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The Evaluation of the Impacts of Title II Monetization Programs for Wheat and Crude Edible Oils in Mozambique, 1997-2007

by

Cynthia Donovan, Helder Zavale, and David Tschirley

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EXECUTIVE SUMMARY

From 1997-2007, the United States Agency for International Development (USAID) Title II monetization programs sold more than US$200 million of food aid wheat and unrefined vegetable oils in Mozambique. This research has three objectives: 1) to document the lessons learned from past monetization programs in Mozambique; 2) to identify the intended and unintended effects of monetization in Mozambique; and 3) to document indirect successes as a result of using monetization in Mozambique, if any. Monetization programs in Mozambique prior to 1997 demonstrated positive effects on market development and contributed to food security in a critical period. During later periods, the monetized food aid displayed the negative effects of uncoordinated food aid deliveries and arrival of quantities beyond absorptive capacity, depressing prices for locally produced staples and adding to market price volatility.

Food aid managers in the recent years learned from that earlier experience. For the 1997-2007 PL 480 Title II program, design features included using an umbrella marketing scheme, with a single cooperating sponsor responsible for monetization, providing professional trading experience and coordinated activities for sales. Wheat grain and unprocessed bulk edible oils were selected, and sold to buyers using an auction system. There is almost no domestic wheat production, and the production of oilseeds meets only a small proportion of local needs, so the threat of directly competing with local production is greatly diminished.

Analysis shows that the monetized wheat arrivals did not cause price shocks on local wheat flour in Nampula or in Maputo. Analysis of costs and prices indicates that for oil, monetization sales prices were close to and above commercial import prices and met cost recovery guidelines. For wheat, prices at which monetized commodities were sold were between 85-97% of the benchmark, when implicit shipping subsidies are excluded from costs. Prices approached import parity prices for the hard wheat varieties. Import substitution for imports from the wider world markets is probable, although we were unable to empirically assess this effect.

On consumption, we show that the wheat flour price was unaffected by the monetized wheat, from which it follows that the Title II wheat did not change food consumption habits or depress the prices for locally produced substitutes. Analysis was unable to determine if the monetized unrefined oils had price effects due to the small number of arrivals. As found in the literature, increased consumption of wheat products and oils during the period are likely driven by income increases especially in urban areas, not by cheap food aid commodities.

Regarding industry structure, the bidding system and relatively easy payment schedules aided small, new processors especially for wheat, and the decision to distribute to a range of buyers may have assisted in establishing more competitive markets. While we cannot empirically test the hypothesis, we believe that decreasing margins between world wheat prices and local retail wheat flour prices in the early period along with stable margins in the second half of the period are partially due to increased competitiveness in the milling sector. Regarding imports, the monetized commodities complemented but also competed with commercial imports from international markets for both oil and wheat, given the pricing structure.

There are other probable effects for which the empirical evidence is either weak or unavailable, although there may be anecdotal evidence. Title II wheat shipments may have facilitated a shift to using higher quality wheat in bread and other flours, increasing demand for hard wheat varieties, grown in the U.S. and a reduced number of other countries. The Title II monetization programs in Mozambique likely contributed to sector development for

domestic processing and packaging for edible oils, encouraging growth in domestic oilseeds sector, an objective of the Mozambican government. The monetization program provided a platform for discussions between the public and private sectors concerning wheat quality and demands. In the future, Title II commodities may provide some of the leverage needed to motivate fortification of wheat flour in the country.

For future work, it will be critical for monetization teams to assess world market prices, changing domestic processing and production capacity, and government of Mozambique development objectives to ensure that the programs do not begin to show the types of negative effects found in other countries, but currently absent or minimized.

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LIST OF ACRONYMS

ADF	Augmented Dickey Fuller
ADRA	Adventist Development Relief Agency
AIC	Akaike's Information Criterion
CIF	Cost Including Freight
CIM	*Companhia Industrial da Matola*
CS	Cooperating sponsor
DNS	Dark Northern Spring (hard wheat, subclass of HRS)
DSGD	Development Strategy and Government Division
EMG	Emerging Markets Group
EXCOM	Mozambique PL 480 Title II Monetization Consortium
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agricultural Organization Online Statistical Database
FAS	Foreign Agricultural Service
FOB	Free on Board
FPE	Final Prediction Error
FY	Fiscal Year
GAO	Government Accountability Office
GOM	Government of Mozambique
HQIC	Hannan and Quinn Information Criterion
HRS	Hard Red Spring (wheat)
HRW	Hard Red Winter (wheat)
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
INTERFAIS	International Food Aid Information System
IPP	Import parity price
MIC	Ministry of Industry and Commerce (Mozambique)
MINAG	Mozambique Ministry of Agriculture
MSU	Michigan State University
MT	Metric Ton
NGO	Nongovernmental Organization
NSW	Northwest Soft White (wheat)
PAPA	Plano de Acção para Produção de Alimento (Action Plan for Food Production)
PARPA	Action Plan for the Reduction of Absolute Poverty
PP	Philips Perron
SBIC	Schwarz's Bayesian Information Criterion
SIMA	*Sistema de Informação de Mercados Agrícolas* (Agricultural Market Information System)
SRW	Soft Red Winter (wheat)
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
VAR	Vector auto-regression
VAT	Value Added Tax
WFP	World Food Programme
WV	World Vision

1. INTRODUCTION AND BACKGROUND

The Government of Mozambique (GOM) seeks to reduce poverty to 45% by the end of 2009. To accomplish that, it has worked with international agencies and bilateral donors to develop assistance programs that will address the issues of food supply, access, and utilization, including nutrition and health. Such programs range from immediate food distributions in times of emergency, as occurred during the catastrophic floods of 2000, to education and extension programs to improve nutrition and agricultural productivity.

USAID PL 480 Title II programs can fit into this agenda in two ways: 1) commodities arrive for direct distribution to meet needs; and 2) through a monetization process, commodities arrive and are sold into the market to increase supply of food in the markets while providing funds for development activities that improve food security, including health and nutrition, over the longer run.[1] In recent years non-governmental organizations (NGOs), known as cooperating sponsors (CSs) in this context, have monetized 100% of Title II supplies that have arrived in Mozambique. In 1997, rather than managing the monetization process individually, these CSs established EXCOM, an umbrella group for Title II food aid monetization. EXCOM selected one of their members, World Vision (WV), as the agency that would implement the monetization of Title II aid. WV makes funds available for the CSs, according to the funds available through monetization and to each CS's Development Assistance Programs approved by USAID.

During the next 10 years, through 2007, approximately US$200 million dollars of Title II monetized commodities arrived in Mozambique from the United States and were sold to the private sector through the EXCOM umbrella. Crude (unrefined) vegetable oil and wheat were the selected commodities. Both commodities need processing and packaging before sales to final consumers. The buyers were large and medium scale processors with the financial capability and infrastructure capacity to deal with the values and volumes of monetized commodities. In 2009, World Vision, with the support of USAID/Mozambique, requested an independent analysis of the monetization program, specifically focused on the impacts of the monetization activities and the commodities sold, exclusive of the use made of the funds received. Table 1 details by year the overall amounts of each commodity that arrived under Title II, by weight and by value.

The three key objectives for this work are the following:

- To document the lessons learned from past monetization programs in Mozambique;
- To identify the intended and unintended effects of monetization in Mozambique; and
- To document indirect successes as a result of using monetization in Mozambique, if any.

[1] For more about different assistance programs and the history of the PL 480 Title II program, see Hansch (1991); Bonnard et al. (2002); Simmons (2009); GA0 2007 and cited references in those documents.

Table 1. Volumes of and Proceeds from Title II Monetized Commodities, 1997 – 2007

	Metric tonnage (MT)			Proceeds (000US$)		
Year	**Oil**	**Wheat**	**Total**	**Oil**	**Wheat**	**Total**
1997	13,938	58,600	72,538	NI	NI	NI
1998	5,500	71,069	76,568	NI	NI	NI
Sub-Total 1997/1998	**19,438**	**129,669**	**149,106**			
1999	8,999	63,270	72,269	5,719	9,442	15,161
2000	1,499	78,954	80,453	712	11,848	12,560
2001		98,399	98,399		15,338	15,338
2002		57,880	57,880		9,487	9,487
2003		61,700	61,700		12,422	12,422
2004		76,567	76,567		14,820	14,820
2005		17,499	17,499		3,904	3,904
2006		48,000	48,000		10,065	10,065
2007		49,849	49,849		12,925	12,925
Sub-Total 1999-2007	**10,498**	**552,118**	**562,616**	**6,431**	**100,251**	**106,682**
Total	**29,936**	**681,786**	**711,722**			

Source: World Vision Annual Report on Monetization. Proceeds are based on prices to processors and quantities received. NI = no information. Prices to processors were only available for the period 1999-2007.

In the evaluation, empirical approaches will be used according to information availability. As will be seen, monetization of Title II resources in Mozambique evolved into a system that avoided many of the pitfalls of earlier monetization programs, may have contributed positively to development of local processing capacity, and was an additional supply source for the private sector processors.

This study is organized in nine sections. Section 1 has provided an introduction and background to the study. Section 2 presents a brief literature review on monetization and its impacts, followed by a discussion of previous experience with monetization in Mozambique. Section 3 discusses monetization as related to Mozambican government policy and stated priorities. Section 4 looks at the choice of commodity and expected effects, followed by Section 5, which describes the empirical methods and data for this work. Section 6 focuses on the empirical results for effects on the following conditions: local markets, local processors, consumption, and finally imports and relationship with foreign markets. Section 7 reviews cost recovery and discusses various other issue. Section 8 summarizes the results, while Section 9 provides conclusions and recommendations.

2. LITERATURE REVIEW

Given the objectives of this report, this review will focus on literature that evaluates the effects of commodity monetization. In general, the documents discuss impacts on local markets, production and prices of local staples, consumption habits, local currency, and international markets. Many documents address efficiency concerns of monetization, making a comparison with direct distribution or cash assistance (directly to households or to the agencies implementing projects and programs). Here we will highlight those documents with empirical evidence of effects, with limited mention of the discussion papers that posit impacts based on logic or anecdotal evidence.

Hansch (1991) reviews the case for and against monetization in general terms and then compares 14 monetization programs from the late 1980s and early 1990s. He covers issues related to transfer efficiency, choice of commodities, valuation of the commodity, and market impact. While Hansch provides limited empirical analysis, he suggests key aspects to evaluate when looking at monetization programs: 1) transfer efficiency; 2) appropriate choice of commodity; 3) impacts of commodity on consumer demand; 4) possible loss of value when official exchange rates used differ greatly from market rates; and 5) possible loss of value due to inflation. Box 1 contains Hansch's criteria for commodity selection, based on increasing desirable effects while minimizing negative effects of the monetized shipments. For the empirical analysis, Hansch focused on transfer efficiency, in which the transfer price (value of sales) is compared to the cost of programming, procuring, and shipping food for monetizing. He found that the ratio varied from slightly over 1 (value of sales covered all costs with a bit extra) and less than 0.50 (value of sales only covered 50% of the costs). If the transfer efficiency is 0.5, for every US$1 spent on the commodity the NGOs received less than US$0.50 for project funding. Hansch cites the World Food Programme (WFP) monetization experience to indicate that when local market prices are much higher than world market prices, efficient monetization can occur, helping to bring down local prices with increased supply and possibly increased competition.

Box 1 Criteria for Commodity Selection (Hansch, page 6)

- Self-targeting
  - Cassava, millet, sorghum, soy blends
- High Income transfer Value
  - Oil, beans, dairy products
- Indigenous tastes
  - Rice, corn, roots
- Complementing local production
  - Wheat, oil, processed foods
- Accesses comparative advantage of donor
- Fosters donors' comparative advantages

In their 1996 review of monetization programs, Mendez England and Associates (1996) evaluated programs in various countries, including Mozambique and Ethiopia. Their evaluation covered cost recovery, in-country costs, price determination mechanisms, and the relative role of monetized commodities in total supply in each country studied. They discussed ancillary impacts of the food aid on local production, consumption, marketing, and other aspects, although they did not present analysis of these impacts. Analytically, they chose to use simple ratios of costs and revenues, and evaluated proportions of supply from different sources. Key in their findings was the high variability in costs and cost recovery. They found that monetized commodities represented very high percentages of total availability in some cases, including Mozambique, a situation that could create dependency or create disincentives, although they did not test for the presence of disincentives.

In 1995, the U.S. Congress passed the Bellmon Amendment for PL 480 Title II programs, requiring that certain analyses are completed before commodities can be ordered and shipped. Analysis must demonstrate that "1) adequate storage facilities will be available in the recipient country at the time of the arrival of the commodity to prevent the spoilage or waste of the commodity; and 2) the distribution of the commodity in the recipient country will not result in a substantial disincentive or interference with domestic production or marketing in that country." (USAID 1998). Bellmon analyses can provide valuable information; however, the quality of the analyses has not been reliable and these are ex ante analyses, rather than ex post. In recent years, there have been more rigorous standards placed on the analyses and they are often conducted by third parties. Simmons (2009) draws heavily from extended Bellmon analyses completed by the Emerging Markets Group (EMG) in Ethiopia and Rwanda. The recent Mozambique Bellmon (Emerging Markets Group 2008) represents a case of a more intensive effort to assess the potential impacts of commodities and to select commodities based on that assessment. A number of aspects of the Mozambique Bellmon are very useful in the current study and will be cited in this document.

Simmons (2009) is the most recent study to look at the issues and literature concerning food aid monetization under Title II programs. She focuses on the same topics as our evaluation: the costs and market impacts of monetization rather than the impacts of the programs implemented with the funds. Simmons (2009) cites various potential benefits and risks that are relevant to examine in this context. In Ethiopia, she cites Levinsohn and McMillan's (2005) analysis as providing evidence that food aid lowered the price of wheat for poor consumers, in particular, thus enhancing food access for them. Simmons briefly mentions that concessional terms are often enjoyed by buyers. This may lower barriers to entry for young industries, but it also may create dependence on monetized food aid, especially with smaller processors, a question to which we will return for Mozambique. On commercial displacement, the analysis in Simmons (2009) demonstrates the challenge of determining displacement. She cites the example of edible oils arriving in Rwanda, comprising 14-29% of total commercial oil imports. Price analysis demonstrates that the Title II commodities were sold in Rwanda below import parity prices (IPP) at times, and above it at other times, with commercial displacement most likely when the sales price is lower than IPP, although it is not empirically proven in this case. If food aid represents a significant portion in the overall supply and displaces commercial imports, the removal of food aid may represent a shock to the markets. Simmons also reflects on the cost efficiency of the monetized food aid. How many dollars for development project funding are available for each dollar of cost in buying, transporting, managing and selling the monetized food aid commodities? The cost recovery calculations found in the EMG Bellmon analysis for Rwanda cited in Simmons (2009) suggest that only US$0.63 in development funding was obtained for every dollar spent on the food aid.

