when non-tariff related costs for imported maize will be obtained. Lastly, it is claimed that the role of NAFCO is to absorb excess production and stabilize prices; however it is not clear how the level of excessive production is defined as well as the quantities to be purchased.

An evaluation of the four programmes is being carried out by IFPRI in 2011 in collaboration with independent consultancy companies.

Trade Policy

The lack of an agreed Common External Tariff (CET) or a functioning customs union in West Africa leads countries to apply their own tariff schedules. According to UNCOMTRADE data, the simple average of Ghana's external tariffs is 12.7 percent (WB, 2012).

Maize imports are charged with a 20 percent import tariff. It should also be noted that maize imports are subject to restrictions upon them where a license is required to import Maize from outside Ghana.

Moreover, Ghana sometimes blocks the duty-free importation of goods originating in ECOWAS by applying a wide range of additional taxes and fees which are something different from import duties and are charged on all imports. These include the statistical fee, various processing fees, or the export development and investment levy. A part from the VAT (12.5 percent) and National Health Insurance Levy (2.5 percent), which are also applied on domestically produced goods most of these taxes and fees penalize imported goods (2 percent)[6] and can be considered as additional import duties. The West Africa Trade Hub highlights that Ghana keeps on applying temporary import bans and quotas for selected agricultural commodities.

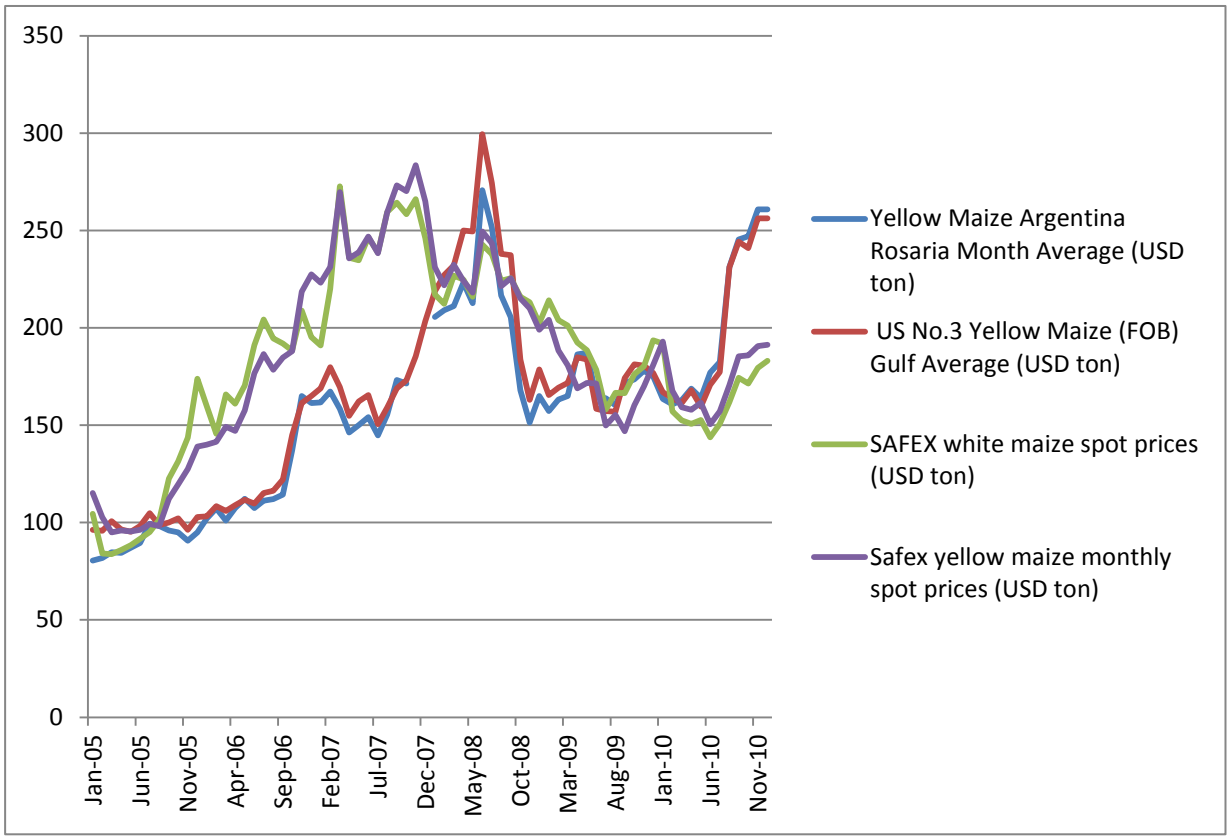
[6] In addition to tariffs, the c.i.f. value of imports is subject to a destination inspection fee (1%), the ECOWAS levy (0.5%), and the Export Development and Investment Levy (0.5%).

DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

TRADE STATUS OF THE PRODUCTS

While Ghana is more or less self-sufficient in terms of white maize production and consumption, it remains a net importer of yellow maize that is mainly utilized by the animal feed industry. Information on imports of white against yellow maize is difficult to obtain. However looking at main suppliers it can be concluded that if imports of white maize occur these originate from South Africa or Cote d'Ivoire as the US and Argentina are yellow maize exporters only. The choice of yellow or white maize prices as the benchmark price appears not to be so relevant. For example, the spread between monthly spot prices of white and yellow maize traded on SAFEX is very close to zero and the coefficient of correlation between the two is also very high, 0.952.

