ABSTRACT

IMPROVING MAIZE MARKETING AND TRADE POLICIES TO PROMOTE HOUSEHOLD FOOD SECURITY IN SOUTHERN MOZAMBIQUE

By

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This research is aimed at helping to understand and resolve a number of perceived problems in the maize marketing system in Mozambique, including relatively high pri of industrial maize meal especially for lower income consumers in Southern Mozambique, disappearance of whole maize meal in Maputo urban markets, limited availability of maize grain in the markets, difficulties of import from South Af and perhaps reduction of maize flow from the Center to the South of Mozambique.

Findings reveal that maize grain is widely produced throughout the country, but, together with sales, it is very concentrated. Analysis of consumers' expenditure d that expenditures on maize grain did not change in 2002 compared with 1996, although there were some differences when the analysis is done by regions. Most of the maize grai produced by rural households in 2002 was retained at home, and informal traders are the most important link to whom farmers sell their production. Foreign countries are competing with the South for maize grain produced in the Central region. The analysis of the impact of VAT on maize imports shows that it would have frequently been profitable to bring in maize grain from South Africa if no VAT was charged. Results of the market integration analysis show that Central-South trade in Mozambique is still somew weak.

DEDICATION

To my dear late grandmother, Fatamo Issofo.

Part of the delightful images that I still have from when I was a little kid, you are in. I, *Macandene*, the sweetest name that you used to call me, am very thankful for all your love, and to take care of me when I was a child.

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INTRODUCTION AND RESEARCH CONTEXT

"*An important element in the development of a more efficient marketing system is the removal of rigidities and distortions resulting from government policy itself....*" *(Ruttan, V. and Hayami, Y.)*

1.1 Overview of Problem and Objectives

The broad objective of this research is to gain a better understanding of the maize marketing system, especially in Southern Mozambique, to contribute to more effective food security policies and market growth for the benefit of farmers and consumers. This research is aimed at helping to understand and resolve a number of perceived problems in the industry, including relatively high prices of industrial maize meal especially for lower income consumers in Southern Mozambique, disappearance of whole maize meal in Maputo urban markets, limited availability of maize grain in the markets, difficulties of import from South Africa, and perhaps reduction of maize flow from the Center to the South of Mozambique.

1.2 Specific Problem Statement

Mozambique is situated on the south eastern coast of Africa, with an area of 799,380 square kilometers, 2,515 kilometers of coastline running North-South, and 10 provinces divided into three regions, namely Northern, Central, and Southern regions.

Maize grain, which along with cassava is the key domestically produced staple, is produced primarily in the Northern and Central regions of the country. The South contains the main urban population center of the country (Maputo and Matola cities) but is a marginal agricultural production area. Most farmers in this region are net maize buyers.

In such a long country, and in one with poor road, rail, and sea links, the cost of transporting maize from where it can be competitively grown to the South is relatively high.

Due to these conditions, there are regular imports of maize grain to Southern Mozambique from South Africa to supply established commercial maize mills. For other users, some maize grain also flows from Central regions to the South to supply informal wholesale markets that serve rural and urban consumers.

The poverty rate is very high throughout the country, including in Maputo and Matola cities, with a population around 2 millions of habitants. More than any other city in the country, the population of these two cities relies on markets to purchase their basic needs in order to satisfy their food security. Therefore, the cost of purchased food in the urban and rural areas has a strong impact on the real income of poor households.

Historically, maize grain and rice have been the basic staples in the Southern region, consumed by both rural and urban households. Table 1 below shows that, between January 1996 and August 1998, the city of Maputo had the second highest wholesale price for maize grain among five countries of Southern and Eastern Africa. Furthermore, the city of Maputo registered the second highest price for industrialized

roller maize roller meal.

