Food and Agriculture Organization of the United Nations

Technical note: Analysis of price incentives and disincentives for cashew nuts in the Republic of Mozambique for the time period 2005-2013

July 2014

Monitoring and Analysing Food and Agricultural Policies (MAFAP)

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Analysis of price incentives and disincentives for cashew nuts in the Republic of Mozambique for the time period 2005-2013

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This technical note is a product of the Monitoring and Analysing Food and Agricultural Policies (MAFAP) programme. It 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 Government of The Netherlands, the United States Agency for International Development (USAID) and Germany.

The analysis presented in this document is the result of partnerships established in the context of the MAFAP programme with the National Economics Directorate from the Ministry of Agriculture and the Center for Studies of Agro-food Policies and Programs (CEPPAG) from the Eduardo Mondlane University (UEM).

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For more information: www.fao.org/in-action/mafap

Recommended citation:
FAO. 2014. *Analysis of price incentives and disincentives for cashew nuts in the Republic of Mozambique 2005-2013.* Technical notes series, MAFAP, by Zavale, H., and Monroy, L., Rome.

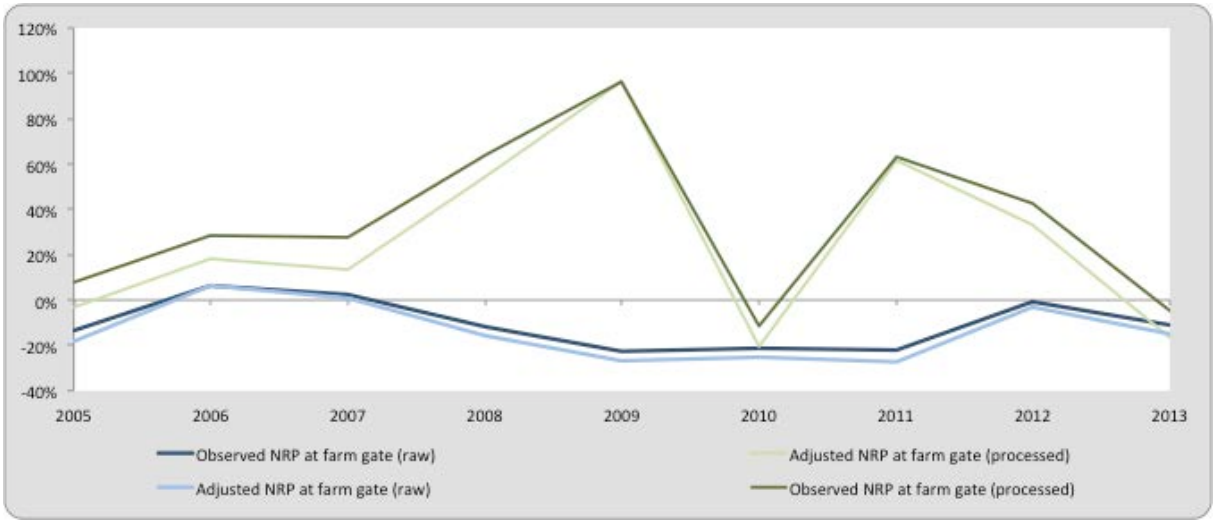
CONTENTS

SUMMARY OF THE NOTE

Product: **Cashew Nuts**
Period analyzed: **2005 - 2013**
Trade status: **Export in all years**

COMMODITY CONTEXT

- One of Mozambique´s top three agricultural exports;
- About 45% of farmers' production marketed, of which: 32% is exported raw, 28% captured by the domestic processing industry, 27% goes to other uses and 13% is waste. More than 85% of raw cashew nuts exports go to India;
- Well-structured sub-sector, supervised by a national cashew nuts institute, with policies incentivizing domestic processing: 18% tax on raw cashew nuts exports and the preferential buying of raw cashew nuts by domestic processors (including a temporary export ban of raw cashew nuts) to secure stocks for the domestic processing industry.



The observed Nominal Rate of Protection (NRP, darker lines) in the graph above measures the effect of policy distortions and overall market performance on price incentives for farmers who grow cashew nuts. The adjusted NRP (lighter lines) captures the same elements as the observed NRP in addition to any market distortions resulting from inefficiencies in the commodity's value chain. The difference between darker and lighter lines reflects the estimated cost that value chain inefficiencies and exchange rate misalignment represent to the cashew-nuts-growing farmers.

DRIVING FACTORS

- The export tax on raw cashew nuts has resulted in price disincentives to farmers; implicitly protecting the domestic processing industry, resulting in price incentives along the processed segment of the value chain;
- Excessive profit margins from both processors and traders increased the level of disincentives in the two segments of the export value chain (raw and processed cashew nuts);
- The preferential buying policy of processors over export traders in the domestic market might be restricting competition, hindering prices received by producers;
- Lower production in 2006 and 2007, combined with the preferential buying policy, might have forced the exporters to pay relatively higher prices to farmers;

- In 2010, the gains from the sudden depreciation of the domestic currency (Metical) – during the second half of the year – might have not been entirely transferred to the farmers in the processed segment of the value chain.

POSSIBLE RECOMMENDATIONS

- Assess the impact of gradually reducing the export tax on raw cashew nuts, monitoring closely the effect on economic incentives faced by farmers under both segments of the value chain;
- Assess closely the effect of the implementation of a benchmark floor pricing system;
- Assess the impact on domestic market performance by the elimination of domestic market restrictions that hinders competition between processors and traders. Assess the possibility of implementing alternative marketing instruments, such as auctions or a national stock exchange.

1. PURPOSE OF THE NOTE

This technical note is an attempt to measure, analyze and interpret price incentives for cashew nuts in Mozambique over the period 2005-2013.

For this purpose, yearly averages of domestic farm gate prices are compared with reference prices calculated on the basis of the price of the commodity in the international market. The price gaps between reference prices and domestic prices along the commodity's value chain indicate the extent to which incentives (positive gaps) or disincentives (negative gaps) were present at the farm gate level. The price gaps are expressed in relative terms as a percentage of the reference price, referred to as the Nominal Rate of Protection (NRP). These key indicators are used by MAFAP to assess the effects of policy and market performance on prices.

This technical note begins with a review of the commodity's production, consumption/utilization, marketing and trade, value chain and policy context (Chapter 2). Then, the methodological approach employed in the technical note is outlined (Chapter 3). The technical note also provides a detailed description of how key data elements were obtained and indicators were calculated (Chapter 4). The indicators were then interpreted in light of existing policies and market characteristics (Chapter 5). Finally, the note concludes with a few main messages, key policy recommendations based on the interpretation of the results, limitations of the analysis and areas identified for further research to improve the analysis (Chapter 6).

The results and recommendations presented in this analysis of price incentives can be used by stakeholders involved in policy-making for the food and agriculture sector. They can also serve as input for evidence-based policy dialogue at the national, regional or international level.

This technical note should not be interpreted as an in-depth value chain analysis or detailed description of the commodity's production, consumption/utilization, marketing and trade or policy context. 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 MAFAP indicators.

All information in this technical note is subject to review and validation.

2. COMMODITY CONTEXT

Cashew nuts (raw and processed) are among the most important commodities in terms of contribution to Mozambique´s export value of agricultural commodities. According to data from FAOSTAT, tobacco, cashew nuts (raw and processed), and cotton (lint and seed) together accounted, on average, for more than half of total export value of agricultural commodities during the period 2000 to 2011 in Mozambique. Tobacco – contributing, on average, to 27% of total export value of agricultural commodities – stands out as the most important commodity; followed in order by cashew nuts with 17% and cotton with 16%. Data from a nationally representative survey covering the agricultural season 2007/08 indicate that about 40% of Mozambican smallholder farmers generate income from cashew nuts production, especially in Northern Mozambique.

PRODUCTION

Cashew is a perennial tree crop that starts to produce cashew nuts when the tree is about four years old. With good production and management practices (e.g. weeding, spraying, and pruning), cashew trees can produce cashew nuts of good quality for about 20 years on a yearly basis. When cashew trees are older than 25 years, productivity of the trees in terms of both cashew nuts production and quality (relatively small cashew nuts) declines substantially and the trees should be replaced if the main objective is to produce cashew nuts.

We now turn our attention to describing the cropping calendar for cashew production in Northern Mozambique, according to the Mozambique National Cashew Institute (INCAJU), Grobe-Ruschkamp and Seelige (2010), and MEDA (2011).[1] The description focuses on Northern Mozambique because it is the main cashew-producing region in the country, as shown below. Farmers usually plant their cashew seedlings between December and January. Weeding on fields with cashew trees and/or cashew seedlings takes places from January to March. This period coincides with the rainy season spanning November through March and the hunger season spanning December through March. Spraying of the cashew trees is usually done between June and August. This is followed by harvest and sales of cashew nuts, starting around the second week of October and ending by the second half of January in the Central and Northern regions. In the Southern region, commercialization begins around the second week of November and ends on February.

As documented by MEDA (2010) and Aksoy and Yagci (2012), a large proportion of smallholder farmers who have cashew trees do not consider their cashew trees as one of their farming enterprises, and therefore they pay little attention to their cashew trees in terms of farming practices. Those smallholder farmers just collect cashew nuts from the cashew trees they own when harvesting time arrives rather than farming the trees throughout the agricultural season.

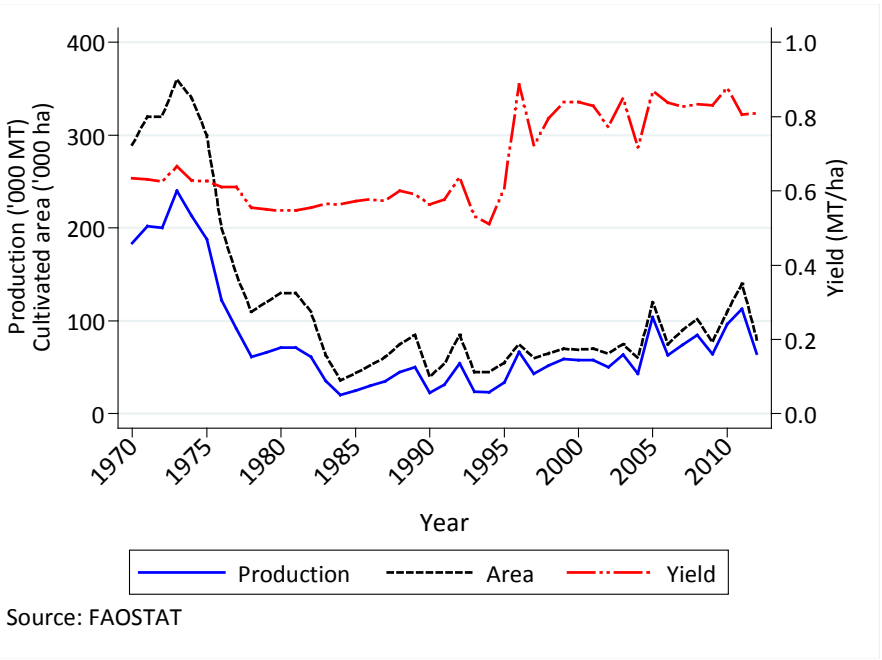
Cashew nuts production, cultivated area and yield during the period 1970 to 2012 are plotted in Figure 1. This figure illustrates that production of cashew nuts registered dramatic drop between the 1970s to the 1990s, falling from historical high of 213 thousand metric tons (MT) in 1974 to historical low of 23 thousand MT in 1994. Starting in the late 1990s, cashew nuts production fluctuated with a

[1] MEDA stands for Mennonite Economic Development Associates which is an international economic development organization with headquarters in Waterloo, Ontario in Canada. MEDA was founded in 1953 and its mission is to create business solutions (small- and medium-sized businesses) to the poor in developing countries around the world.

slight upward trend, increasing from 43 thousand MT in 1997 to 104 thousand MT in 2005 to 113 thousand MT in 2011. Despite this growth, cashew nuts production levels in the last ten years are significantly smaller, compared to historical high production registered in the 1970s. From 2002 to 2012, cashew nuts production averaged about 75 thousand MT, which constitutes less than 50% of the historical high production. Cultivated area under cashew followed a similar pattern, falling drastically from historical high of 360 thousand hectares (ha) in 1973 to 45 thousand ha in 1994 and then increasing to 140 thousand ha in 2011.

Between 1970 and 1995, cashew nuts yields were stagnant at about 0.6 MT/ha. They then jumped to 0.89 MT/ha in 1996 (see Figure 1). Since then, cashew nuts yields oscillated with no clear trend. From 1996 to 2012, cashew nuts yield averaged 0.82 MT/ha. This represents nearly 40% increase from average yield registered over the period 1970 to 1995. Between 1996 and 2012, average cashew nuts yield was smaller in Mozambique than in Tanzania (0.82 MT/ha versus 0.96 MT/ha). According to MEDA (2010), a considerably small share of cashew-producing farmers in Mozambique put in place measures (such as weeding and spraying) aimed at boosting productivity of their cashew trees. This combines with low replanting rates to lead to low average yields estimated at two-four kilograms of raw cashew nuts per cashew tree, compared to potential yields of 10-15 kilograms per cashew tree for trees aged between 10 and 15 years.