In an analysis of monetization in 30 countries from 2001-2005, Shaw and McKay (2006) used simple ratios to understand the relative importance of the quantities monetized in total world trade and in domestic supplies in the countries in which monetization occurred. They found that there is little support for the idea that monetized commodities affected world trade in those commodities, given the small market share (less than 1% of any given commodity in the period). Looking at local production, the majority of programs occurred where domestic production was less than 10% of total consumption of the commodity and monetization provided less than 10% of the total consumption quantity. Commercial imports meet the consumption needs for these commodities in the majority of countries. They found that, on average and across programs and countries, Title II monetization consisted of about 10.5% of total imports. They assess that this could reflect displacement of commercial imports, although they contend that the maximum quantity displacement overall is closer to 4.8% or less, based on the comparison of monetized quantities to total supplies. That monetized commodities are paid in local currency means that it would displace a relatively smaller share of more expensive commercial imports when considering volumes. Shaw and McKay (2006) also calculated the foreign exchange savings for the countries due to receipt of local currency for buyer payments, rather than hard currency. Given the wide range of results, depending on the commodity and the country, it will be important to evaluate the Mozambican monetization experience in more detail.

As explained in Barrett (2004) and Donovan et al. (2005), when food aid has strong negative effects on local markets, it is usually due to poor planning or management, such that large shipments arrive as local harvest begins or when commercial importers already had stocks. Donovan (1996) demonstrated the price impacts for monetized maize arrivals in Mozambique in the mid-1990s, as discussed below. There are very few other studies that assess price impacts of monetized commodities. In the case of wheat imports in many countries, including Mozambique, wheat imports arrive throughout the year and are the only source of wheat, so monetized quantities can blend in with commercial quantities at the processing level with no immediate direct impact on the markets. As will be seen, this is not a problem with the Title II deliveries under study here.

Proponents of monetization cite a potential benefit for U.S. producers based on the idea that monetized commodities provide a basis for future commercial sales of U.S. commodities, opening new markets. There is little empirical evidence to support or reject this idea. Barrett and Maxwell (2005) conclude that monetization has not built U.S. markets, but it will be important to look at the Mozambican case more specifically, since there are commercial sales of U.S. wheat to Mozambique.

Tschirley and Howard (2003) reviewed monetization experience in Sub-Saharan Africa to understand when monetization is a first choice option to respond to needs, and when it might be the second-best option or should be rejected as an option. They raised several issues that are not under the scope of this paper, such as the possible additionality aspects of PL 480 Title II monetized food aid. Monetization can have valuable market development effects, both planned and unplanned; Tschirley and Howard (2003) cite cases in Rwanda and Uganda in which monetized food aid commodities helped to increase competitiveness in local markets for vegetable oil, as well as investments in oil processing capacity in Rwanda. The authors note the need for more rigorous analysis of the monetization process itself, independent of the use of monetization funds, both before and during implementation.

2.1. More Advanced Empirical Research

In most of the research cited above, the analytical methods related to the impacts of food aid were based on simple estimations of the ratios of food aid quantities compared to commercial imports and to domestic production, as found in Bellmon analyses and elsewhere, as well as price and cost differences for efficiency and recovery estimates. There are researchers who have used econometric methods with time series data such as vector auto-regressions (VARs), and two- and three-stage least squares estimates. These works include Lavy (1990); Donovan (1996); Barrett, Mohapatra, and Snyder (1999); Abdulai, Barrett, and Hazell (2004); Tapio-Bistrom (2001); Lowder (2004); Mabuza et al. (2009); and Tadesse and Shively (2009). Maunder (2006) provides an overview on these and other recent empirical studies, focused on Sub-Saharan Africa.

Tapio-Bistrom's dissertation analyzed the case of Tanzania, in which food aid arrived and potentially competed in the markets for local products, thus reducing producer incentives. She developed a market equilibrium analysis using maximum likelihood methods to evaluate whether the food aid arrivals have significant effects on production and producer prices for maize. She found no significant effects, although the author points out that the results may be due in part to the unique features of the marketing system in place in Tanzania during the time. Much of the food aid went through the public sector marketing agency, and there was substantial activity in informal sectors at different price levels. Mabuza et al. (2009) undertook a similar analysis in Swaziland recently, in which they assessed the effects of maize food aid on local production and prices of maize using two stage least squares analysis. As did Tapia-Bistrom (2001), the authors included food aid quantities, commercial import quantities, local maize prices, and various aspects related to domestic maize production in their model. Food aid imports were found to have had no significant effect on domestic prices or local production.

Abdulai, Barrett, and Hazell (2004) evaluated food aid effects from two perspectives: 1) household level effects based on survey data from Ethiopia; and 2) macroeconomic effects based on annual data from 42 countries over a 30 year period. Using maximum likelihood methods and vector autoregressions, the authors attempted to determine if one period's food aid shipments had a negative impact on food production in the following period, controlling for rainfall and disasters. They did not find evidence of impacts on local production. Earlier work by Barrett, Mohapatra, and Snyder (1999) using VARs on data from 18 countries over 1961-95 found that program food aid had only small impacts on local production. They found evidence that monetization improved market performance for food staples.

Donovan's work in Mozambique in the early to mid 1990s determined that the large quantities of monetized yellow maize did not have an effect on local maize prices until the later period (1994-96) when domestic production began to recover from civil war and yet yellow maize continued to arrive in large quantities (Donovan 1996). The lessons from the earlier Mozambique monetization experience are discussed further below.

Lowder (2004) undertook cross-country analysis to assess whether or not food aid displaces commercial imports or lowers domestic production using a panel data study of 64 countries from 1991-2000 and distinguishing between targeted and program aid.[2] This is an extension

[2] Lowder makes the distinction between *program* and *targeted* food aid, with Title II food aid defined as targeted. While her assumption is that Title II aid is all targeted aid, delivered to the targeted individuals or households directly, the monetization programs have changed, with some Title II aid going to the markets directly. In Mozambique, with substantial monetization of Title II, the analysis would be flawed using that definition.

of the earlier work by Barrett, Mohapatra, and Snyder (1999), using VARs and fixed effects to control for country-level differences. The effects were strongest of program aid on commercial imports, indicating a nearly one-to-one displacement. For each metric ton cereal import in program aid, there was a one ton reduction in commercial imports. The author highlights the data challenges involved in the work, using the Food and Agricultural Organization Online Statistical Database (FAOSTAT) and the International Food Aid Information System (INTERFAIS) datasets. We will not be able to estimate this in the Mozambican case.

Overall, the newer documents benefit from the maintenance of better records and availability of datasets to empirically evaluate many potentially important effects of monetized food aid commodities. The current report will build on these most recent empirical studies, focused on impacts identified for Mozambique, and distinguishing between those effects that lend themselves to empirical analysis and those which must be evaluated in a more qualitative way. First, it is important to know how previous programs have been developed in Mozambique and how their effects are perceived within the Mozambican government.

2.2. Past Monetization Experience in Mozambique

The Title II monetization program that began in 1996/97 was not the first experience in Mozambique with monetization of food aid. There were earlier Title II programs, and Title III program food aid began during the civil war period as large-scale government to government transfers in which yellow maize grain was delivered directly into private sector mills in Mozambique, and then the maize meal was sold at controlled prices and through ration shops, with funds going to government as counterpart funds and to the mills. By mid-1991, research suggested that it would be valuable to widen the potential buyers beyond the millers and allow local traders to purchase the grain for sales in local markets. Market intermediaries and consumers could then buy the maize grain, take it to small hammer mills, and have it processed to a straight-run maize flour for a low cost consumption staple.

Yellow maize grain was the commodity selected by the U.S. government, as it was considered an inferior good (consumers preferred white maize), was a basic staple, and could be (and was) phased out when local production began to recover from the war. Market research in 1992 demonstrated that the maize was going straight from the port into the public markets, providing small scale traders with an opportunity to work, but the imports introduced short-run price volatility, possibly exacerbated by leakage of emergency maize grain into the markets. The market development aspects of the monetization program were successful, along with addressing food security needs of the poorest with a self-targeting commodity (Tschirley, Donovan, and Weber 1996). The monetized commodity is thought to have been the right response to food insecurity due to high staple prices in Mozambique and in the region during this period. By early 1994, local production was recovering and yellow and white maize prices began to move together. In late 1994 and early 1995, large quantities of yellow maize food aid arrived in Maputo, and stayed in the food system for months, lowering market prices for both white and yellow maize (Donovan 1996). It was in this period that the monetization efforts needed to be scaled back, but the system lacked the necessary flexibility. A key lesson from this experience was the importance of timing of food supplies, coordinating with local production and seasonality, as well as with the private sector, other donors, and food aid programs. The need for professional trading skills in dealing with pricing and allocation of lots was also evident with this early monetization.

3. RELATIONSHIP BETWEEN MONETIZATION AND GOVERNMENT OF MOZAMBIQUE OBJECTIVES

The economic and political environment in Mozambique has changed since the early 1990s and it is important to look at government priorities during the 1997-2007 period to understand how they viewed the role of Title II monetized commodities. The GOM officials with whom we spoke are highly supportive of both Title I and Title II commodities, especially the current wheat and unrefined oil commodities, although for the EMG Bellmon research (Emerging Markets Group 2008), the officials stated a clear preference for Title I program assistance in wheat and oils. They expect these commodities to both relieve pressure on foreign currency for imports while helping to meet food deficits and keep food prices down.

The Agricultural Strategy announced in 1996 indicated a desire to achieve self-sufficiency in food production, which would suggest potential conflict with the arrivals of imported food aid commodities. However, the Action Plan for the Reduction of Absolute Poverty (PARPA) 2001-2005 (Government of Mozambique 2001) indicated that agro-industry plays an important role in the government's vision for agriculture and rural development and for employment generation, especially based on local, private investment. Government officials from the Ministry of Industry and Commerce felt that the importation of unrefined vegetable oil and of wheat contributed to the development of local processing capacity.

Ministry of Finance officials spoke of the benefits from reduction in demands on foreign exchange reserves. The Title II commodities are purchased by the private sector using local currency and the local currency is used in the economy for assistance programs. Commercially purchased imports are paid for in hard currency, thus contributing to draw downs on the foreign currency reserves.[3] The Ministry of Finance staff also sees monetization of food as a good *exit strategy* after years of reliance on food aid distributions. With improved household income, greater reliance on markets will be enabled by greater market supplies.

Interviews with processors in the private sector and with public officials indicated that monetized oil and wheat did not present competition with local raw material production or processing industry during this time period. Ministry of Agriculture officials noted that the current government Action Plan for Food Production 2008-2011 focuses on local production of wheat and oilseeds with a view to reducing dependence on imports; however, during the period of our analysis, neither was produced in adequate volume to meet local demand, and imports were needed. GOM staff indicated that investments in oil processing equipment are desirable to promote domestic oilseed crops into the future, and to the extent that monetized unrefined oil helped to promote those investments, the program was successful. This echoed the processors' expressed interest in having the unrefined vegetable oils arrive under Title I or II programs. A domestic oilseeds development program based on sunflowers in the northern part of the country was undermined not by Title II monetization, but by a combination of imports of inexpensive Asian palm oil and high prices (due to good export markets) for raw sesame seeds, a competing crop to sunflower that reduced participation in sunflower production. Both public officials and private agents suggested that refined oil would not be welcome as it would compete with, rather than support, the local processing industry, and praised the decision-makers for not bringing in the refined vegetable oil.

[3] On the negative side, while there has been discussion about such overseas direct assistance (ODA) contributing to Dutch disease, with inflation and exchange-rate appreciation; analysis indicates that Mozambique has not suffered from this in spite of high rates of such assistance (McKinley 2005).

Until 2008, wheat was not one of the government's priority crops for production investments, and domestic production was estimated to be less than 3,000 metric tons. Thus, Mozambique relies almost entirely on imported wheat from a range of countries. The government officials with whom we spoke were not concerned that the monetized wheat was encouraging the consumption of an inappropriate foreign food, creating dependence on imports. Most officials believe that wheat consumption, especially in bread and noodles, is rising in Mozambique due to income dynamics and the desire of urban consumers to have access to easily prepared food. It is not uncommon to see people on their way to work grabbing inexpensive margarine topped bread from street vendors in Maputo. With approximately 7% of urban food expenditures on wheat bread (with 13% in Maputo) (Barslund 2007), it is reasonable for GOM to see the monetized wheat as an instrument to dampen price spikes for wheat flour and other wheat-based commodities, thus improving food security for both urban and rural households.[4]

Government officials praised USAID and World Vision for working with them to determine the commodities, sales modalities, and the timing of shipments. The government indicated that they found the negotiation processes open and transparent and acknowledged that there were occasional problems in which the private sector would submit complaints and combined USAID, World Vision, and Ministry of Industry and Commerce (MIC) effort would resolve the issues. The main complaints from the private sector centered on price disputes, when world prices declined between a call forward for a shipment and the arrival of the shipment, or on quality issues related to damage of commodities in shipping. This will be discussed in Section 7.

It would be difficult to discuss Title II monetization programs as they relate to GOM objectives without mentioning the activities funded with the sales of the commodities. The EXCOM members have all developed activities designed to reduce food insecurity, increase nutrition, and increase incomes of rural Mozambican households. Those activities correspond directly with three of the six PARPA fundamental areas of action: (i) education, (ii) health; and (iii) agriculture and rural development (Government of Mozambique 2001). At a USAID workshop for Cooperating Sponsors in November, 2006, NGOs presented results across a range of activities that relate to these fundamental areas of action: World Vision's work with literacy and farmer organizations, Save the Children's work addressing cassava productivity problems, CARE's work with improved infant feeding practices, Adventist Development Relief Agency's (ADRA) community programs on malaria and HIV prevention, and Food for the Hungry's programs to improve productivity of staples and of vegetable crops. All of these programs are primarily funded with Title II monetization proceeds, and in each case, they are developed based on GOM's declared priorities, as found in the PARPA and other documents.

[4] Analysis later in this paper will seek to assess whether or not the Title II commodities actually lowered market prices in selected urban centers of Mozambique.

