MAFAP
SPAAA

Monitoring African Food and Agricultural Policies

Suivi des politiques agricoles et alimentaires en Afrique

# ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR MAIZE IN MOZAMBIQUE

MARCH 2013

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.

The analysis presented in this document is the result of the partnerships established in the context of the MAFAP project with governments of participating countries and a variety of national institutions.

For more information: **www.fao.org/mafap**

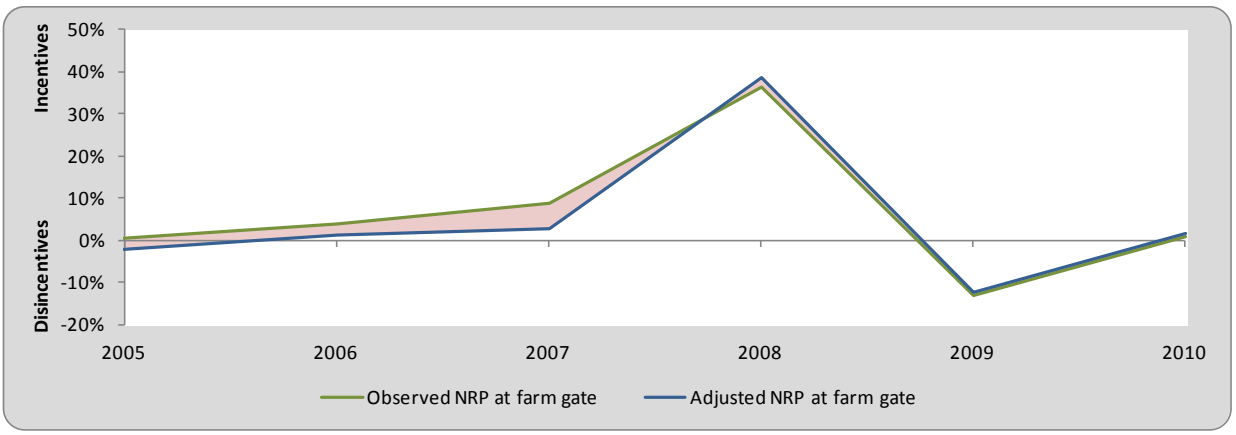
Suggested citation:

Dias P., 2013. Analysis of incentives and disincentives for maize in Mozambique. Technical notes series, MAFAP, FAO, Rome.

# SUMMARY OF THE NOTE

Product: Maize
Period analyzed: 2005 – 2010
Trade status: Import in all years (Southern region market)

- Maize is the second most important staple food in Mozambique (after cassava), along with rice, beans and millet. Its production is mainly concentrated in the central and northern region (surplus areas), while the south Mozambique (except Gaza province) is the deficit area and net importer from South Africa.
- Production was relatively volatile over the period of analysis, reaching its maximum of 1.9 million tonnes in 2009 compared to 942 000 tonnes in 2005. Yields followed the same pattern of volatility and reached the maximum of 1.2 tonnes/ha in 2009 compared to 0.77 tonnes/ha in 2005, which is however still below the average of the African countries (1.8 tonnes/ha).




The observed Nominal Rate of Protection (NRP, green line) indicates that maize farmers have received price incentives under the prevailing cost structure in the value chain (except in 2009). 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.

Overall, our indicators show that government policies, such as the application of tariffs on imports of maize grain from South Africa, are more supportive to wholesalers than to producers. However, the incentives to maize wholesalers may explain the high level of prices of maize grain in the Maputo market, especially in 2008, the peak of the food price crisis. During this year, the price of maize increased by 63 percent compared with that in 2007 (SIMA), suggesting that price volatility on the international market was directly transmitted to wholesalers in Maputo. It is important to note that protection to wholesalers and producers impacts negatively on consumers, since wholesale prices in Maputo were above reference maize prices for all years under review (Figure 12). Urban consumers therefore pay higher prices than would be the case under a free trade regime and efficient functioning of the maize market.

Finally, incentives at farm level suggest that the government objective of promoting food security through increased production and self-sufficiency of maize is gradually being achieved. For example, in 2009 and 2010, total volume of maize production reached record levels, while imports declined further (Table 2). As a result, the self-sufficiency ratio of Mozambique's maize production came close to 100 percent during these years.

# CONTENTS

# 1. PURPOSE OF THE NOTE

This technical note aims to describe the market incentives and disincentives for maize in Mozambique. 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 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 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 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

Maize is the most important cereal crop in Mozambique, followed by wheat, rice, sorghum and millet. It is produced in nearly all regions of the country, with the Central and Northern regions producing a surplus. The Southern region often produces less than the volume consumed; as a result, it has to rely on supplies from other areas, mainly South Africa. Productivity is low since smallholders, who dominate maize production, rely on hand hoes and rainfed agriculture, with limited access to inputs and technology (Tostão et al., 2010). The average farm size is less than one hectare, and production is currently estimated to be around 0.3 - 0.9 tonnes per hectare (Agricultural Survey, TIA, 2008).

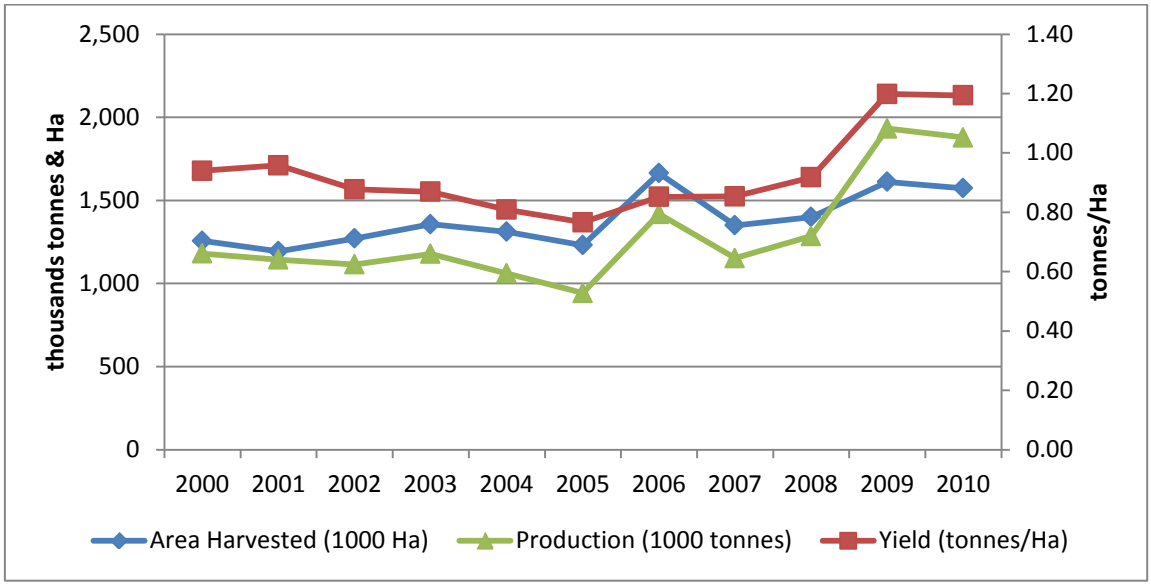
Overall, most farmers produce maize exclusively for household needs (subsistence production), with little surplus to sell in the local market. This fact underscores the significant importance of maize for food security for the large majority of poor households, who rely on agriculture for their livelihoods. In this respect, increasing maize production and productivity would not only contribute to reducing poverty and hunger in rural areas; it would also help to reduce import bills through import substitution.

## PRODUCTION

As shown in Figure 1, maize production was volatile over the period under review, reaching its maximum of 1.9 million tonnes in 2009 compared to 942 thousand tonnes in 2005. Yields followed the same pattern of volatility and reached the maximum of 1.2 tonnes/Ha in 2009 compared to 0.77 tonnes/ha in 2005. From 2007 to 2009, production of maize increased significantly, part of this good performance is attributed to the expansion of cultivated area. Some sources attribute the increase in production to increased foreign aid to the agriculture sector (Peiris, 2008), while others (PES[1], 2012) suggest the government's policies in support of the agricultural sector such as the Green Revolution Strategy. From 2009, after the peak of the international economic crisis, production of maize reduced significantly. Several reasons are attributed to this reduction in production; i) bad weather conditions (drought followed by heavy floods) which affected the production areas in the central and north regions of the country; ii) high prices in 2008, which could have influenced maize producers to engage in production of other cash crops (crop substitution), taking advantage of the increase of prices in the local and international markets, and iii) the international economic crisis which forced the government to reallocate resources to support immediate short term initiatives to buffer the effects of high food prices and price volatility on the poor households.

[1] Mozambique Economic and Social Plan.

**Figure 1: Maize area harvested, yield and production trends in Mozambique**



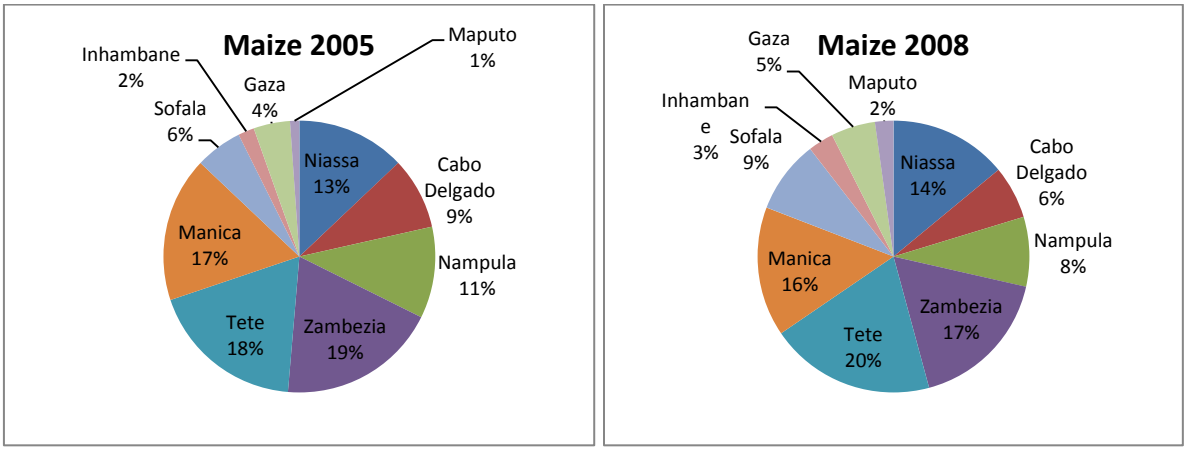

Source: FAOSTAT

Figure 2 below shows the distribution by province of maize production in Mozambique. The main production provinces are in the Center and Northern Mozambique (notably in Nampula, Zambezia, Tete, Manica and Sofala). Zambezia, Tete and Manica account for over 50 percent of the country's maize production in 2005 and 2008. According to the Mozambican Agricultural Survey (2008), about 21 percent of maize produced is sold, evidencing that a significant quantity is consumed by farmer households - accounting for 11 percent of total daily intake of calories in 2009 (Table 1).