Table 1.2 Maize Grain and Maize Meal Prices, Janeiro 1996 – August 1998

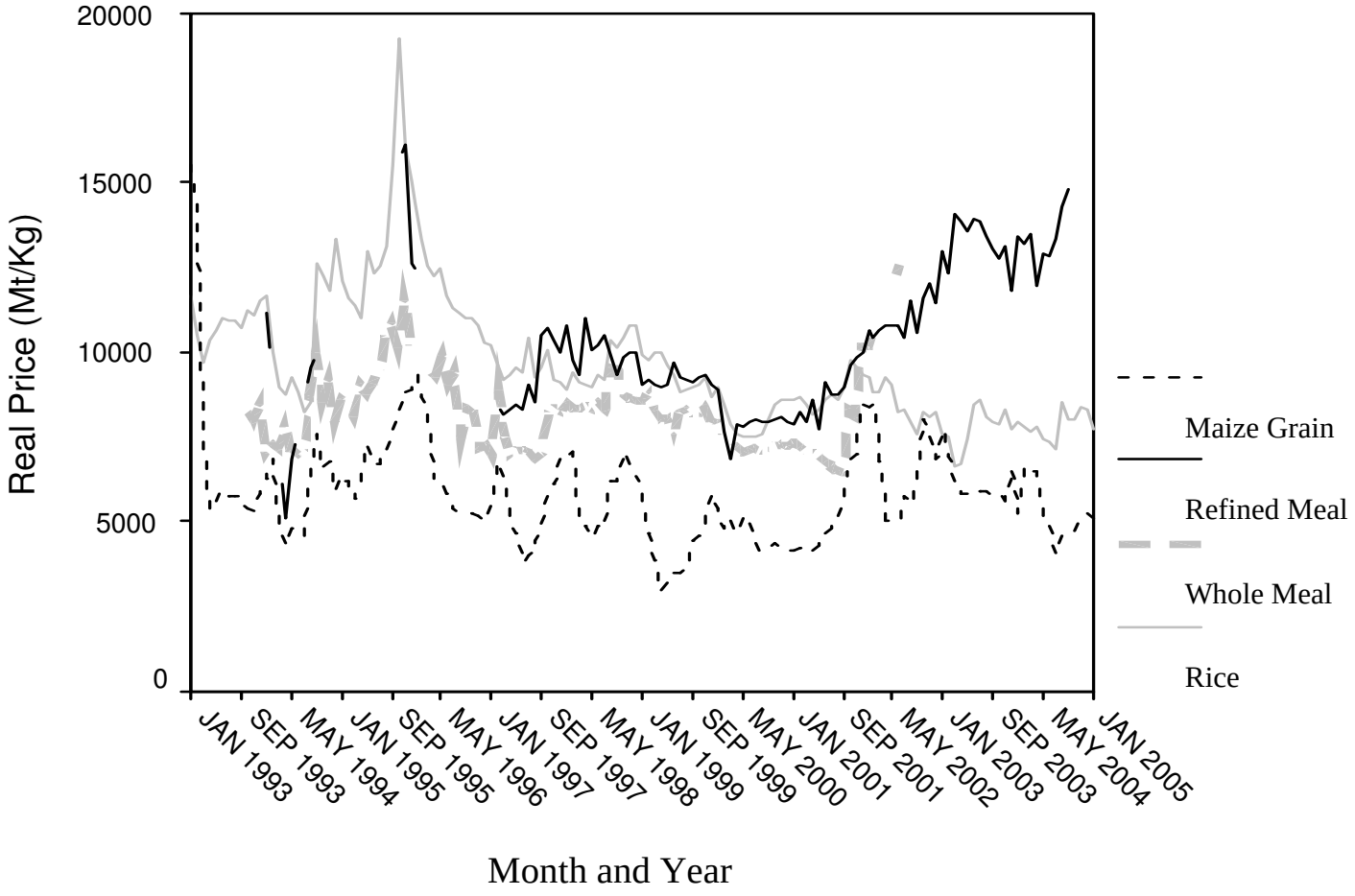
Prices ($US/Ton)	Kenya	Zambia	Zimbabwe	RSA	Mozambique
Producer- Grain	190	133	109	113	101
Wholesale at Capital-Grain	241	174	120	133	217
Roller Meal-Industrial Mill	390	285	172	443	424
Whole Meal-Hammer Mill	272	204	124	-	254

Data Source:

During the first three months of 2004, the price of industrial maize meal registered a mean of $US543 per metric ton in Maputo city, which may be the highest in all Southern and Eastern Africa. Moreover, while the prices of industrial maize meal have been increasing in Southern Mozambique, whole maize meal sold at retail, which is much cheaper, has disappeared from some of the urban markets. Furthermore, there is some indication that the availability of maize grain to be purchased by urban as well as rural consumers have decreased.