Figure 12: White and yellow maize daily spot prices, 2005-2010



Source: International Grain Council and SAFEX

Ghana is a net importer of maize for the period 2005-2010. Data reported is extracted from UN COMTRADE and refers to "maize corn, other than seed". The zero value of exports in years 2006 and 2009 was replaced with data on imports of maize in those countries that resulted being the main destination markets of Ghana maize exports over the period 2005-2010.

Table 7: Net trade, maize other than seed (tonne)

	2005	*2006*	*2007*	*2008*	*2009*	*2010*
Export (tonnes)	22.28	10.71*	16.24	107.08	5.00*	50.00
Import (tonnes)	73,945.74	6,551.98	595.98	63,868.57	34,228.89	886.53
Net Trade (X-M) in tonnes	**-73,923.47**	**-6,541.27**	**-579.75**	**-63,761.49**	**-34,223.89**	**-836.53**
	IMPORT	**IMPORT**	**IMPORT**	**IMPORT**	**IMPORT**	**IMPORT**

Source: UN Comtrade (*calculated on the basis of main destination countries' imports of maize from Ghana)

BENCHMARK PRICES

As per the considerations made on the maize trade status in Ghana it was decided to take the average implicit CIF import prices of maize from those countries that result being the main exporters to Ghana in each of the years considered in the analysis. Argentina, accounting on average for 75 percent of Ghana imports is the main exporter for all years except for 2006 when 95.8 percent of Ghana imports are from the USA. The decision not to consider weighted average value of imports from the whole world was because some of the unit values of maize imports are extremely high especially in those years when imported volumes are low (CIF prices in certain years can reach 1 000 USD for a MT).

Other solutions for a more reliable estimate of unit values of maize imports are under consideration, including CIF prices for maize in neighboring countries. Moreover, all trade data will need to be double-checked against other sources of data as well as information on the application criteria of tariff and non-tariff duties as it seems that unit values tend to increase in years when imported volumes are particularly low. According to recent value chain analysis (WABS consulting Ltd, 2008) some of the levies and duties apply per load which is minimum 15 000 tons for large importers. In other words, if an importer is not big enough to purchase a full load he will have to bear a relatively higher tax for his imports. An alternative explanation could be that instances of over-invoicing stick out more in years of lower volumes of imports as they are not averaged away.

Observed

Table 8: Benchmark prices (USD/Mt) considered for the analysis of price incentives and disincentives for maize in Ghana

	2005	2006	2007	2008	2009	2010
Main supplier	Argentina	USA	Argentina	Argentina	Argentina	Argentina
Share on Ghana total imports (%)	51.5%	95.8%	30.0%	99.0%	98.2%	47.0%
Implicit CIF import price of maize from main suppliers (USD/Mt)	184.77	201.62	316.21	335.28	236.78	339.37

Source: UN Comtrade.

Looking at both some of the unit values of Ghana total imports of maize and the unit values of imports per country of origin it seems that prices are particularly high when imported volumes are negligible.

DOMESTIC PRICES

Drawing from the description of the human consumption value chain for white maize based on smallholder producers and previous analysis undertaken by IFPRI about marketing costs within the Ghanaian maize value chains, it was concluded that the most representative maize pathway in Ghana is that of production taking place in the Central and Northern districts and internal trade to major deficit areas, the main one being the city of Accra. Official data made available by the Ministry of Food and Agriculture refers to Accra urban area wholesale prices and Techiman area farm gate prices. Techiman is located in the central region of Brong-Ahafo, the main maize producing area in Ghana.

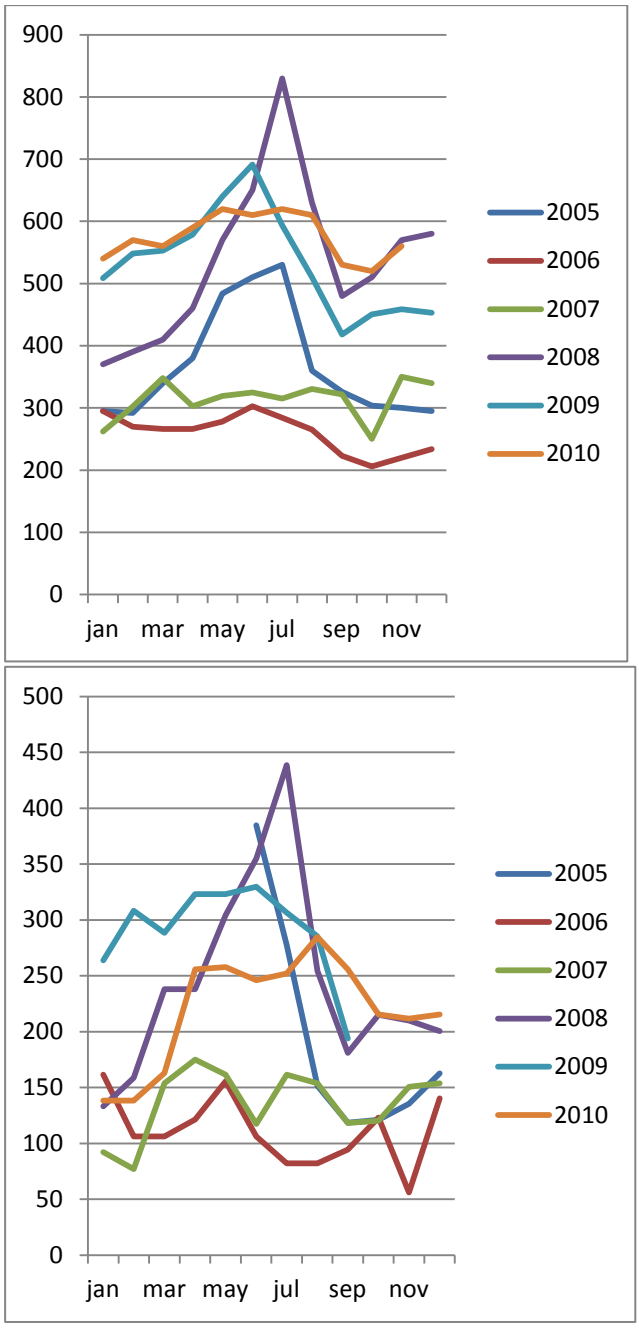
However, while wholesale prices for Accra are available for the period 2005-2010 on a monthly basis, the farm gate prices for Techiman are only available for years 2006, 2007, 2008 and 2010. In 2005, farm gate prices are available starting from June and in 2009 data is available up to September. Thus, average margins between farm gate and wholesale prices in years 2006, 2007, 2008 and 2010 had to be applied to estimate farm gate prices in 2005 and 2009.