Figure 2 below also shows no change in the distribution of maize production between 2005 and 2008[2]. The central and Northern Mozambique, where 76 percent of the population lives, emerge as the high producing regions despite their weak link with the most important urban markets in the southern Mozambique (such as Maputo). Additionally, high transportation and transaction costs due to poor rural infrastructure constitute a significant barrier for the rural farmers to sell their surplus in the deficit areas in southern Mozambique (Third National Poverty Assessment, 2010). At the same time in the southern provinces, maize production is fairly low (Figure 2) and faces competition from South African imports. Given these factors, strong trade flows within the SADC region are important to provide market opportunities for smallholder farmers in the North and Central regions.

[2] i.e., the structure of maize production has largely remained the same in 2005 and 2008.

**Figure 2: Distribution of maize production in Mozambique by provinces, 2005 and 2008**



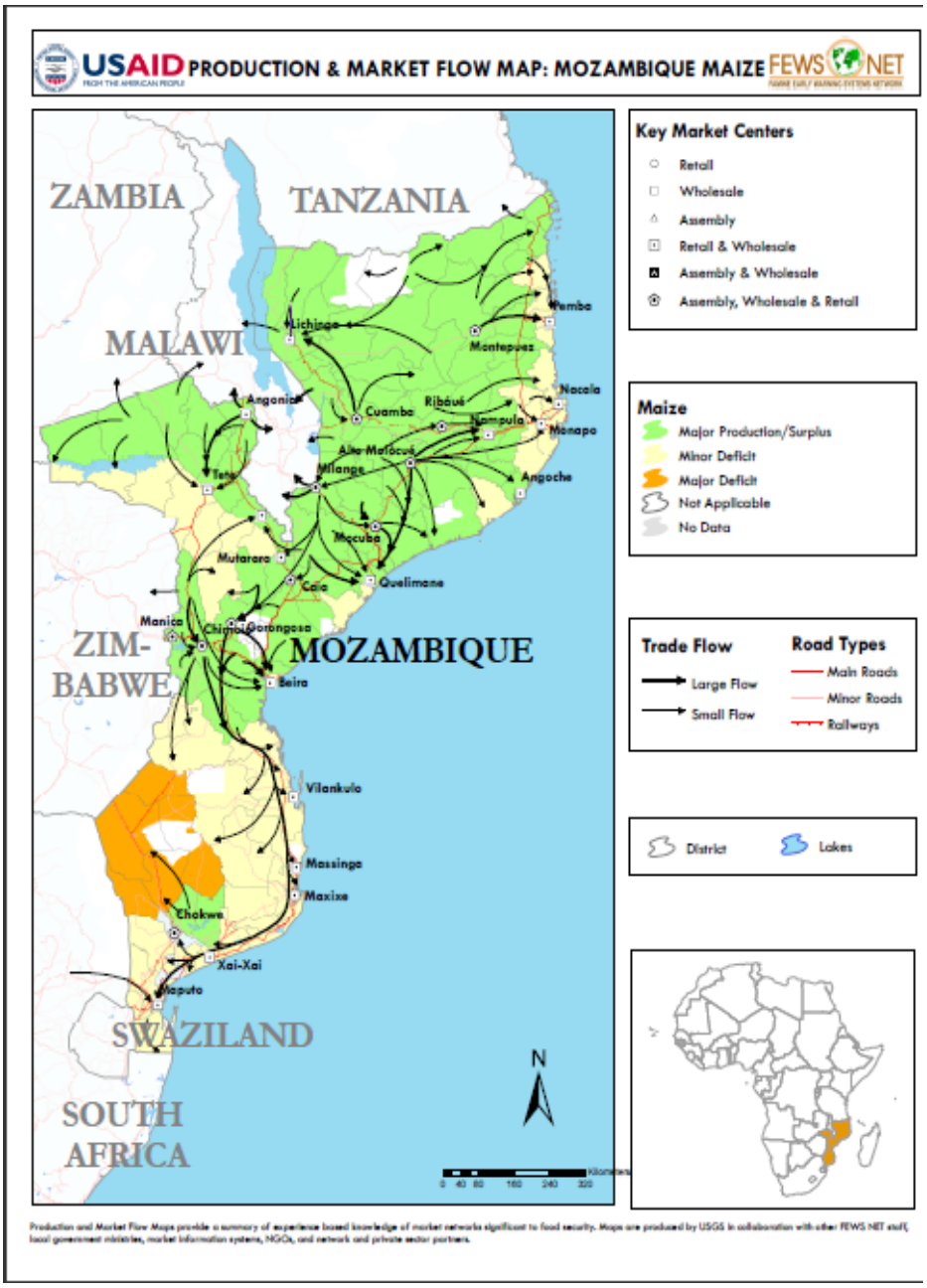

Source: IAF (2005/2008)

Figure 3 below shows the main production and market flows of maize in Mozambique. The difference between the surplus regions in the north and central areas of the country, and the deficit areas in the south can be clearly observed. The figure also shows a large trade flow from the central regions to the urban retail market in Maputo.

**Figure 3: Production and Market Flow Map:**

In the Southern Region, Gaza Province is a main production province and accounts for 5 percent of total maize production in 2008. It is the only surplus area in the south of Mozambique. It is important to mention that therefore Gaza is considered a strategic agricultural region in terms of production of maize and other staples (such as rice) because of its potential and favourable agro-ecological conditions for agriculture (PES, 2012) and proximity to Maputo. Gaza also has the biggest and the most important system of irrigation in the country, but the rate of utilization is below 50 percent of its potential, (MozSAKSS [3], 2012).

As a result, despite the available potential, the Southern Region of Mozambique is still net importer of maize from South Africa.




Source: FEWSNET

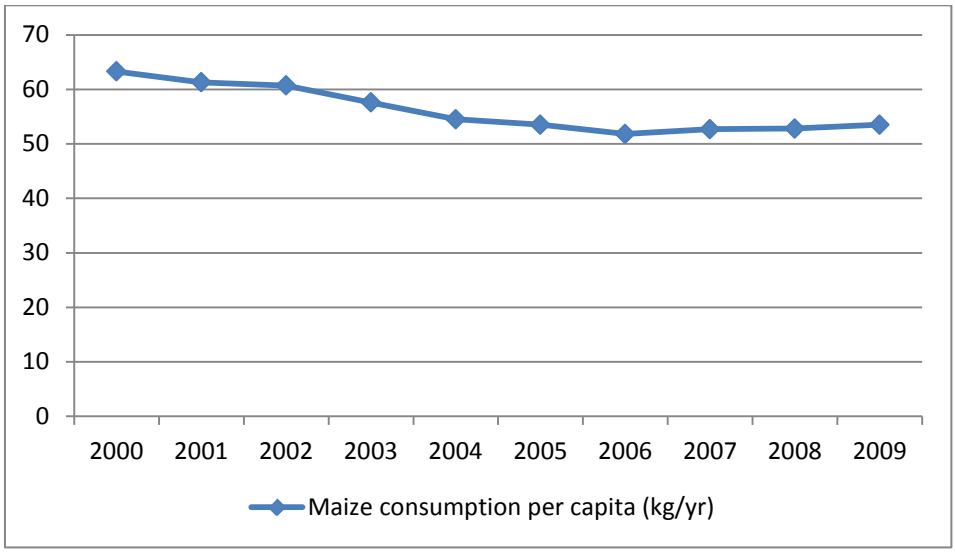
[3] Mozambique Strategic Analysis and Knowledge Support System

## CONSUMPTION/UTILIZATION

Estimates from the latest FAO food balance sheet for Mozambique indicate that over 80 percent of maize is consumed as food, with a remaining small percentage used for feed, seed or industrial materials (Table 1). In terms of regional distribution, maize is the major food staple consumed in nearly all regions of the country (notably in Central and Southern Mozambique)[4]. It is mainly eaten in the form of flour, mixed with water to make a nutritious porridge (known as *xima*), and also roasted or boiled (fresh). In some cases, consumers mix maize and cassava flour to make porridge (notably in the Central and Northern regions), depending largely on the seasonal availability of these products. Poor households adjust the mixture to accommodate available budgets and taste preferences, due to seasonal variation in the price of maize (Donovan et al., 2011).

Figure 4 below shows the average annual consumption per capita of maize between 2000-2009. The figure shows a gradual reduction of per capita maize consumption. This reduction can be attributed to different factors; i) the substitution of maize with cheaper staples such as cassava as a result of high maize prices, and ii) the improvement of standards of living in urban areas which resulted in a shift from consumption of maize to rice, as well as from maize grain to maize flour.

**Figure 4: Mozambique maize grain consumption per capita**




Source: FAOSTAT Food Balance Sheets

[4] In the Southern region, maize is much more widely consumed in rural than in urban areas (IOF, 2008).