Figure 1 Cashew production, cultivated area and yield in Mozambique

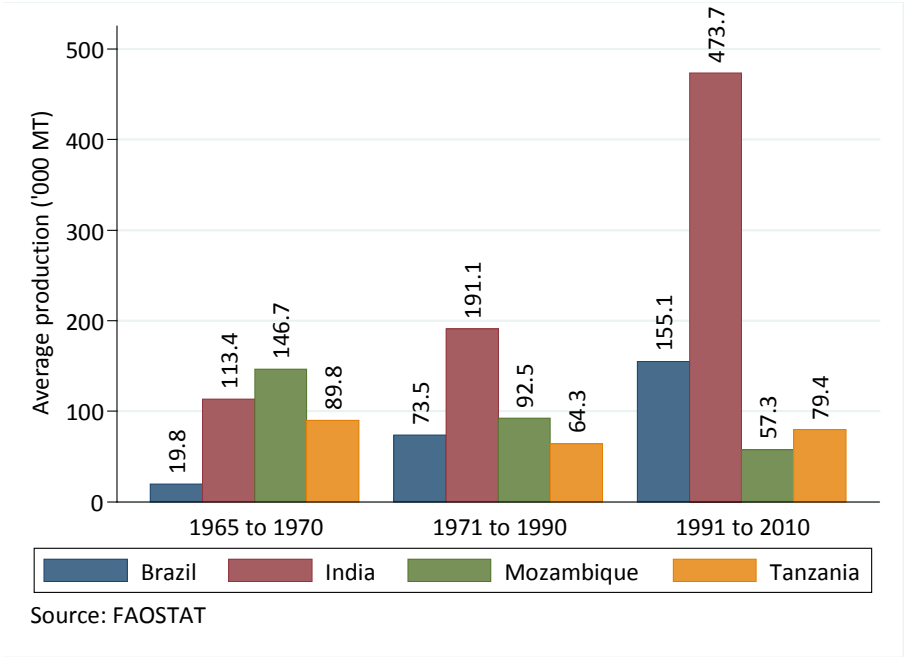


Source: FAOSTAT

Figure 2 shows average cashew nuts production in Mozambique and selected major cashew-producing countries competing with Mozambique in international market. It can be seen from this figure that Mozambique registered the highest average cashew nuts production of 146.7 thousand MT over the period 1965 to 1970, compared to countries such as India (113.4 thousand MT), Tanzania (89.8 thousand MT) and Brazil (19.8 thousand MT). In the last three to four decades, average cashew nuts production plummeted in Mozambique and Tanzania, while it increased substantially in India and Brazil. Over the period 1991 to 2010, Mozambique registered the lowest average production estimated at 57.3 thousand MT, compared to 155.1 thousand MT in Brazil and 473.7 thousand MT in India.

From 1965 to 1970, the shares of the total global cashew nuts production accounted for by Mozambique and Tanzania were, respectively, 34% and 21%. These two countries along with India (26%) contributed to nearly 80% of the worldwide cashew nuts production during the same period, making them the dominant cashew nuts producers during this time. Mozambique and Tanzania saw their shares of the global cashew nuts production dropping drastically to about 3% each during the period 1991 to 2010, while India share fell to 23%. On the other hand, Vietnam share increased substantially from less than 1% over the period 1965-1970 to 24% during the period 1990-2010. The share of the total global cashew nuts production accounted for by Brazil also registered an increase from 5% to 7% during the same period. Among African countries, some Western African countries expanded their shares of total global production: from 6% to 17% for Nigeria, from less than 1% to 5% for Cote d'Ivore, and from less than 1% to 3% for Guinea Bissau.

Figure 2 Production of cashew in Mozambique and selected countries



Source: FAOSTAT

These shifts in the patterns of raw cashew nuts production could be an indication that structural changes might be occurring at regional and international levels. These production patterns suggest that the importance of Mozambique in the worldwide cashew nuts production is declining, while other countries such as Vietnam, Brazil, Nigeria and Cote d'Ivore are becoming more important cashew nuts producers.

According to various studies (Mole and Weber, 1999; McMillan, Rodrik, and Welch, 2002; MEDA, 2010; Aksoy and Yagci, 2012), the drop in the Mozambique share of worldwide cashew nuts production – once the worldwide largest producers of raw cashew nuts – could be attributed to at least three factors. First, civil war that devastated the country in the 1980s and the early 1990s forced cashew-producing smallholder farmers to abandon their cashew trees to move to safer places. The second factor relates to liberalization of the cashew marketing and exporting under the umbrella of the structural adjustment program started in the early 1990s. This policy change led to substantial reduction in the protection of the domestic processing industry, leaving it in a vulnerable position and raising the question of whether the domestic processing industry could be competitive in terms of scale and quality in the global marketplace without policy protection. Interviews with the

Mozambique National Cashew Institute (INCAJU, 2014a) revealed that Indian traders purchased raw cashew nuts in Mozambique and exported them to India for processing, but still sell processed cashew nut – obtained from raw cashew nuts imported from Mozambique – at competitive prices in the international market. This is happening despite the fact that a policy mandate requires that exports of raw cashew nuts can only take place after consultations with domestic cashew nuts processors to check whether the processors can match export FOB prices being offered to exporters in international market. In addition, export of raw cashew nuts from Mozambique is subject to an export tax of 18% to protect the Mozambique cashew processing industry. Third, and related to the first point to some extent, aging of the cashew trees combined with diseases, especially powdery mildew, resulted in considerably lower production per tree, and consequently lower overall production.

To gain insights about the geographical distribution of production and sales, Table 1 summarizes raw cashew nuts production and sales broken down by province. The table was generated using data from a nationally representative household survey conducted by the Mozambique Ministry of Agriculture. This survey is commonly known as TIA (*Trabalho de Inquerito Agricola*). The survey data we used cover the 2007/08 agricultural season. Table 1 indicates that about 1.5 million households owned cashew trees in the 2007/08 agricultural season, representing about 40% of the total number of rural households in the country. Cashew trees are usually planted in marginal farmland. When intercropped with other crops within the farming systems, farmers pay generally little attention to cashew cultivation (spraying of the trees and other farming management practices) because cashew cultivation is not as profitable as other crops, as suggested by findings by Mole (2000).[2] This contributes to reduction in productivity of the cashew trees.

Table 1 Raw cashew nuts production and sales by province: 2007/08 agricultural season

Province	HH growing cashew	Share of HH selling raw cashew nuts	Raw cashew production (MT)	Share of production sold
Niassa	3,401	0.0%	4	0.0%
Cabo Delgado	110,138	5.3%	2,622	6.3%
Nampula	416,746	53.9%	19,009	43.6%
Zambezia	349,612	22.5%	9,616	17.7%
Tete	4,553	0.0%	15	0.0%
Manica	39,216	3.7%	4,944	11.1%
Sofala	93,052	6.4%	14,811	15.1%
Inhambane	234,253	2.4%	7,584	2.0%
Gaza	146,610	5.8%	8,245	4.0%
Maputo	57,428	0.1%	848	0.1%
National	**1,455,008**	**100.0%**	**67,699**	**100.0%**

Source: TIA 2008

Table 1 also shows that households that sell raw cashews are heavily concentrated in Nampula and Zambezia provinces. These two provinces together accounted for about 80% of the total number of

[2] Findings by Mole (2000) showed that for a typical cashew producer in Nampula province, the profitability of the sole cropped cassava – one of the main food crops in Nampula province – was estimated at 122 USD per hectare. The profitability declined to 107 USD per hectare when cassava is mixed cropped with cashew.

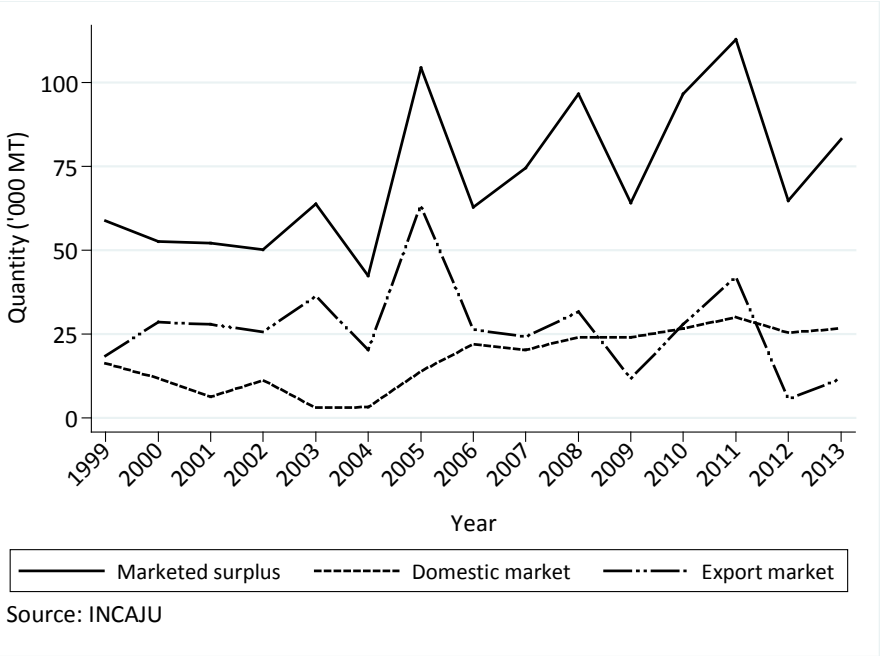
households selling raw cashew nuts in the country. Nampula with 19 thousand MT and Sofala with 14.8 thousand MT are the provinces with the largest production levels of raw cashew nuts in Mozambique. Zambezia (9.6 thousand MT), Gaza (8.2 thousand MT) and Inhambane (7.6 thousand MT) also have sizeable production of raw cashew nuts. In terms of relative importance measured as the percentage contribution to the total sales of raw cashew nuts in the country, Nampula (44%) and Zambezia (18%) ranked first and second, respectively; followed in order by Sofala with 15% and Manica with 11%. The contribution of each remaining province to the total raw cashew nuts sales amounted to 6% or less. Overall, Nampula province clearly stands out as the province with the largest production and sales volumes of raw cashew nuts in Mozambique.

CONSUMPTION/UTILIZATION

According to data from TIA 2008, nearly 45% of the total production of raw cashew nuts by smallholder farmers is sold in the market. This is consistent with findings by Joao and Machava (2013) who estimated that 47% of raw cashew nuts production by smallholder farmers is not commercialized and with findings by Aksoy and Yagci (2012) who reported that 64% of raw cashew nuts harvested by smallholder farmers are not commercialized. Smallholder farmers keep about 55% of their raw cashew production to produce shelled cashew nuts after small-scale home roasting and to make juices and/or alcoholic drinks. These cashew-derived commodities are either used for household own consumption or sold in the market or both. Joao and Machava (2013) documented that cashew producers keep considerable proportion of their cashew nuts production because prices for raw cashew nuts are not very attractive from farmers' viewpoint.

Figure 3 shows volumes of raw cashew nuts sold by smallholder farmers, purchased by domestic processing industry and exported to international market. From 1999 to 2004, quantities of raw cashew nuts sold by farmers and shipped to international market declined by 28% and 80%, respectively, while exports of raw cashew nuts increased by 9%. Since then, marketed surplus and purchases of raw cashew nuts by the domestic processing industry oscillated with an upward trend, reaching 65 thousand MT and 25 thousand MT in 2012, respectively. From 2004 to 2005, shipments of raw cashew nuts to international markets rose to reach historical high of 63 thousand MT over the period 1999 to 2013. They then trended downward, falling to 42 thousand MT in 2011 to 6 thousand MT in 2012. Quantities of raw cashew nuts shipped to international markets exceed quantities captured by the domestic processing industry. In 10 out of 13 years from 1999 to 2013, exports of raw cashew nuts outstrip purchases by domestic processing industry. Excluding the three years when the ratios of purchases by domestic industry to exports of raw cashew are greater than one, quantities bought by domestic industry represented, on average, nearly 50% of exports of raw cashew nuts.

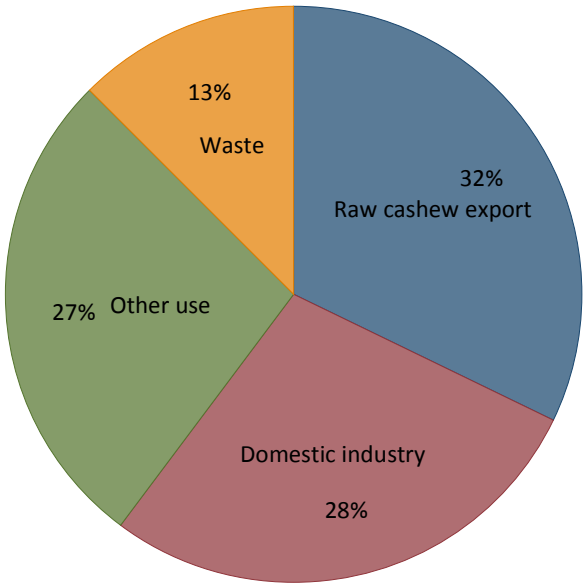
Figure 3 Marketed surplus, purchases by domestic industry and exports of raw cashew



Source: INCAJU

From 2005 to 2013, an average of 84 thousand MT of raw cashew nuts was sold to the market. Of which, 32% on average were shipped to international markets without being processed in Mozambique, making export markets the main destination of domestic sales of raw cashew nuts (Figure 4). Domestic processing industry, contributing on average to 28% of the marketed surplus, ranked second; followed closely by other destinations with 27%. Other destinations include the informal sector and any other marketing channel excluding export of raw cashew nuts and purchases by domestic processing industry. This could suggest that the informal sector is an important channel through which raw cashew nuts reach marketing channels in the country. In fact, estimates from Joao and Machava (2013) indicate that the informal sector represented 6% of the total cashew nuts production (marketed plus kept by cashew producers), but it accounted for 12% of the total volume of raw cashew production kept by cashew producers in the 2010/11 agricultural season. Our finding showing that 28% of the marketed raw cashew nuts go to domestic processing industry is consistent with INCAJU estimates indicating that domestic industry has capacity to capture only about 30% of marketed raw cashew nuts in the country.