4. MONETIZED WHEAT AND OIL: COMMODITY CHOICES AND EXPECTED EFFECTS

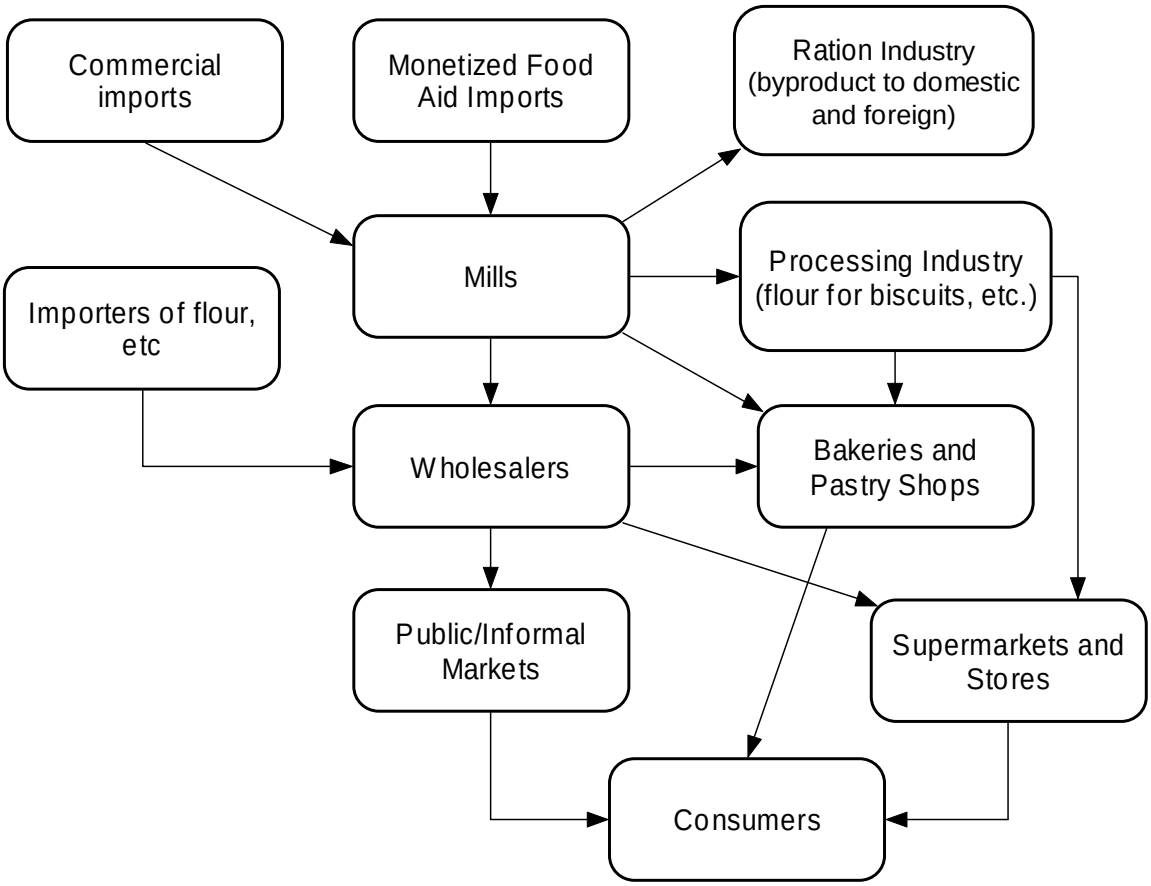
Since the effects of monetization will depend on the structure, conduct and performance of the industry, in this section we provide information and analysis on wheat and oil production, processing and marketing systems in Mozambique.

4.1. Wheat: Type of Wheat, Product Characteristics, Structure of the Industry, Imports, and Monetization

Muendane, Zandamela, and Schalke (2000) developed a simple schematic representation of the structure of the industry (Figure 1). Mills import directly through the world market as well as purchase monetized food aid wheat. There are also limited imports of processed products from within southern Africa as well as from elsewhere. Local industry acquires the wheat flour to use in making cookies, pasta, and other products, but bread and related uses are by far the most important, accounting for about 80% of wheat use in the 1995/97 period (Muendane, Zandamela, and Schalke 2000).

Since Mozambique relies on imports to supply consumers, the challenge is estimating other sources of supplies and then consumption of wheat, given difficulties with data on imports.

Figure 1. Simple Schematic of Wheat Industry Structure



Source: Authors' adaptation and translation of Muendane, Zandamela, and Schalke 2000. Figure A2-1, p.100.

According to food balance sheets produced by MIC, wheat consumption needs have substantially increased from 224 thousand metric tons in 2000 to 485 thousand metric tons in 2008. Muendane, Zandamela, and Schalke (2000) estimated that between 1995 and 1997 an average of 34% of wheat imports came from the U.S., 22% from Australia, 16% from Canada, and 28% from other countries. Within those quantities, U.S., Canada, and Australia all sent food aid wheat in addition to commercial exports (FAOSTAT 2009). In the region, only South Africa and Namibia exported to Mozambique, in small quantities. For recent years we did not find detailed wheat import data by country and type for Mozambique, although FAOSTAT indicates that various countries export to Mozambique, including those mentioned above. Table 2 shows volumes of commercially imported, monetized, and other food aid wheat that arrived in Mozambique between 1998 and 2007. This table indicates that total wheat imports have fluctuated between 185,000 MT in 1999 and 382,000 MT in 2006. Monetized wheat has never accounted for more than 50% of total imports, ranging between 5% in 2005 of total imports and 46% of total imports in 2001.

Although monetized wheat imports have contributed an average of 23% of imported wheat over the 1998-2007 period, total import of wheat through food aid programs, including monetization programs, accounted for far more than 50% of wheat imports prior to 2002 (Table 2), reaching as high as 86% in 1999. In recent years monetized share remained at 20% or below, and total food aid wheat imports have stayed below 35% of total imports since 2003.

Mozambique imports several types of wheat to meet its range of needs. Title II monetized wheat is mostly Hard Red Winter (HRW), Pacific Northwest Soft White (NSW), and Dark Northern Spring (DNS), one of the subclasses of Hard Red Spring (HRS) wheat. Type of wheat is important in demand. HRW is said to be good for noodles, hard rolls, and general purpose flour, in comparison with soft red winter wheat (SRW) which is relatively low protein wheat good for cookies, cakes, flat breads and blended flours. SRW was not included in U.S. Title II programs. In addition to the U.S., Canada, and Australia are known for hard wheat, whereas soft wheat comes from Argentina, Spain, Austria, and elsewhere in Europe.

Table 2. Quantity of Commercially Imported and Food-aid Wheat (MT)

Year	Total comer-cially imported wheat	Title II monetized wheat	Title I monetized wheat	Food for progress monetized wheat	Other food aid wheat	Total food aid wheat	Title II Monetized as % imported wheat	Food aid as % imported wheat
1998	255.0	71.1			125.4	196.5	27.9	77.1
1999	185.0	63.3			95.3	158.6	34.2	85.7
2000	254.9	79.0	49.0		51.7	179.6	31.0	70.5
2001	256.7	98.4	13.3		94.2	205.9	38.3	80.2
2002	223.1	57.9	17.0		53.5	128.4	25.9	57.6
2003	333.6	61.7			48.4	110.1	18.5	33.0
2004	377.0	76.6			27.5	104.1	20.3	27.6
2005	340.3	17.5				17.5	5.1	5.1
2006	381.7	48.0				48.0	12.6	12.6
2007	294.4	49.8	9.0	20.0		78.8	16.9	26.8
Average	**290.2**	**62.3**				**122.7**	**23.1**	**47.6**

Source: World Vision Annual Report on Monetization, MIC database, FAIS database

Table 3. Title II Monetized Wheat by Year and Type of Wheat ('000 Metric Tons)

Year	DNS Wheat	HRW Wheat	NSW Wheat
1997		39.67	18.93
1998	21.00	45.07	5.00
1999	20.76	30.54	11.97
2000	28.03	38.93	12.00
2001	32.00	28.00	38.40
2002		32.23	25.65
2003		27.73	33.97
2004		39.42	37.15
2005			17.50
2006		28.24	19.76
2007		20.30	29.55
Total	**101.79**	**330.13**	**249.88**

Source: World Vision Annual Reports on Monetization. Note: DNS is Dark Northern Spring Wheat (a hard wheat), HRW is Hard Red Winter Wheat, and NSW is Northern Soft Wheat

Table 3 shows the distribution of Title II wheat by type and year. As one miller explained, the higher protein hard wheat is a key ingredient in the wheat flour sold locally for small-scale bakeries. Flours need to have a high percentage of hard wheat to make local breads. For larger-scale bakeries, bread flour can have a lower percentage of such hard wheat. Unfortunately, other than the Title II data, we are unable to identify the specific type of wheat arriving with commercial shipments, and even country of origin is lacking.

The rice and wheat market study by Muendane, Zandamela, and Schalke (2000) for MIC demonstrates that Mozambique will continue to be dependent on imports of wheat into the long term future and that wheat consumption will continue to rise. In 1999, the millers were fairly concentrated with five millers. The largest, Companhia Industrial da Matola (CIM) had about one third of the national processing capacity, followed by Socimol with 29%, Mobeira with 23%, *Moagens de Moçambique* with 6% and Gani Comercial with 6% (Muendane, Zandamela, and Schalke 2000). There have been new entrants such as Armazens Maiaia in the north, and CIM has consolidated its ownership of domestic processing capacity, adding Mobeira to its facilities. A thorough analysis of wheat market structure, conduct, and performance would evaluate the potential for market control by CIM given its high share of processing capacity in three key urban markets: Maputo, Beira, and Nampula.

While the public sector in the past has controlled wheat distribution and wheat prices, currently the public sector role in wheat markets is fairly restricted. It participates in the decisions on bread prices, but the price is not centrally mandated. There is no parastatal working with wheat processing or marketing. Public institutions, such as schools, hospitals, and the military, buy significant quantities of wheat flour and other products, so they enter the market as a buyer. The government's most important action for the wheat industry is in setting import regulations. Wheat flour and other processed goods are charged high import duties (30%) whereas the wheat grain is not; this effectively protects the domestic processing and baking industry. As can be seen in Table 4, the number of buyers each year was usually just four, through 2000. In 2001, the participants expanded and each call forward had from

Table 4. Title II Monetized Wheat, by Year and Miller (Thousand MT)

Miller	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Buyer 1 (north)											6.9	6.9
Buyer 2 (south and center)	26.8	39.0	36.2	57.0	25.0			4.0	3.0	10.0	12.5	213.5
Buyer 3 (north)						6.0	3.0	13.2	2.7	4.7		29.6
Buyer 4 (north)					9.0	10.7	7.7	8.0	8.8	17.8	19.0	80.9
Buyer 5 (north)					5.0							5.0
Buyer 6 (north and south)		6.0										6.0
Buyer 7 (center and south)					5.0	16.2	15.1	11.0		3.6	2.5	53.5
Buyer 8 (north)	3.3		5.1									8.4
Buyer 9 (center)	9.3	16.0	10.0	10.0	28.0	6.0	27.9	12.0	3.0	11.9	8.9	143.0
Buyer 10 (south)	19.2	10.1	12.0	12.0	26.4	19.0	8.0	28.4				135.0
Total	**58.6**	**71.1**	**63.3**	**79.0**	**98.4**	**57.9**	**61.7**	**76.6**	**17.5**	**48.0**	**49.8**	**681.8**

Source: World Vision Annual Reports on Monetization

2 – 8 buyers involved, using the blind bidding process. There have been cases of combined bids, so this table may under-estimate the number of end buyers involved. EXCOM deliberately sought a geographic spread with the country, delivering to Maputo/Matola, Beira, and Nacala. In recent years, one of the biggest millers, CIM, has relied less on Title II in the south, whereas current quantities are quite important for newcomer Armazens Maiaia and for Gani Comercial in the north.

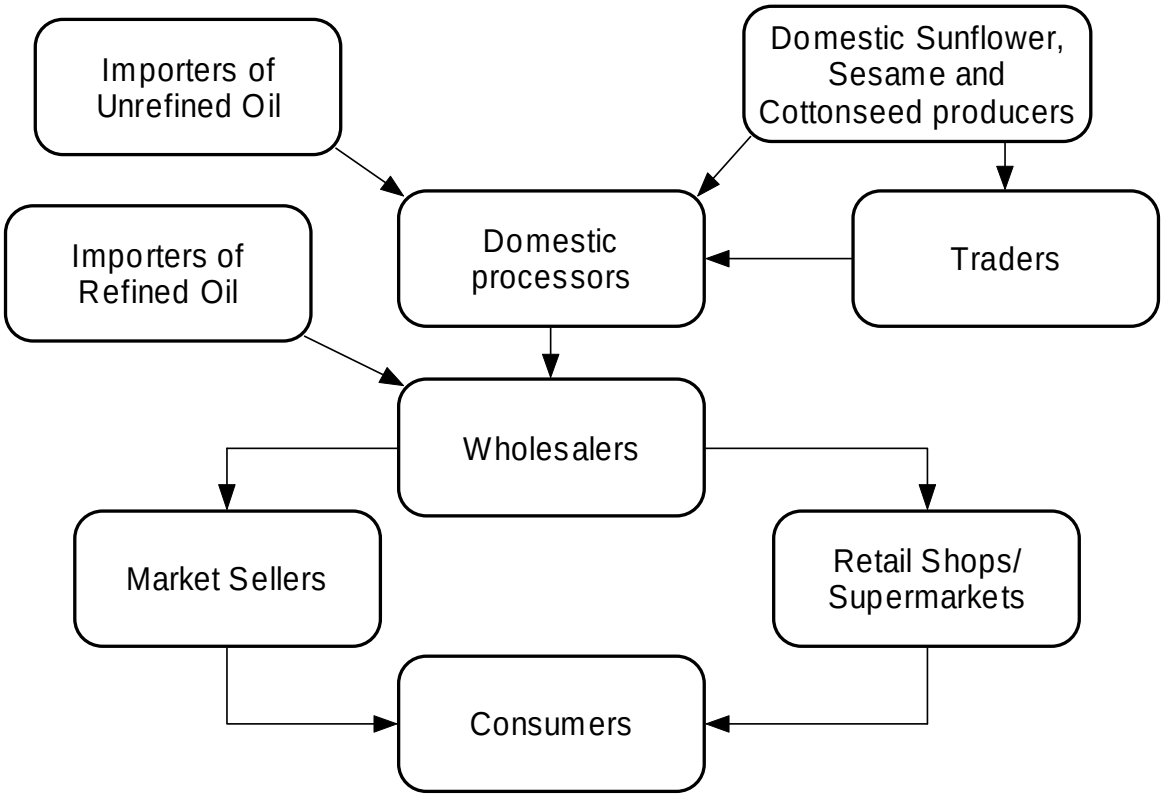
4.2. Oil: Type, Production Perspectives, Structure of the Industry, and Imports, and Monetization

Mozambique's edible oils industry has three basic channels: 1) domestic production of oil crops which are then processed and sold locally by medium-scale industry; 2) imports of unrefined edible oils, which are then processed and sold locally by medium-scale industry; and 3) imports of refined edible oils, pre-packaged and ready for consumer markets (Figure 2) Both the domestic production and locally processed imports are sold in standard quantity retail sizes or in bulk containers for re-sale in public markets. The degree of processing and the quality of the oils varies. Mozambican processors suggest that Mozambican consumers prefer palm and sunflower oils over soybean and maize oils, and processors may mix soy and/or corn with sunflower oils to create a final product.