In addition, analysis of the real price pattern of rice (Figure 1.3) shows that the price has decreased throughout the Southern region since the second half of the 1990s. Furthermore, the price of rice is lower than the price of industrial maize meal, and the premium paid for rice over maize grain in Maputo has decreased.

Figure 1.3 Real Retail Prices for Maize Grain, Industrial Maize Meal, Wheat and Rice; Maputo, January 1993-January 2005



The decreasing price of rice has been, without any doubt, an important contributor to maintaining households' real purchasing power in the South. However, the absence of whole maize meal sold at retail from urban markets in the South, together with the dramatic increase in prices for industrialized maize meal and limited availability of maize grain (supported by evidences from Agricultural Market Information System, SIMA), has resulted in the concern that the cost of the basic food is very high for low income consumers.

While industrial maize meal has registered high prices and the availability of maize grain has decreased, there are no records of any imports of maize grain from South Africa, the only reliable year-round source of maize in the region, to be sold in the markets as grain to fill the gap. Indeed, it seems that import of maize grain are only done by the industrial milling industry as a way to supply their mills.

These facts show important potential implications for consumers. When the availability of local maize grain is reduced, consumers in both rural and urban areas of the South of Mozambique have to purchase maize flour produced by large industrial mills. Since the cost to produce maize flour is high in large industrial mills in comparison with the cost through hand pounding or in small-scale mills, they explicitly have to pay high prices for maize flour produced industrially. Rural consumers in the South still use a hand method for processing maize meal, assuming they can source maize grain. Under these conditions, buy potential or real scarcity of maize grain may threaten the food security of the poorer consumers.

This lack of imports of maize grain to be sold in local markets as grain has

persisted throughout the years, although there is some evidence that in some periods over the last six years, such imports might be profitable.

These tendencies – high prices of industrial maize meal especially for lower income consumers in Southern Mozambique, the disappearance of whole grain maize meal in Maputo urban markets, the seemingly limited availability of maize grain in the markets, the difficulties of maize grain imports from South Africa, and perhaps the reduction of maize flow from the Center to the South of Mozambique – raise important policy questions. Therefore, in order to address these questions, research on the maize marketing system is needed to generate the information required for policy and program decisions to safeguard households' food security.

1.3 Specific Research Questions

The general purpose of this research is to gain a better understanding of the maize marketing system in Mozambique in order to contribute to more effective policies to induce the growth of food security of the poor, as well as the growth of markets in general.

The specific research questions of the study are:

1. What are the maize production, consumption and marketing patterns among the rural population of Mozambique?
2. Are consumers in the Southern region of Mozambique, especially poor urban consumers and net buying farmer households in rural areas, utilizing less maize grain at relatively higher prices than in the past? If yes, what is the cause?

3. How is the maize marketing system structured in Mozambique, especially in the Central and Southern Region? Who are the major participants in the maize marketing system in Mozambique, and what are their roles?

4. Would it be competitive to import more maize grain from South Africa for use in a broader array of maize meals and for sale as grain in markets in urban and rural areas of Southern Mozambique, and if so, why is there not more maize grain imported from South Africa for these purposes?

5. What are the costs of trade between Central and Southern Mozambique, and how well integrated over space are maize markets in these two regions?

6. What might be the component that helps explain what appears to be happening?

   a) The value-added Tax (VAT) that is unrecoverable by some traders on imported maize grain from South Africa?

   b) The transport costs for maize grain from South Africa and Central Mozambique?

   c) Competing uses (markets in Zimbabwe and Malawi) for maize grain produced in Central and Northern Mozambique?

   d) Lack of competition among maize meal manufactures in Southern Mozambique?

   e) Cheap rice imports?

   f) Others?

1.4 Overview of the Methodology and Data

To describe the maize subsector in Mozambique, the subsector framework was used. The use of this framework helps in the identification of constraints in the marketing system, and then in the identification of critical points of intervention necessary to alleviate those constraints.

Some criticisms have been pointed out about the complexity of the subsector approach. Indeed, Scott (1995) pointed out that studies using this approach require enormous quantities of data that took time and had high costs.

To avoid this problem and to get answers to the specific questions pointed above, the study was first delimited in geographical regions, being the Central and Southern Regions, the main focus of the study.