**Table 1: Trends in maize consumption and supply quantities in Mozambique**

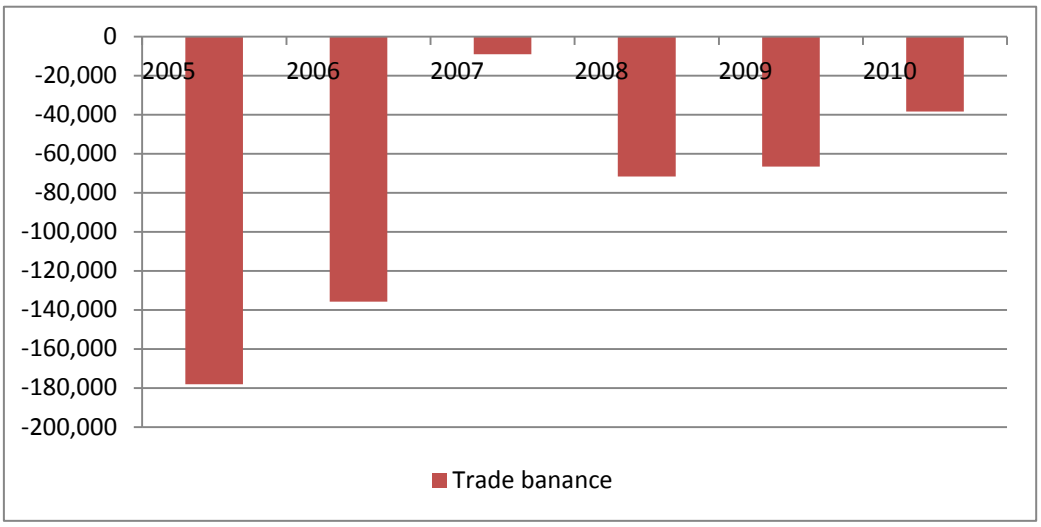
| year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| Domestic supply quantity (1000 tons) | 1,380 | 1,393 | 1,383 | 1,361 | 1,325 | 1,300 | 1,353 | 1,361 | 1,413 | 1,555 |
| Food (% of total supply quantity) | 84% | 82% | 84% | 83% | 83% | 86% | 82% | 84% | 83% | 79% |
| Feed (% of total supply quantity) | 10% | 11% | 8% | 10% | 10% | 7% | 10% | 8% | 9% | 13% |
| Seed (% of total supply quantity) | 2% | 2% | 2% | 2% | 2% | 3% | 2% | 2% | 2% | 2% |
| Other (% of total supply quantity) | 6% | 6% | 6% | 6% | 6% | 6% | 8% | 6% | 6% | 6% |
| Food supply quantity (kg/capita/yr) | 63.3 | 61.3 | 60.7 | 57.6 | 54.5 | 53.5 | 51.8 | 52.7 | 52.8 | 53.5 |
| Food supply (kcal/capita/day) | 508 | 492 | 487 | 462 | 437 | 430 | 416 | 423 | 424 | 430 |
| Protein supply quantity (g/capita/day) | 13.4 | 13 | 12.8 | 12.2 | 11.5 | 11.3 | 11 | 11.1 | 11.2 | 11.3 |
| Fat supply quantity (g/capita/day) | 5.5 | 5.3 | 5.2 | 5 | 4.7 | 4.6 | 4.5 | 4.6 | 4.6 | 4.6 |

Source: FAOSTAT food balance sheets (2012)

## MARKETING AND TRADE

During the colonial period, the Mozambican economy was structured mainly as a service economy for neighbouring states, and integrated into a region dominated by South African industrial capital mainly through the provision of transport services and mining labour. Geographical and historical factors between the regions also contribute to the large differences in maize production and trade in Mozambique. In terms of regional distribution of economic activities, the country was divided into two regions: the southern region was specialized in providing labour to the mining industry in South Africa, while central and northern regions were dedicated to agriculture. This economic structure still exists, but with some changes due to foreign direct investment in a number of large industrial projects (the so-called "mega-projects") in the central and southern regions. The production and market flow map of maize in Figure 3 above shows that the central and northern region are the major production/surplus areas, while the south Mozambique (except Gaza province) is the deficit area.

**Figure 5: Maize trade balance (X – M) in Mozambique (2005-2010)**




Source: FAOSTAT and UN COMTRADE

Figure 5 above shows that Mozambique is a net importer of maize at the national level. However, big differences exist between regions. Namely, maize is imported in the south (net imports from South Africa), while in the central and northern Mozambique, imports of maize only occur during lean periods (i.e., low season - from Malawi and other neighbouring countries), while most of the year the northern region is an exporter and supplier of maize to neighbouring countries, such as Malawi, Zimbabwe and Tanzania. This tends to keep the prices in central/northern Mozambique closely tied to Malawian prices (Tostão et al. 2010).

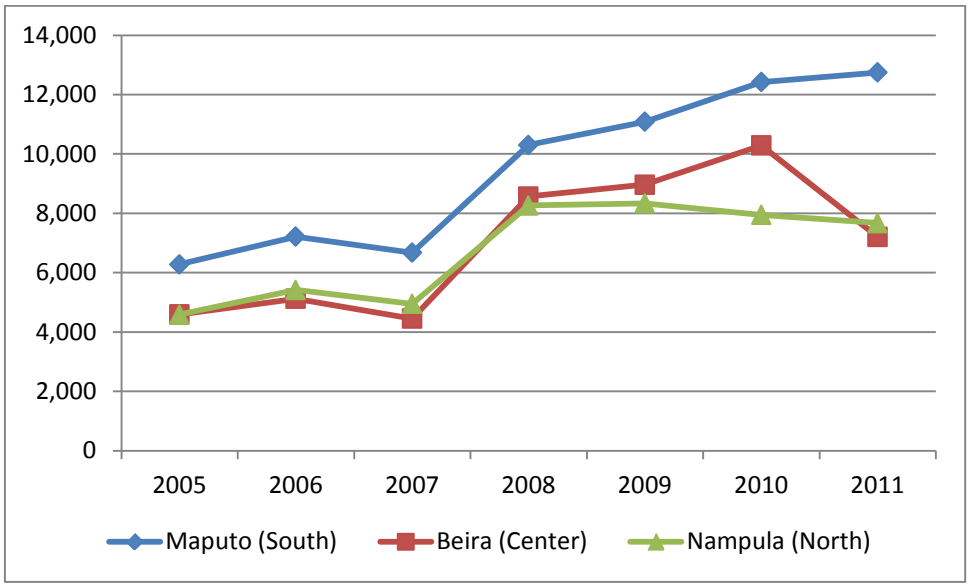
**Table 2: Maize production, import and export of Mozambique**

| Item | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| Production (tonne) | 942,000 | 1,417,800 | 1,152,050 | 1,284,930 | 1,932,000 | 1,878,000 |
| Import (tonne) | 179,000 | 239,000 | 28,150 | 100,893 | 81,794 | 42,493 |
| Export (tonne) | 931 | 103,210 | 19,123 | 29,156 | 15,190 | 4,007 |
| Trade Intensity (X+M)/P | 19.10% | 24.14% | 4.10% | 10.12% | 5.02% | 2.48% |

Source FAOSAT and UN COMTRADE

In terms of volume, Table 2 shows that in 2009 and 2010 total maize production reached very high levels compared to the period 2005 – 2008. This resulted in a further reduction of imports and of trade intensity. In 2010, imports and exports only represented 2.5 percent of total volume. Imports only constituted 2.2 percent of total volume, which has brought Mozambique close to maize self-sufficiency in 2010.

**Figure 6: Retail prices of maize by regions (MT/tonne)**




Source: SIMA

Figure 6 above shows the differences in trends of the retail prices between the main markets of the three Mozambican regions. Retail prices of maize are consistently higher in Maputo because supply from the region is not sufficient to meet demand. In addition, high transportation costs due to the long distance between Maputo (maize deficit city) and the production regions (central and north Mozambique) exist. The distance between Maputo and Beira is 1 216 km, and from Maputo to Nampula is 2 039 km. This constitutes a huge barrier in terms of market integration between Mozambican regions.

The construction of a bridge over the Zambezi River (inaugurated in 2010) connecting the southern and northern regions of the country is expected to reduce the market access cost and facilitates the commercial flows between these two parts of the country. This bridge effect cannot be captured by the commercial flows under the period of analysis, as the results will only be visible in the coming years.

Therefore, for the purpose of this study we will focus our analysis of price incentives and disincentives on two key regions, namely south (Maputo) and centre (Manica and Chimoio). Maputo is the main wholesale and retail market in southern Mozambique and the most important point of competition of the country where domestically produced maize competes with imports from neighbouring South Africa. Manica and Chimoio are among the main maize production areas in the centre of the country from which surpluses are sold in Maputo. The analyzed flows are further explained in the chapter on Data Requirements and Calculation of Indicators.

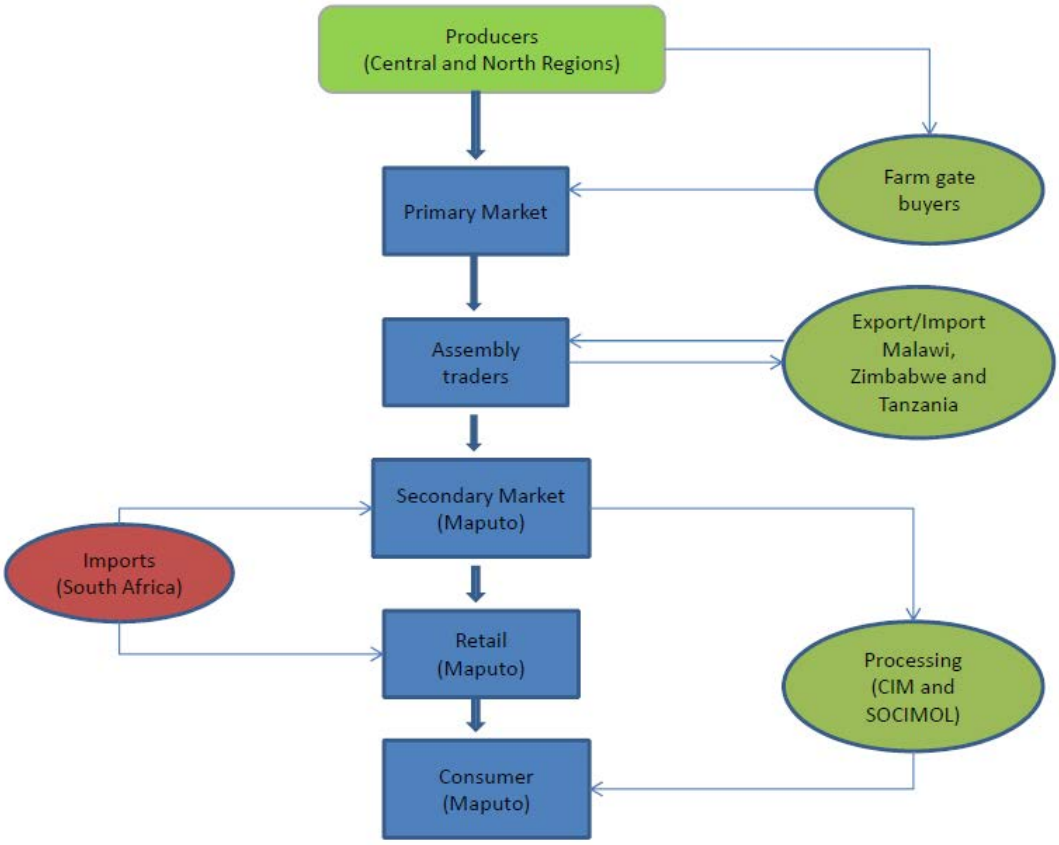
## DESCRIPTION OF THE VALUE CHAIN AND PROCESSING

Maize is generally sold directly to consumers in local markets, but most of the production is sold to middlemen and small traders, who sell it on to larger wholesalers in the cities (Figure 7). It has been estimated that only 20 percent of domestic maize production is actually marketed (TIA, 2008). Traders and middlemen generally buy maize at local markets in the Central and Northern regions and transport it to wholesalers in urban areas. Wholesalers then sell directly to retailers and grain millers. Commercial farmers, or larger traders who have access to storage facilities and financial capacities to support high transportation costs to ship the maize from producers to the markets, are able to take advantage of these market opportunities in terms of profit margins, since they buy maize directly from producers or small traders for a very low price and sell it to wholesalers in urban areas for high prices.