Figure 4 Destination of marketed surplus of raw cashew: 2005 to 2013

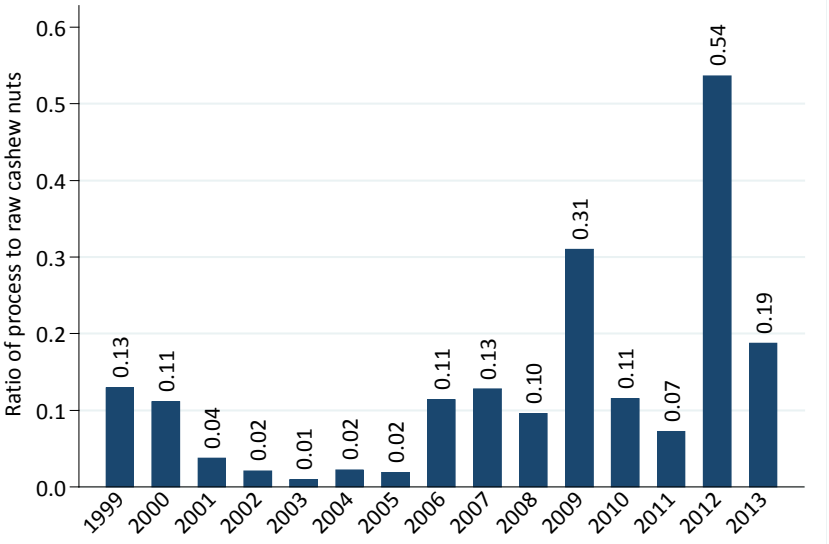


Source: INCAJU

MARKETING AND TRADE

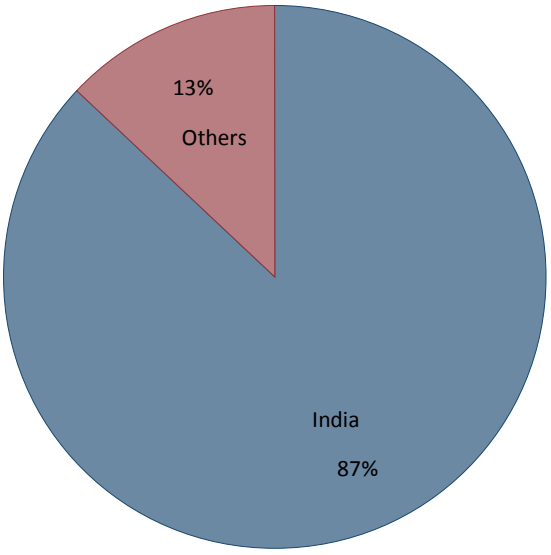
Quantities of cashew nuts exported without processing are significantly greater that volumes exported after being processed by the domestic processing industry. Mozambique exports partially processed, and not fully processed, cashew nuts. Interviews with INCAJU pointed out that cashew nuts processed by the domestic industry require additional processing to be ready for human consumption. When partially cashew nuts imported from Mozambique arrive in their destination countries, the final processing and packaging are done. This reduces considerably the proportion of the price paid by the final consumer of processed cashew nuts that is accrued by cashew nuts farmers, as argued by Grobe-Ruschkamp and Seelige (2010). Figure 5 shows ratios of exports of processed cashew nuts to exports of raw cashew nuts. With the exception of two years (2009 and 2012), exports of processed cashew nuts in any given year constitutes less than 20% of exports of raw cashew nuts in that year, with an average of 8% and a maximum of 19%. Figure 6 shows exports of raw cashew nuts by destination country. The figure illustrates that India, accounting for about 90% of the total exports of raw cashew nuts, is nearly the sole destination for Mozambique raw cashew nuts that cross the border without being processed, while Mozambique exports of processed cashew nuts go to many countries throughout the world. The most important countries in terms of contribution to volumes of processed cashew nuts exported from Mozambique from 2001 to 2012 are the Netherlands (27%), USA (18%), Canada (14%) and South Africa (14%).

Figure 5 Ratio of processed to raw cashew exports



Source: Authors' calculations based on data from INCAJU

Figure 6 Exports of raw cashew nuts by destination: 2001 to 2012



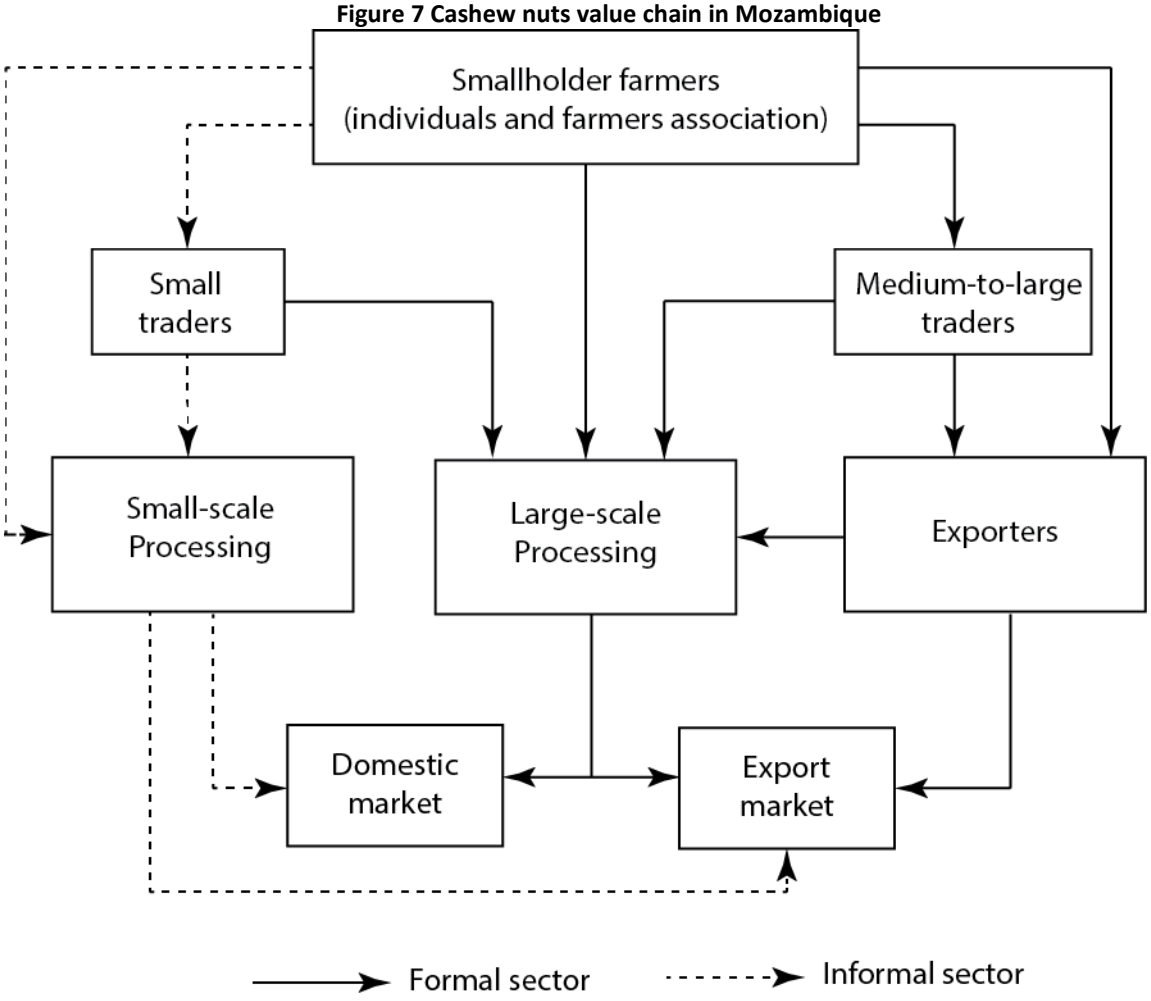
Source: UNCOMTRADE

DESCRIPTION OF THE VALUE CHAIN

The structure of the cashew nuts value chain in Mozambique is depicted in Figure 7. This figure illustrates that cashew nuts flow through informal and formal marketing channels before reaching either consumers of processed cashew nuts in domestic markets or exporters of raw and processed cashew nuts. This technical note focuses on the formal channels. Under this channel, cashew nuts producers – consisting of individual farmers or farmers' associations – sell their cashew nuts surplus to small traders, medium-to-large traders, exporters of raw cashew nuts, or processing factories. In addition to cashew nuts producers, processing factories acquire cashew nuts from small traders, medium-to-large traders, and in some occasions from exporters whenever domestic cashew nuts processors can match FOB prices that the exporters are being offered in the global marketplace. As mentioned earlier, a considerable share of the marketed raw cashew nuts surplus is exported

without being processed. Cashew nuts processed by the domestic processing industry are supplied to both domestic and international markets.

Figure 7 Cashew nuts value chain in Mozambique



POLICY DECISIONS AND MEASURES

Cashew nuts industry in Mozambique had been heavily regulated since the colonial period. The government of Mozambique (GoM) used to control prices paid to cashew nuts producers and other players along the value chain, as well as the flows of cashew nuts through various stages of the value chain. For instance, the GoM imposed a ban on the exports of raw cashew nuts in 1978 in an attempt to boost the domestic processing industry (McMillan, Rodrik and Welch, 2002; Aksoy and Yagci, 2012). The cashew industry operated under a controlled minimum price system until the late 1980s and early 1990s. Around this time, through the structural adjustment programs (SAPs), the GoM had to liberalize commodity marketing and privatize several sectors of the economy, including the cashew nuts sector, in order to qualify for loans from the World Bank (World Bank, 1995). This led to substantial reduction in government control on the cashew industry – but did not eliminate it completely – although SAPs did not focus on the cashew nuts industry. It was expected that liberalization of the cashew nuts industry would stimulate cashew nuts production and increase cashew nuts export value, and consequently leading to higher incomes for cashew nuts producers.

According to Aksoy and Yagci (2012), under the SAPs, the World Bank proposed a phased elimination of raw cashew nuts export tax on FOB price: decline from 35% to 20% between 1995 and 1996 and a

complete elimination of export tax by 2000. However, McMillan, Rodrik and Welch (2012) argued that the GoM did not follow the World Bank proposal after 1996. The GoM reduced the raw cashew nuts export tax to 14% in 1997 and then increased it to 18% in 1994. Since then, the export tax has never been changed until nowadays. Proceedings from the raw cashew nuts exports are used by INCAJU for various activities – such as research, extension, subsidies on pesticides, seedling distribution to farmers, among others – aimed at making the cashew industry more productivity and competitive. The proceedings are also used to cover part of INCAJU administrative costs.

The raw cashew nuts export tax might not be changed any time in the foreseeable future although INCAJU is looking for alternatives that would benefit growers of cashew nuts (INCAJU, 2014b). Estimates from McMillan, Rodrick and Welch (2002) indicate that lifting of restrictions on the export of cashew nuts, as advised by the World Bank, resulted in efficiency gains amounting to about 6.5 million USD. On the other hand, these authors estimated that these efficiency gains were offset by the costs stemming from losses of employment by workers who were employed in the cashew processing industry prior to liberalization of the cashew nuts sector, especially in urban areas.

Despite the relatively high raw cashew nuts export tax, considerable quantities of raw cashew nuts get exported, predominantly to India, without any processing. As mentioned earlier, the domestic cashew nuts processing industry captured on average about 30% of the marketed output over the period 1999 to 2013 and purchases of raw cashew nuts by the domestic cashew processing industry represented on average about 50% of raw cashew nuts exports over the same period but excluding years when domestic industry purchases exceeded raw cashew nuts exports (this happened only in three out of thirteen years; see figure 3).

An additional policy implemented by INCAJU is preferential marketing of raw cashew nuts for processing over raw exports. Interviews with INCAJU pointed out that before exporting raw cashew nuts, every single exporter has to give notice to the domestic processing industry of every price offer that the exported received from potential buyers overseas. In case the domestic processing industry is in need of raw cashew nuts, exporters of raw cashew nuts are obliged to sell their cashew nuts to the domestic processors at the price offered overseas. Our interviews with INCAJU also revealed that complementary to this policy, prior to the beginning of the each marketing season, INCAJU holds consultation meetings with the National Tax Authority, exporters of raw cashew nuts and domestic cashew nuts processors in order to determine a time window during which raw cashew nuts cannot be exported before the domestic processing industry fulfills its raw cashew nuts requirements for the marketing season. This period when exports of raw cashew nuts are not allowed takes usually one to two months.

Furthermore, our interviews with INCAJU also pointed out that currently, the GoM through INCAJU is seeking to set farm-gate-level reference floor prices for sales of raw cashew nuts in Mozambique. This is an effort made by INCAJU to increase the incentives to cashew nuts producers in order to boost production and to raise quality of domestically produced cashew nuts. This price reform is still under discussion and has not been approved by the GoM yet.