Second, secondary data sources were reviewed. This included historical production data such as area and maize production, prices, household level data, etc.

Third, as information regarding the maize traders operation as well as millers operation was not available, the decision was made to get this information through the use of rapid appraisal (RA). Thus, interviews with key participants directly or indirectly involved in maize subsector were conducted to generate valuable insights related to their operation. These key participants were selected from among formal and informal wholesalers, retailers, maize processors, and private companies. Furthermore, direct observations in some stages of the whole maize chain were made.

The geographic area of the interviews included three provinces, namely Maputo and Gaza in the Southern region, and Manica in the Central region. More explicitly, the

interviews with those key participants were conducted in the provincial capital cities because most of the maize trade is done there (most of the informal wholesale markets are located there). Furthermore, the main processors, importers, and the majority of private companies dealing with maize trade are located in the capital cities.

1.5 Research Instruments

Two interview guides were designed, being one for informal maize traders and another one to managers of maize mills. The first interview guide was used to interview 29 informal maize traders. Twenty-two of them were interviewed at informal wholesale markets located in Maputo, and the remaining seven at the Xai Xai informal wholesale market.

The second interview guide was used to interview the four principal medium/large maize millers in the study region. The idea was to include all principal maize millers in the sample since they are not so many, but was not possible to do it; two of the main millers were not included in the study.

1.6 Thesis Organization

The present thesis will comprise six chapters. The introductory chapter presents an introduction to the topic, as well the problem statement and the objectives. Chapter two will present the role of maize grain in Mozambican rural households' livelihoods, describing in more details the structure of maize production, marketing and consumption throughout the country, and the role of maize grain in smallholder livelihoods. In this

chapter, the first, and second specific research questions will be answered. Chapter three will present the structure of maize marketing system in Mozambique based on the subsector approach and insights from taking a marketing channel approach and examining related questions of industrial organization. In this chapter, the third specific research question will be answered.

In chapter four, the role of duties and taxes on maize marketing will be presented. This will help address the fourth specific research question. In chapter five, to assess the performance of the maize markets, an analysis of the market integration among vertical marketing stages and across spatially differentiated markets will be conducted, as well as an analysis of marketing margins. The fifth specific question will be answered.

Finally, in the chapter six, the main findings of the study will be summarized, and some recommendations for policies will be presented.

CHAPTER TWO

MAIZE GRAIN IN MOZAMBIQUE HOUSEHOLDS' ECONOMY

2.1 Introduction

This chapter presents the role of maize grain in Mozambique's smallholder household economy, describing in more details the structure of maize production throughout the country, and the role of maize grain in smallholder livelihoods.

The next two sections of this chapter summarize maize production trends from a national perspective, using data from the last Agricultural and Livestock Census (CAP, 1999-2000), and from the National Early Warning System (SNAP), which has responsibility for generating official agricultural production data. In the fourth section, data from the 2002 National Agricultural Household Survey (TIA 2002) is used to present information on smallholder's maize production and sales patterns by geographical region. The fifth section discusses the role of maize grain in smallholder livelihoods. Section six presents information on maize consumption patterns in the country. One main source of data was used to compute consumption results, namely data from the First and Second National Assessment of Poverty (IAF, 1996 and 1997). Finally, the last section presents a chapter summary.

2.2 Structure of Maize Production

Maize production in Mozambique is affected by several conditions that determine the structure of marketing in the country and thus the range of issues this process faces.

Technology – specifically the widespread absence of modern technology – is a key determinant of the structure of production and sales. The structure of maize production in Mozambique is dominated by smallholder farms where the majority of them use rudimentary technologies. Data from CAP show that nearly 2.4 million smallholder households and only 8,900 medium sized farm households grew maize grain at the time of this survey. Thus, over 99 percent of the maize producers in Mozambique are smallholder farms. Table 2.2a below shows the number of farms producing maize, other cereals, and cassava by farm size.

Table 2.2a Number of Farms Producing Cereals and Cassava

Commodity	Number of Farms Producing Cereals and Cassava			
	Farm Size Category			
	Small[1]	Medium	Large	Total
Maize	2,398,169	8,933	206	2,407,308
Rice	632,305	906	44	633,255
Sorghum	820,803	2,565	51	823,419
Millet	140,999	1,478	29	142,506
Cassava	1,935,154	2,984	57	1,938,195

Data Source: CAP

[1] For discussion on how the farm size was classified, see *Apresentacao Sumária dos Resultados do Censo AgroPecuário1999-2000*. Instituto Nacional de Estatística, Moçambique, 2002.