The relative importance of each channel is difficult to determine. Gordon and Langworthy (1999) estimated that for 1999 about 36% of the edible oils available to consumers were from refined oil imports, 46% from crude oil imports processed locally, and finally 19% from oil processed from locally produced cotton and other oilseeds, including 11% which is industrially processed. Given problems with domestic production of oilseeds and falling cotton production in particular, it is likely that the proportion from domestic raw materials is reduced, with greater importance for locally processed edible oils based on unrefined oil imports, and refined, pre-packaged oil imports.[5] Consumption of oils increased

[5] Gordon and Langworthy in 1999 worked to determine quantities and sources of domestic edible oils and they reflect on the challenges. In customs, the records indicate values but not quantities of commodities entering, and there is often no differentiation between crude and refined oils. Add to that the unregistered quantities that cross the borders and the possible practice of under-invoicing (so as to pay lower duties). As a result, there are clearly problems with estimating oil quantities moving across borders and entering the market.

Figure 2. Simple Schematic of Oil Industry Structure



Source: Authors' adaptation of Gordon and Langworthy, 1999, Figure 1, page7.

dramatically in the 1997-2007 period and continues to rise, and processors are investing in increased processing capacity, especially based on bulk oil imports.

Title II monetized soybean and sunflower oils were received in Mozambique only between 1997 and 2000, so there is a limited history with this commodity under this program. Table 5 indicates that two processors, both based in Maputo, were the major beneficiaries of Title II monetized crude vegetable oil. These two oil processors accounted on average for 60% of total monetized oil over 1997-1999. Gordon and Langworthy (1999) report that sunflower, soy, and corn oils were imported under Title II monetization programs, while commercial imports were primarily Argentine sunflower oil purchased in South Africa, although customs data may indicate that it is South African. Local oil processors are concerned about South African refined oil imports that have not paid the requisite duties, entering through informal markets. In the center and north, even with duties paid, palm oil imports were the lowest cost option.

As with other crops, production of oil crops is dominated by smallholder farmers with limited use of improved technologies in predominantly rain-fed agricultural systems. As a result, production of oil crops fluctuates substantially from year to year due to weather. Cottonseed oil is the most important locally produced oil, but processors have indicated the lack of raw material for ensuring domestic supply of the oil, and efforts to develop domestic sunflower seed production were frustrated by competition with other more profitable crops. Shortfalls and unpredictability of domestic production have led to increased dependence on imports of

Table 5. Title II Monetized Oil by Oil Processor and Oil Type (Thousand MT)

Oil type	Oil processor	1997	1998	1999	2000	Total
Crude Degummed Soybean Oil	Buyer 1 (center and south)			4.5		**4.5**
	Total			4.5		**4.5**
Crude Sunflower Oil	Buyer 1 (south)	6.0	2.5		1.5	**10.0**
	Buyer 2 (south)	4.0	0.5	2.0		**6.5**
	Buyer 3 (center)	2.4	1.0	1.5		**4.9**
	Buyer 4 (north)	1.5	1.5	1.0		**4.0**
	Total	13.9	5.5	4.5	1.5	**25.4**
Total		**13.9**	**5.5**	**9.0**	**1.5**	**29.9**

Source: World Vision Annual Monetization reports. No oil was imported and sold under Title II after 2000. In 2002, 37,153 metric tons of sunflower oil was deemed unfit for consumption and destroyed.

bulk oil. As one processor indicated, processing the bulk oil imports involves much less labor and lower capital investments than is required for processing the bulk agricultural commodities to obtain the oil from cottonseeds, sunflower seeds, etc.

Another factor driving increased growth in these bulk oil imports is the reduction of tariffs and exemption of Value Added Tax (VAT) granted to oil refiners. Prior to 2003, imports of bulk oil were subject to 2.5% tariff and 1% VAT, while. In an attempt to further support development of the domestic oil processing industry, GOM granted tariff exemptions in 2003 and VAT exemption in 2004 on bulk oil imports. Import tariffs of 25% and VAT of 1% on refined oil imports remain in place to protect domestic industry. Following the import tariff and VAT exemptions on imports of bulk oil, Table 6 indicates that production of refined oil has experienced an upward trend, growing about fivefold between 2005 and 2008. Of the oil produced, 43% consisted of sunflower oil and 14% of soybean oil, with cotton, coconut, palm, and other oils accounting for the rest.

Key players in the oil processing industry are Fasorel accounting for 31% of total refined oil production between 2005 and 2008, Southern Refineries representing 31%, Sanoil comprising 19%, and SE Ginwala making up 10% though domestic production of refined oil has increased substantially in the last years, interviews with agents in the oil processing industry suggest that imports of refined oil, especially palm oil from Asia, have threatened profitability of the domestic industry. Reduction of local cotton production is also a threat since cottonseed is an important source of raw material. This issue will be further discussed in section 6.6.

Table 6. Production of Refined Oil in Mozambique, 2005-2008 (MT)

Product	2005	2006	2007	2008
Sunflower seed oil	5,082	8,310	14 ,545	26,237
Soybean oil			7,249	20,555
Coconut oil			1,702	2,061
Cotton seed oil	429	668	788	455
Palm oil	1,139	397	989	62
Other oils	4,792	8,154	18,417	8,656
Total	**11,442**	**17,529**	**43,690**	**58,026**

Source: MIC 2009.

5. EMPIRICAL METHODS AND DATA

We used several analytical approaches to assess the potential impacts of monetization of wheat and crude vegetable oil in Mozambique under Title II programs. We examine the following impacts hypothesized in the literature:

Hypothesis 1: Monetized food aid wheat and oil affects domestic retail prices of wheat flour and edible oil, respectively.

Hypothesis 2: Monetized wheat depresses the prices for locally produced commodities that are consumption substitutes for wheat.

Hypothesis 3: Consumers shift to imported commodities (including monetized commodities) for consumption, away from domestically produced commodities; and

Hypothesis 4: Monetized commodities (wheat and oil) crowd out commercial imports.

Since there are two ways in which the commodities might help to lower prices, we will be evaluating the following: 1) prices at which the commodities were sold to processors, to examine whether there were subsidies compared to commercial imports, and 2) market prices for the processed commodities to see if any subsidy element was reflected in the final goods. If the monetized supplies increased market quantities or market competition, they might also result in lowered market prices for final commodities, another reason to look at prices for final goods in the markets. In addition, we analyze whether cost recovery under U.S. Title II monetization programs has improved over time in Mozambique.
The methods and requisite data are discussed more thoroughly below.

5.1. Methods

Simple diagnostics are used to demonstrate relationships between prices and quantities in the initial work. For wheat, we investigate potential dynamic impacts of Title II monetization program on domestic wheat flour markets, using VAR analysis, a method frequently found in the literature.[6] Diagnostic methods are used to assess the validity of the VAR methods given the time series available on world wheat prices, local wheat flour prices, and quantities of monetized wheat. We also perform unit root tests to assess whether each time series is stationary, using Augmented Dickey Fuller (ADF) and Philips Perron (PP) tests. Granger causality tests are conducted on hypothesized relationships between different variables to test whether current and lagged variables of one time series help in predicting future values of another time series. Finally, we use a VAR analysis and the outputs generated to assess impacts over time. For oils, given the limited amount and time over which the arrivals occurred, we simply evaluate price trends and assess quantities arriving compared to total supply. For cost recovery, we calculate the percentage of cost recovery on the basis of different options, as described more fully below. Other issues are discussed, using a combination of qualitative and quantitative approaches.

[6] Recent work by Tadesse and Shively (2009) suggests alternative economic methods, which will need to be evaluated.

5.2. Data

We use a combination of data sources for the period 1997 to 2007. Data used include quantities of Title II monetized commodities (wheat and oil), quantities of other food aid, quantities of commercially imported wheat, international prices of Title II monetized commodities, prices paid by processors for monetized commodities, retail wheat flour and refined oil prices in local markets, and ocean freight rates. Data came from various institutions. Quantities of and prices paid for monetized commodities are obtained from WV annual reports for EXCOM and quantities of food aid come from the WFP. Data for domestic retail prices are gathered from the Agricultural Market Information System (SIMA) of the Mozambique Ministry of Agriculture (MINAG), while international prices for wheat and oil are obtained from International Finance Statistics of the International Monetary Fund (IMF). Quantities of imports were gathered from the Mozambique Ministry of Industry and Commerce (MIC) and FAOSTAT (2009). Existing secondary data sources were also founding the literature.

To complement secondary data, additional qualitative and quantitative data were collected through informal interviews with several entities involved direct or indirectly in the monetization programs. The analysis focuses on Maputo and Nampula markets, due to greater reliability of local price data. These markets are the major consumption centers in the country and represent ports to which monetized commodities were shipped. Beira was excluded from the study due to problems and gaps in the local price data.

5.3. Cost Recovery: Issues Related to Prices and Shipping Costs

U.S. law requires that 75% of monetized commodities are shipped in U.S.-flag vessels, and the freight rates charged for that shipping are generally well above the rates charged by foreign-flag carriers. This leads to higher cost including freight (CIF) values for monetized commodities, reflecting a subsidy to U.S. shippers, rather than cost in the commodity in the market. For purposes of cost recovery analysis, we compute CIF values two ways, using shipping costs for U.S.-flagged carriers and for foreign-flagged ships, based on data from World Vision for the actual shipments as well as complementary information from the WFP on foreign-flagged shipments. This latter estimate reflects the commodity cost with the subsidy to shippers netted out, and is more appropriate for evaluating compared to market prices.

6. WHEAT AND OIL MONETIZATION EFFECTS

Food aid is widely expected to have effects on domestic markets and production, and these potential effects have frequently been investigated, with inconclusive results. Empirical evidence suggests that food aid can have both disincentive and incentive effects on domestic markets and production, depending on the dynamics of the recipient country's economy and how food aid is managed. In this section, we look at these expected effects of food aid monetization on local markets, processors, and imports in the case of Title II monetization in Mozambique.

6.1. Effects On Local Markets: Price Relationship Between Title II Monetized Wheat And Local Wheat Flour Prices

A key question to be asked is the following: did food aid monetization influence retail prices of wheat flour and those of close substitutes and complements? If so, this could ultimately affect domestic production patterns. Delivery of high volumes of monetized wheat at lower than commercial import prices in short periods of time could potentially have impacts on retail price of wheat flour in the recipient market, lowering the price of wheat and reducing producer incentives for wheat and its substitutes. However, in Mozambique, Title II monetized wheat is unlikely to have any measurable discouraging impacts on local production of wheat, since local production represented less than 1% of total national wheat consumption requirements from 2000 to 2007. This high dependence on imports to meet national consumption needs suggests that imports are driving local prices and trade of wheat.

Figures 3 and 4 show monthly average nominal retail prices of wheat flour and monthly monetized wheat deliveries between 1997 and 2007. Prior to 2002, large shipments of monetized wheat were associated with a steady decline in retail wheat flour prices in Maputo. Between 2002 and 2007, these prices trended upward despite continued (though less frequent) arrivals of monetized wheat. In the case of Nampula, from 2001 to 2007 retail prices of wheat flour experienced an upward trend regardless of the observed deliveries of monetized wheat. However, we need to understand movements in international prices during the periods in order to establish a counterfactual of what Mozambican wheat prices might have done without the monetized commodities, and to evaluate other shifters that might be driving wheat flour retail prices movements in these markets.

We also looked at international wheat flour prices and domestic retail prices of wheat flour to assess whether domestic retail prices deviate from international prices due possibly to shipments of monetized wheat into domestic markets. International wheat grain prices are Free on Board (FOB) Gulf Port, HRW. Figure 5 presents domestic nominal retail prices of wheat flour for Maputo and Nampula markets, and FOB Gulf Port prices. This figure demonstrates the general movements in prices over time and shows that there is strong relationship between movements in prices of wheat flour in Maputo and Nampula. Importantly, domestic prices of wheat flour declined between 1997 and 2001 while world prices were fairly stable, such that the margin between local prices and world prices declines steeply from 1997 through early 2001. Since early 2001, the margins have remained relatively stable, both in Maputo and in Nampula, until 2007 with the onset of the worldwide food price crisis. The increase in domestic wheat flour prices in 2005 may reflect the demand pressure on wheat as the maize crop was lower than expected, and brief increases in Nampula may reflect localized short term shortages.