When it is not consumed fresh, maize is processed using various technologies that require the use of simple tools (the traditional way of processing) or mechanical equipment in the case of specialized industries. The main Mozambican industries involved in processing maize for human consumption, as well as for animal feed, are SOCIMOL and CIM,[5] located in Maputo, MOBEIRA, in Sofala, and CIMPAN in Nampula[6]. A significant quantity of maize processed by these industries is imported from neighbouring countries due to lack of capacity on the part of local producers in satisfying demand in terms of quantity and quality standards, i.e. conservation, packaging, etc. For example, CIM usually buys maize in the central and northern regions - as a political strategy aiming to promote local producers, but due to unreliable supply of maize in the central and northern regions, it imports significant part of maize from South Africa and process very little quantity of maize from local producers. 2010 is, however, an exception, imports only constituted 2.2 percent of total volume, which has brought Mozambique close to maize self-sufficiency.

[5] SOCIMOL - Sociedade Comercial e Industrial de Moagem and CIM - Companhia industrial da Matola.
[6] MOBEIRA - Moagem da Beira and CIMPAM – Companhia de Processamento Industrial de Milho.

**Figure 7: Simplified marketing chain for maize in Mozambique**




Source: Authors

## POLICY DECISIONS AND MEASURES

Mozambique has a wide set of policies targeting the agricultural sector. Unlike in other African countries, maize is not the main staple food in Mozambique and the country does not have a specific policy for the production and marketing of maize. All policy decisions and measures undertaken by the government aim to improve the agricultural sector as a whole – the maize subsector is considered along with other crops. In this section we describe the relevant policy instruments of intervention used by the government in the recent years.

**International and Regional Trade Policy Measures**

In the last two decades, trade reforms (such as the elimination of *exchange controls* and *quantitative restriction on imports*) have been implemented by the Mozambican Government in compliance with the *Washington consensus* which was based on market liberalization, fiscal discipline and privatization. With the exception of the minimum prices for sugar and petroleum products, prices of all other goods and services were liberalized (MozSAKSS, 2012).

At international level, Mozambique is a member of the World Trade Organization (WTO) and the African Caribbean and Pacific Group of States (ACP) which grants a preferential trade agreement with the European Union (European Partnership Agreement - EPA).

The country is also classified as a Least Developed Countries, a group of countries that are awarded preferential trade and access to some international markets such as the USA and the European Union.

At the regional level, Mozambique is a member of the Southern African Development Community (SADC) which commits its members to the removal of trade barriers. This should also include the elimination of the application of value-added tax (VAT) on cross-border trade among the SADC countries. However, in the case of maize trade between Mozambique and South Africa, this is not applied and VAT is still levied at the border on imports of maize grain (MozSAKKS, 2012). This creates an immediate cost disadvantage for the imported product. Since VAT is not applied to domestic production, this measure *de facto* constitutes a trade policy measure in the form of an import tax.

On the other hand, large millers (such as CIM and SOCIMOL) who import maize grain from South Africa and mill the grain in Maputo are entitled to the full reimbursement of the VAT. This government policy is favourable to the large millers who import maize grain for milling while small traders who import grain to sell it in Maputo are not refunded the VAT. Tschirley et al. (2006) conclude that due to this imbalance, grain retailed in markets in southern Mozambique was mostly of domestic origin. This explains the preferences of traders in Maputo to procure maize grain from central and northern region of Mozambique, despite the high transportation cost, which keeps the prices in Maputo market higher than in other regions.

**Marketing and price policies**

After price liberalization in 1989, presently price control is restricted to the basic products, including subsidized food products sold through a ration system in urban areas and transport services in order to protect the most vulnerable population (MozSAKSS, 2012). As a general rule, prices in Mozambique are determined by market forces; this makes imported inputs (such as fertilizer) unaffordable for smallholder farmers - discouraging them from using inputs that can improve their productivity.

The simplified regulation which eliminated the *pre-declaration* and *formal quote requirements for importers* where the value of their imports did not exceed USD 500 encouraged informal cross-border traders to formalize their activities (notably cross border traders between Mozambique and South Africa). Finally, after the international food crisis in 2007/2008, Mozambique introduced food price subsidies (such as subsidy of price of bread, rice, cooking oil, beans) aiming to minimize the effects of food price volatility affecting the most vulnerable households, both rural and urban.

**Agriculture Inputs Measure/Subsidies**

In 2010, the Mozambican government introduced production subsidies consisting of a 10 percent reduction of electricity price per kilowatt-hour aiming to incentivize the domestic industry, notably farmers which use electricity for food production. Maize producers also benefited from this government subsidy, as it is one of the most important staple crops and consumes substantial quantities of energy during milling. Also in 2010, the government introduced credit subsidies of USD 25 million with low interest loans to small farmers to support cereal production growth during the planting season. Maize producers also benefited from this government subsidy.

A two-year Agricultural Input Subsidy Programme was introduced in 2009 and targeted 25 000 producers in five provinces and 17 districts (MozSAKSS, 2011).

Through the programme, farmers received either a rice input pack (40 kg seed and 2 bags of fertilizer) or maize input pack (12.5 kg seed and 2 bags of fertilizer). Own contribution of farmers consisted of 30 per cent of the cost of inputs. Government projections indicate that the measure has had a short term positive impact on increasing production and productivity of smallholder farmers in rural areas (PES, 2012) but no specific data on the impact of the subsidy programme is currently available.

The unavailability of data on a specific amount of subsidies received by farmers hampers the identification of the real impact of agricultural policy on smallholder farmers and to determine the exact level of budgetary transfers to maize farmers that were realized. This problem can be solved by public expenditure analysis, which is expected to take place under MAFAP in the future.

# 3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

To calculate the indicators to estimate incentives or disincentives to production (NRP)[7] as well as the Market Development Gaps (MDGs), several types of data are required. These data were collected and are presented and explained hereafter.

## TRADE STATUS OF THE PRODUCTS

As mentioned before, Mozambique's maize trade is segmented into two main regional markets - the southern market (net importers and consumers) and central/northern market (maize producers/suppliers/ consumers). Due to geographical and historical factors which contribute to the large differences in demand and supply of maize between the regions, maize produced in the north during the high season is exported to Malawi and other neighboring countries. The southern region is net importer of maize from South Africa (FAOSTAT, UN COMTRADE). Overall, Mozambique is a net importer of maize for the whole period under analysis. Therefore, in our analysis, the trade status of the country is 'import' for all years.

## BENCHMARK PRICES

**Observed**

Calculating a reference parity price to determine whether Mozambique maize farmers receive market incentives or disincentives requires establishing a benchmark border price. Since maize is considered an import commodity in Mozambique, a CIF price was calculated based on the unity value using data from the UN COMTRADE. The official statistics confirm that over 70 per cent of the total maize imported and traded in the Mozambican markets is from South Africa. Therefore, the benchmark price is the Maputo's CIF price for imports from South Africa (Table 3).

**Table 3: Estimating the benchmark price of maize with unit value of imports (USD/tonne)**

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| CIF price (UED/tonne) | 185 | 185 | 167 | 249 | 322 | 228 |

Source: UN COMTRADE

**Adjusted**

No adjustments to the benchmark price have been made.

## DOMESTIC PRICES

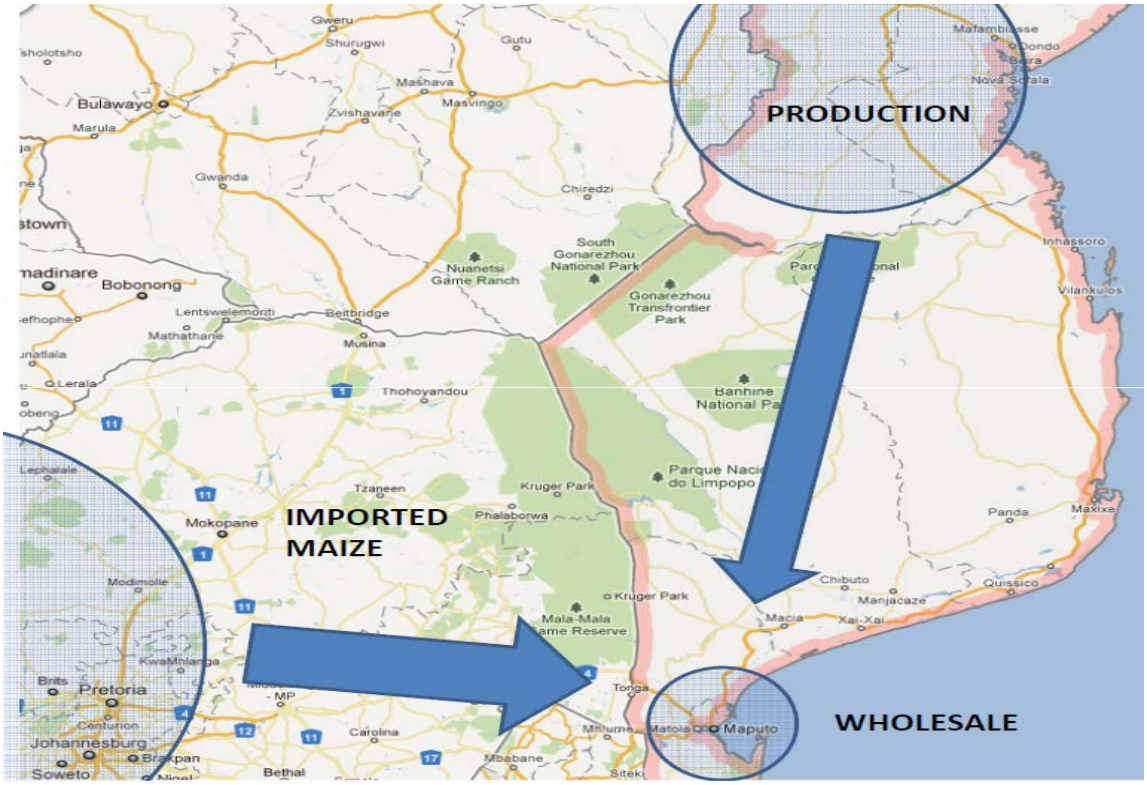
In order to determine the domestic prices it is important to define the *point of competition* where the domestic maize competes with the imports. For this study, we have selected Maputo as the point of competition because this is where domestic maize competes with the imported maize from South Africa.