Another factor that affects maize production is agro-ecological conditions. The majority of maize producers are concentrated in the Northern provinces (Figure 2.2), namely Niassa, Cabo Delgado, and Nampula, that have a better rainfall distribution as well as better soil fertility. Together, these three provinces account for about 40 percent of area planted to maize and nearly half of national maize production.

Table 2.2b shows the percentage distribution, by province, of the number of small farms as well as the total area allocated to maize grain, other cereals, and cassava.

2.3 National Production Trends

After the peace agreement of October 1992, maize production increased dramatically, especially in the first three years. This growth was not due primarily to increased productivity. Rather, it was a result of the peaceful conditions that allowed access to more land by the population that was displaced and unable to practice agriculture during the war period. Also, exports to Malawi provided a good market for maize grain produced in the Northern Region, and therefore, contributed to the growth of maize production. Between 1996 and 1999, production rose approximately 10 percent a year, a pattern that no other food crop has shown (Figure 2.3).

The variability of maize output is due essentially to weather factors. For instance, in the 1999-2000 crop season, maize production declined 18 percent, due primarily to floods that devastated large areas of the Center and South of the country. Furthermore, droughts as the one observed in 1995 and 2002, are another issues that influence the production.

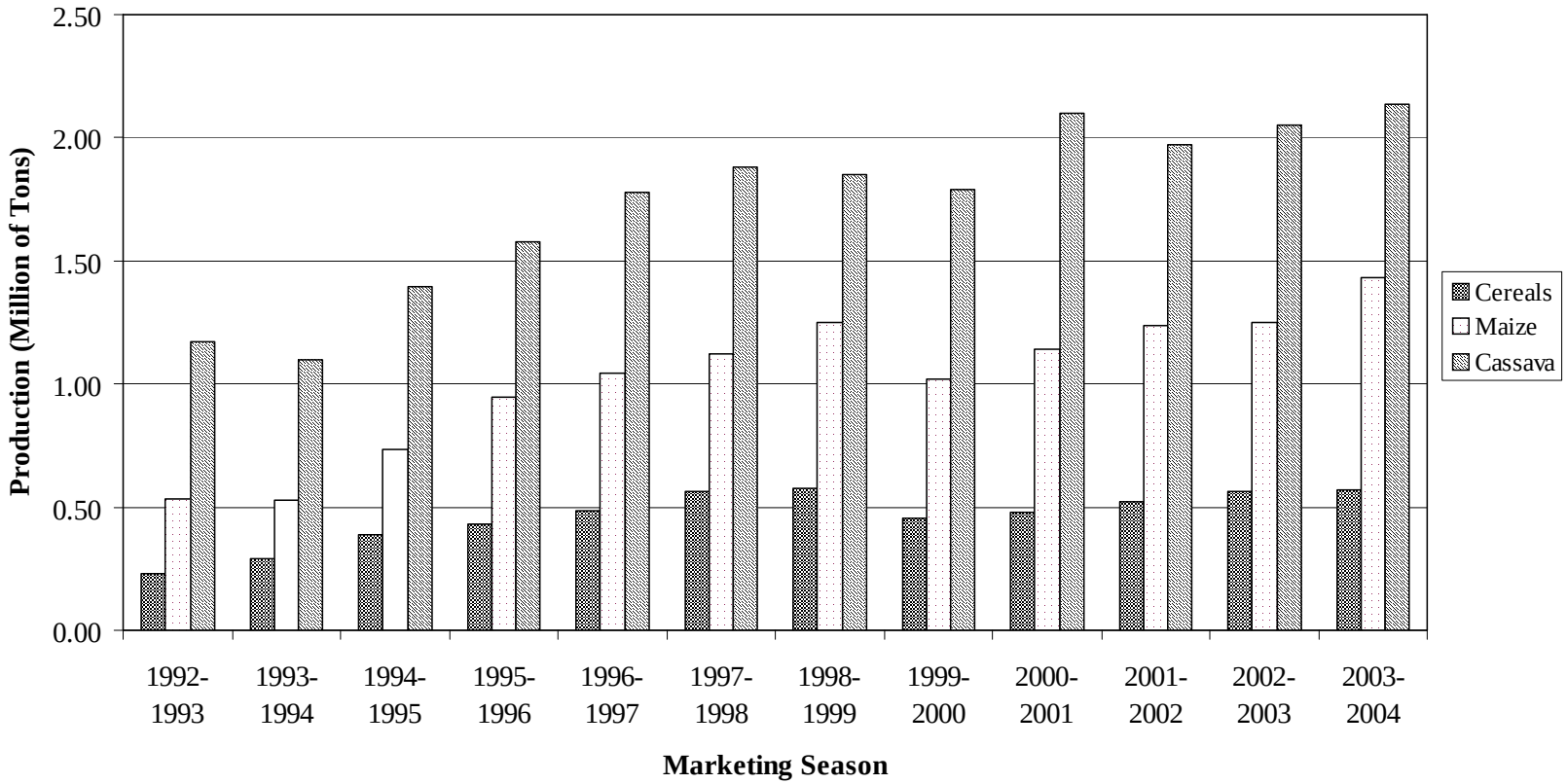
Figure 2.2 Map of Mozambique

Table 2.2b Small Farms Producing Cereals and Cassava, and Patterns of Land Distribution (Percentage of National Total)

Province	Number of Farms with					Land Allocated to				
	Maize	Rice	Sorghum	Millet	Cassava	Maize	Rice	Sorghum	Millet	Cassava
	Percentage of National Total									
Niassa	7.3	2.8	8.4	5.0	4.5	8.7	2.7	6.7	2.0	3.6
C. Delgado	11.1	13.5	17.8	9.7	12.9	8.2	15.0	18.6	6.7	13.5
Nampula	18.7	22.4	26.4	13.7	33.9	8.3	17.7	20.7	5.6	37.5