Figure 3. Monthly Retail Nominal Price of Wheat Flour in Local Markets of Maputo (US$/MT), and Monetized Wheat Deliveries (Thousands of Metric Tons)

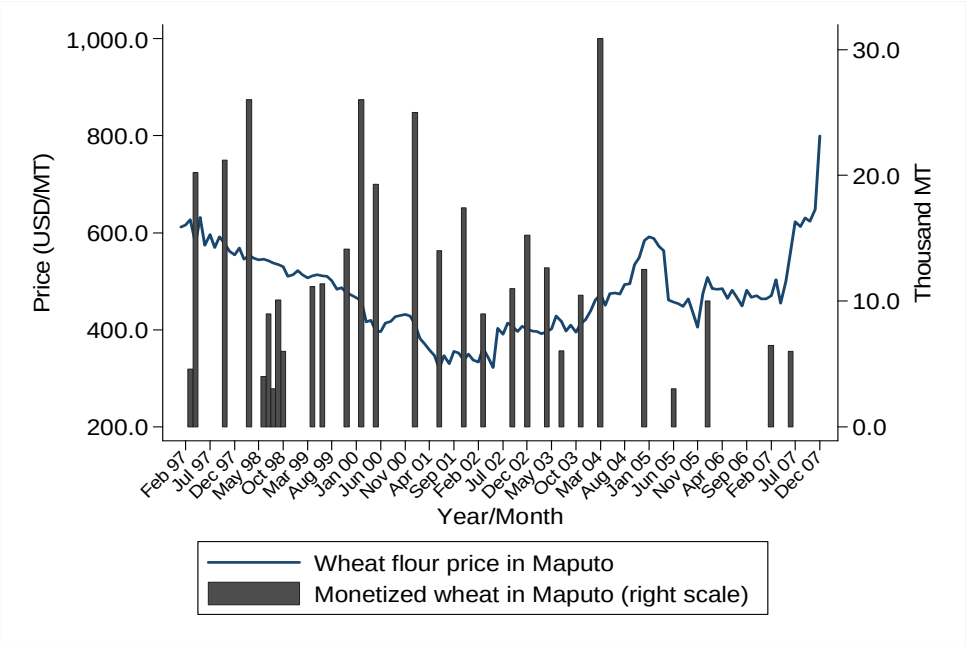


Figure 4. Monthly Retail Nominal Price of Wheat Flour in Local Markets of Nampula (US$/MT), and Monetized Wheat Deliveries (Thousands of Metric Tons)

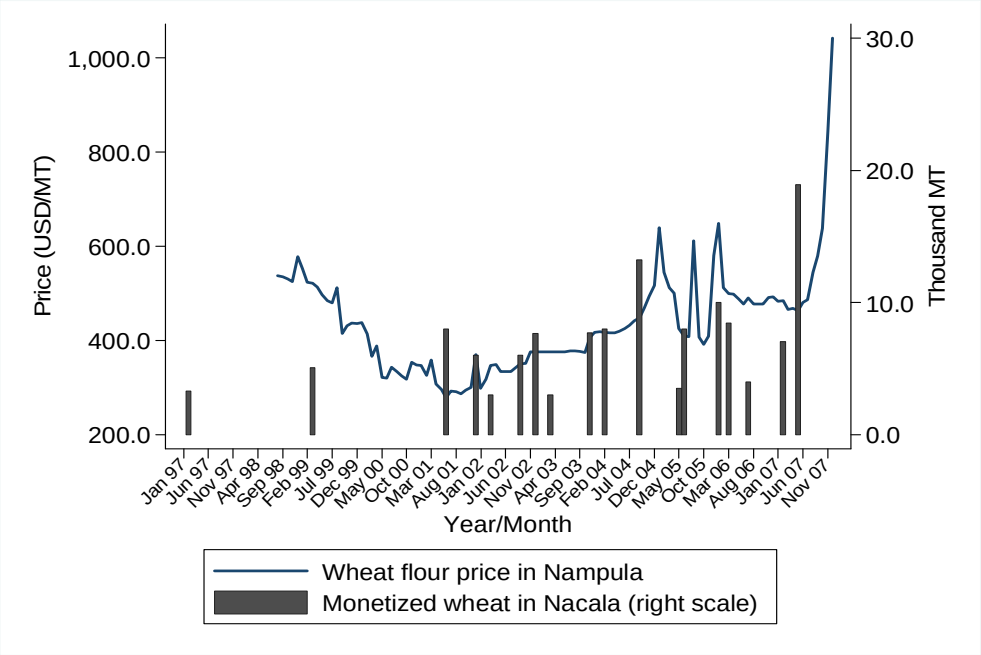
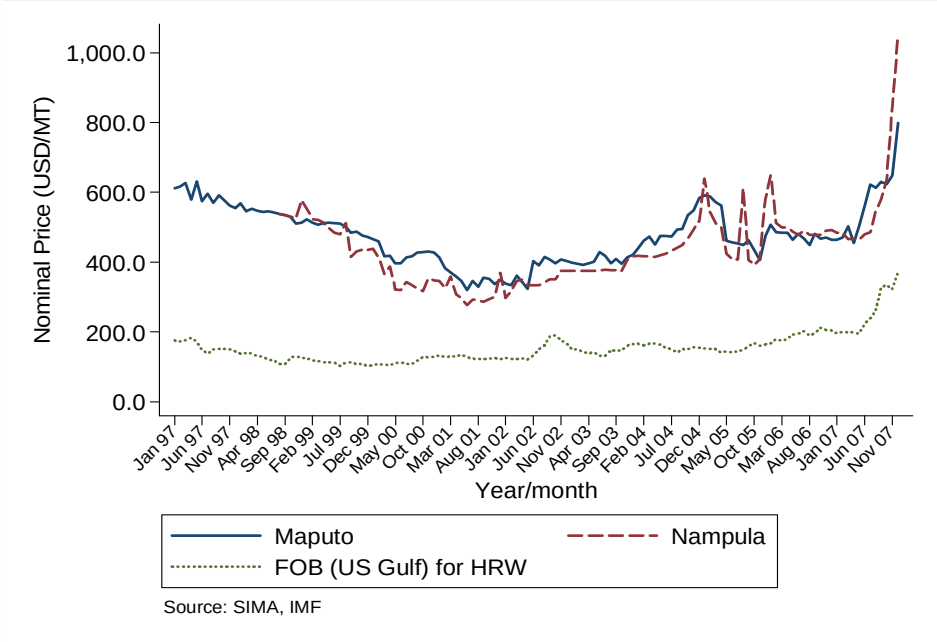


Figure 5. Free on Board (FOB) Gulf Port Prices and Retail Wheat Flour Prices in Maputo and Nampula



6.2. Effects on Local Wheat Markets of Monetized Arrivals

It is commonly voiced that monetized wheat could depress the prices for wheat on the local market and increase demand for wheat products. As a consequence, there would be lower demand and lower prices for locally produced commodities that are consumption substitutes for wheat products, reflecting the economics of demand and supply. However, if the monetized food aid wheat had no price effect on local wheat prices, there would be no reason to evaluate the impact of monetization on the consumption of substitute commodities that are locally produced.

VAR techniques were used to evaluate the dynamic relationships between monetized wheat deliveries and price of wheat flour in domestic markets. Both Nampula and Maputo have excellent price datasets to use combined with data on monetized shipments arriving in the ports of Nacala and Maputo. Due to the dramatic world price shifts from July to December 2007, suggesting structural changes in the markets, we did not include that period in this analysis. The diagnostic tools on stationarity, lag lengths and Granger causality all contributed to the recursive VAR analysis. See Appendix A for greater detail on the analysis and testing involved in developing the VARs for Nampula and Maputo.

Granger causality testing did not show strong relationships between these series. In general, lags in world food prices or in monetized quantities do not help predict local prices, with the exception of Nampula where there is weak evidence of world wheat prices helping to forecast local wheat prices (Appendix A). Given those results, it is expected that for both markets, our recursive VAR estimation results reveal that when there are shocks to the quantities of monetized arrivals, namely a new arrival in the country, there is no significant impact on local wheat flour prices using lags of one to three months in Maputo and in Nampula. In addition, shocks to world prices are also not reflected in the retail wheat flour prices in Maputo during the January 1997 through July 2007 period.

With the analysis, we can look at how local prices react when there is a shock of monetized food aid arrivals. Does such an arrival send prices immediately downward? Do prices go down after a month or two? What happens over time as the shock works its way through the system? As Figures 6 and 7 demonstrate, there are not strong shocks on the local retail prices for wheat flour in either market, with each ton having far less than a 1% shift in price which disappears by the fifth month. The Nampula shocks show a higher percentage impact, although still small. This is logical given Nampula's smaller market and the potential for monetized supplies to provide a high proportion of total supplies in that market.

Given these results, we conclude that the price effects of monetization on local retail wheat flour prices are not significant in either Nampula or Maputo. There are several reasons why this might be true. Since monetized wheat is processed by private mills and retail wheat flour prices are determined by millers, any savings with monetized wheat may be captured by the millers, especially if wheat markets are not competitive. If there is collusion or other lack of competitiveness, local wheat flour prices might not reflect any savings when monetized wheat is delivered below import parity. Flours in the market are a combination of different types of wheat, of which the monetized types are just a portion, such that the impact of any given delivery is minimal. Millers may have developed strategies to deal with price changes of the wheat grain, to smooth out the price fluctuations.

This is a key finding. If there are no price effects on wheat products at retail level, the monetized wheat would also have no effect on the prices or demand for substitutes in consumption, including such commodities as locally produced maize or rice, or imported rice. As such, we will not need to evaluate possible shifts in consumption due to monetization. If consumption shifts from maize and rice to wheat are occurring, they are caused by other factors, including increasing urbanization and higher incomes.

Figure 6. Impulse Response Function for Wheat Flour Price Following a One Metric Ton Shock to Monetized Wheat in Maputo

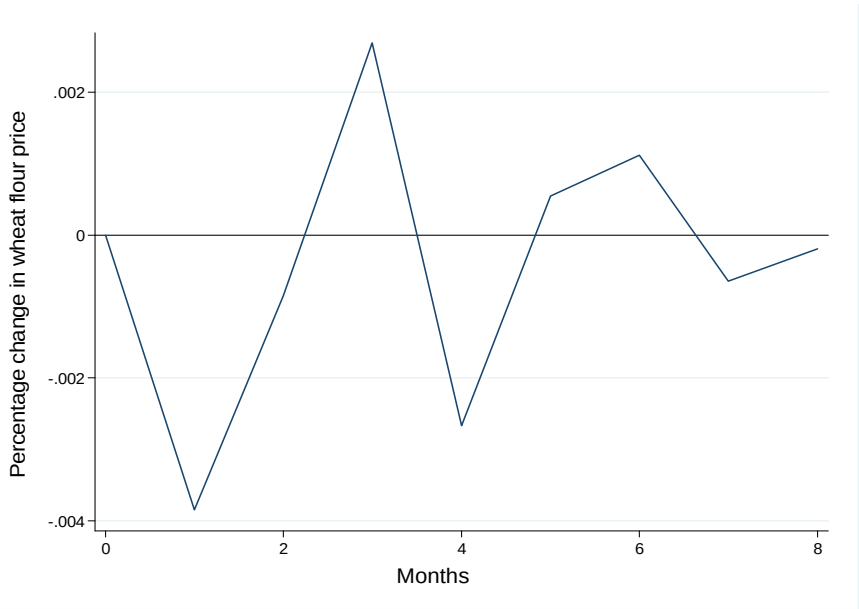
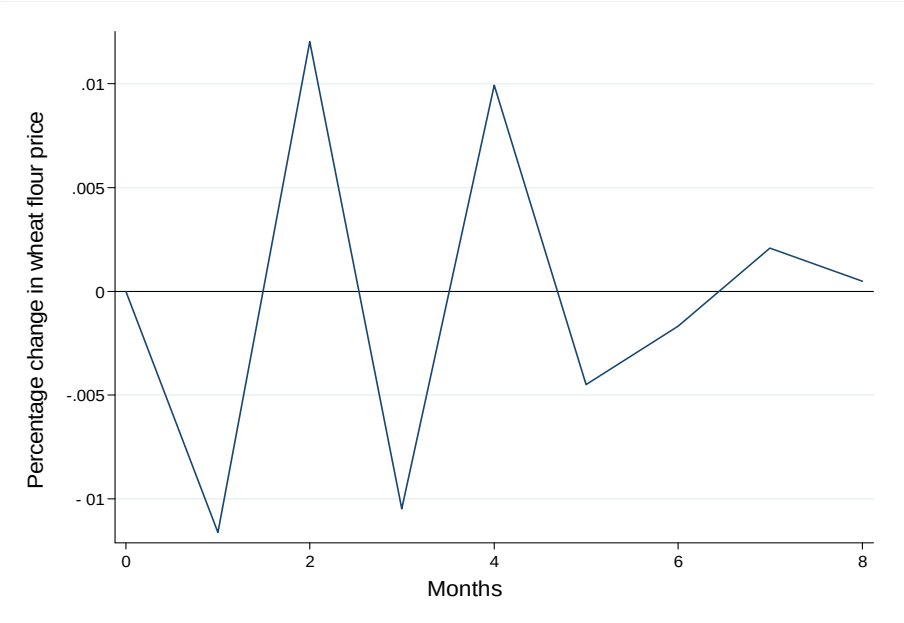


Figure 7. Impulse Response Function for Wheat Flour Price Following a One Metric Ton Shock to Monetized Wheat in Nampula



6.3. Impacts on Wheat Production and on Imports and Relationship with Foreign Markets

Wheat supplies in Mozambique come predominantly from imports. The majority of wheat imports to Mozambique come from Argentina, Canada, France, USA, Australia, and Germany, although there is great variability from year to year (FAOSTAT 2009).[7] GOM through its Action Plan for Food Production (PAPA) is currently promoting production of wheat in the center and north of the country. However, domestic wheat production is far below millers' demand. Even with the very small quantity produced currently, low quality of domestically produced wheat is a pervasive concern raised by agents in the wheat milling industry. We have no reason to believe that Title II Food Aid deliveries of wheat have any impact on local production incentives for wheat or other commodities.