During the whole period of analysis wholesale prices (Figure 15) and farm gate prices register significant drops during the month of September (Figure 15). The main cause of these price drops can be attributed to the injection of significant volumes of maize that has been harvested and sun-dried between July and August and marketed in September. The low level of prices of domestically produced maize in September would make it impossible for imported maize to compete with the domestically produced maize. Hence yearly average wholesale and farm gate prices for the incentives and disincentives analysis were calculated by excluding the month of September since it is implied that in that month there is no competition between imported and domestically produced maize.

Figure 13:

Accra wholesale monthly prices (white maize) GHC/tonne, 2005-2010

Average farm gate prices GHc/tonne, selected years and months



Source: FAO Giews and Ghana statistical service, GSS

Farm Gate prices

Observed

Farm gate prices for 2006, 2007, 2008 and 2010 were calculated as the average monthly farm gate prices in Techiman, excluding the month of September. Prices for years 2005 and 2009 were obtained by subtracting the average spread between wholesale and farm gate prices in those years for which price data was available.

Table 9: Average annual farm gate prices (GHC/MT)

	2005	2006	2007	2008	2009	2010
Farm Gate Prices (GHC/MT)	126.37*	112.83	137.92	249.58	298.73*	216.22

Source: MOFA SRID and own calculations

* Estimate

Wholesale prices

Yearly averages of urban Accra wholesale prices, obtained from the Ministry of Food and Agriculture for the period 2005-2010, were used for the analysis. Annual averages were calculated by excluding the month of September.

Table 10: Accra yearly average wholesale prices (GHC per Mt)

	2005	2006	2007	2008	2009	2010
Wholesale prices (GHC/MT)	371.8	262.5	313.2	542.7	544.2	580.0

Source: MOFA SRID

EXCHANGE RATES

Ghana has a floating exchange rate regime for its currency, the Ghana cedi. With the 2006 Foreign Exchange Act Ghana shifted away from exchange controls. In July 2007, the national currency was re-denominated by setting 10 000 Cedis to 1 new Ghana cedi.

Table 11: Exchange rate Ghana Cedis/USD

	2005	2006	2007	2008	2009	2010
National Currency per US Dollar (principal rate, period average)	0.91	0.92	0.94	1.06	1.41	1.43

Source: IMF

MARKET ACCESS COSTS

Observed

From farm gate to wholesale

Observed access costs between the farm gate and the wholesale market are calculated on the basis of the computation of maize access costs made by IFPRI (2007) from the farm gate, Techiman, to the retail market in Accra. Table 5 above shows the data as it was presented by IFPRI, however for the purpose of calculations of market incentives and disincentives for maize, access costs from the farm gate to the wholesale market in Accra where considered for the analysis. The leg from the wholesale in Accra to the retail was not included. Costs have been converted in local currency (GHCs) and Tons as the original data was in USD per 100kg.

Table 12: Estimated access costs from farm gate to point of competition for maize in Ghana (GHCs/tonne)

	2005	2006	2007	2008	2009	2010
Handling and other costs	15.4	15.6	15.9	18.0	23.9	24.3
Transport (from farm gate to Techiman)	5.4	5.5	5.6	6.3	8.5	8.6
Commission and Mktg Fee	2.7	2.7	2.8	3.2	4.2	4.3
Storage, Interest, Losses	10.0	10.1	10.3	11.6	15.5	15.7
Wholesale Agent Fee (Techiman WH)	2.7	2.7	2.8	3.2	4.2	4.3
Handling, Marketing Fee, other	7.3	7.3	7.5	8.5	11.3	11.4
Transport (from feeder market (Techiman) to Accra)	15.4	15.6	15.9	18.0	23.9	24.3
Storage, interest, losses	8.2	8.2	8.4	9.5	12.7	12.9
Wholesale Profit	6.3	6.4	6.5	7.4	9.8	10.0
Total access costs	**73.41**	**74.23**	**75.76**	**85.69**	**114.11**	**115.91**

Source: authors calculations based on NRI (2006; as published by WB and IFPRI, 2007)

Adjusted

No adjustment was made

From border to point of competition

Observed

The information on the price structure for imported maize was extracted from IFPRI (2012). Observed costs considered in the analysis are the VAT (12.5%), the Insurance Levy (2.5%), the destination and inspection fee (1 %), the ECOWAS levy (0.5%), and the Export Development and Investment Levy (0.5%).