Zambezia	18.8	41.4	15.0	12.4	21.6	14.3	37.7	10.6	3.7	18.6
Tete	10.5	0.6	5.6	21.4	2.2	15.6	0.5	5.2	25.8	1.1
Manica	8.1	3.6	10.5	11.5	2.7	12.7	3.8	13.1	14.7	1.2
Sofala	6.5	11.8	11.7	17.6	2.6	8.7	16.7	19.3	23.4	1.1
Inhambane	8.5	2.6	3.9	5.7	9.4	8.5	3.0	4.0	9.6	12.1
Gaza	8.1	1.4	0.5	2.9	7.5	12.7	2.8	1.7	8.4	9.7
Maputo	2.5	0.0	0.1	0.1	2.6	2.1	0.0	0.1	0.0	1.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Data Source: CAP

Figure 2.3 Production and Trend for Maize, Other Cereals, and Dried Cassava for the Last Twelve Marketing Seasons



Data Source: SNAP

2.4 Smallholder Maize Production and Sales by Geographical Region

Among cereals, maize grain in Mozambique is the basic staple food for most of the poor. Indeed, data from TIA surveys showed that, in average, 79 percent of all households were engaged in its production in 1996, and almost the same percentage (80 percent) in 2002.

Table 2.4 presents the percentage of households producing and selling maize during the 2002 harvest year, by geographical region, as well the average quantity of maize produced and sold.

Table 2.4 Maize Production and Sales Indicators by Region of Country (2002 Harvest Year)

	Region			
	North	**Center**	**South**	**Total**
% of National Production	50.5	39.8	9.6	100
% of National Sales	59.1	38.5	2.4	100
Household Level by Region				
% Planting Maize	73.5	93.7	89.8	-
% Producing Maize	72.5	90	77.5	-
Mean Quantity Produced Among Those Producing (Mean Kg)	406	749	250	-
% Selling Maize	24	23.4	3.8	-
Mean Quantity Sold Among Those Selling (Mean Kg)	154	299	137	-

Data Source: TIA 2002

Despite the fact that nearly all households in the Center and Southern region try to grow maize, the percentage of households that actually realized maize production in 2002 was lower, due to pests and other unfavorable weather conditions, especially in the Southern region. As such, the percentage of households with maize production as compared to the number planting decreased in all regions, with more emphasis in the Southern region where from 90 percent of households planting maize grain, only 78 percent in fact had some production.