Rather than disincentives to local production or to regional trade, the most likely negative effect of the Title II program in Mozambique is related to potential displacement of commercial imports from world markets. As we shall see, Title II PL 480 monetized wheat is generally sold to processors at prices below the international market prices they pay for the bulk of their raw materials. There are also concessionary terms in payment schedules. As discussed earlier and shown in Table 2, total wheat imports have fluctuated between 1999 and 2006. Mozambique is not a major market for any country, with volumes to Mozambique low relative to total exports. For example, in 2005, Canada exported about 48,000 metric tons of wheat to Mozambique out of total exports of 15 million metric tons – less than 0.3% (FAOSTAT 2009). For Australia in 2005, Mozambique imported 23,000 metric tons out of a total of 17 million metric tons – barely 0.15%. Regionally, only South Africa has had

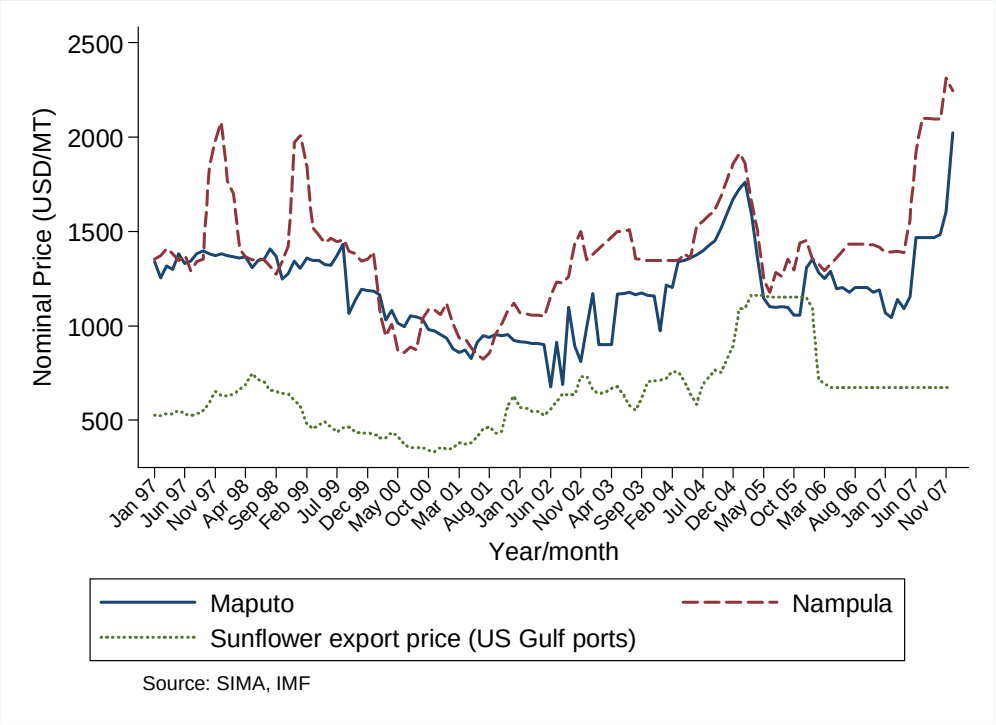
[7] Import data for Mozambique do not indicate source or type of wheat. FAOSTAT (2009) indicates destination of wheat exports, and we reviewed the key exporters.

significant exports, although total production there does not meet demand and they import up to 1 million metric tons annually, depending upon the year (SAGIS 2009). They have exported limited quantities of wheat and wheat products to neighboring countries, averaging 130,000 MT over the period 1997/8-2006/7. South Africa produces some winter wheat, although it is not known how much of that is exported, if any. U.S., Canada, Australia, and Argentina all produce hard wheat for export, and so if there is displacement of commercial imports, it would be competition with Canada and Australia in particular. The EMG Bellmon report (2008) discussed these issues as well, without coming to a specific conclusion, and Simmons (2009) stresses the difficulty of empirically determining displacement effects, even though there is agreement that they are likely.

6.4. Oil Monetization Effects on Local Markets: Price Relationship between Monetized Commodities and Local Prices

There have been too few shipments of monetized oil arriving in Mozambique in the 1997-2007 period to evaluate empirically the effects of those shipments. As with wheat, a simple graph of the nominal prices shows that domestic prices showed similar overall trends as world prices, with falling prices from 1997 – 2000, rising prices from 2001-2004, then a brief respite from the higher prices, before again assuming a strong upward trend in 2007 (Figure 8). One key feature of Mozambican markets is the challenge of linking quality to pricing. Consumers will pay more per liter when buying imported, prepackaged refined oils, than when buying bulk oils, whether imported or of national production. SIMA, the agricultural market information system, collects prices in public markets, and found that over time traders were unable to distinguish between bulk oils that arrived in Mozambique already refined and those processed in Mozambique.

Figure 8. Sunflower Export Price from Gulf Ports and Domestic Retail Oil Price



Based on the work of EMG (2008) and additional data from the Ministry of Industry and Commerce, overall refined oil consumption in Mozambique has been rising, with very little monetized oil arriving. According to the Foreign Agricultural Service (FAS) and World Vision, 3000 metric tons of Title I oil for monetization arrived in fiscal year (FY) 2005 while 3000 metric tons of unrefined edible oil arrived each year in FY04, FY05, and FY06 under Food for Progress programs. When looking at overall consumption figures from 20,000 to 54,000 metric tons annually, these monetization amounts are unlikely to have major effects on the markets, although as noted earlier, the data on oil consumption in Mozambique is unreliable at best.

6.5. Oil Consumption Issues

In Gordon and Langworthy (1999), the authors provide an estimate of income elasticity of demand for edible oils of 1.26 for poor rural consumers to 2.25 for non-poor, urban consumers. Thus, if income for non-poor urban dwellers increases by 1%, oil consumption increases by 2.25%. Per capita consumption for 1996/97 (based on the IAF) was between 132 ml and 979 ml for rural consumers, depending on income group, compared to 676 ml to 6.8 liters for urban residents.

Using the 1996/97 data, urban populations were found to spend a higher percentage of food budget shares on oil than the rural populations. For example, among rural non-poor, 0.8% of total food expenditures went to oil, compared to 2.4% for urban non-poor (Gordon and Langworthy, 1999). Using data for 2002, Barslund (2007) determines food budget shares for fats (oils and butter) averaging 3.8% for urban households nationally, and ranging from 3.6% in the South, 5.4% in the Center and 2.6% in the North. Barslund did not develop the same categories as the earlier work and included butter along with oils, so it is difficult to compare consumption, without analyzing the full datasets for each period.

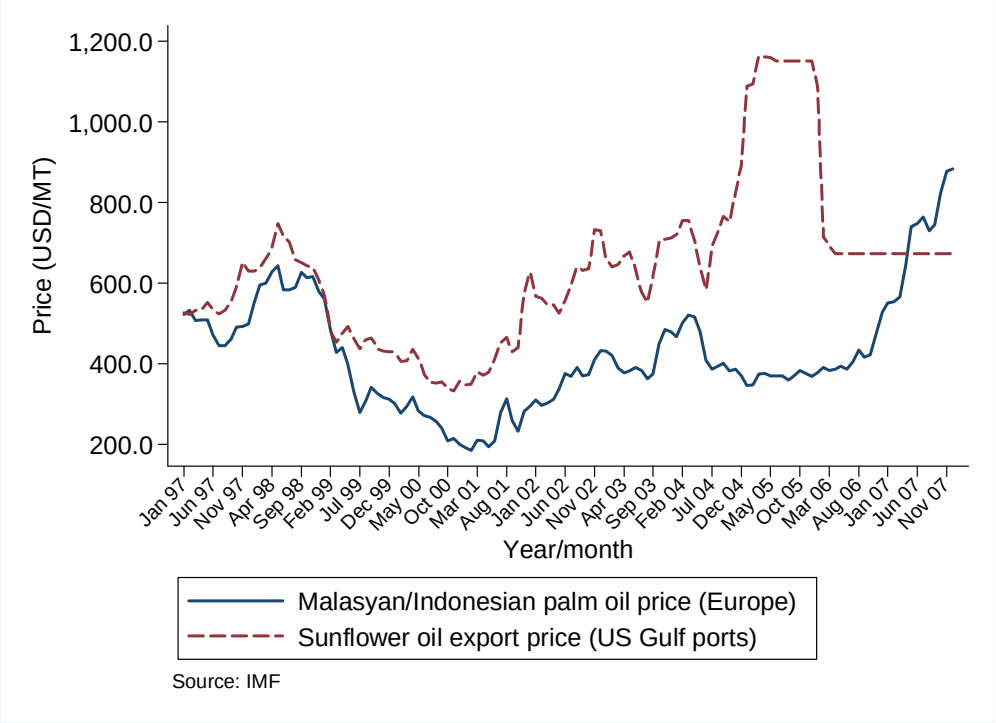
The consumption data indicate that there is rising demand for edible oils and that demand is currently being met mostly through imports. As indicated in Figure 8, Maputo and Nampula retail prices tend to track each other, and the world price for bulk oil remains substantially below the local retail prices, as expected. Additional monetized imports if sold at IPP are unlikely to make much of a difference; if the sales price to processors is below IPP, then monetization may help relieve upward pressure on oil prices, but not in any long term sense. Processors are already investing in additional capacity.

6.6. Issue of Illegal Imports, Dumping, and Asian Palm Oil Competition

In both the current research and earlier research for the Bellmon Analysis, oil processors have mentioned various sources of unfair competition including illegal, undocumented imports, and imports with reduced tariffs, and imports of oils that are being dumped into the international market by exporting countries seeking to raise their domestic prices and protect producers. The government policy is to exclude refined vegetable oils from monetization programs in order to avoid damage to the local processing industry. A question is whether or not the monetized crude oils have helped local processors compete with unfair marketing of other imports by providing a lower cost crude oil, thus helping to level the playing field.

In a recent analysis by FAO on import surges, authors lamented the lack of data in Mozambique to conduct a proper analysis of trends and impacts of price and production shifts in Mozambique compared to the world market. They note a rapid rise in Mozambican

Figure 9. World Prices for Palm and Sunflower Refined Oil



importation of edible oils since 2000, and observed that "(t)he serious structural problems of the vegetable oil sub-sector [in Mozambique] have precluded the local industry from reacting to a scenario where a growing domestic demand, declining international prices and an appreciating currency created a very favorable environment for imports to thrive" (FAO 2006, p. 4). In other words, the local industry had a difficult time competing with imports.

On the question of dumping, Indonesia is one of the two main palm oil exporters (Malaysia being the other), and a recent analysis of the Indonesian palm oil market evaluated its price and supply trends, both for domestic consumption and for exports. There is nothing in that work that suggests dumping and, in fact, the government imposed export taxes on oils to try to retain greater domestic supplies and avoid rising consumer prices in Indonesia (Rifin 2009). Figure 9 shows price relationships over time. Changes in international markets and demand mean that international prices for palm oil have been increasing since late 2007 and thus local producers may be in a better position to compete, although domestic production of oilseeds remains low and processors continue to rely on the international markets for the crude oil. The Title II shipments may have maintained more soybean oil in the market as palm oil prices declined and palm oil imports dominated the markets.

7. COST RECOVERY FOR WHEAT AND EDIBLE OIL AND OTHER ADMINISTRATIVE ISSUES

Through food aid monetization programs, the U.S. government buys agricultural commodities in the U.S. with the objective of shipping them to developing countries to combat hunger, malnutrition, and their causes. Nevertheless, Congress has mandated that when commodities are monetized, there should be a minimum of cost recovery, with sales prices reflecting the majority if not all of the costs involved in buying and shipping the commodities. A key reason for this requirement is to ensure that the prices charged for commodities in the receiving countries are close to market prices to avoid market distortions.

The benchmark that should be used to measure cost recovery for food aid monetization programs is described in the Cooperating Sponsor (CS) Operation Manual (Ralyea 1999). According to this manual, the cost recovery benchmark that CSs are required to meet in their monetization of Title II commodities is 80% of the commodity and freight value as quoted at the time of the call forward, plus port clearing and handling costs and duties, estimated transport costs to move the commodity to the point of sale, and expenses associated with marketing the commodity, or 100% of Free Alongside Ship price, whichever is greater. Cost recovery is the ratio of actual sales prices per metric ton in Mozambique to the cost to the U.S. government to deliver a metric ton of monetized wheat at the port of entry in Mozambique (CIF Mozambique).

As mentioned earlier, the full costs of delivery of monetized commodities include the additional costs of using U.S. freight carriers, an implicit subsidy for the freight industry. To net out this subsidy from the costs, we use foreign flagged carrier rates in the costs, as seen in the last three columns of Table 7, based on wheat costs and prices. As Table 7 indicates, from 1999 to 2007, the sales prices for monetized wheat were always above 80% of CIF value using foreign-flag vessels. Over the 9-year period, cost recovery averaged 90% using shipping rates from foreign-flagged services.

Table 7. Average Cost Recovery for Monetized Commodities

	Cost recovery based on U.S.-flag vessel shipping[1]			Cost recovery based on foreign-flag vessel shipping		
Year	**Oil[2]**	**Wheat**	**Total**	**Oil**	**Wheat**	**Total**
1999	100.0%	74.5%	83.0%	105.5%	89.7%	95.0%
2000	102.4%	73.0%	75.9%	109.5%	97.4%	98.6%
2001		80.2%	80.2%		89.4%	89.4%
2002		84.4%	84.4%		88.2%	88.2%
2003		72.1%	72.1%		93.8%	93.8%
2004		66.2%	66.2%		85.2%	85.2%
2005		72.4%	72.4%		89.6%	89.6%
2006		78.4%	78.4%		85.1%	85.1%
2007		69.8%	69.8%		92.8%	92.8%
Average	**101.2%**	**74.6%**	**75.8%**	**107.5%**	**90.1%**	**90.9%**

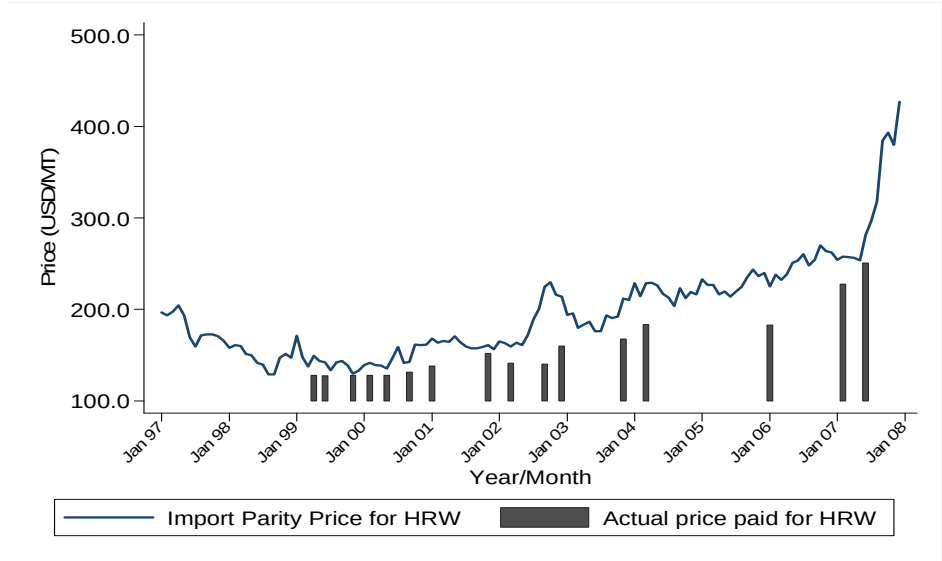
Source: World Vision database.

Notes: [1] Includes implicit shipping subsidy. [2] During the period 1999-2007, for which data are available, Title II shipments of unrefined edible oil occurred only in 1999 and 2000.