IFPRI data on the price formation of imported maize refer to year 2011. The share of each cost item, including transport, handling, taxes and levies was applied to the the CIF price of maize for each year over the period of analysis 2005-2010.

Adjusted

Access costs were adjusted by subtracting levies and fees which are considered as excessive. The West Africa Trade Hub report (WB, 2008) highlighted that apart from the VAT (12.5%) and National Health Insurance Levy (2.5%), which are also applied on domestically produced goods, taxes and fees such as the destination inspection fee (1%), the ECOWAS levy (0.5%), and the Export Development and Investment Levy (0.5%) penalize imported goods and can be considered as additional import duties and were subtracted from observed costs.

Table 13: Estimated access costs from border to point of competition for maize in Ghana (GHC/tonne)

	2005	***2006***	***2007***	***2008***	***2009***	***2010***
A. ECOWAS Levy	0.8	0.9	1.5	1.8	1.7	2.4
B. EDFL	0.8	0.9	1.5	1.8	1.7	2.4
C. Processing fee (1%)	1.7	1.9	3.0	3.6	3.3	4.9
D. VAT	25.2	27.8	44.6	44.4	41.7	72.8
E. NHIL	5.0	5.6	8.9	8.9	8.3	14.6
F. Port Charges	69.4	76.6	122.8	122.7	115.2	200.4
G. Transport to market	27.4	30.3	48.5	48.5	45.5	79.2
Total Observed access costs (A+B+C+D+E+F+G)	**130.5**	**144.0**	**230.7**	**231.5**	**217.5**	**376.7**
Total adjusted access costs (D+E+F+G)	**127.1**	**140.3**	**224.8**	**224.4**	**210.8**	**367.0**

Source: author's calculations based on data from IFPRI (2012)

EXTERNALITIES

We are not aware of the presence of externalities in the maize value chain in Ghana.

BUDGET AND OTHER TRANSFERS

As highlighted in the section dedicated to the description of the different interventions targeting the maize value chain in Ghana, especially concerning the fertilizer subsidy and the mechanization programme, we are not aware of any disaggregation of the amount of subsidies absorbed by the maize sub-sector as opposed to the other targeted crops.

QUALITY AND QUANTITY ADJUSTMENTS

The need for quality adjustment between imported yellow maize and domestically produced white maize was considered. The availability of official data on prices for white and yellow maize will have to be further verified with the Ministry of Food and Agriculture and the Ghana Statistical Service. For the time being the quality adjustment of 0.50 as calculated by IFPRI (2012) was factored in the calculations.

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 Maize in Ghana. While the table reflects general approaches, specific changes are discussed in Section 4, data reflects the final data used.

		Description	
Concept		***Observed***	***Adjusted***
Benchmark price		▪ CIF unit values of imported yellow maize from Argentina and US (depending on the year) calculated using data from UN Comtrade	*N.A.*
Domestic price at point of competition		▪ Wholesale prices for maize in Accra provided by the Ministry of Food and Agriculture	*N.A.*
Domestic price at farm gate		▪ Farm gate prices in Techiman provided by the Ministry of Food and Agriculture. Yearly averages for 2005 and 2009 had to be estimated as monthly data was only available for selected months	*N.A.*
Exchange rate		▪ Annual average of exchange rate as reported by IMF	*N.A.*
Access cost to point of competition		▪ *Estimated using IFPRI data collected in 2011 on maize access costs*	*Adjusted by subtracting excessive levies and taxes charged on imported rice*
Access costs to farm gate		▪ Calculated on the basis of the maize value chain analysis undertaken by IFPRI (2007)	*N.A.*
QT adjustment	Bor-Wh	N.A	*N.A.*
	Wh-FG	N.A.	*N.A.*
QL adjustment	Bor-Wh	Estimated on the basis of the price difference between imported yellow maize and local white maize on the Ghana market (IFPRI 2012)	*N.A.*
	Wh-FG	*N.A.*	*N.A.*

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

		Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
		trade status	*m*	*m*	*m*	*m*	*m*	*m*
DATA	*Unit*	*Symbol*						
Benchmark Price								
Observed	USD/TONNE	$P_{b(int\$)}$	184.77	201.62	316.21	335.28	236.78	339.37
Adjusted	USD/TONNE	P_{ba}						
Exchange Rate								
Observed	GHC/USD	ER_o	0.91	0.92	0.94	1.06	1.41	1.43
Adjusted	GHC/USD	ER_a						
Access costs border - point of competition								
Observed	GHC/TONNE	AC_{owh}	130.51	143.97	230.71	231.55	217.51	376.67
Adjusted	GHC /TONNE	AC_{awh}	127.14	140.26	224.76	224.44	210.84	366.97
Domestic price at point of competition	GHC /TONNE	P_{dwh}	371.82	262.45	313.17	542.73	544.18	580.00
Access costs point of competition - farm gate								
Observed	GHC /TONNE	AC_{ofg}	73.41	74.23	75.76	85.69	114.11	115.91
Adjusted	GHC /TONNE	AC_{afg}						
Farm gate price	GHC /TONNE	P_{dfg}	126.37	112.83	137.92	249.58	298.73	216.22