[7] NRP - Nominal Rate of Protection.

The data source for the farm gate price is the SIMA (Market Information System – Ministry of Agriculture, Mozambique). The SIMA collects data on wholesale prices, farm gate prices and transport costs on a weekly basis for a range of core agricultural products (notably maize, rice, cassava and beans) in 25 urban markets (cities and towns) covering all provinces in Mozambique (Third National Poverty Assessment, 2010).

The farm gate price is the average of the farm gate price from Manica province (Table 4), because this province is among the biggest producers of maize (Figure 2) and is located in the central region of Mozambique - close to the main road which connects the north and southern Mozambique (Maputo). An overview of the analyzed product flow is given in Figure 8.

**Figure 8: Overview of analyzed maize flows from South Africa, Manica and Sofala to wholesale market in Maputo**




Source: Authors

**Table 4: Production prices (average MT/tonne Chimoio - Manica)**

| Production price | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| Chimoio | 3,520.31 | 3,959.59 | 3,423.49 | 6,230.48 | 6,928.54 | 7,361.75 | 7,773.81 |
| Manica | 3,596.43 | 4,285.32 | 3,695.64 | 9,086.90 | 7,789.68 | 7,382.45 | 7,638.10 |
| **Average** | **3,558.37** | **4,122.46** | **3,559.56** | **7,658.69** | **7,359.11** | **7,372.10** | **7,705.95** |

Source: SIMA

## EXCHANGE RATES

**Observed**

The exchange rate between the Mozambican Metical and the United States Dollar has been taken from the IMF database on exchange rates. The average of the exchange rate for each year has been calculated from the monthly data reported in that database.

**Table 5: Nominal exchange rate MT/USD**

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| Nominal Exchange Rate | 23.06 | 25.40 | 25.84 | 24.30 | 27.52 | 33.96 |

Source: IMF

As shown in Table 5, from 2006 to 2008 the nominal exchange rate was stable, with slight reduction in 2008. The stability of Metical against the dollar (from 2006 to 2008) was due to the good performance of the Mozambican economy as well as the results of monetary reforms introduced by the Central Bank of Mozambique during this period. From 2008, the nominal exchange rate increased slightly reaching its maximum of 33.96 MT/USD in 2010 compared to 23.06 MT/USD in 2005. This was driven largely by the discovery of new vast reserves of coal and natural gas in 2008/2009, which prompted several billion dollar investments by the world's largest mining and oil companies, contributing to real exchange rate appreciation, with negative impact on the real economy (notably export sector). Official projection indicates that the nominal exchange rate is expected to continue appreciating as Foreign Direct Investment (as well as foreign aid) rise.

**Adjusted**

As there is no explicit exchange rate policy or foreign currency controls there is no justification to consider an adjusted exchange rate.

## ACCESS COSTS

Access cost are calculated for two different segments of the maize value chain, namely: i) the access cost from the farm gate (Manica/Chimoio) to the point of competition (Maputo), which uses SIMA data; and ii) from the South African border to Maputo which uses data from the World Bank working paper 2004. In both routes, maize is shipped to the point of competition through road transport (SIMA).

According to the agricultural markets information system (SIMA), the transportation cost is the main component determining the access cost of transporting maize to the point of competition; while all other components of access cost (such as storage and handling) are basically incorporated into the transport cost. Also, there is no distinction between the transport costs of the different commodities analyzed by SIMA (cassava, maize, rice and beans), as the unit of measure used by SIMA is MT/tonne/km. This is also confirmed in the World Bank study on the maize value chain (2004), that the transport cost is one of the main components of access cost in the value chain of maize in Mozambique.

**Observed**

Farm gate (Manica/Chimoio) to wholesale (Maputo)

The distance between Maputo and Chimoio is 1 150 km. Manica is a district which is close to Chimoio (51 km), both are located in the Manica Province which the capital is Chimoio. The total observed access cost from the farm gate to wholesale ranges from 1 349 to 1 726 MT/tonnes in 2005 and 2010, respectively - as shown in Table 6 below. The transport cost is the main component of the access cost in this segment of maize value chain; due to the long distance between producing areas and the wholesale market (Table 6). The other component of the access cost is the 5 percent profit margins[8] as shown in the Table 6 below.

Wholesale (Maputo) to Border (Ressano Garcia)

The maize is mainly transported by road, the distance between Maputo to Ressano Garcia (South African border) is 97 km and the road is in very good condition. The access cost in this segment of the maize value chain are relatively low compared to the cost from farm gate to Maputo market, it ranges from 667 MT/ton in 2005 to 1,355 MT/ton in 2010, as sown in Table 6 below.

The transport cost from the border (South Africa) to Maputo was estimated using the average price per tonne/km specified in World Bank working paper (2004) and not by using the SIMA data although this was the first intention. The main reasons for that choice include: (i) SIMA provided data on transport cost from South Africa to Maputo only for two years (2005 and 2011); and (ii) the transport cost (MT/ton/km) reported by SIMA is very high and is out of range compared to the value obtained for the distance production areas –Maputo. Since SIMA collects data on prices and transport costs on a weekly basis for a range of core agricultural products (notably maize, rice, cassava and beans), we suspect that the transport costs indicated for 2005 and 2011 actually refer to a specific weeks and are not average for the year and resulting in an over estimation of these costs. The transport cost obtained from the World Bank (WB) study is an annual average for 2004 and is more consistent with the transport cost estimated for the distance production areas – Maputo. We estimated the transport cost for the period 2005-2010 that we analyze by adjusting the value of 2004 with the consumer price index. We therefore decided to use the data from the World Bank (WB) study for the observed access cost. The results are presented in the table below.

[8] We considered 5 percent of profit margins because no detailed information on profit margins was available.

**Table 6: observed access cost from the border to the point of competition (MT/tonne)**

| Access cost (MT/tons) | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| **Chimoio - Maputo** | | | | | | |
| Estimated average distance (farmers - Market) | 1,150 km | | | | | |
| Transport cost | 1,171 | 1,214 | 1,571 | 1,143 | 1,143 | 1,357 |
| Profit margins (5 % of producer price) | 178 | 206 | 178 | 383 | 368 | 369 |
| Total | 1,349 | 1,420 | 1,749 | 1,526 | 1,511 | 1,726 |
| **Maputo - Ressano Garcia (South African border)** | | | | | | |
| Distance (Maputo - Border) | 96.3 km | | | | | |
| Transport cost (Maputo - Border) | 143 | 178 | 196 | 203 | 238 | 331 |
| Profit margins (5 % of wholesale price) | 291 | 312 | 314 | 511 | 503 | 569 |
| Customs brokers (0.5% of CIF price) | 21 | 23 | 22 | 30 | 44 | 39 |
| Total | 455 | 513 | 531 | 745 | 785 | 939 |

Source: Own calculations on SIMA and World Bank data

**Adjusted**

We adjusted the access cost in the segments of the maize value chain from the producing areas in the central and northern regions to the point of competition (Maputo) by reducing 25 percent on the transport cost made available by SIMA. The estimate aims to take into account the informal system of transport mostly used by traders operating in different markets. Under the informal system of transport, the transport cost is less than the official transport cost reported by SIMA. In this study, we assume that transport costs are 25 percent less than the cost reported by SIMA. The information was collected though interviews with traders in Maputo market. This also explains the preference of local traders in Maputo market for maize from central and northern Mozambique, despite the long distance between producing areas and Maputo market.

Traders operating in Maputo market mostly use informal systems of transport to ship agricultural products from the central and northern regions to Maputo (point of competition).
It is important to note that, a significant part of the products supplied to different regions of Mozambique come though Maputo, due to its strategic geographical location, more specifically its proximity to South Africa (the main trade partner of Mozambique). Additionally, Maputo has the most important port of the country and is where the majority of Mozambican industries are located. The products are supplied to different regions of the country by road transport using trucks hired from different trucking companies. In theory, the trucks come back empty on their way back to Maputo, but in reality they transport agricultural products (informally) to supply the Maputo market. This informal system of transport is well developed/established among traders operating in different regions of Mozambique.

## EXTERNALITIES

No externalities have been taken into account in the analysis.

## BUDGET AND OTHER TRANSFERS

Although we are aware of the existence of some specific budget transfer to producers of maize as a result of subsidies on agricultural inputs to maize farmers, no specific data on the expenditures

targeted towards maize production are currently available. As consequence we will only calculate NRPs and not NRAs at this stage.

## QUALITY AND QUANTITY ADJUSTMENTS

No quality or quantity adjustments have been applied in our analysis.