The cost-recovery rates for monetization programs are higher in Mozambique (90% using foreign-flagged service and 75% using U.S.-flagged service) compared to Rwanda where rates of cost recovery with U.S. carrier involved were in the order of 65% for the 2001-2005 period. Findings indicate that for every U.S. taxpayer dollar put into wheat monetization in Mozambique, on average more than 90 cents could be recovered to support funding of development programs in the country, netting out the shipping subsidy. However, a word of caution should be added. Due to lack of information, cost-recovery analysis presented here does not take into consideration administrative costs of running monetization programs, although the current use of umbrella organization and direct port delivery to millers lowers those costs and risks. Further benefit-cost analysis can be undertaken to more thoroughly monitor the degree to which revenues cover costs associated with delivering monetized commodities, and to ultimately conduct detailed analysis of issues related to potential efficiencies and inefficiencies of monetization programs in Mozambique. Just as the costs may be under-estimated here, the revenues from sales are not the only potential benefit from the monetization programs. They are the easiest to determine and value, as will be discussed later in this paper.

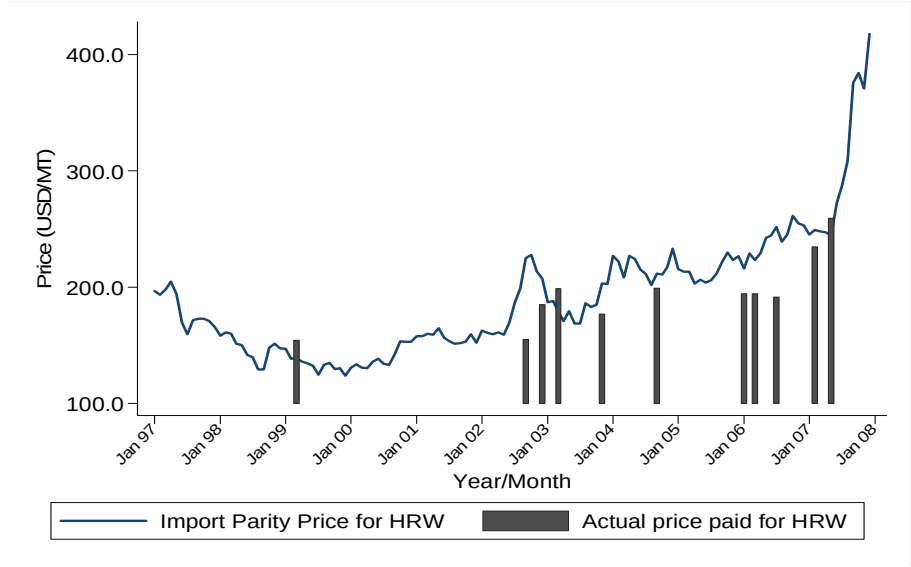
To evaluate how the prices paid by the processors compare to what they might have paid for the commodity with commercial imports, Figures 10 and 11 graph the actual prices paid by millers for monetized wheat in Maputo and Nampula, respectively, compared to the relevant IPP for wheat. In most cases, the price paid is below the IPP, but the differences are often small. Millers benefited from a lower price, but as we saw earlier that difference did not result in lower prices for wheat flour, even though the margins between international prices and local wheat flour prices were declining or stabilized during the period 1997-2007, as indicated earlier in Figures 3 and 4.

Figure 10. Price Paid for Monetized Wheat and Import Parity Price in Maputo



Source: World Vision Annual reports on Monetization; IMF, authors' calculations
Note: Sales prices are observed, import parity prices estimated for hard red winter wheat, based on FOB Gulf ports, USA.

Figure 11. Price Paid for Monetized Wheat and Import Parity Price in Nampula



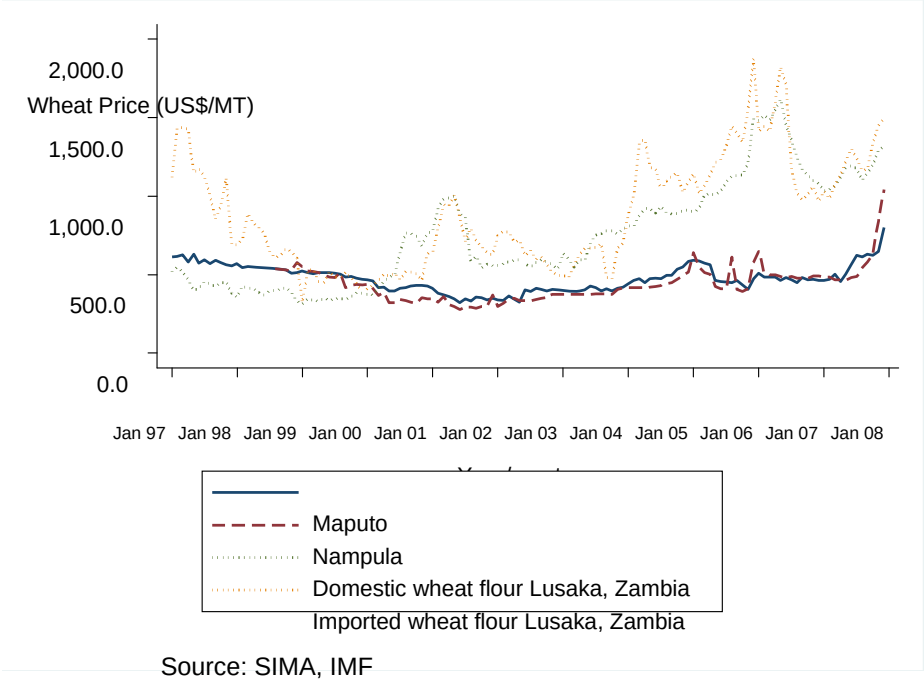
Source: World Vision Annual reports on Monetization; IMF, authors' calculations.
Note: Sales prices are observed, import parity prices estimated for hard red winter wheat, based on FOB Gulf ports, USA.

7.1. Impact of Monetization Program on Industry Organization (Especially for Wheat) and Potential Influence on Industry to Improve Quality (Fortification)

In earlier sections, we demonstrated that the margins between world prices and local prices for wheat declined from 1997 through 2001 and then stabilized. Looking at markets in Lusaka, Zambia, a neighboring country, from 2001 forward, Maputo and Nampula retail wheat flour prices are consistently lower than Zambian prices (Figure 12). Zambia is a wheat producer as well as importer, and as a landlocked country would have a transport cost wedge, so higher prices there are expected, but the differences in price trends between the countries may reflect gains in market efficiency over time, with increased competition in Mozambique as monetization encourages new entrants and distributes the monetized quantities across participants. There has been openness to newly operating mills, as well as a system of allotting portions of each sale to different participants in an effort to encourage competition in the markets. The transparency found in the bidding system is appreciated by these buyers, although the potential for collusion among the millers cannot be ignored. As noted earlier, the number of bidders for each call forward varies.

Monetized commodities, especially wheat, introduced new quality standards and may have played a role in improving the quality of the final consumption good. Title II programs provided a mechanism for getting the millers together for a discussion of fortification of flours. Productive discussions were held and the idea vetted in this forum, but no program for fortification has been implemented, as the long term sustainability of fortification programs was doubted by the private sector millers. Establishing a forum for dialogue between public and private sectors provides the opportunity to assess the viability and potentially to implement such programs, and monetization can help provide leverage with the millers to motivate and implement change within the industry as a whole. On another quality issue, we have already discussed the type of wheat and the key role that the hard wheat plays in Mozambican mixed flours. Title II programs made that type of wheat more accessible, with favorable payment schemes, so it may have encouraged greater use of the higher quality wheat.

Figure 12. Retail Wheat Flour Prices in Mozambique and Zambia



Source: SIMA, IMF

In the edible oils, Mozambican processors are increasing their capacity to refine crude oils, and the monetization supplies were valuable for them during the periods when they arrived; however, those industries continue to expand now due to increased demand for the commodity from consumers. There are three key problems indicated by these processors: 1) unregistered entrance of South African refined oils in the South; 2) entrance of cheap Asian palm oil imports in the North; and 3) lack of supply of domestic oilseeds for processing to have domestically produced oils. Title II edible oils provided reliable, high quality oil for refining, when they were available, and when prices for Title II were relatively lower, helped to enable domestic processors to compete with refined oil imports. Since late 2006 or early 2007, the price of Asian palm oil dramatically increased, reaching over US$1000 per metric ton by June 2008, such that the costs of those imports may leave greater room for other oil imports to compete. Gordon and Langworthy (1999) note the need to interpret industry comments with care. Investments in the customs system may have reduced some of the customs problems in the period since 1999, and as mentioned above, rising prices for Asian palm oil make it less likely to undercut other commodities.

7.2. Impacts on Local Processors: Dependency/New Commodities and Generating Demand

For wheat, the higher protein hard wheat from the U.S. that arrived under Title II contributed to developing wheat flours adapted to the local markets. In at least one case, a new entrant to wheat processing was able to use the Title II wheat to help overcome an initial poor investment in lower quality wheat from Eastern Europe. That processor mixed the poorer quality wheat with higher quality wheat during a period of product development and breaking in of new machinery, and the lower price for Title II enabled it to survive the problems and learn to import the appropriate quality of wheat, including HRW from the U.S.. According to the database of the FAS of the United States Department of Agriculture (USDA), there have been commercial exports of wheat to Mozambique during the period of study, fluctuating

from year, generally increasing over time, reaching over 53,000 metric tons in 2007/2008 (FAS Export Sales Database 2009), of which 35,000 was HRW and the rest SRW. The role of Title II monetization experience with U.S. commodities may have influenced this opening in the market for U.S. wheat. It is not clear that continued monetization would have that effect.

7.3. Use of Local Currency Represented a Foreign Exchange Savings for Mozambican Economy

As indicated previously, staff members at the Ministry of Finance and at the Ministry of Industry and Commerce highlighted the value of Title II deliveries in reducing demand for foreign exchange which would otherwise be required for commercial imports, up to US$ 200 million over the period. The analysis of McKinley (2005) shows that in spite of very high amounts of foreign aid arriving in Mozambique, there was no evidence of it causing currency appreciation, one of the key negatives with use of local currency transactions. The counterpart funds developed through the Title II efforts are channeled to the NGOs and then used for program implementation in the local economy, freeing up their hard currency for salaries and other expenses that must use hard currency. To protect the value of the shipments, the values of contracts are stated in dollars and then local currency exchange rates used at the time of the transaction, avoiding loss of value, although occasionally creating difficulties for the buyers facing domestic price competition. Counterpart funds developed through Title I and Title III activities are not always available or used on a timely basis in development activities, as indicated by the Ministry of Finance staff. Title II funds are made available by World Vision to the EXCOM members on a regular basis.

7.4. Role in Developing New Markets for U.S. Commodities

This potential effect cannot easily be assessed, given the lack of detailed information on commercial imports into Mozambique. According to the FAS of the USDA, traders report commercial sales to Mozambique, which have been increasing since 2000, although with high variability (FAS Export Sales Database 2009). Table 8 indicates the quantities reported by the private sector in the USA. According to FAS staff members, these data should exclude Title II and Food for Progress quantities, and FAS has a separate Food Aid database. However, purchases made directly by a U.S.-based NGO may be registered as commercial, so there is room for double counting and caution should be used in interpreting these data. Ideally, these amounts could be compared to Mozambique import data, but detailed data are unavailable.

Table 8. Export Sales Data of Wheat from the U.S. to Mozambique (in Metric Tons), by Type of Wheat, 1999-2007

Year	HRW	SRW	HRS	All wheat
1999	20,306	0	38,077	58,383
2000	7,677	0	6,819	14,496
2001	0	9,342	12,083	21,425
2002	9,000	5,500	5,501	20,001
2003	56,081	8,451	42,419	106,951
2004	11,046	3,800	43,089	57,935
2005	24,568	0	20,366	44,934
2006	0	4,108	19,037	23,505
2007	34,898	14,104	6,271	55,273

Source: FAS Export Sales Database 2009, Calendar years used.

Note: These data are reported by the private sector. While it should exclude Title II and Food for Progress quantities, and FAS has a separate Food Aid database, there is room for double counting and caution should be used in interpreting these data.

8. SUMMARY OF EFFECTS: EXPECTED AND NOT EXPECTED

The empirical analysis shows that in both the north and the south, the arrival of Title II monetized wheat did not have a significant impact on local retail prices in the Maputo and Nampula markets for wheat flour, even with up to four months of lags included. The limited oil shipments do not allow us to test the possible presence of price effects, but analysis of the prices paid by processors suggests that these Title II oil shipments were sold at close to commercial import prices, such that price effects would not be expected.

Given this lack of price effects on retail wheat flour and oil prices, we did not test for potential price effects on locally produced consumption substitutes. Wheat and oil consumption are rising, but this should not be attributed to monetization, based on price analysis. Without price effects on wheat flour, there is no evidence that the monetized wheat changed food consumption habits or depressed the prices for locally produced substitutes. Thus a shift in consumption to wheat products is likely due to increasing incomes and dietary shifts that have been noted in other countries in SSA. Bread and pasta are convenient, low cost foods for a busy urban population, and increasingly for rural consumers as well (Adbula 2005). With the entrance of high quality Title II monetized wheat, the millers are able to develop locally adapted flours and encourage a higher quality product, purchasing U.S. wheat to produce it.

One of the key potential negatives of the monetization program is commercial import displacement. The quantity of wheat imported under monetization programs is high relative to total wheat imports and Mozambique relies almost entirely on imports. It is likely that removal of monetization wheat would increase the amount of wheat imported commercially. The monetized wheat was primarily hard wheat which is more expensive yet adapted to Mozambican conditions. In the absence of Title II wheat, commercial wheat imports might shift to the cheaper soft wheat, so that elimination of monetization programs is not likely to cause a crisis in supplies in Mozambique. With less of the hard wheat, however, the quality of flour may be reduced. With edible oils, the removal of Title II monetization unrefined oils meant that the local processing industry sought elsewhere to find supplies elsewhere at prices that enabled it to compete with legal commercial imports of palm oil, but also with allegedly illegal refined South African oil. Currently, the processing sector is growing as consumer demand continues to expand, and it is the domestic production of oilseeds that is still faces with major challenges to respond to this opportunity.

We are unable to draw firm conclusions in several areas. We find that the arrival of Title II supplies was seen as extremely important by the relatively new participants in oil and wheat processing. Using blind bids, concessional payment conditions, and geographic distribution, the management entity ensured that a range of market participants received the Title II imports. We are unable to empirically assess quantitatively whether these Title II commodities helped to foster market development and encouragement of new entrants, but conversations with private sector participants lend credence to this idea. The declining margin between international wheat prices and Mozambican retail wheat flour prices reflects increased efficiency in the subsector, possibly due to increased competition.