Externalities associated with production	GHC /TONNE	E						
Budget and other product related transfers	GHC /TONNE	BOT						
Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}						
Quality conversion factor (border - point of competition)	Fraction	QL_{wh}	0.50	0.50	0.50	0.50	0.50	0.50
Quantity conversion factor (point of competition – farm gate)	Fraction	QT_{fg}						
Quality conversion factor (point of competition – farm gate)	Fraction	QL_{fg}						

CALCULATION OF INDICATORS

The indicators and the calculation methodology used are described in Box 1. A detailed description of the calculations and data requirements is available on the MAFAP website or by clicking here. So far it was not possible to measure crop specific budget or other transfers; hence NRAs have not been calculated.

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 NRP*o* generate the NRP*a* indicators. Comparison of the different rates of protection identifies where market development gaps can be found and reduced.

With the data described above we obtain the price gaps summarized in Table 14, nominal rates of protection in Table 15 and Market Development Gaps in Table 16, for the period 2005-2010.

Table 14: MAFAP price gaps for Maize in Ghana 2005-2010 (GHC per Mt)

	2005	2006	2007	2008	2009	2010
Trade status for the year	m	m	m	m	m	m
Observed price gap at wholesale	157.24	25.73	(66.16)	133.49	159.74	(39.32)
Adjusted price gap at wholesale	160.61	29.44	(60.21)	140.59	166.41	(29.62)
Observed price gap at farm gate	(14.80)	(49.65)	(165.65)	(73.98)	28.40	(287.19)
Adjusted price gap at farm gate	(11.44)	(45.94)	(159.71)	(66.87)	35.07	(277.48)

Source: Own calculations using data as described above.

Table 15: MAFAP nominal rates of protection (NRP) for Maize in Ghana 2005-2010 (%)

	2005	2006	2007	2008	2009	2010
Trade status for the year	m	m	m	m	m	m
Observed NRP at wholesale	73.28%	10.87%	-17.44%	32.62%	41.55%	-6.35%
Adjusted NRP at wholesale	76.04%	12.64%	-16.13%	34.96%	44.05%	-4.86%
Observed NRP at farm gate	-10.48%	-30.56%	-54.57%	-22.86%	10.50%	-57.05%
Adjusted NRP at farm gate	-8.30%	-28.94%	-53.66%	-21.13%	13.30%	-56.20%

Source: Own calculations using data as described above.

Table 16: MAFAP Market Development Gaps for Maize in Ghana 2005-2010 (GHC per MT)

	2005	2006	2007	2008	2009	2010
Trade status for the year	m	m	m	m	m	m
International markets gap (IRG)	0	0	0	0	0	0
Exchange policy gap (ERPG)	0	0	0	0	0	0
Access costs gap to point of competition (ACG_{wh})	3.36	3.71	5.94	7.11	6.68	9.71
Access costs gap to farm gate (ACG_{fg})	N/D	N/D	N/D	N/D	N/D	N/D

ND: No data available for calculation

Source: Own calculations using data as described above.

INTERPRETATION OF THE INDICATORS

Ghana is a net importer of maize for all years considered in the analysis (2005-2010). In years 2006, 2007 and 2010 volumes imported are particularly negligible.