3. METHODOLOGY

MAFAP methodology seeks to measure price incentives for producers and other marketing agents in key agricultural value chains. The analysis is based on the comparison between observed domestic prices and constructed reference prices. Reference prices are calculated from the international price of the product at the country's border, where the product enters the country (if imported) or exits the country (if exported). This price is considered the benchmark price free of influence from domestic policies and markets. MAFAP estimates two types of reference prices – observed and adjusted. *Observed reference prices* are those that producers and other marketing agents could receive if the effects of distortions from domestic market and trade policies, as well as overall market performance, were removed. *Adjusted reference prices* are the same as observed reference prices, but also exclude the effects of any additional distortions from domestic exchange rate policies, structural inefficiencies in the commodity's value chain, and imperfect functioning and non-competitive pricing in international markets.

MAFAP's price incentives analysis is based on the law of one price, which is the economic theory that there is only one prevailing price for each product in a perfectly competitive market. This law only applies in the case of homogeneous goods, if information is correct and free, and if transaction costs are zero. Thus, this analysis was conducted for goods that are either perfectly homogeneous or perfect substitutes in the local market in terms of quality, or, failing that, are simply comparable goods. Indicators calculated from reference and domestic prices will, therefore, reveal whether domestic prices represent support (incentives) or a tax (disincentives) to various agents in the value chain.

Domestic prices are compared to reference prices at two specific locations along commodity value chains – the farm gate (usually the main production area for the product) and the point of competition (usually the main wholesale market where the domestic product competes with the internationally traded product). The approach for comparing prices at each location is summarized below, using an imported commodity as an example. In this situation, the country is importing a commodity that arrives in the port at the benchmark price (usually the unit value CIF price at the port of entry). In the domestic market, we observe the price of the same commodity at the point of competition, which is in this case the wholesale market, and at the farm gate. We also have information on observed access costs, which are all the costs associated with bringing the commodity to market, such as costs for processing, storage, handling, transport and the different margins applied by marketing agents in the value chain. These include access costs between the border and wholesale, as well as between the farm gate and wholesale.

The benchmark price is made comparable to the domestic price at wholesale by adding the access costs between the border and wholesale, resulting in the observed reference price at wholesale. This takes into account all the costs incurred by importers and other agents to bring the commodity to market, which in effect, raises the price of the commodity. The reference price at wholesale is further made comparable to the domestic price at the farm gate by deducting the access costs between the farm gate and wholesale, resulting in the observed reference price at farm gate. This takes into account all the costs incurred by farmers and other agents to bring the commodity from the farm to the wholesale market. Mathematically, the equations for calculating the observed

reference prices at wholesale (RP_{owh}) and farm gate $\left(RP_{ofg}\right)$ for an imported commodity are as follows:

$$RP_{owh} = P_b + AC_{owh}$$

$$RP_{ofg} = RP_{owh} - AC_{ofg}$$

where AC_{owh} are the observed access costs from the border to wholesale, including handling costs at the border, transport costs from the border to the wholesale market, profit margins and all observed taxes and levies, except tariffs, and P_b is the benchmark price. AC_{ofg} are the observed access costs from the farm gate to wholesale, including handling costs at the farm, transport costs from farm to wholesale market, processing, profit margins and all observed taxes and levies.

The same steps described above can be taken a second time using benchmark prices and access costs that have been adjusted to eliminate market distortions due to exchange rate misalignments, structural inefficiencies in the commodity's value chain[3] and imperfect functioning and non-competitive pricing in international markets, where possible and relevant. The adjusted benchmark prices and access costs are then used to generate a second set of *adjusted* reference prices, in addition to the first set of *observed* reference prices calculated.

For exported commodities, a slightly different approach is used. In this case, the border is generally considered the point of competition (wholesale), and the unit value FOB price for the commodity is normally taken as the benchmark price. Furthermore, observed and adjusted reference prices at wholesale are obtained by subtracting, rather than adding, the access costs between the border and wholesale. Mathematically, the equations for calculating the observed reference prices at wholesale (RP_{owh}) and farm gate $\left(RP_{ofg}\right)$ for an exported commodity are as follows:

$$RP_{owh} = P_b - AC_{owh}$$

$$RP_{ofg} = RP_{owh} - AC_{ofg}$$

After observed and adjusted reference prices are calculated for the commodity, they are subtracted from the domestic prices at each point in the value chain to obtain the observed and adjusted price gaps at wholesale and farm gate. *Observed price gaps* capture the effect of distortions from trade and market policies directly influencing the price of the commodity in domestic markets (e.g. price ceilings and tariffs), as well as overall market performance. *Adjusted price gaps* capture the same as the observed, in addition to the effect of any distortions from domestic exchange rate policies, structural inefficiencies in the commodity's value chain, and imperfect functioning and non-competitive pricing in international markets. Mathematically, the equations for calculating the observed price gaps at wholesale (PG_{owh}) and farm gate $\left(PG_{ofg}\right)$ are as follows:

$$PG_{owh} = P_{wh} - RP_{owh}$$

$$PG_{ofg} = P_{fg} - RP_{ofg}$$

[3] Structural inefficiencies in commodity value chains may include government taxes and fees (excluding fees for services), high transportation and processing costs, high profit margins captured by various marketing agents, bribes and other non-tariff barriers.

where P_{fg} is the domestic price at farm gate, RP_{ofg} is the observed reference price at farm gate, P_{wh} is the domestic price at wholesale, and RP_{owh} is the observed reference price at wholesale.

A positive price gap, resulting when the domestic price exceeds the reference price, means that the policy environment and market functioning as a whole generate incentives (support) to producers or wholesalers. For an imported commodity this could be due to distortions such as the existence of an import tariff. On the other hand, if the reference price exceeds the domestic price, resulting in a negative price gap, this means that the policy environment and market functioning as a whole generate disincentives (taxes) to producers or wholesalers. For an imported commodity this could be due to distortions such as a price ceiling established by the government to keep domestic prices low.

In general, price gaps provide an absolute measure of the market price incentives (or disincentives) that producers and wholesalers face. Therefore, price gaps at wholesale and farm gate are divided by their corresponding reference price and expressed as a ratio, referred to as the ***Nominal Rate of Protection (NRP)***, which can be compared between years, commodities, and countries.

The *Observed Nominal Rates of Protection* at the farm gate (NRP_{ofg}) and wholesale (NRP_{owh}) are defined by the following equations:

$$NRP_{ofg} = \frac{PG_{ofg}}{RP_{ofg}} \; ; \; NRP_{owh} = \frac{PG_{owh}}{RP_{owh}}$$

where PG_{ofg} is the observed price gap at farm gate, RP_{ofg} is the observed reference price at the farm gate, $PG_{owh}$is the observed price gap at wholesale and RP_{owh} is the observed reference price at wholesale.

Similarly, the *Adjusted Nominal Rates of Protection* at the farm gate (NRP_{afg}) and wholesale (NRP_{awh}) are defined by the following equations:

$$NRP_{afg} = \frac{PG_{afg}}{RP_{afg}} \; ; \; NRP_{awh} = \frac{PG_{awh}}{RP_{awh}}$$

where PG_{afg} is the adjusted price gap at farm gate, RP_{afg} is the adjusted reference price at the farm gate, $PG_{awh}$is the adjusted price gap at wholesale and RP_{awh} is the adjusted reference price at wholesale.

If public expenditure allocated to the commodity is added to the price gap at farm gate when calculating the ratios, the ***Nominal Rate of Assistance (NRA)*** is generated. This indicator summarizes the incentives (or disincentives) due to policies, market performance and public expenditure.[4] Mathematically, the Nominal Rate of Assistance is defined by the following equation:

$$NRA = \frac{PG_{afg} + PE_{csp}}{RF_{afg}}$$

[4] The NRA indicator was not calculated for any of the commodities analyzed because of insufficient data on public expenditure. However, it will be developed in the forthcoming reports, as the public expenditure analysis is improved and better data are made available.

where PE_{csp} is commodity-specific public expenditure that has been identified and measured as monetary units per tonne.

Finally, MAFAP methodology estimates the ***Market Development Gap (MDG),*** which is the portion of the price gap that can be attributed to "excessive" or inefficient access costs within a given value chain, exchange rate misalignments, and imperfect functioning of international markets. "Excessive" access costs may result from factors such as poor infrastructure, high processing costs due to obsolete technology, government taxes and fees (excluding fees for services), high profit margins captured by various marketing agents, bribes and other non-tariff barriers. Therefore, the total MDG at farm gate is comprised of three components – gaps due to "excessive" access costs, the exchange rate policy gap and the international market gap. When added together, these components are equivalent to the difference between the observed and adjusted price gaps at farm gate.

Similar to the price gaps calculated, the MDG is an absolute measure, which is also expressed as a ratio to allow for comparison between years, commodities, and countries. This relative indicator of the total MDG affecting farmers is derived by calculating the ratio between the total MDG at farm gate and the adjusted reference price at farm gate as follows:

$$MDG_{fg} = \frac{(ACG_{wh}+ACG_{fg}+EXPG+IMG)}{RP_{afg}}$$

where ACG_{wh} is the access cost gap at wholesale defined as the difference between observed and adjusted access costs at wholesale, ACG_{fg} is the access cost gap at farm gate defined as the difference between observed and adjusted access costs at the farm gate, ERPG is the exchange rate policy gap, and IMG is the international market gap.

A more detailed description of the methodology applied in this analysis is available on MAFAP's website at www.fao.org/in-action/mafap.

4. DATA REQUIREMENTS AND CALCULATION OF INDICATORS

To calculate MAFAP's price incentives indicators, several types of data are needed. This section presents the data that was obtained and methodological decisions that were taken during data analysis.

Analysis of the cashew nuts value chain in Mozambique, presented earlier, suggest there are two marketing channels through which cashew nuts are exported from Mozambique. First, part of the raw cashew nuts bought from smallholder farmers is shipped to international markets without processing. Second, the other part gets exported as processed cashew nuts. Hence, two separate sets of indicators were calculated.

In this section, we discuss how indicators for these two channels were calculated.

TRADE STATUS OF THE PRODUCT

There is no data showing that Mozambique imports either raw or processed cashew nuts. However, data shows that both raw and processed cashew nuts are shipped from Mozambique to international markets. We took exports of processed cashew nuts and converted them into raw cashew nuts equivalent by first dividing them by 0.20 and then adding 12.5% of marketed surplus of raw cashew nuts.[5] We estimated total exports of raw cashew nuts by adding exports of raw cashew nuts to exports of processed cashew nuts measured in raw-cashew equivalent. Then, we divided total exports of raw cashew nuts by marketed raw cashew nuts to obtain an estimate of export shares of marketed surplus. Results are summarized in Table 2. This table shows that export of raw cashew nuts relative to marketed surplus averaged about 52% over the period 2005 to 2013. Overall, we considered that Mozambique is net exporter of raw and processed cashew nuts throughout the period under analysis (2005 through 2013).

Table 2. Marketed surplus and exports of cashew nuts in Mozambique

		Export (MT)			Exports as share of marketed surplus
Year	Marketed raw cashew (MT)	Raw cashew	Processed cashew (raw cashew equivalent)	Total	
2005	104,337	63,346	7,653	70,999	68.0%
2006	62,821	26,349	17,765	44,114	70.2%
2007	74,397	24,176	17,975	42,151	56.7%
2008	96,500	31,607	18,092	49,699	51.5%
2009	64,150	11,720	21,183	32,903	51.3%
2010	96,557	27,923	19,376	47,299	49.0%
2011	112,700	42,000	19,000	61,000	54.1%
2012	64,731	5,595	18,186	23,781	36.7%
2013	83,141	11,700	14,293	25,993	31.3%
Average	**84,370**	**27,157**	**17,058**	**44,215**	**52.4%**

Source: INCAJU

[5] As we pointed out earlier, according to interviews with INCAJU and cashew nuts processors, one MT of raw cashew nuts processed by the domestic industry generates 0.20 MT of processed cashew nuts and 0.125 MT of wastage.

MARKET PATHWAY ANALYSED

Our analysis of price incentives and disincentives focused on Northern Mozambique, specifically on Nampula province, and covers the period 2005 through 2013. This is consistent with analysis presented in the production section of this document, which showed that Nampula province clearly stands out as the province with the largest production and sales volumes of raw cashew nuts during the 2007/08 agricultural season in Mozambique. Our interviews revealed that both exporters and processors of raw cashew nuts operating in Nampula province buy their supplies in Nampula and Cabo Delgado provinces. As pointed out earlier when we discussed cashew nuts value chain, raw and processed cashew nuts, originated from the Northern region in Mozambique, are exported through Nacala port. According to Meeuws (2004), with an installed capacity of 2.6 million MT per year, Nacala port – located in Nampula province – is the third largest major port in Mozambique, after ports of Maputo (12 million MT per year) and Beira (7.5 million MT per year). Nacala port is by far the largest port in Northern Mozambique, serving also Malawi.