## 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 Mozambique.

**Table A1: Sources of data used in the calculations of indicators**

| | | ***Description*** | |
|---|---|---|---|
| ***Concept*** | | ***Observed*** | ***Adjusted*** |
| Benchmark price | | *CIF price calculated as unit value from import data reported in UN COMTRADE from main origin of imports (see table 3).* | *N.A.* |
| Domestic price at point of competition | | *Annual average of wholesale price in Maputo market as reported by the Market Information System – Ministry of Agriculture, Mozambique (see figure 12).* | *N.A.* |
| Domestic price at farm gate | | *Annual average of the farm gate price from Manica and Chimoio as reported by the Market Information System – Ministry of Agriculture, Mozambique (see table 4).* | *N.A.* |
| Exchange rate | | *Annual average of exchange rate as reported by IMF (see table 5).* | *N.A.* |
| Access cost to point of competition | | *Profit margins, customs brokers and transport cost (see table 6).* | *Profit margins and transport cost (see table 6).* |
| Access costs to farm gate | | *Transport cost as reported by the SIMA and 5 percent margin profit (see table 6).* | *80% transport cost and 5% margin profit (see table 6).* |
| QT adjustment | Bor-Wh | *N.A.* | *N.A.* |
| | Wh-FG | *N.A.* | *N.A.* |
| QL adjustment | Bor-Wh | *N.A.* | *N.A.* |
| | Wh-FG | *N.A.* | *N.A.* |

Source: authors

The data used for this analysis is summarized below.

**Table A2: Data and values used in the calculations of indicators**

| | | Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|
| DATA | Unit | trade status | m | m | m | m | m | m |
| Benchmark Price | | Symbol | | | | | | |
| Observed | USD/TON | Pb(int$) | 184,77 | 184,77 | 166,81 | 249,1 | 322,22 | 227,56 |
| Adjusted | USD/TON | Pba | | | | | | |
| Exchange Rate | | | | | | | | |
| Observed | MT/TON | ERo | 23,06097 | 25,40078 | 25,84034 | 24,30064 | 27,5183 | 33,9601 |
| Adjusted | MT/TON | ERa | | | | | | |
| Access costs border - point of competition | | | | | | | | |
| Observed | MT/TON | ACowh | 455,4531 | 513,1609 | 531,2106 | 744,8729 | 784,944 | 938,5236 |
| Adjusted | MT/TON | ACawh | 434,1482 | 489,6944 | 509,6585 | 714,6065 | 740,6092 | 899,8838 |
| Domestic price at point of competition | MT/TON | Pdwh | 5826,667 | 6232,5 | 6272,5 | 10225,83 | 10057,5 | 11385,45 |
| Access costs point of competition - farm gate | | | | | | | | |
| Observed | MT/TON | ACofg | 1349,347 | 1420,413 | 1749,407 | 1525,795 | 1510,816 | 1725,748 |
| Adjusted | MT/TON | ACafg | 1056,49 | 1116,84 | 1356,55 | 1240,08 | 1225,101 | 1386,462 |
| Farm gate price | MT/TON | Pdfg | 3558,367 | 4122,455 | 3559,565 | 7658,69 | 7359,112 | 7372,102 |
| Externalities associated with production | MT/TON | E | | | | | | |
| Budget and other product related transfers | MT/TON | BOT | | | | | | |
| Quantity conversion factor (border - point of competition) | Fraction | QTwh | | | | | | |
| Quality conversion factor (border - point of competition) | Fraction | QLwh | | | | | | |
| Quantity conversion factor (point of competition - farm gate) | Fraction | QTfg | | | | | | |
| Quality conversion factor (point of competition - farm gate) | Fraction | QLfg | | | | | | |

## 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.

**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.

In this analysis, only Nominal Rates of Protection were calculated and the results are presented in Tables 7 and 8 below.

**Table 7: MAFAP price gaps for maize in Mozambique (MT per tonne)**

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| Trade status for the year | m | m | m | m | m | m |
| Observed price gap at wholesale | 1,110 | 1,026 | 1,431 | 3,428 | 406 | 2,719 |
| Adjusted price gap at wholesale | 1,132 | 1,050 | 1,452 | 3,458 | 450 | 2,758 |
| Observed price gap at farm gate | 191 | 336 | 467 | 2,386 | -782 | 431 |
| Adjusted price gap at farm gate | -80 | 56 | 96 | 2,131 | -1,023 | 131 |

Source: MAFAP

**Table 8: MAFAP nominal rates of protection (NRP) for maize in Mozambique (%)**

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| Trade status for the year | m | m | m | m | m | m |
| Observed NRP at wholesale | 24% | 20% | 30% | 50% | 4% | 31% |
| Adjusted NRP at wholesale | 24% | 20% | 30% | 51% | 5% | 32% |
| Observed NRP at farm gate | 6% | 9% | 15% | 45% | -10% | 6% |
| Adjusted NRP at farm gate | -2% | 1% | 3% | 39% | -12% | 2% |

Source: MAFAP

**Table 9: MAFAP Market Development Gaps for maize in Mozambique (MT per tonne)**

| | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** |
|---|---|---|---|---|---|---|
| Trade status for the year | m | m | m | m | m | m |
| International markets gap | 0 | 0 | 0 | 0 | 0 | 0 |
| Exchange policy gap | 0 | 0 | 0 | 0.00 | 0.00 | 0 |
| Access costs gap to point of competition | 21 | 23 | 22 | 30 | 44 | 39 |
| Access costs gap to farm gate | -293 | -304 | -393 | -286 | -286 | -339 |
| Externality gap | 0 | 0 | 0 | 0 | 0 | 0 |

Source: MAFAP

# 4. INTERPRETATION OF THE INDICATORS

Figures 10 and 11 below shows price gaps and nominal rate of protection for maize producers in northern Mozambique. The price gaps provide an absolute measure of the deviation of domestic price from the comparable export price, while the nominal rate of protection is the price gap in relative terms. The market development gap measures the deviation between the observed and adjusted access costs from farm gate to wholesale, which is important to identify potential inefficiencies along the value chain. For the purpose of this analysis, we have defined Maputo as the point of competition, where domestic production competes with imports from South Africa (SA). Although members of SADC are exempt from border tariffs in line with the free trade agreement among SADC countries, maize grain trade between Mozambique and South Africa is subject to a 2.5 percent tariff and 17 percent VAT, which serves as a *de facto* tariff (MozSAKKS, 2012).

Estimated observed indicators show that maize producers were highly protected in all years analysed, except in 2009. They also show that a significant share of protection is captured at wholesale level, indicating that wholesalers and producers are receiving higher prices than they would in the absence of domestic policy and market distortions. The observed NRPs at farmgate ranged from 45 percent in 2008 to -10 percent in 2009, averaging 9 percent over the six years studied. At wholesale level, the observed NRPs ranged from 50 percent in 2008 to 4 percent in 2009, averaging 26 percent over the same period. However, the level of protection was highest in 2008, the peak of the international food price crisis. This represents transfers from domestic consumers, indicating that government policies are more supportive of producers and wholesalers than of consumers, since wholesale prices in Maputo were higher than the benchmark price for maize imports from South Africa. Overall, the level of protection was higher at wholesale level than at the farmgate, suggesting that a significant share of incentives is captured at the upper level of the value chain, i.e. by wholesalers.

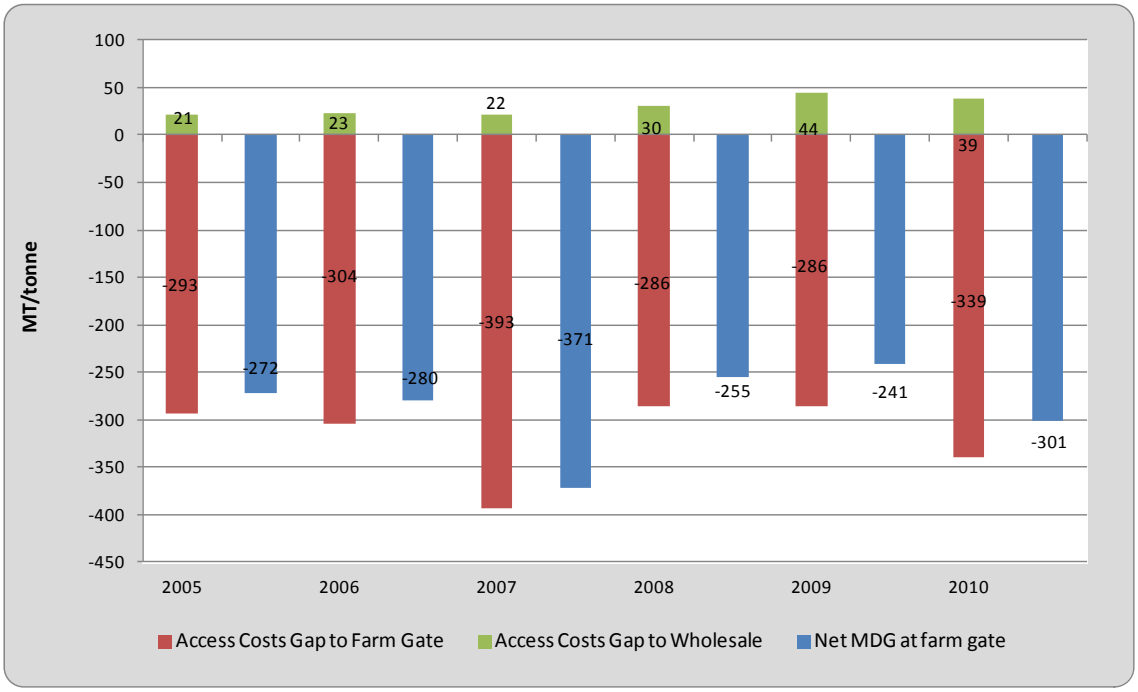
In 2009 however, the observed NRP at the farmgate was negative, indicating lack of protection for producers. This reflected a decline in international maize prices and a consequent reduction of government short-term measures to minimize the effects of the peak in world market prices. However, these disincentives cannot be explained by changes in domestic policies in 2009, since they remained unchanged compared with 2007-2008. However, the disincentive in 2009 was consistent with the increase in food aid, which could have reduced maize prices on domestic markets.

However, the high level of protection, notably at wholesale level (average 26 percent) cannot be explained by import tariffs alone. These include the 17 percent VAT levied on maize grain imports from South Africa, which served as a *de facto* tariff, and the 2.5 percent tariff levied on imports from the SADC region, which collectively accounts for almost 19.5 percent. Such levels also include the effect of trade licences and other bureaucratic practices required to import grain maize from South Africa to the Maputo market, which results in additional costs to importers of maize and a consequent increase in prices at wholesale level. At farmgate level, incentives were additionally driven by the import tariffs mentioned earlier, and by other government measures aimed at increasing food production and productivity. These included subsidies for the price of petroleum products, leading to a reduction in the cost of transport and inputs and partly contributing to an increase in prices at producer level. However, incentives to maize producers may explain the progressive expansion of maize production in the country, especially during the period 2007 to 2010

(Figure 1). Over this period, maize production increased by 10 percent (FAOSTAT, 2012), despite the negative NRP in 2009.