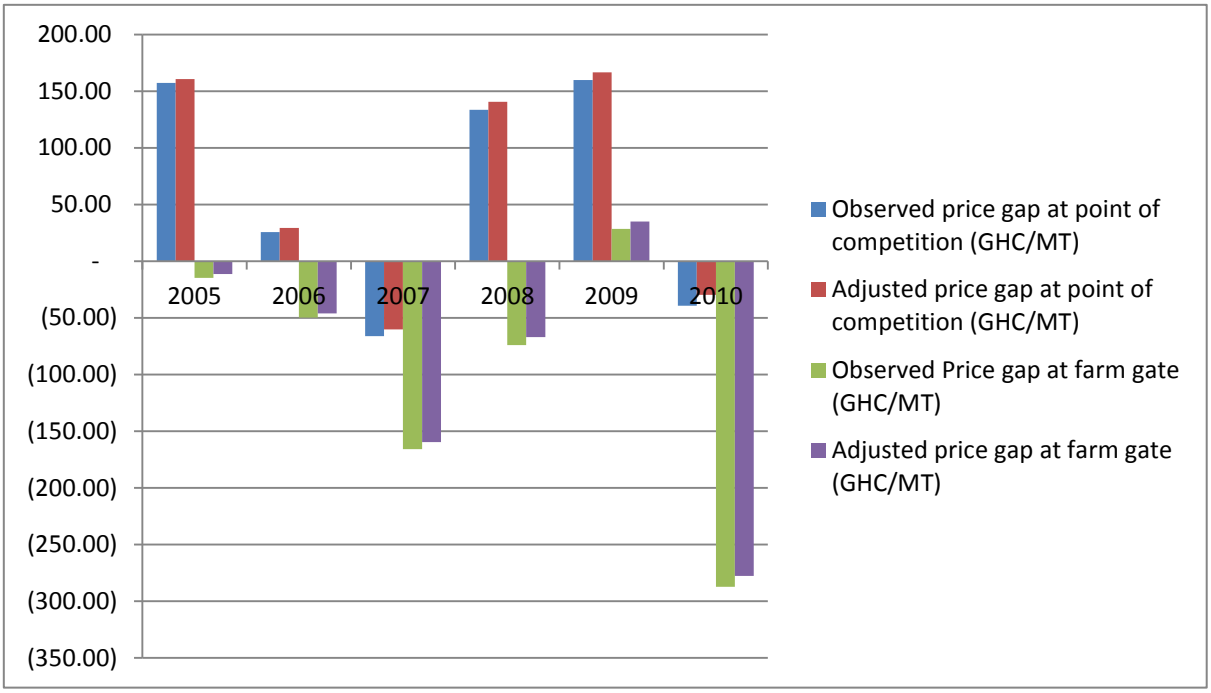
Our results show that the price gaps between the wholesale and the reference price are positive meaning that there is an incentive to trade maize for the wholesalers with the exception of years 2007 and 2010 when the price gaps show negative values of 66 and 39 GHC/MT, respectively. In 2005, 2008 and 2009 we observe high and positive price gaps. This translates into a very high rate of protection at the wholesale level between 73% in 2005 and 41% percent in 2009. The incentives in 2008 and 2009 are positive despite the suspension of the 20% import duty on maize during the soaring food prices biennium in 2008 and 2009.

The price gaps at farm gate level are negative in all years except for 2009. 2010 shows a pick disincentive for maize producers of almost 300 GHC per MT.

Rates of protection reflect this trend and contribute to highlight the fact that the maize sector in Ghana benefits from protection deriving from prices which are kept high even if not only by trade policies which were removed in those years when rates of protection appear to be higher.

Adjusted values follow a similar trend to that of observed values as adjustments could only account for the excessive taxes and levies charged on the imported commodity. We find that transport and port charges as estimated by IFPRI appear to be particularly high. However, it is difficult to find appropriate adjustment criteria for these specific costs items.

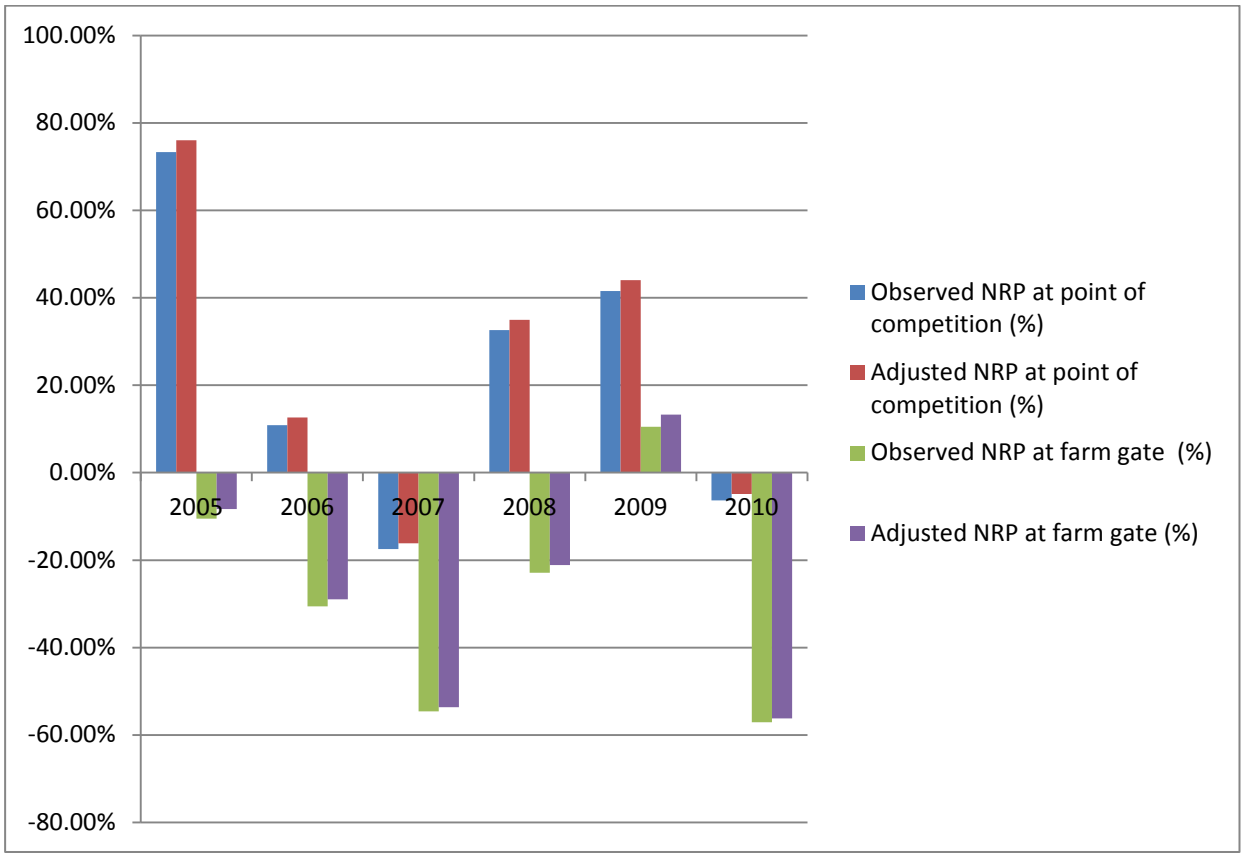
Figure 1: Observed and adjusted price gaps at wholesale and production levels (GHC/MT)