BENCHMARK PRICES

Observed

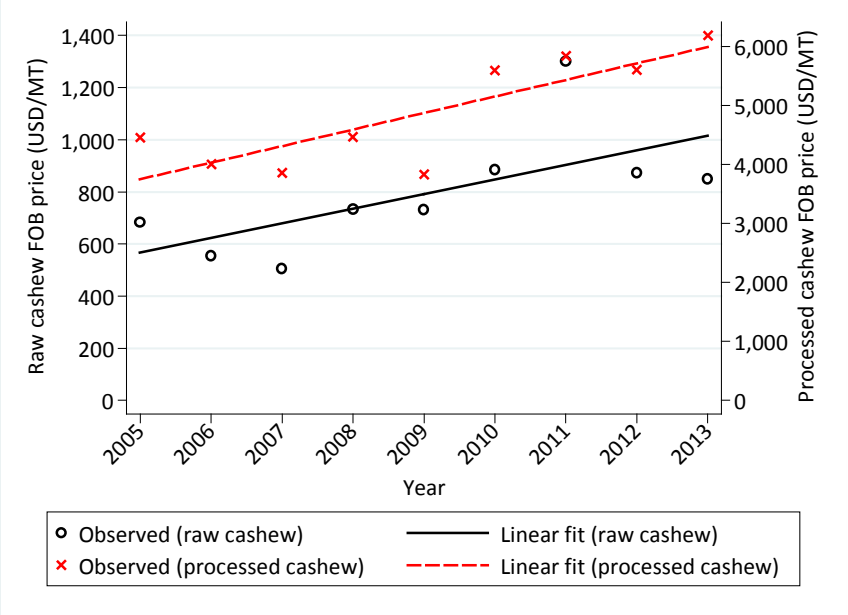
The basis for calculating a reference price to determine whether cashew nuts producers receive market incentives or disincentives is to establish a benchmark price, which represents the price for cashew nuts free of domestic policy and market distortions. The reference price is generally referred to as the opportunity cost for agents in the value chain. Given that cashew nuts are exported in two different forms (raw and processed cashew nuts), we required benchmark prices for both commodities. Since Mozambique was a net exporter of both raw and processed cashew nuts during the period 2005 to 2013, the benchmark prices considered are the free-on-board (FOB) price for raw and processed cashew nuts. The FOB prices for raw and processed cashew nuts, obtained from the Mozambique National Cashew Institute (INCAJU), are presented in Table 3 below. This table shows that FOB prices for processed cashew nuts are greater than those for raw cashew nuts by a factor of more than four. Both FOB prices fluctuated in the same year from one year to another, but they experienced an upward trend, ranging from 506 USD/MT in 2007 to 1,300 USD/MT in 2011 for raw cashew nuts and from 3,830 USD/MT in 2009 to 6,185 USD/MT in 2013 for processed cashew nuts (see Table 3 and Figure 8).

Table 3. FOB prices (USD/MT) for raw and processed cashew nuts

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Raw cashew nuts	683	556	506	735	733	886	1,300	874	850
Processed cashew nuts	4,454	4,000	3,860	4,467	3,830	5,592	5,838	5,606	6,185

Source: INCAJU, 2014

Figure 8: FOB prices for raw and processed cashew nuts



Source: INCAJU, 2014

Adjusted

Although there could be some indications about distortions in the international prices due to the possible monopsony power of India in the international market of cashew nuts (Aksoy and Yagci, 2012), we did not considered any adjustments in the benchmark price for this analysis, due to the difficulty to find an adequate level of adjustment.

This is left for future research and enhancement of this analysis.

DOMESTIC PRICES

Observed prices at point of competition

The structure of the cashew nuts in Mozambique indicates that processed cashew nuts are sold in domestic markets through both informal and formal channels. However, from the best of our knowledge, wholesale or retail prices for processed cashew nuts are not available. For this reason, wholesale prices were not included in this analysis until further research.

Observed prices at farm gate

The same farm gate prices were assumed for both market pathways. We gathered prices at farm level from INCAJU. We summarized the farm-gate price data in Table 4. Prices paid to farmers for raw cashew nuts dropped from 8,000 MZN/MT in 2005 to 6,380 MZN/MT in 2007. They then experienced a considerable upward trend, increasing to 19,000 MZN/MT in 2011. Since then, they declined to 13,660 MZN/MT in 2012 and to 12,500 MZN/MT in 2013 (Table 4). It can also be seen from Table 4 that prices received by farmers for their raw cashew nuts represented on median, about 50% of FOB price for raw cashew nuts and 8% of FOB prices for processed cashew nuts. This could be an indication that processing cashew nuts leads to sizeable added value despite the fact that the share of marketed surplus accounted for raw cashew exports is greater than that accounted for purchases by the domestic processing industry; as shown in Figure 4 in the section dealing with commodity

context. We note that prices paid to farmers for raw cashew nuts are not differentiated based on the destination of the cashew nuts (exports of raw and processed cashew nuts).

Table 4 Prices paid to farmers for raw cashew nuts

Year	Farm-gate prices (MZN/MT)	Farm-gate price as share of raw cashew nuts FOB price	Farm-gate price as share of processed cashew nuts FOB price
2005	8,000	50.8%	7.8%
2006	7,919	57.0%	7.9%
2007	6,380	49.4%	6.5%
2008	8,720	49.1%	8.1%
2009	8,730	44.6%	8.5%
2010	14,530	49.6%	7.9%
2011	19,000	50.6%	11.3%
2012	13,660	55.1%	8.6%
2013	12,500	49.3%	6.8%
Median	**8,730**	**49.6%**	**7.9%**

Source: Authors' calculations based on data from INCAJU

EXCHANGE RATES

Observed

Monthly nominal exchange rates, gathered from the Mozambique Central Bank, were averaged and the resulting annual exchange rates are presented in Table 5. Between 2005 and 2008, exchange rates was essentially stagnant at about 25 MZN/USD. They then trended upward, reaching their historical high of 33.0 MZN/USD in 2010. Since then, they dropped to 28.4 MZN/USD and increased to 29.8 MZN/USD.

Table 5 Nominal exchange rates (MZN/USD)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Exchange rate (MZN/USD)	23.1	25.0	25.6	24.2	26.7	33.0	28.9	28.4	29.8

Source: Central Bank of Mozambique

Adjusted

Over the period 2005 to 2013, we are not aware of any explicit exchange rate policies or exchange rates controls undertaken by the Government of Mozambique. Hence, we did not find any reasons to consider adjustments for the observed exchange rates.

ACCESS COSTS

Observed

Point of competition to border

We interviewed cashew nuts processors in Nampula province to gather estimates of access costs from border to processing facilities for both marketing channels we analyzed. Through these interviews, we gathered estimates of the following access costs components in 2013: transport, handling fees and extra storage at Nacala port. Our interviews with cashew nuts processors indicated that transport costs from farm-gate to cashew nuts processing plants and from cashew nuts processing plant to Nacala port averaged 2.0 MZN per kilogram and 1.5 MZN per kilogram,

respectively, in 2013. For the same year, our interviews revealed that cashew nuts processors spent 2.5 USD per MT on handling of raw cashew nuts from farm gate to processing facilities and 14,040 MZN per 40-foot container on handling of processed cashew nuts from processing facilities to the border. We took the estimated handling cost for a 40-foot container of processed cashew nuts and divided it by 35 to obtain the equivalent handling costs per MT (401 MZN per MT).[6] We also converted the estimate of handling costs from USD into MZN by multiplying it by the average annual exchange rate for 2013 reported in Table 5 above.

According to cashew nuts processors we interviewed in Nampula province, costs of processing raw cashew nuts were estimated to be between 12,800 and 14,400 MZN per MT in 2013. The processing costs (13,600 MZN per MT) used in this analysis were estimated by averaging these two figures. Cashew nuts processors we talked to estimated that the cost of storing a 40-foot container of processed cashew nuts at Nacala Port was 270 MZN per day in 2013. They also indicated that it took about six days to process the paperwork required to export cashew nuts and to get their cashew nuts loaded into the ships. This indicates that storage costs at Nacala Port are estimated to be 46 MZN per MT (270 multiplied by six and the resulting figure divided by 35). Estimates of access costs obtained from our interviews with cashew nuts processors in Nampula province are summarized in Table 6 below.

Table 6: Estimates of access costs in Nampula province: 2013

Item	Cost (MZN/MT)
Transport	
Farm gate to processing facility	2,000
Processing facility to border	1,500
Handling fees	
Farm gate to processing facility	75
Processing facility to border	401
Storage fee (border)	46

Source: Interviews with cashew nuts processor

We took the estimates of access costs presented in Table 6 and we computed estimates of each component of access cost for other years (2005 through 2012) by deflating the 2013 estimates using the consumer price index (CPI) where 2013 is considered the base year for the CPI. Estimates of the CPI are gathered from the Mozambique National Institute of Statistics (INE). From the World Bank Doing Business online database (2005-2013), we also obtained estimates of costs relating to customs fees and processing of paperwork at the border for each year over the period 2005 to 2013. Access cots for both marketing channels we analyzed – exports of raw and processed cashew nuts – are summarized at the bottom panel of Table 7.

[6] Interviews with customs officials revealed that the weight of a 40-foot container of processed cashew nuts was about 35 MT.

Farm gate to border

As mentioned above, estimates of the following components of access costs from farm gate to processing facilities were obtained from interviews with cashew processors in Nampula province: transport from farm gate to processing plant, handling costs during processing of cashew nuts, processing costs and profit margins. These estimates are for year 2013. We took the 2013 estimates for all components except profit margins and deflated them to obtain estimates of the corresponding component of access costs for other years. We used the same approach for both marketing channels (exports of raw and processed cashew nuts), but we note that processing costs are excluded for the raw-cashew-nuts marketing channel. The interviews expressed that profit margins represent 20% of FOB prices. For the processed-cashew-nuts marketing channel, our estimates of profit margins are based on observed FOB prices for processed cashew nuts in each year. Similarly, for the raw-cashew-nuts marketing channels, profit margins are based on observed FOB prices for raw cashew nuts. Our estimates of access costs from farm gate to raw-cashew-nuts exporters are summarized in the top panel of Table 7, while those from farm gate to processing facilities are reported in the middle panel of Table 7.

Table 7 Observed access costs (MZN/MT of raw cashew nuts)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Farm gate to exporter: raw cashew nuts								
Transport	1,092	1,228	1,329	1,466	1,514	1,706	1,883	1,922	2,000
Margins	3,151	2,777	2,585	3,553	3,916	5,855	7,516	4,955	5,074
Handling	41	46	50	55	56	64	70	72	75
Total	**4,283**	**4,051**	**3,964**	**5,073**	**5,487**	**7,625**	**9,469**	**6,948**	**7,149**
	Farm gate to processing factory: processed cashew nuts								
Transport	1,092	1,228	1,329	1,466	1,514	1,706	1,883	1,922	2,000
Margins	4,108	3,998	3,947	4,320	4,092	7,392	6,751	6,358	7,384
Processing	7,424	8,353	9,035	9,968	10,294	11,599	12,803	13,067	13,600
Handling	41	46	50	55	56	64	70	72	75
Total	**12,665**	**13,625**	**14,359**	**15,808**	**15,956**	**20,760**	**21,507**	**21,418**	**23,059**
	Processing factory to border at Nacala Port: raw and processed cashew nuts								
Transport	819	921	996	1,099	1,135	1,279	1,412	1,441	1,500
Handling	1,410	1,719	1,886	1,822	2,275	2,776	2,470	2,628	2,767
Total	**2,229**	**2,640**	**2,883**	**2,922**	**3,410**	**4,055**	**3,883**	**4,070**	**4,267**

Source: Authors own interviews and estimations, and World Bank´s Doing Business online database.

Adjusted

Adjustments were made only on the level of profit margins by processors or export traders. Although we are aware of the existence of other inefficiencies along the cashew nuts value chain in Mozambique (i.e. transport), we did not have enough information on which to base other adjustments.

To get a sense of whether our estimates of profit margins are excessive or not, we estimated the share of profit margins in total investment (total access costs excluding profit margins plus farm gate prices for raw cashew nuts). The findings indicate that profit margins appear to be high in certain years. Hence, we adjusted profit margins by assuming that profits margins represent 19% of total investment in each year for the processed-cashew-nuts marketing channel and 23% for the raw-

cashew-nuts marketing channel. 19% and 23% are the minimum estimated shares of profit margins in total investment costs during the period 2005 to 2013. Adjusted costs for both marketing channels are summarized in Table 8 below.

Table 8 Adjusted observed access costs (MZN/MT of raw cashew nuts)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Farmer gate to exporter: raw cashew nuts								
Transport	1,092	1,228	1,329	1,466	1,514	1,706	1,883	1,922	2,000
Margins	2,666	2,777	2,497	3,089	3,217	4,776	5,828	4,628	4,421
Handling	41	46	50	55	56	64	70	72	75
Total	**3,799**	**4,051**	**3,876**	**4,610**	**4,787**	**6,546**	**7,781**	**6,622**	**6,496**
	Farmer gate to processing factory: processed cashew nuts								
Transport	1,092	1,228	1,329	1,466	1,514	1,706	1,883	1,922	2,000
Margins	3,270	3,476	3,341	3,999	4,092	5,522	6,642	5,680	5,583
Processing	7,424	8,353	9,035	9,968	10,294	11,599	12,803	13,067	13,600
Handling	41	46	50	55	56	64	70	72	75
Total	**11,827**	**13,103**	**13,755**	**15,488**	**15,956**	**18,891**	**21,398**	**20,741**	**21,258**
	Processing factory to border at Nacala Port: raw and processed cashew nuts								
Transport	819	921	996	1,099	1,135	1,279	1,412	1,441	1,500
Handling	1,410	1,719	1,886	1,822	2,275	2,776	2,470	2,628	2,767
Total	**2,229**	**2,640**	**2,883**	**2,922**	**3,410**	**4,055**	**3,883**	**4,070**	**4,267**

BUDGET AND OTHER TRANSFERS

MAFAP is performing a public expenditure analysis in Mozambique. Once available this could provide figures relative to policy transfers to producers per MT of cashew nuts to more precisely compute the Nominal Rate of Assistance (NRA). In this technical note, expenditure figures were not included in the computation of the reported NRA.