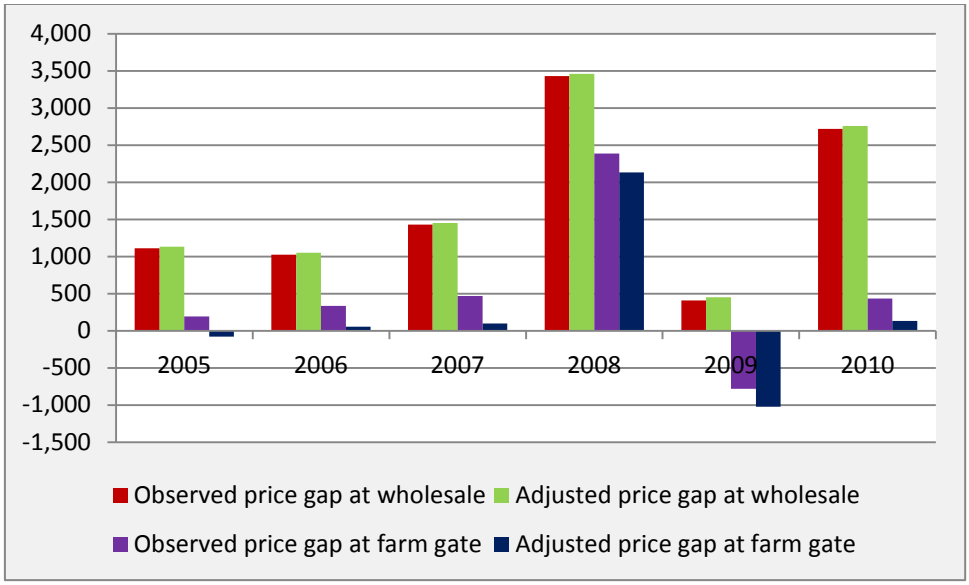
MDGs for maize resulted entirely from access costs gaps at wholesale and farmgate levels, as shown in Figure 9. The access costs gaps at farmgate were substantial in all years analysed, and they were higher between the farmgate and wholesale levels than between border and wholesale levels. In fact, producers only benefited if inefficiencies between the border and wholesale (positive MDGs) outweighed those between the farmgate and wholesale levels (negative MDGs), since the former represent some form of natural protection, given that they tend to make imports more costly. The high access cost gaps at farmgate were mainly due to poor or limited integration of maize markets as a result of long distance between Maputo (a maize deficit province) and the production regions (Central and Northern Mozambique). At wholesale level, the access cost gaps were mainly due to market distortions, such as government taxes and fees, customs brokers and high profit margins of agents (assemblers and distributors).

**Figure 9: Market Development Gaps (MDGs) for maize (MT/tonne), 2005-2010**



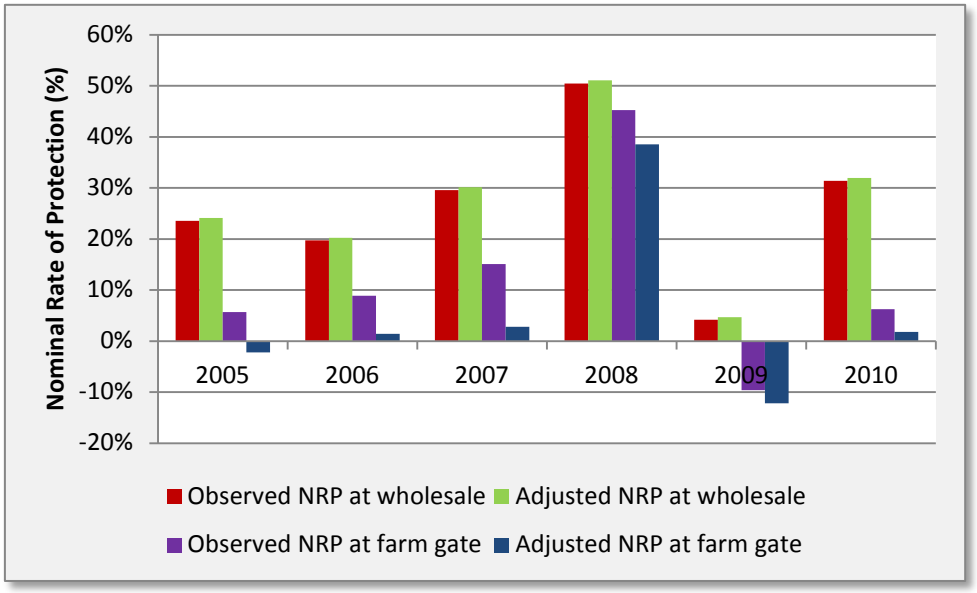

Source: MAFAP

**Figure 10: Observed and adjusted price gaps for maize at wholesale and farm gate in Mozambique (MT per tonne)**




Source: MAFAP

**Figure 11: Observed and adjusted NRP for maize at wholesale and farm gate in Mozambique (%)**



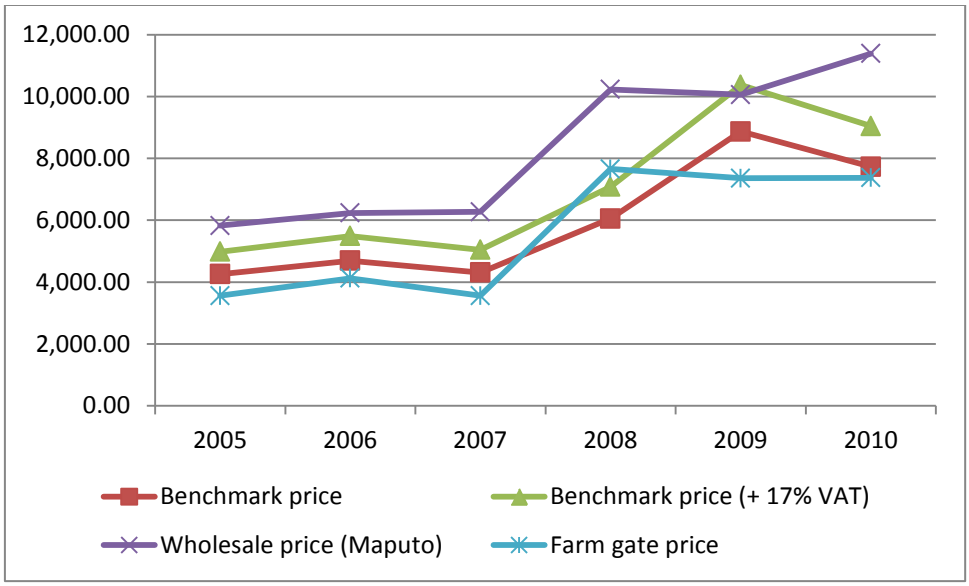

Source: MAFAP

**Price dynamics**

As mentioned above, maize grain imported from South Africa and sold in the Maputo market is subject to tariff of 17 percent, as a political strategy to protect national producers. This tariff increased significantly the price of imported maize (Figure 12 below). Looking at the price dynamics at different points in the value chain (Figure 12), we can make the following two observations: First, the prices in Maputo are positively correlated with the farm gate price - following the same trend in the period of analysis. What emerges is that the prices in Maputo are influenced by the producer prices from the central region of the country.

This is attributed to the preference of the local traders (in Maputo) for grain from the north and central Mozambique due to their preference to avoid payment of the VAT which is only applied to maize grain imports. Figure 12 bellow shows *close linkages between the Maputo prices and the farm gate prices.*

**Figure 12: Price dynamics between Maputo, production area and imports (MT/tonne)**




Source: Author's elaboration on SIMA and Global Trade Atlas data.

Second, the prices in Maputo increased significantly from 2007 to 2008 and 2010 due to the high food prices in international markets - the increase of Maputo prices follow the same trend of the farm gate price as well as the benchmark price (see figure above). From 2009, the international prices (benchmark price) reduced significantly, while the farm gate prices remained static and the prices in Maputo increased significantly (after relative stability from 2008 to 2009). Although international prices have gone down since 2008, they however still remain higher than their pre-crisis levels at farm level and wholesale levels. This situation can be attributed to the monopolistic behaviour of the traders, asymmetrical distribution of market power between producers and sellers, and lack of market information (MozSAKSS, 2012 and Third National Poverty Assessment, 2010).

# 5. PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

## MAIN MESSAGE

Overall, our indicators show that government policies, such as the application of tariffs on imports of maize grain from South Africa, are more supportive to wholesalers than to producers. However, the incentives to maize wholesalers may explain the high level of prices of maize grain in the Maputo market, especially in 2008, the peak of the food price crisis. During this year, the price of maize increased by 63 percent compared with that in 2007 (SIMA), suggesting that price volatility on the international market was directly transmitted to wholesalers in Maputo. It is important to note that protection to wholesalers and producers impacts negatively on consumers, since wholesale prices in Maputo were above reference maize prices for all years under review (SIMA and FAOSTAT, 2012). Urban consumers therefore pay higher prices than would be the case under a free trade regime and efficient functioning of the maize market.

Finally, incentives at farm level suggest that the government objective of promoting food security through increased production and self-sufficiency of maize is gradually being achieved. For example, in 2009 and 2010, total volume of maize production reached record levels, while imports declined further. As a result, the self-sufficiency ratio of Mozambique's maize production came close to 100 percent during these years.

## PRELIMINARY RECOMMENDATIONS

It would be useful to analyze options and the potential impact on producers of phasing out VAT in order to increase competition between domestically produced maize and imports, as this could lead to lower staple food prices for consumers.

Policies aiming at lowering access costs and better connecting the North and Center regions of production with the South (Maputo) region of consumption should be encouraged. This should include investment in public goods such as infrastructure and bridges but should also consider improvements in the functioning of value chains with more competition among traders and better access to market information for farmers.

The attention of policy makers should also be drawn on the coherence of policy effects resulting from prices incentives on the one side, and other incentives resulting from public expenditures at farm and rural levels, on the other side.