The positive value of the rate of protection at farm level for year 2009 means that the absence of import duties does not make imported goods more competitive and hence creates an incentive for the maize producers. In 2010, both farm gate and point of competition price gaps as well as NRPs show negative values. One year is not sufficient to draw robust conclusions, however, it should be noted that 2010 is the year when NAFCO started its operations and when the import duty on maize

was reinstated. It appears that at least these policies are not producing the expected benefits at the farm gate and wholesale levels.

Figure 2: Observed and adjusted nominal rates of protection at wholesale and farm levels



PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

MAIN MESSAGE

Apart from year 201o, the positive price gaps resulting from the price incentives and disincentive analysis are quite significant at the point of competition for the maize sector in Ghana. The specific impact of domestic policies such as the fertilizer subsidy, the mechanization programme and Government procurement need to be assessed more carefully but it appears that the overall policy environment provides significant incentives to wholesalers and not to producers which are largely penalized by the access costs between remote producing areas and major wholesale markets in Ghana. Moreover, import duties and taxes do not seem to play their role since incentives seem to be higher when trade policies are not in place.

These preliminary conclusions on the impact of trade policies will have to be further verified when more information on access costs becomes available.

LIMITATIONS

The unavailability of reliable information on prices of white versus yellow maize did not allow for a clear assessment of the quality adjustment ratio.

Access costs seem to be particularly high with reference to specific segments such as handling and transport charges. However it was not possible to find a reliable criterion to adjust the data on access costs.

FURTHER INVESTIGATION AND RESEARCH

Further analysis needs to be undertaken on the impact of the restrictions on imports of yellow maize on the livestock industry, the poultry sector in particular. These restrictions seem unjustified as the yellow maize imported by the poultry industry does not compete with white maize in terms of quality as the poultry industry seem to buy it even in times when this is particularly expensive.

The stagnation of average yields at 1.9 tonnes, according to MOFA estimates which seem to differ from FAO estimates, could not be evaluated against other indicators such as the use of fertilizer per hectare for which no updated information is available. Nevertheless the discrepancy between the positive trend of imports of inputs and the stagnation of yields will have to be evaluated and explained.

Updated information on the net buying/selling status of different households and the seasonal variation in prices would help explain how “incentives” might feed through to different households and explain why average yields are stagnating even though incentives seem positive for net sellers. Yearly average wholesale and farm gate prices for the incentives and disincentives analysis were calculated by excluding the month of September since it is implied that in that month there is no competition between imported and domestically produced maize. This information can be further verified by looking at imported volumes per month.

Impact of subsidies should be evaluated by developing crop budgets at the household level considering the different farm typologies especially in terms of size, the crop farming system in place,

linkage with the market. Only through these assessments it will be possible to evaluate any profitability increase at the farm level and household type, due to direct or indirect budget transfers such as the ones currently in place in Ghana.

NAFCO operations and farm gate price setting mechanisms need to be further investigated especially in terms of eventual influence and distortions they may create on the market prices.

BIBLIOGRAPHY

Chamberlin, Jordan. 2007. *Defining smallholder agriculture in Ghana: Who are smallholders, what do they do and how are they linked with markets?* GSSP Background Paper 6. Washington, DC: IFPRI.

Ghana Ministry of Food and Agriculture - Statistics, Research and Information Directorate (SRID), "Agriculture in Ghana: Facts and Figures (2010)". May 2011

Bank of Ghana Monetary And Exchange Rate Management In Ghana www.bog.gov.gh

FAO "Policies for the Effective Management of Food Price Swings in Africa The Transmission of International Maize Price Signals in Eastern and Southern Africa" Easypol Technical Brief n. 2/2010

FAO Agricultural markets and trade New Approaches to Analyzing Market Structure and Instability, Edited by Alexander Sarris and David Hallam, 2006

IFPRI, Ghana Strategy Support Programme, Working paper 28 " Analyzing Profitability of Maize, Rice, and Soybean Production in Ghana: Results of PAM and DEA Analysis" Kamiljon Akramov and Mehrab Malek, 2012.

IFPRI. "Evaluation of Four Special Initiatives of the Ministry of Food and Agriculture, Government of Ghana - A Draft Report", 2011.