QUALITY AND QUANTITY ADJUSTMENTS

No quality or quantity adjustments were made between de farm gate and the border when analyzing the marketing channel of raw cashew exports.

A quantity adjustment of 1 MT of processed cashew nuts for every 5 MTs or raw cashew nuts was applied when analyzing the marketing channel of processed cashew exports.

DATA OVERVIEW

Following the discussions above, the table below summarizes the main data sources used and methodological decisions taken for the analysis.

Table 9: Data sources and methodological decisions

		Description	
Concept		***Observed***	***Adjusted***
Benchmark price		*Annual FOB for raw cashew nuts and FOB for processed cashew nuts provided by INCAJU*	*N.A.*
Domestic price at point of competition		*No price at point of competition was used in this analysis*	*N.A.*
Domestic price at farm gate		*Annual producer price provided by INCAJU*	*N.A.*
Exchange rate		*Official exchange rate obtained from the Bank of Mozambique*	*N.A.*
Access cost from the point of competition to the border		*Port handling and fees based on WB Doing Business online database* *Transport costs from factory to border obtained on field inquiry and interview with domestic industry.*	*N.A.*
Access costs from the point of competition to farm gate		*Transport, handling, processing and margins obtained on field inquiry and interviews with domestic industry.*	*Margin adjusted to the average profit margin as a percentage of processors or traders´ financial costs.*
QT adjustment	Bor-PoC	*A 5 to 1 ratio was used to adjust MT of raw cashew to MT of processed cashew, based on information provided by the industry via INCAJU*	*N.A.*
	PoC -FG	*N.A.*	*N.A.*
QL adjustment	Bor- PoC	*N.A.*	*N.A.*
	PoC -FG	*N.A.*	*N.A.*

The data used for this analysis is summarized below.

Table 10. Data used for processed cashew nuts analysis

		Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
		Trade status	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
DATA	*Unit*	*Symbol*									
Benchmark Price											
Observed	USD/MT	$P_{b(int\$)}$	4,453.9	4,000.0	3,860.0	4,467.3	3,830.3	5,592.3	5,838.1	5,605.6	6,184.5
Adjusted		P_{ba}									
Exchange Rate											
Observed	MZN/USD	ER_o	23.1	25.4	25.8	24.3	27.5	34.0	29.1	28.4	29.9
Adjusted		ER_a									
Access costs border - wholesale											
Observed	MZN/MT	AC_{owh}	2,228.5	2,640.2	2,882.8	2,921.7	3,410.1	4,055.0	3,882.5	4,069.6	4,266.9
Adjusted	MZN/MT	AC_{awh}	2,228.5	2,640.2	2,882.8	2,921.7	3,410.1	4,055.0	3,882.5	4,069.6	4,266.9
Domestic price at wholesale		P_{dwh}									
Access costs wholesale - farm gate											
Observed	MZN/MT	AC_{ofg}	12,665.3	13,625.1	14,359.4	15,807.8	15,956.3	20,760.0	21,506.5	21,417.8	23,058.6
Adjusted	MZN/MT	AC_{afg}	11,827.0	13,103.1	13,753.3	15,487.1	15,956.3	18,889.9	21,397.2	20,740.4	21,257.6
Farm gate price	MZN/MT	P_{dfg}	8,000.0	7,919.0	6,380.0	8,720.0	8,730.0	14,530.0	19,000.0	13,660.0	12,500.0
Externalities associated with production		E									
Budget and other product related transfers		BOT									
Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}									
Quality conversion factor (border - point of competition)	Fraction	QL_{wh}									
Quantity conversion factor (point of competition – farm gate)	Fraction	QT_{fg}	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Quality conversion factor (point of competition – farm gate)	Fraction	QL_{fg}									

Table 11. Data used for raw cashew nuts analysis

		Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
		Trade status	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
DATA	*Unit*	*Symbol*									
Benchmark Price											
Observed	USD/MT	$P_{b(int\$)}$	683.1	555.6	505.7	734.9	733.2	886.0	1,300.0	873.8	850.0
Adjusted		P_{ba}									
Exchange Rate											
Observed	MZN/USD	ER_o	23.1	25.4	25.8	24.3	27.5	34.0	29.1	28.4	29.9
Adjusted		ER_a									
Access costs border - wholesale											
Observed	MZN/MT	AC_{owh}	2,228.5	2,640.2	2,882.8	2,921.7	3,410.1	4,055.0	3,882.5	4,069.6	4,266.9
Adjusted	MZN/MT	AC_{awh}	2,228.5	2,640.2	2,882.8	2,921.7	3,410.1	4,055.0	3,882.5	4,069.6	4,266.9
Domestic price at wholesale		P_{dwh}									
Access costs wholesale - farm gate											
Observed	MZN/MT	AC_{ofg}	4,283.2	4,051.0	3,963.5	5,073.4	5,486.7	7,624.8	9,469.4	6,948.3	7,148.8
Adjusted	MZN/MT	AC_{afg}	3,798.6	4,051.0	3,875.2	4,609.2	4,787.6	6,545.8	7,781.0	6,621.5	6,496.0
Farm gate price	MZN/MT	P_{dfg}	8,000.0	7,919.0	6,380.0	8,720.0	8,730.0	14,530.0	19,000.0	13,660.0	12,500.0
Externalities associated with production		E									
Budget and other product related transfers		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}	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Quality conversion factor (point of competition – farm gate)	Fraction	QL_{fg}									

SUMMARY OF INDICATORS

For processed cashew nuts:

Table 11. MAFAP Reference Price and Price Gaps for processed cashew nuts in Mozambique, (MZN/MT),2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trade status for the year	x	x	x	x	x	x	x	x	x
Observed reference price at farm gate	7,430.4	6,166.9	5,012.3	5,318.9	4,444.0	16,411.8	11,659.4	9,574.6	13,108.8
Adjusted reference price at farm gate	8,268.8	6,688.9	5,618.4	5,639.6	4,444.0	18,281.9	11,768.8	10,252.0	14,909.7
Observed price gap at farm gate	569.6	1,752.1	1,367.7	3,401.1	4,286.0	-1,881.8	7,340.6	4,085.4	-608.8
Adjusted price gap at farm gate	-268.8	1,230.1	761.6	3,080.4	4,286.0	-3,751.9	7,231.2	3,408.0	-2,409.7

Source: Author's own calculations using data as described above.

Table 12. MAFAP Nominal Rates of Protection and Assistance for processed cashew nuts in Mozambique, (%), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trade status for the year	x	x	x	x	x	x	x	x	x
Observed NRP at point of competition	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Adjusted NRP at point of competition	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Observed NRP at farm gate	8%	28%	27%	64%	96%	-11%	63%	43%	-5%
Adjusted NRP at farm gate	-3%	18%	14%	55%	96%	-21%	61%	33%	-16%
Observed NRA at farm gate	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Adjusted NRA at farm gate	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Source: Author's own calculations using data as described above.

Table 13. MAFAP Market Development Gaps for processed cashew nuts in Mozambique (%), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trade status for the year	x	x	x	x	x	x	x	x	x
Access costs gap to competition point (ACGwh)	-	-	-	-	-	-	-	-	-
Access costs gap to farm gate (ACGfg)	-838.3	-522.0	-606.0	-320.7	-	-1,870.1	-109.3	-677.4	-1,800.9
Exchange rate policy gap (EXRP)	-	-	-	-	-	-	-	-	-
International markets gap (IMG)	-	-	-	-	-	-	-	-	-

Source: Author's own calculations using data as described above.

For raw cashew nuts:

Table 15. MAFAP Reference prices and Price Gaps for raw cashew nuts in Mozambique, (MZN/MT), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trade status for the year	x	x	x	x	x	x	x	x	x
Observed reference price at farm gate	9,240.8	7,421.5	6,221.2	9,861.9	11,280.3	18,408.7	24,439.1	13,771.2	14,024.7
Adjusted reference price at farm gate	9,725.3	7,421.5	6,309.6	10,326.1	11,979.4	19,487.8	26,127.5	14,098.1	14,677.5
Observed price gap at farm gate	-1,240.8	497.5	158.8	-1,141.9	-2,550.3	-3,878.7	-5,439.1	-111.2	-1,524.7
Adjusted price gap at farm gate	-1,725.3	497.5	70.4	-1,606.1	-3,249.4	-4,957.8	-7,127.5	-438.1	-2,177.5

Source: Author's own calculations using data as described above.

Table 16. MAFAP Nominal Rates of Protection and Assistance for raw cashew nuts in Mozambique, (%), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trade status for the year	x	x	x	x	x	x	x	x	x
Observed NRP at point of competition	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Adjusted NRP at point of competition	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Observed NRP at farm gate	-13%	7%	3%	-12%	-23%	-21%	-22%	-1%	-11%
Adjusted NRP at farm gate	-18%	7%	1%	-16%	-27%	-25%	-27%	-3%	-15%
Observed NRA at farm gate	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Adjusted NRA at farm gate	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Source: Author's own calculations using data as described above.

Table 17. MAFAP Market Development Gaps for raw cashew nuts in Mozambique, (%), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trade status for the year	x	x	x	x	x	x	x	x	x
Access costs gap to competition point (ACGwh)	-	-	-	-	-	-	-	-	-
Access costs gap to farm gate (ACGfg)	-484.6	-	-88.3	-464.2	-699.1	-1,079.1	-1,688.4	-326.8	-652.8
Exchange rate policy gap (EXRP)	-	-	-	-	-	-	-	-	-
International markets gap (IMG)	-	-	-	-	-	-	-	-	-

Source: Author's own calculations using data as described above.

5. RESULTS AND INTERPRETATION

In this analysis, only the farm gate indicators were considered because there were no data on domestic wholesale prices available for this study. This is because large proportion of cashew nuts sold for domestic consumption is traded via the informal market. Therefore, the market flow we

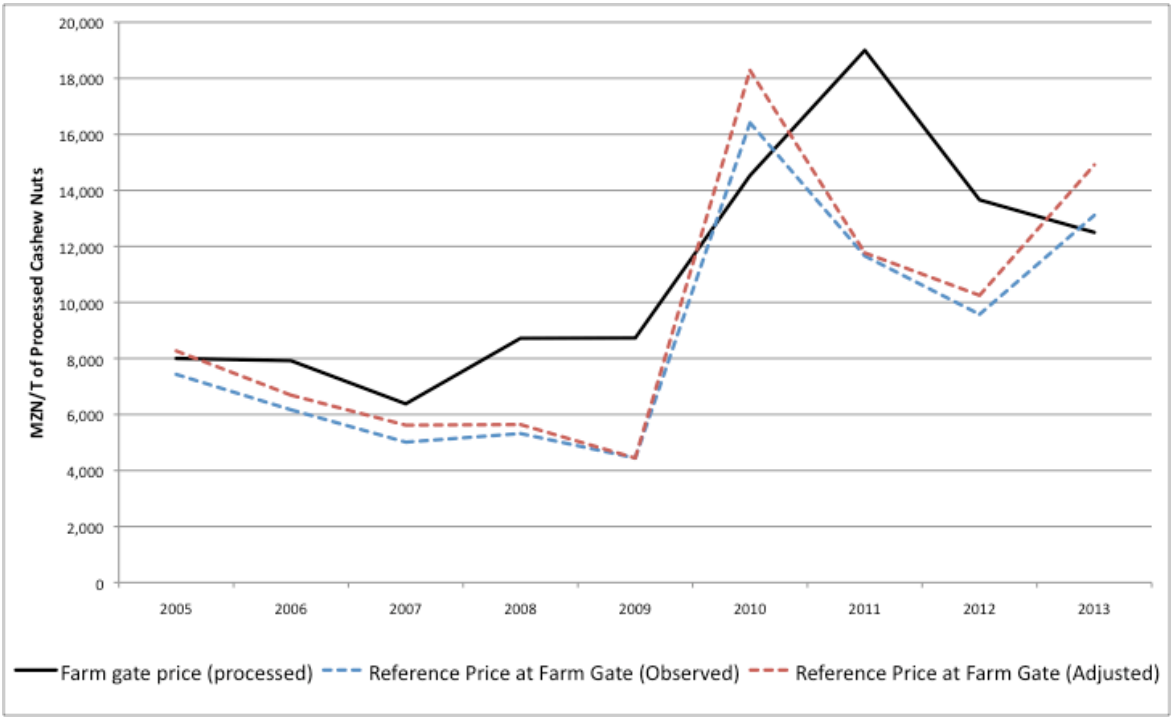
analyzed goes between the farm gate and the border – where domestic cashew nuts compete with the international market. Two channels of this market flow are considered: exports of processed cashew nuts and exports of raw cashew nuts.

Due to Mozambique's cashew nuts policy framework, which is focused towards incentivizing domestic processing of cashew nuts, results show that in general both marketing channels are effectively facing an opposite structure of incentives.

Figure 9 presents the trends on the **processed marketing channel** for the absolute deviation of the price received by farmers from the one that they would have received in the absence of domestic policies and market distortions (observed reference price) or with additional improvement on their market access (adjusted reference price). The results show a positive gap for almost all the period under analysis, except for the years 2010 and 2013. This means that in general, farmers were receiving prices higher than those they would have received in the absence of domestic policies. The highest price gaps were observed on the years 2009 and 2011, with a positive differential between the price received by the farmers and the observed reference price of 4,286 and 7,340 MZN per MT of cashew nuts, respectively. Despite the general positive trend, for the years 2010 and 2013, the results show a negative differential of up to *minus* 1,988 MZN per MT of cashew nuts in 2010 and of *minus* 608 MZN/MT in 2013.