Policy measures to empower farmers association will be important for example in the negotiation of the minimum price. According to the World Bank (2010), the Mozambican farmers association is one of the weakest in Africa, this is visible by the very low producer prices in Figure 12 compared to other countries;

## LIMITATIONS

Data issues:

- the unavailability of data on access cost from the border to the point of competition, created problems in the calculation of the indicators;

- unavailability of desegregated data on access cost. The available data from SIMA (transport cost) compounds all the components of access costs, which creates difficulties to do deeper analysis to understand the real cost to bring maize from producers to the point of competition and, as well as from the border to the point of competition.

Other issues:

- the existence of many different policy frameworks for agriculture development which do not necessarily converge, which makes it difficult to understand the impact of the policies on maize production;

- the unavailability of data on input subsidies desegregated by commodity, as well as data on other government measures creates problems in identification of the real impact of the policies.

## FURTHER INVESTIGATION AND RESEARCH

Conduct two analyses of maize – one in the central and one in the northern region of the country, i.e. considering the production areas in the central and northern Mozambique as the point of competition, presents an opportunity for a deeper understanding of the dynamics and potential importance of cross border trade in the regions.

Further analysis to better understand the components of the access costs will be helpful to strengthen our understanding of the market development gap in the value chain analysis. There is a need to further explore the price dynamics in the Maputo market as our analysis diverges from the official statistics which shows that Maputo relies significantly on maize from South Africa. Our analysis shows close linkages between the Maputo prices and the farm gate prices. Also, further analysis to better understand the informal system of transport of maize would be helpful to strengthen our understanding of the components of access cost.

Our analysis focused on the southern Mozambique market (Maputo), which is connected to the South Africa market. There are also two other important markets in Mozambique, central and north regions. This analysis would benefit from further market analysis considering the central and northern regions (production regions) which share borders with Malawi, Zimbabwe and Zambia, as points of competition. This would contribute to a better understanding of the dynamics of the cross-border trade in the region.

# BIBLIOGRAPHY


Castel-Branco (2008) “Aid Dependency and development: a Question of Ownership? A critical Review”, *IESE* working paper nº 01/2008.

DNEAP (2010) “Poverty and Wellbeing in Mozambique: Third National Poverty Assessment”, National Directorate of Studies and Policy Analysis (DNEAP), Ministry of Planning and Development, Maputo, Mozambique.

IOF (2008) “Mozambican Household Survey”, National Institute of Statistic, Mozambique

MozSAKSS (2011) “Monitoring Agricultural Sector Performance, Growth and Poverty Trends in Mozambique”, 2010 Annual Trend and Outlook report, Mozambique Ministry of Agriculture.

MozSAKSS (2012) “Monitoring and Evaluating Agriculture Growth, Trade, and Poverty in Mozambique”, 2011 Annual Trend and Outlook report, Mozambique Ministry of Agriculture.

O’Laughlin (2009) “Rural Social Security and the Limits of 'Associativismo' in Southern Mozambique”, Instituto de estudos Sociais e Economicos, Conference Paper Nº40.

Peires (2008) “Macroeconomic Management of Scaled-Up foreign aid”, In S. J. Peires (eds), *Post-Stabilization Economics in Sub-Saharan Africa - Lessons from Mozambique*, edited by, *International Monetary Fund publications, pp. 205-238.*

PES (2012) “Plano Economico e Social para 2012” Repulica de Moçambique.

TIA (2005/2008) “Trabalho de Inquérito Agrícola”, Mozambique Ministry of Agriculture.

Tombez et al. (2011) “Evaluation of socio-economic feasibility of pilot micro-insurance schemes for cotton producers in Mozambique”, Institute for Environmental Decisions / IED Agricultural Economics - Agri-food & Agrienvironmental Economics Group (Forthcoming).

Tostão et al. (2010) “Staple food prices in Mozambique”, Prepared for the Comesa policy seminar on “Variation in staple food prices: Causes, consequence, and policy options”, Maputo, Mozambique, 25-26 January 2010.

Tschirley et al. (2006) “Toward Improved Maize Marketing and Trade Policies to Promote Household Food Security in Central and Southern Mozambique”, Mozambique Ministry of Agriculture, Research Report No.60E.

World Bank (2004) “Mozambique – Trade and transport facilitation audit”, World Bank working paper, Reference: R20040164/30144/rme/lwi.

Yesuf et al. (2007) “Risk Aversion in Low-Income Countries: Experimental Evidence from Ethiopia”, *IFPRI Discussion Paper No. 715* (Washington, DC: International Food Policy Research Institute, 2007).

## 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 | USD | | | Local currency | | MT | | | | | |
| | | | | | | | | | | | |
| DATA | Unit | Symbol | Year trade status | 2005 m | 2006 m | 2007 m | 2008 m | 2009 m | 2010 m | | |
| **Benchmark Price** | | | | | | | | | | | |
| *Observed* | USD/TON | $P_{b(int\$)}$ | | 184,77 | 184,77 | 166,81 | 249,1 | 322,22 | 227,56 | | |
| *Adjusted* | USD/TON | $P_{ba}$ | | | | | | | | | |
| **Exchange Rate** | | | | | | | | | | | |
| *Observed* | MT/TON | $ER_o$ | | 23,06 | 25,40 | 25,84 | 24,30 | 27,52 | 33,96 | | |
| *Adjusted* | MT/TON | $ER_a$ | | | | | | | | | |
| **Access costs border - point of competition** | | | | | | | | | | | |
| *Observed* | MT/TON | $ACo_{wh}$ | | 455,45 | 513,16 | 531,21 | 744,87 | 784,94 | 938,52 | | |
| *Adjusted* | MT/TON | $ACa_{wh}$ | | 434,15 | 489,69 | 509,66 | 714,61 | 740,61 | 899,88 | | |
| **Domestic price at point of competition** | MT/TON | $P_{dwh}$ | | 5.826,67 | 6.232,50 | 6.272,50 | 10.225,83 | 10.057,50 | 11.385,45 | | |
| **Access costs point of competition - farm gate** | | | | | | | | | | | |
| *Observed* | MT/TON | $ACo_{fg}$ | | 1.349,35 | 1.420,41 | 1.749,41 | 1.525,79 | 1.510,82 | 1.725,75 | | |
| *Adjusted* | MT/TON | $ACa_{fg}$ | | 1.056,49 | 1.116,84 | 1.356,55 | 1.240,08 | 1.225,10 | 1.386,46 | | |
| **Farm gate price** | MT/TON | $P_{dfg}$ | | 3.558,37 | 4.122,46 | 3.559,56 | 7.658,69 | 7.359,11 | 7.372,10 | | |
| Externalities associated with production | MT/TON | E | | | | | | | | | |
| Budget and other product related transfers | MT/TON | 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 | $QT_{fg}$ | | | | | | | | | |
| 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** | | | | | | | | | | | |
| *Observed* | MT/TON | $P_{b(loc\$)}$ | | 4.260,97 | 4.693,30 | 4.310,43 | 6.053,29 | 8.866,95 | 7.727,96 | | |
| *Adjusted* | MT/TON | $P_{b(loc\$)a}$ | | 4.260,97 | 4.693,30 | 4.310,43 | 6.053,29 | 8.866,95 | 7.727,96 | | |
| **Reference Price at point of competition** | | | | | | | | | | | |
| *Observed* | MT/TON | $RPo_{wh}$ | | 4.716,43 | 5.206,46 | 4.841,64 | 6.798,16 | 9.651,89 | 8.666,48 | | |
| *Adjusted* | MT/TON | $RPa_{wh}$ | | 4.695,12 | 5.183,00 | 4.820,09 | 6.767,90 | 9.607,56 | 8.627,84 | | |
| **Reference Price at Farm Gate** | | | | | | | | | | | |
| *Observed* | MT/TON | $RPo_{fg}$ | | 3.367,08 | 3.786,05 | 3.092,23 | 5.272,37 | 8.141,07 | 6.940,74 | | |
| *Adjusted* | MT/TON | $RPa_{fg}$ | | 3.638,63 | 4.066,16 | 3.463,54 | 5.527,82 | 8.382,46 | 7.241,38 | | |
| | | | | | | | | | | | |
| **INDICATORS** | *Unit* | *Symbol* | | *2005* | *2006* | *2007* | *2008* | *2009* | *2010* | | |
| **Price gap at point of competition** | | | | | | | | | | | |
| *Observed* | MT/TON | $PGo_{wh}$ | | 1.110,24 | 1.026,04 | 1.430,86 | 3.427,67 | 405,61 | 2.718,97 | | |
| *Adjusted* | MT/TON | $PGa_{wh}$ | | 1.131,54 | 1.049,50 | 1.452,41 | 3.457,94 | 449,94 | 2.757,61 | | |
| **Price gap at farm gate** | | | | | | | | | | | |
| *Observed* | MT/TON | $PGo_{fg}$ | | 191,29 | 336,41 | 467,33 | 2.386,32 | (781,96) | 431,37 | | |
| *Adjusted* | MT/TON | $PGa_{fg}$ | | (80,27) | 56,30 | 96,03 | 2.130,87 | (1.023,34) | 130,72 | | |
| **Nominal rate of protection at point of competition** | | | | | | | | | | | |
| *Observed* | % | $NRPo_{wh}$ | | 23,54% | 19,71% | 29,55% | 50,42% | 4,20% | 31,37% | | |
| *Adjusted* | % | $NRPa_{wh}$ | | 24,10% | 20,25% | 30,13% | 51,09% | 4,68% | 31,96% | | |
| **Nominal rate of protection at farm gate** | | | | | | | | | | | |
| *Observed* | % | $NRPo_{fg}$ | | 5,68% | 8,89% | 15,11% | 45,26% | -9,61% | 6,21% | | |
| *Adjusted* | % | $NRPa_{fg}$ | | -2,21% | 1,38% | 2,77% | 38,55% | -12,21% | 1,81% | | |
| **Nominal rate of assistance** | | | | | | | | | | | |
| *Observed* | % | NRAo | | 6% | 8,89% | 15,11% | 45,26% | -9,61% | 6,21% | | |
| *Adjusted* | % | NRAa | | -2,21% | 1,38% | 2,77% | 38,55% | -12,21% | 1,81% | | |

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

MAFAP SPAAA

supported by the *Bill and Melinda Gates Foundation*