Increased efficiency in the monetization system itself can be suggested indicated by higher cost recovery than was found in earlier studies elsewhere. The Title II monetization program in Mozambique attained cost recovery rates of over 100% for bulk edible oils and over 90% in several years for wheat, when excluding shipping subsidies in costs. Foreign-flag shipping rates reflect the private sector costs for shipping and thus are an appropriate benchmark. Achieving relatively high cost recovery rates reflects lessons learned and effectiveness of the umbrella organization in planning arrivals and negotiating with the private sector.

9. CONCLUSIONS AND RECOMMENDATIONS

Overall, based on the available information and our analyses, the monetization process achieved several objectives while avoiding many of the potential negatives. It expanded the supply of key consumption commodities; it worked with a range of millers and processors to help expand the number of agents, especially in wheat milling. Monetization provided a base for discussions between private and public sector within the wheat sector on possible fortification. Monetization is also likely to have developed greater demand for the hard wheat varieties, a quality standard. Margins between international wheat prices and local wheat flour prices have declined during the period, suggesting increased competition and efficiency, although we are unable to empirically test whether this is an effect of monetization. Foreign currency reserves were saved, and other research indicates that overall Mozambique does not suffer from Dutch disease problems.

These objectives were achieved without many of the negative effects posited in the literature. The wheat and oil imports were selected because local production of the raw material is very low, clearly below demand, such that Title II imports did not present direct competition for locally produced wheat or oil. Monetized wheat was not found to cause price shocks on local wheat flour prices. Unrefined oil shipments were too few to empirically test impact, but edible oil processors cite problems with other commercial imports rather than the Title II oils. The umbrella group EXCOM with the single management group sold commodities to Mozambican processors at or near import parity prices, based on foreign flagged carriers. While some processors purchased large quantities of wheat, withdrawal of the monetized commodities is not likely to have severe consequences on the food system and the Title II program is unlikely to have established dependency. The U.S. hard wheat provided a quality of wheat that continues to be in demand for local processing and mixing, and monetized wheat may have opened the door to greater use (and imports) of this type of wheat.

The monetized commodities are likely substituting for commercially imported goods from the world markets, although the quantities involved are small on the world markets and Mozambique is not a major trading partner for any specific wheat or oil exporting country. No country in the region has significant oil or wheat exports, so regional trade remains relatively unaffected by the monetization. For future monetization programs, analysts should continue to watch South African production, in case it returns to having wheat surpluses, although this is unlikely. Mozambican processors are linked to international markets, and there are no indications that, if Title II monetization were to end, there would be a collapse of industry. Commercial imports are likely to expand if monetization program are reduced or end.

Looking to the future, if monetization continues, the use of the umbrella group of CSs with a single management entity appears to be an effective way to manage the monetization process, based on its performance in the cost recovery analysis and in avoiding lack of price impacts. Within the bidding process, to avoid collusion among millers or processors resulting in low prices received for shipments, reserve prices for bids should be based on assessment of IPP. The current commodity choice is appropriate, as long as efforts continue to enhance competition in the markets by including new participants. Mandated direct food distributions of Title II shipments without considering local needs and market conditions are likely to be unproductive in Mozambique and would run contrary to current GOM policies, as the country seeks to improve market structure, production incentives, and food availability.

APPENDIX A

APPENDIX A: VAR ESTIMATIONS AND RESULTS

Using VAR techniques, we evaluate the dynamic relationships between monetized wheat deliveries and price of wheat flour in domestic markets. Prior to estimating the VARs, Granger causality testing can be used to understand whether information from one data series is useful in forecasting the values in another. For example, this testing can identify if knowledge on the quantities of monetized wheat arriving in Mozambique helps to predict the prices of wheat flour in the markets. While gaps in the price data set for Beira do not allow us to evaluate relationships there, both Nampula and Maputo have excellent price datasets to use combined with the quantities arriving for monetization at the ports of Nacala and Maputo.

Results of the Granger causality test (Table A1) indicate that data on shipments of monetized wheat do not help to improve forecasting of retail prices of wheat flour in Maputo and Nampula markets. This suggests that retail prices of wheat flour prices in Maputo and Nampula are exogenous in the time series sense to monetized wheat arrivals. Findings of the Granger causality test also indicate that retail flour prices in Maputo and Nampula markets are exogenous to monetized wheat shipments. This means that retail prices of wheat flour do not provide further information to forecast monetized wheat deliveries. This in turn would indicate that the decisions to bring in food aid were not directly linked to retail wheat price trends in Mozambique. Table A1 also shows that there is no price linkage between world wheat prices and domestic retail wheat flour prices in Maputo. However, the world wheat price "Granger-causes" domestic wheat flour prices in Nampula. Furthermore, world wheat prices and monetized wheat arrivals combined help to improve forecasting of retail wheat flour prices in Nampula.

Table A1. Results of Granger Causality Test

	Maputo		Nampula	
Null hypothesis	Chi squared	p-value	Chi squared	p-value
Monetized wheat delivery does not Granger cause world wheat prices	10.0	0.019	0.8	0.854
Wheat flour price does not Granger cause world wheat prices	4.6	0.204	2.0	0.573
Monetized wheat delivery and wheat flour price do not Granger cause world wheat prices	16.3	0.012	2.8	0.833
World wheat prices do not Granger cause monetized wheat delivery	1.7	0.633	4.9	0.183
Wheat flour price does not Granger cause monetized wheat delivery	1.6	0.649	3.0	0.397
World wheat prices and wheat flour prices do not Granger cause monetized wheat delivery	3.5	0.739	6.7	0.347
World wheat prices do not Granger cause local wheat flour price	2.0	0.575	10.8	0.013
Monetized wheat delivery does not Granger cause local wheat flour price	2.6	0.458	1.8	0.617
World wheat prices and monetized wheat delivery do not Granger-cause wheat flour price	3.8	0.710	13.2	0.039

VAR modeling is commonly used to examine endogenous and dynamic relationships because VAR techniques impose few restrictions on the estimated system of equations. This technique is also appealing because there is no need to make behavioral assumptions for every endogenous variable independently to estimate how changes in a specific endogenous variable affect other endogenous variables in the system of equations.

The reduced-form VAR representation of the endogenous and dynamic structural relationships can be specified as

$$WP_t = \alpha_0 + \sum_{k=1}^{n} \alpha_k WP_{t-k} + \sum_{k=1}^{n} \beta_k MW_{t-k} + \sum_{k=1}^{n} \gamma_k DP_{t-k} + \varepsilon_t$$

$$MW_t = \alpha_0 + \sum_{k=1}^{m} \alpha_k^{'} WP_{t-k} + \sum_{k=1}^{m} \beta_k^{'} MW_{t-k} + \sum_{k=1}^{m} \gamma_k^{'} DP_{t-k} + \mu_t$$

$$DP_t = \alpha_0 + \sum_{k=1}^{s} \alpha_k^{''} WP_{t-k} + \sum_{k=1}^{s} \beta_k^{''} MW_{t-k} + \sum_{k=1}^{s} \gamma_k^{''} DP_{t-k} + \eta_t$$

where WP, MW and DP denote world wheat price, monetized wheat deliveries, and domestic wheat flour price, respectively. ε, μ and η are stochastic disturbance terms with zero means and are individually serially uncorrelated. α, β and γ are parameters to be estimated.

Before estimating the reduced-form VAR system of equations, we use theory and practice to impose restrictions on the underlying contemporaneous coefficient matrix, $\mathbf{A}$. First, we assume that world wheat prices are exogenous to cotemporaneous shocks to monetized wheat deliveries and domestic wheat flour prices. On the other hand, shipments of monetized wheat are normally requested at least three months prior to deliveries and thus are likely to be exogenous to contemporaneous shocks to domestic wheat flour prices. On the other hand, domestic wheat flour prices could well be affected by contemporaneous shocks to both international wheat prices and monetized wheat deliveries given that the vast majority of the wheat consumed in Mozambique is imported. Based on this logic, we impose the following restrictions on the contemporaneous coefficient matrix

$$\mathbf{A} = \begin{bmatrix} 1 & 0 & 0 \\ \lambda_{21} & 1 & 0 \\ \lambda_{31} & \lambda_{32} & 1 \end{bmatrix}$$

It is expected that λ_{21} and λ_{31} are both nonnegative, meaning that world wheat prices are positively associated with shipments of monetized wheat and domestic wheat flour prices. We also expected λ_{32} to be nonpositive, suggesting that monetized wheat deliveries are negatively related to domestic wheat flour prices.

To determine whether each time series is stationary in the time series sense, we test for unit roots using Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. We find some evidence of unit roots in all time series except for shipments of monetized wheat (Table A2). Due to non-stationarity, we estimate our VAR system of equations using first differences. It is important to test for unit roots because non-stationarity of the time series could lead to biased estimation of the parameters.

Table A2. ADF and PP Unit Root Tests

	H_o: Unit root H_1: Stationary process p-value for Z(t)		H_o: Unit root H_1: Stationary process with trend p-value for Z(t)	
	Dickey-Fuller	Phillips-Perron	Dickey-Fuller	Phillips-Perron
Domestic wheat flour price in Maputo	0.368	0.350	0.896	0.906
Domestic wheat flour price in Nampula	0.036	0.101	0.067	0.167
World wheat price	0.952	0.906	0.672	0.596
Monetized wheat delivery in Maputo	0.000	0.000	0.000	0.000
Monetized wheat delivery in Nampula	0.000	0.000	0.000	0.000

Before estimating the VAR system of equations, one has to decide about the number of lags needed. Given processing involved, it is logical to think that wheat arrivals in the previous months would influence current wheat flour prices, and we need to determine how many previous months should be included in estimations. We use several statistical tests to help us choose the number of lags to be included in the estimation.

For Maputo and Nampula, results of Final Prediction Error (FPE), and Akaike's Information Criterion (AIC) indicate that three lags are adequate to estimate the three-equation VAR system, while Hannan and Quinn Information Criterion (HQIC) indicated that two lags are required. Another test procedure, Schwarz's Bayesian information criterion (SBIC) indicated that one lag is needed in both markets. However, it was decided to be conservative and use three lags for the Maputo and Nampula markets.

Findings from the estimation of the three-equation VAR system indicate that neither world wheat prices nor monetized wheat shipments significantly influence trends in domestic retail wheat flour prices in Maputo and Nampula. This suggests that monetized wheat arrivals and world wheat prices do not provide further information that can help in forecasting retail wheat prices in Maputo and Nampula markets. In the time series sense, domestic retail wheat flour prices are exogenous to international wheat prices and monetized wheat arrivals (Table A3, Table A4, and Table A5.)

Table A3. Vector Autoregression (VAR) Analysis for Maputo

	World wheat price		Monetized wheat		Domestic wheat flour price	
LD.World wheat price (US$/MT)	0.266	***	6.424		0.101	
	(0.088)		(6.114)		(0.261)	
L2D.World wheat price (US$/MT)	-0.160	*	-5.162		0.205	
	(0.089)		(6.189)		(0.264)	
L3D.World wheat price (US$/MT)	-0.023		4.658		-0.284	
	(0.088)		(6.052)		(0.258)	
LD.Monetized wheat (MT)	-0.002	*	-0.859	***	-0.004	
	(0.001)		(0.087)		(0.004)	
L2D.Monetized wheat (MT)	-0.003	**	-0.647	***	-0.005	
	(0.001)		(0.100)		(0.004)	
L3D.Monetized wheat (MT)	-0.004	***	-0.295	***	0.000	
	(0.001)		(0.086)		(0.004)	
LD.Domestic wheat flour price (US$/MT)	0.050		1.851		-0.220	**
	(0.031)		(2.119)		(0.090)	
L2D.Domestic wheat flour price (US$/MT)	0.017		-1.416		0.270	***
	(0.032)		(2.192)		(0.093)	
L3D.Domestic wheat flour price (US$/MT)	0.031		-0.380		0.133	
	(0.031)		(2.141)		(0.091)	
Constant	-0.006		0.121		-0.049	*
	(0.010)		(0.703)		(0.030)	
Observations			127			

*, **, *** denote statistical significance at 10, 5, and 1% levels, respectively.
Numbers in parentheses are t-statistics.
LD, L2D, L3D and L4D represent lag one, two, three and four, respectively

Table A4. Vector Autoregression (VAR) Analysis for Nampula

	World wheat price		Monetized wheat		Domestic wheat flour price	
LD.World wheat price (US$/MT)	0.183	*	-3.775			
	(0.099)		(3.447)		(0.481)	
L2D.World wheat price (US$/MT)	0.048		-2.204		1.270	***
	(0.096)		(3.347)		(0.467)	
L3D.World wheat price (US$/MT)	-0.050		6.451	*	0.571	
	(0.098)		(3.412)		(0.476)	
LD.Monetized wheat (MT)	0.001		-0.898	***	-0.012	
	(0.003)		(0.096)		(0.013)	
L2D.Monetized wheat (MT)	0.002		-0.687	***	-0.001	
	(0.003)		(0.119)		(0.017)	
L3D.Monetized wheat (MT)	-0.001		-0.189	***	-0.011	
	(0.003)		(0.108)		(0.015)	
LD.Domestic wheat flour price (US$/MT)	0.026		-0.686		-0.321	***
	(0.020)		(0.692)		(0.097)	
L2D.Domestic wheat flour price (US$/MT)	0.012		-0.005		-0.212	**
	(0.020)		(0.689)		(0.096)	
L3D.Domestic wheat flour price (US$/MT)	-0.002		0.807		-0.121	
	(0.019)		(0.667)		(0.093)	
Constant	-0.003		0.127		-0.099	**
	(0.010)		(0.339)		(0.047)	
Observations			104			

*, **, *** denote statistical significance at 10, 5, and 1% levels, respectively.

LD, L2D, and L3D represent lag one, two, and three, respectively

Table A5. Contemporaneous Trade Relationship

	Regressor		
Dependent variable	World wheat price	Monetized wheat	Domestic wheat flour prices
		Maputo	
World wheat price	1.000		
Monetized wheat	-9.629	1.000	
Domestic wheat flour prices	-0.519	0.002	1.000
		Nampula	
World wheat price	1.000		
Monetized wheat	-2.150	1.000	
Domestic wheat flour prices	-0.348	-0.003	1.000

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