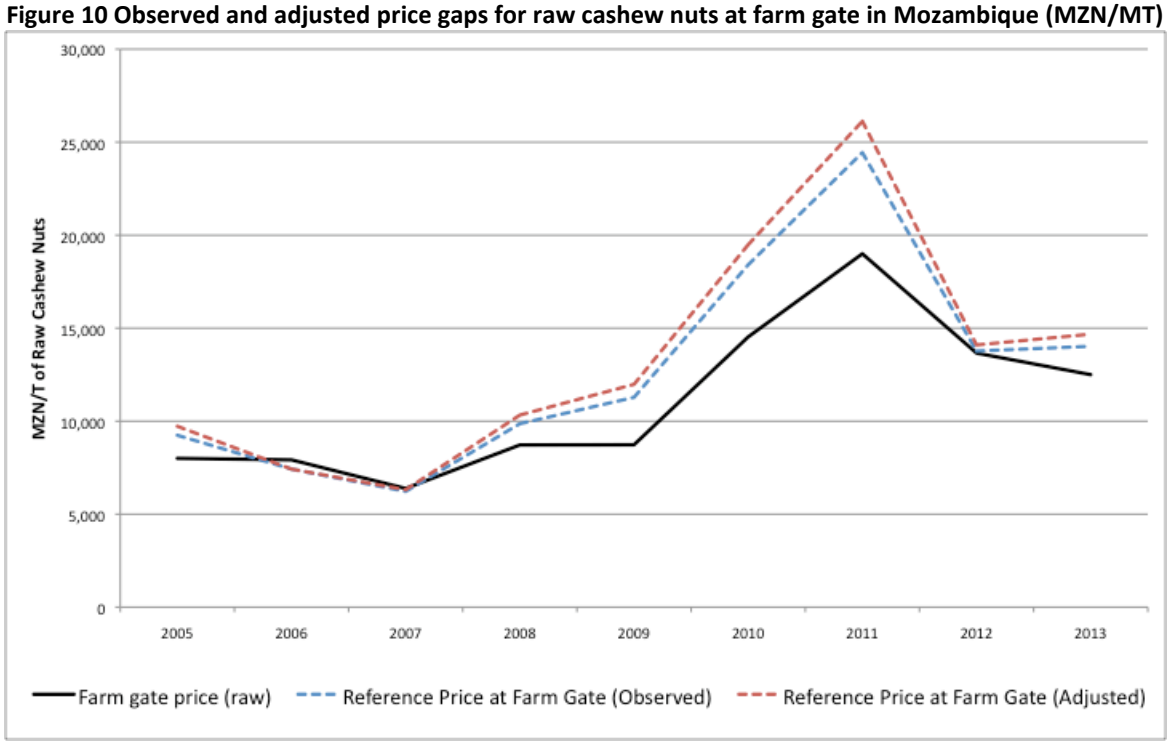
However, when analyzing the **raw marketing channel**, the incentives structure faced by farmers changes. As Figure 10 shows, the MAFAP indicators for this segment of the value chain are negative for almost all the years under analysis, except for 2006 and 2007 (with small positive price gaps of 497 and 158 MZN per MT of cashew nuts, respectively). This means that in general, farmers were receiving prices lower than those they would have received in the absence of domestic policies. From 2007 to 2011, the negative difference between the reference price and the price paid to farmers showed an increasing trend, reaching its lowest in 2011, with a price gap of *minus* 5,439 MZN per MT of cashew nuts. This negative trend smoothed in 2012, with a price gap of only *minus* 111 MZN per MT of cashew nuts, spiking again in 2013.

Figure 9 Observed and adjusted price for processed cashew nuts at farm gate in Mozambique (MZN/MT)



Source: Authors own calculations.

Figure 10 Observed and adjusted price gaps for raw cashew nuts at farm gate in Mozambique (MZN/MT)



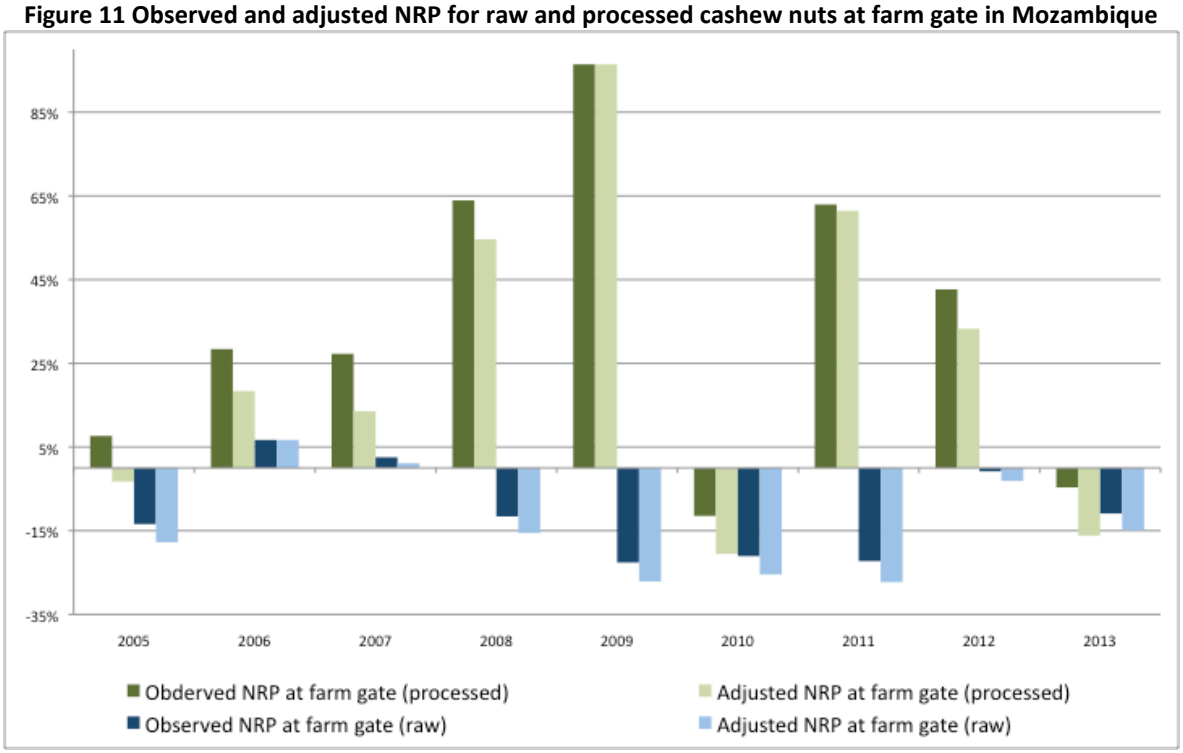
Source: Authors own calculations

Figure 11 presents the nominal rates of protection (NRPs) for both segments of the cashew nuts export market flow analyzed: processed exports (in green) and raw exports (in blue). The NRPs are the difference in relative terms between the price paid to farmers and the estimated reference price (observed and adjusted). The NRPs follow the trends presented before: (1) high levels of protection over the processed segment in seven of the nine years covered by this study, with a peak NRP of over 95% in 2009, and (2) a low level of protection over the raw exports segment, with a peak of *minus*

16% in 2011. Both are expected results that concur with the policy framework of the cashew nuts sector in Mozambique, which seeks to incentivize the domestic industry production over the exports of raw cashew nuts.

The export tax on raw cashew nuts exports reduces the price paid to farmers as disincentives are transmitted along the value chain. As this export tax is not applied to exports of processed cashew nuts, the export tax operates as a *de facto* protection to the domestic processing industry. Altogether with additional government initiatives aimed to incentivize domestic processing of cashew nuts, the export tax would be allowing the processing factories to pay higher prices to farmers than those that would have prevailed in the absence of such policies, further analysis of the net effect of the policies is recommended.

Figure 11 Observed and adjusted NRP for raw and processed cashew nuts at farm gate in Mozambique



Source: Authors´ own calculations

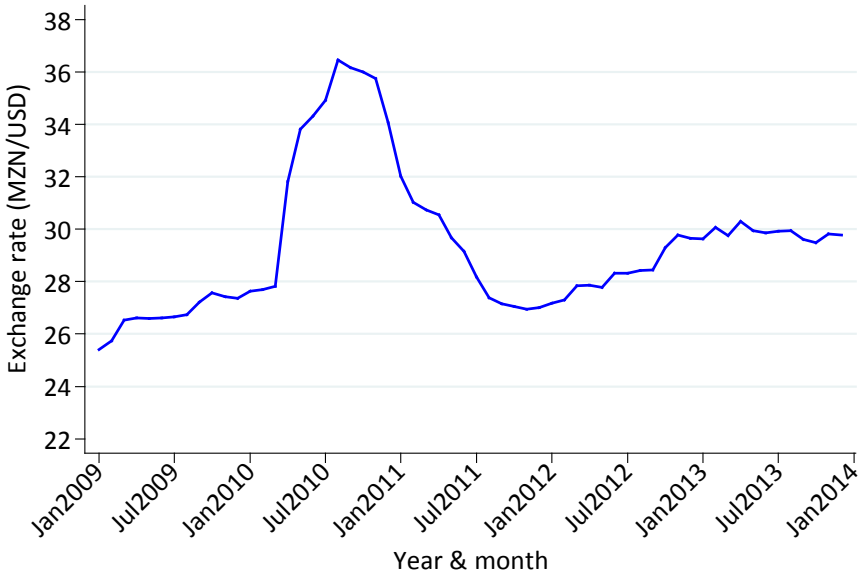
Although in most years our findings reflect what would be expected due to the domestic policy framework, there are some years that present positive NRPs in the export of raw cashew nuts (years 2006 and 2007) and negative NRPs in the export of processed cashews (years 2010 and 2013).

In the first case, the year 2007 correspond to the lowest FOB price for raw cashew nuts over the period of analysis. This was naturally reflected in a low reference price. Also, 2006 and 2007 were among the years with lower production of cashew nuts available for commercialization, compared to other years. This affected the market dynamic of the raw cashew export segment, according to interviews with INCAJU. The policy mandate preventing that raw cashew nuts be exported before the domestic processing industry has met its demand for raw cashew nuts might have contributed to this result. In low production years, there are fewer cashew nuts left after the industry has filled its stocks, forcing the traders of raw cashew nuts to pay relatively higher prices to farmers.

In the second case, although a positive NRP for the processed cashew nuts segment is expected, the results show a negative NRP of up to *minus* 11.4% in 2010. This might be explained by the sudden

depreciation of the domestic currency (Metical) during the second half of the year (Figure 12). In this year, farmers were paid considering a lower exchange rate, which resulted in prices lower than the estimated reference price, which was based on FOB prices paid in US Dollars converted to Meticais with a higher exchange rate. The benefits of a higher exchange rate were not entirely transferred to the farmers through the value chain.

Figure 12 Nominal exchange rate (MZN per USD): 2009-2013



Source: Central Bank of Mozambique

The difference between the observed and the adjusted indicators is the result of the adjustment made on profit margins earned by cashew nuts processors and exporters. The difference between observed and adjusted NRPs constitutes a market development gap (MDG). The market development gap in this analysis measures the deviation between the observed and adjusted access costs from farm gate to the border[7], which is important to identify potential inefficiencies along the value chain. Our findings for this indicator are plotted in Figures 13 and 14, for the processed and the raw segments of the export market flow, respectively.

The MDG between the farm gate and the border for the **processed segment** of the export market flow, represented by the blue bars, shows the absolute value of costs for the farmers due to the excessive profit margins of processing factories in some years. The magnitude is related to the adjustments made in the profit margins of the processing factories. The minimum profit margin for the period under analysis (19% of the investment cost) was used as reference for what would be estimated as a "normal" profit margin. The MDG is negative for all years (except 2009 when it is zero), representing losses to farmers, product of higher-than-normal profit margins of the processing factories. This is mainly reflecting the effect of high international prices and variation in the exchange rates that are not entirely transferred to the price paid to producers, which might be possible due to the market power of the factories. The largest costs to producers over the period under analysis were registered in 2010 and 2013, when the MDGs reached values over *minus* 1,800 MZN/MT of

[7] In the absence of adjustments to the nominal exchange rate or benchmark prices.

cashew nuts. In relative terms, the MDG for the two peak years represents over 12% of the estimated reference price.

The MDGs for the raw segment of the export market flow (represented by the red bars) show a similar trend as the processed segment. The level is product of the adjustments made in the profit margins of the export traders. The minimum profit margin for the period under analysis (23% of the investment cost) was used as reference for what would be estimated as a "normal" profit margin. The MDG is negative for all years, except 2006 when it is zero. After 2006, an increasing trend in the MDGs is observed, reaching a peak in 2011, with a MDG of *minus* 1,688 MTZ/MT of cashew nut, which represents a cost to farmers of over 6% of the estimated reference price. The years 2012 and 2013 show a significant decrease in the MDGs to levels below *minus* 650 MZN/MT of cashew nuts. Again, these inefficiencies are expected under a market and policy structure that enhances market power of traders over farmers due to the hindering of competition among the actors in the value chain.

The MDGs levels for the export segment of both, processed and raw cashew nuts, are a good indication of the effect of the preferential buying policy of processors over export traders in the domestic market dynamic of cashew nuts since it restricts competition between processors and exporters, in detriment of producers. This policy affects the prices paid to producers in two ways: on the one side, it enables the industry to stock up free of competition from export traders when farmers are more needed to sell their harvest; on the other side, once the processing factories have filled their stocks, the export traders have no competition left, increasing their market power over the producers paying lower prices than those they would have paid if facing buying competition from the industry.