IFPRI (2009). "Operational Details of the 2008 Fertilizer Subsidy in Ghana—Preliminary Report"

Ghana Strategy Support Program (GSSP) Background Paper 18

NAFCO http://foodsecurityghana.com/tag/nafco/

USDA FAS, GAIN Report, Grain and Feed Annual, April 2011

WABS Consulting Ltd. "Maize Value Chain Study in Ghana: Enhancing Efficiency and Competitiveness", December 2008

World Bank Agriculture and Rural Development Indicators, 2012 http://data.worldbank.org/indicator/AG.LND.TRAC.ZS/countries

WTO Trade Policy Review, 2008 Ghana

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

Name of product	**Maize**
International currency	**GHC**

Local currency	GHC

	DATA		Unit	Symbol	Year trade status	2005 m	2006 m	2007 m	2008 m	2009 m	2010 m
	Benchmark Price										
1		*Observed*	USD/TON	$P_{b(int\$)}$		184.77	201.62	316.21	335.28	236.78	339.37
1b		*Adjusted*	USD/TON	P_{ba}							
	Exchange Rate										
2		*Observed*	GHC/USD	ER_o		0.91	0.92	0.94	1.06	1.41	1.43
2b		*Adjusted*	GHC/USD	ER_a		0.91	0.92	0.94	1.06	1.41	1.43
	Access costs border - point of competition										
3		*Observed*	GHC/TON	ACo_{wh}		31.61	35.80	53.84	64.11	62.10	89.62
3b		*Adjusted*	GHC/TON	ACa_{wh}		28.25	32.09	47.89	57.00	55.42	79.91
4	**Domestic price at point of competition**		GHC/TON	P_{dwh}		371.82	262.45	313.17	542.73	544.18	580.00
	Access costs point of competition - farm gate										
5		*Observed*	GHC/TON	ACo_{fg}		73.41	74.23	75.76	85.69	114.11	115.91
5b		*Adjusted*	GHC/TON	ACa_{fg}							
6	**Farm gate price**		GHC/TON	P_{dfg}		126.37	112.83	137.92	249.58	298.73	216.22
7	Externalities associated with production		GHC/TON	E							
8	Budget and other product related transfers		GHC/TON	BOT							
	Quantity conversion factor (border - point of competition)		Fraction	QT_{wh}							
	Quality conversion factor (border - point of competition)		Fraction	QL_{wh}		0.90	0.90	0.90	0.90	0.90	0.90
	Quantity conversion factor (point of competition - farm gate)		Fraction	QT_{fg}							
	Quality conversion factor (point of competition - farm gate)		Fraction	QL_{fg}							

CALCULATED PRICES	Unit	Symbol	2005	2006	2007	2008	2009	2010
Benchmark price in local currency								

9		*Observed*	GHC/TON	$P_{b(loc\$)}$	168.14	185.49	297.24	355.40	333.86	485.30
10		*Adjusted*	GHC/TON	$P_{b(loc\$)a}$	168.14	185.49	297.24	355.40	333.86	485.30
	Reference Price at point of competition									
11		*Observed*	GHC/TON	RPo_{wh}	182.93	202.74	321.35	383.97	362.57	526.39
12		*Adjusted*	GHC/TON	RPa_{wh}	179.57	199.03	315.41	376.86	355.89	516.68
	Reference Price at Farm Gate									
13		*Observed*	GHC/TON	RPo_{fg}	109.53	128.51	245.60	298.28	248.46	410.47
14		*Adjusted*	GHC/TON	RPa_{fg}	106.16	124.80	239.65	291.18	241.78	400.77

	INDICATORS		*Unit*	*Symbol*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
	Price gap at point of competition									
15		*Observed*	GHC/TON	PGo_{wh}	188.89	59.71	(8.18)	158.76	181.61	53.61
16		*Adjusted*	GHC/TON	PGa_{wh}	192.25	63.42	(2.24)	165.87	188.29	63.32
	Price gap at farm gate									
17		*Observed*	GHC/TON	PGo_{fg}	16.84	(15.68)	(107.68)	(48.70)	50.27	(194.25)
18		*Adjusted*	GHC/TON	PGa_{fg}	20.20	(11.97)	(101.73)	(41.59)	56.95	(184.54)
	Nominal rate of protection at point of competition									
19		*Observed*	%	$NRPo_{wh}$	103.25%	29.45%	-2.55%	41.35%	50.09%	10.19%
20		*Adjusted*	%	$NRPa_{wh}$	107.06%	31.86%	-0.71%	44.01%	52.90%	12.25%
	Nominal rate of protection at farm gate									
21		*Observed*	%	$NRPo_{fg}$	15.38%	-12.20%	-43.84%	-16.33%	20.23%	-47.32%
22		*Adjusted*	%	$NRPa_{fg}$	19.03%	-9.59%	-42.45%	-14.29%	23.55%	-46.05%
	Nominal rate of assistance									
23		*Observed*	%	NRAo	15.4%	-12.2%	-43.8%	-16.3%	20.2%	-47.3%
24		*Adjusted*	%	NRAa	19.03%	-9.59%	-42.45%	-14.29%	23.55%	-46.05%

	Decomposition of PWAfg	*Unit*	*Symbol*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*
25	International markets gap	GHC/TON	IRG	-	-	-	-	-	-
26	Exchange policy gap	GHC/TON	ERPG	-	-	-	-	-	-
27	Access costs gap to point of competition	GHC/TON	ACG_{wh}	3.36	3.71	5.94	7.11	6.68	9.71
28	Access costs gap to farm gate	GHC/TON	ACG_{fg}	-	-	-	-	-	-
29	Externality gap	GHC/TON	EG	-	-	-	-	-	-

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