Figure 13 Market development gap for raw cashew nuts in Mozambique

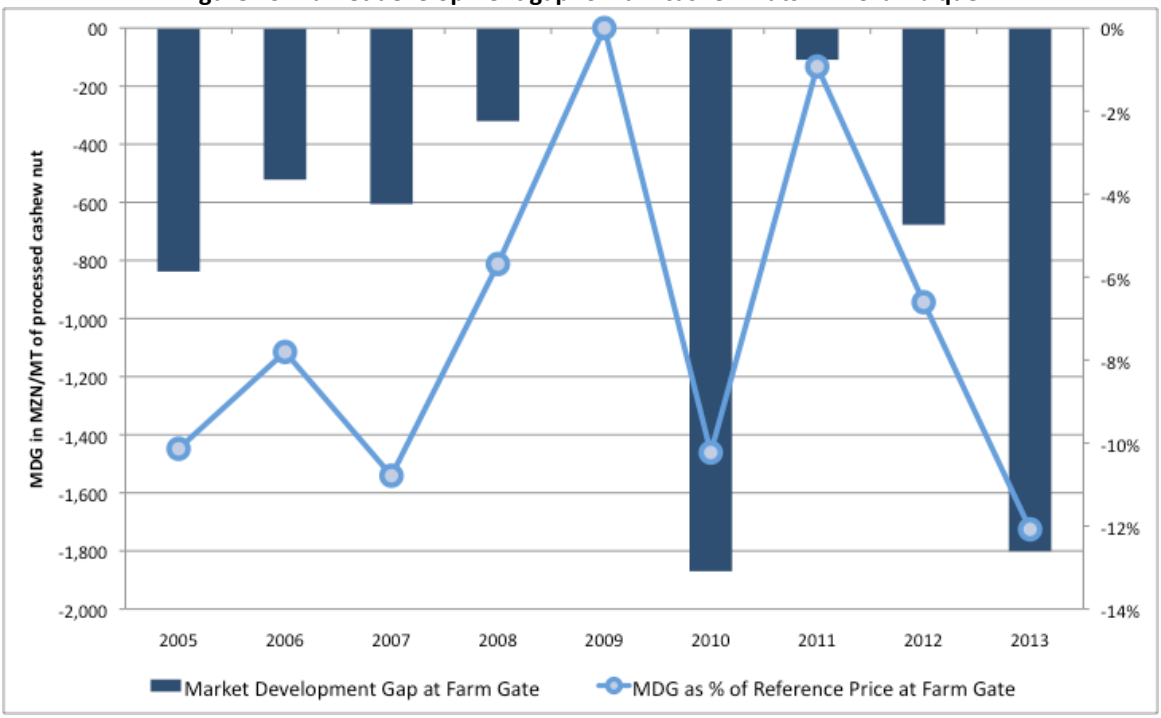
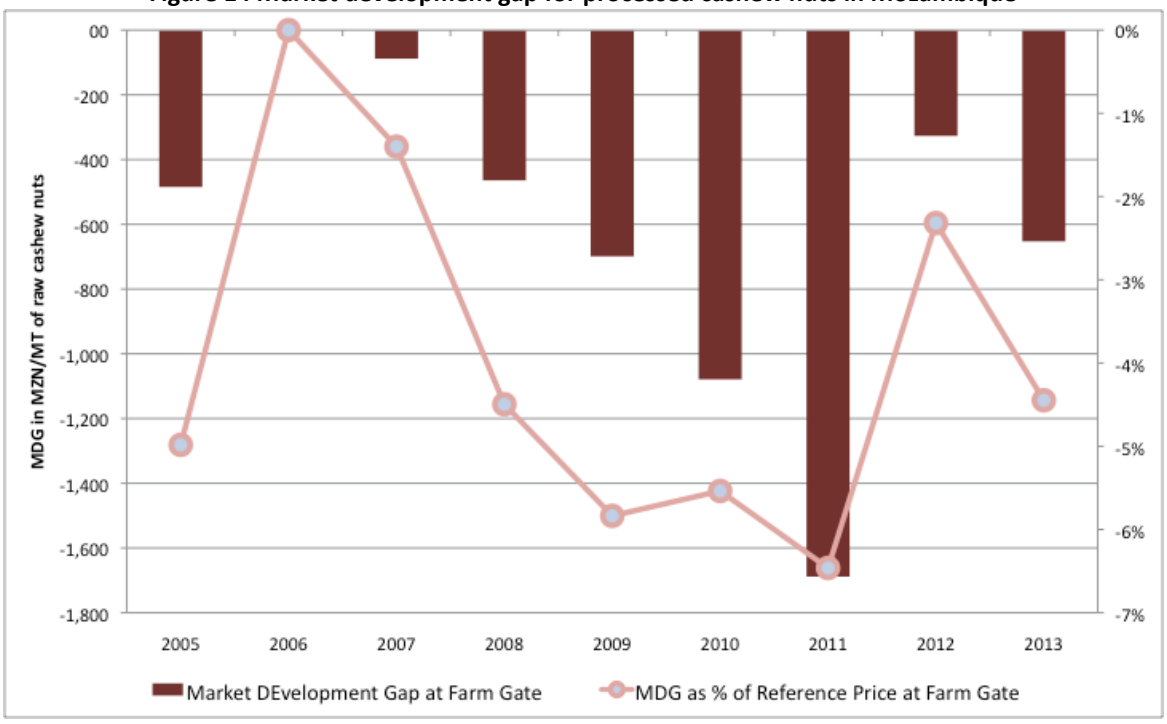


Figure 14 Market development gap for processed cashew nuts in Mozambique



6. CONCLUSION

MAIN MESSAGES

The results of this analysis show that the current policy framework and market structure are having two clear and opposite effects on the level of incentives faced by farmers depending on the segment of the export market flow analyzed. On the one side, the export tax on exports of raw cashew nuts has resulted in a general level of price disincentives to farmers, whom are paid a lower price than what they would have received in the absence of such tax. On the other side, the export tax provide implicit protection to the domestic processing of cashew nuts, resulting in price incentives that are transmitted to producers along this segment of the value chain. In this case, farmers are receiving higher prices than those they would have received in the absence of such policy.

Additionally, MAFAP results identified the existence of market inefficiencies in both segments of the export value chain resulting from excessive profit margins from both processors and traders. These inefficiencies represent implicit losses to farmers resulting from the market power of processors and traders, which might be enhanced by the artificial separation of direct competition between processors and traders due to the preferential buying of the domestic industry.

The possible drivers for these results are summarized in the table below.

Box 1. Driving factors behind MAFAP results for cashew nuts in Mozambique.

Policy	Sector Performance
✓ Liberalized prices at farm gate level (until 2014, when a benchmark pricing system was intended to be established) ✓ 18% tax on raw cashew exports ✓ Preferential buying of raw cashew from processors over raw cashew exporters. ✓ Well-structured sector supervised by the INCAJU	✓ Volatile exchange rates ✓ Volatile and low levels of production

PRELIMINARY RECOMMENDATIONS

It is recognized that further research and in-depth analysis are required in order to detail specific policy recommendations to reduce price distortions and increase efficiency of the sector. Further research and discussion with various stakeholders linked direct or indirectly with the cashew nuts value chain is required. However, the analysis conducted allows identifying some areas of potential intervention.

- Gradually reduce the tax on raw cashew nuts exports and monitor closely the effect on economic incentives faced by farmers under both segments of the value chain (raw and processed cashew nuts exports).
- Assess closely the effect of the implementation of a benchmark floor pricing system.
- Increase the domestic market performance by eliminating domestic market restrictions that hinders competition between processors and traders. Assess the implementation of marketing instruments such as auctions or integration to a national stock exchange.

LIMITATIONS

- Additional discussions over market and production dynamics identify suitable and strengthen recommendations.
- Lack of wholesale prices for raw and processed cashew nuts.
- Access costs for the market flow of raw cashew nuts exports were generally based on those collected for the processed segment of the value chain. Additional field work to gather access costs for the raw cashew nuts marketing segment would improve the quality analysis undertaken for this marketing segment.
- The public monetary transfers to farmers were in the process of being collected by the MAFAP team in Mozambique. This will allow us to compute the Nominal Rate of Assistance (NRA).

FURTHER INVESTIGATION AND RESEARCH

- Compute the net level of incentives to farmers considering the proportion of production marketed under each segment of the value chain (raw and processed). A preliminary calculation is presented in Annex I.
- MAFAP, country partners and stakeholders should work together to identify potential research topics including assessment of policy alternatives for the cashew nuts sector.
- Ex-ante analysis of the effect of a reduction in the export tax on the incentives faced by producers.
- Ex-ante analysis on the effect of setting a benchmark floor price on the incentives faced by producers.
- Ex-ante analysis on the effects of increased competition among cashew nuts processors and exporters.

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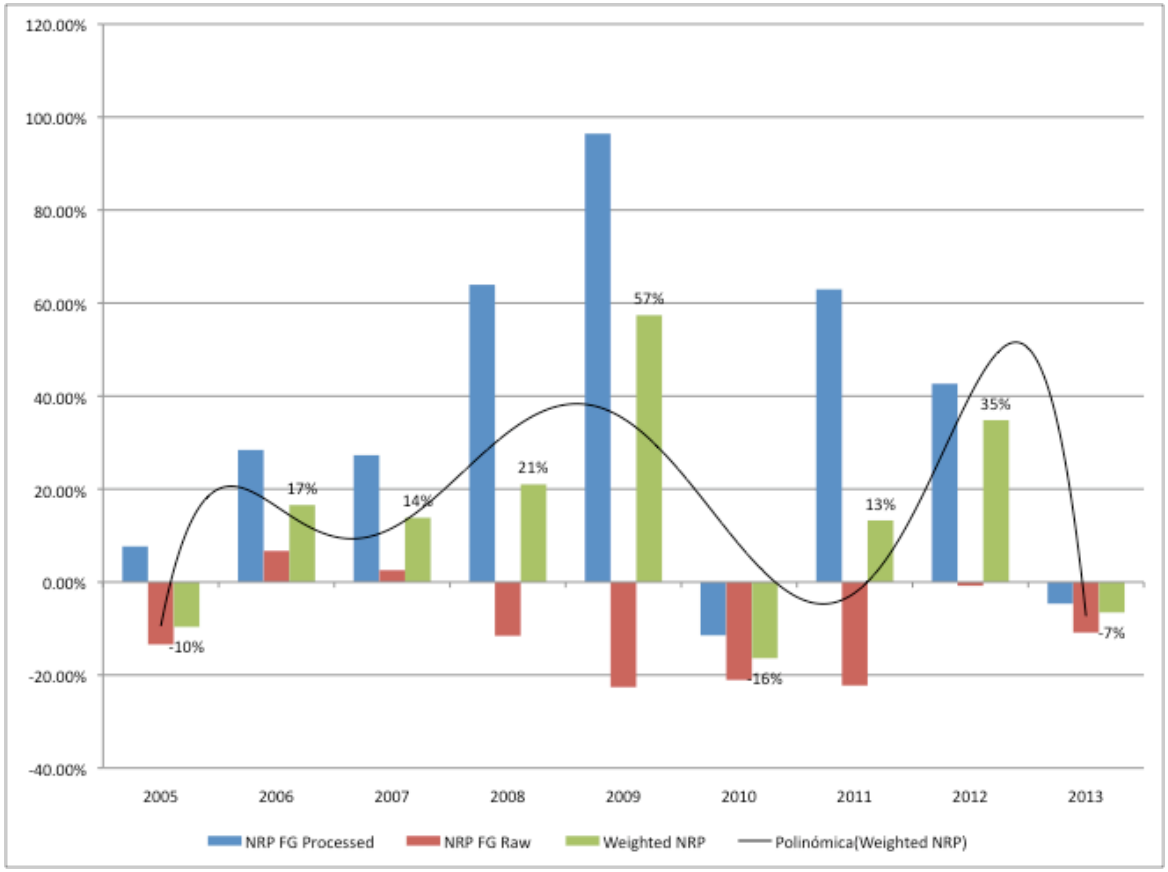
ANNEX I: AVERAGED NRPs FOR CASHEW NUTS SECTOR

	Total buys (raw+industry)	Proportion Raw	Proportion Industry
2005	77.216,3	0,8	0,2
2006	48.291,8	0,5	0,5
2007	44.455,8	0,5	0,5
2008	55.606,7	0,6	0,4
2009	35.733,0	0,3	0,7
2010	54.538,7	0,5	0,5
2011	72.000,0	0,6	0,4
2012	30.994,7	0,2	0,8
2013	38.357,0	0,3	0,7

	2005	2006	2007	2008	2009	2010	2011	2012	2013
NRP FG Processed	7,67%	28,41%	27,29%	63,94%	96,45%	-11,47%	62,96%	42,67%	-4,64%
NRP FG Raw	-13,43%	6,70%	2,55%	-11,58%	-22,61%	-21,07%	-22,26%	-0,81%	-10,87%
% Processed	0,180	0,454	0,456	0,432	0,672	0,488	0,417	0,819	0,695
% Raw	0,820	0,546	0,544	0,568	0,328	0,512	0,583	0,181	0,305
Weighted NRP	-10%	17%	14%	21%	57%	-16%	13%	35%	-7%



Food and Agriculture Organization of the United Nations

In collaboration with

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