The fact that about 25 percent of households did not try to produce maize grain in the Northern region may be explained by several factors. First, households in this region have more favorable climatic conditions and as such, they can diversify their production. Thereby, they take advantage by allocating their available land to alternative crops, with especial emphasis to cassava that occupies a significant portion of land. Second, the level of cash crop production other than maize[2] is much higher in the Northern region, so that available family labor has to be split between food and cash crops. Therefore, since the monetary value earned is much higher with other cash crops, there is less labor available to enable the household to be engaged in maize production.

Among those households producing maize, the Central region, which encompasses the provinces of Sofala, Manica, and Tete, stands out from the other two regions. In this region, the maize quantity produced per household is on average much higher than in the other two regions. This pattern has existed for several years, and may be explained by several factors such as the amount of land allocated for maize grain as

[2] Maize is a cash crop for some households.

shown on Table 2.2b.

In terms of maize sales, the proportion of households selling maize is much higher in the Northern and Central Region (24 percent) than in the South, even though on average the households in the Northern region sell less compared to households in the Central region, that is, 154 Kg against 300 Kg on average. The major reason for Northern and Central regions selling more maize compared to the Southern Region is probably due to the agro-ecological conditions that allow greater production per household. Therefore, households that do sell in the Northern and Central regions have larger production bases from which to sell. This has also driven exports to neighboring countries, and investment in maize processing mills.

In summary, the Central Region has the highest percentage of households producing maize, and the highest mean household production and sales among those producing. However, the Northern region, due to its higher population, predominates in total national production and sales. The Southern region has the lowest mean production among those producing, the lowest mean sales among those selling, as well as the lowest percentage of households selling. Total production and sales in this region are also the lowest.

2.5 Maize Grain in Smallholder Livelihoods

For purposes of the analysis, in this section, we divide all households into six mutually-exclusive categories with respect to maize production and sales, and then we examine selected characteristics of each of these household groups.

The categories are:

1. Households with no maize grain production.
2. Households with maize grain production but no sales.
3. Four groups of sellers, arrayed from those selling the least (quartile one) to those selling the most (quartile 4). The regional importance of maize production and sales by each of these groups is computed, and shown in the rows "% of maize produced in the region"and "% of maize sold in the region". The households in the lowest production and sales quartile produced and sold the least amount of maize grain, while those in the highest quartile produced and sold the largest amount.

2.5.1 Northern Region

In the Northern region, the results of the household-level distribution of maize production and sales show that 28 percent of rural households do not produce maize (Table 2.5.1a). In addition, 48 percent do produce, but do not sell.

Among households that both produced and sold maize in 2002 (about 25 percent of the population), production and, especially, sales are highly concentrated. The top sales group (highest quartile), representing only 6 percent of the rural households, accounted for 24 percent of all production and 71 percent of all sales in the Northern region. They produced on average over one ton of maize grain and sold nearly half a ton.

Among those households without any production of maize grain (28 percent), nearly three-quarters purchased some quantity of either maize grain or maize meal. This

share drops to around one-half for those who produce but sell nothing. This means that at least 48 percent (0.275*0.726 + 0.477*0.585) of all rural households in the North were net buyers of maize in 2002.

For the largest sales group, the percentage of households that bought some quantity of maize grain or maize meal falls to about one-third. The key finding here is that purchases of maize grain or maize meal are widespread in rural areas, are not confined to one single type of household, and are related to the amount of maize produced as well as sold. The majority of households do not produce enough maize grain to eat, something that may be explained by low maize area cultivated and the level of technology expressed by low yields (Table 2.5.1a).

Rural households' income share information indicates the contribution of different types of economic activities to total household income (Table 2.5.1b). Income includes the calculated monetary value gained from consuming own production and selling livestock, cereals and other commodities, as well as income generated from wage earnings and own business activities. Overall, mean households income ranged from nearly five million meticais ($US250) for households with no production to nearly ten million meticais ($US500) for those households in the highest sales quartile.

Among those households without maize production, the main source of income was commodity production for own consumption plus sales other than cereals, contributing with 59 percent of the total income. This pattern was observed in all other production and sale categories except for the category of highest maize sales where cereal sales accounted for the highest proportion of total rural household income (42 percent).

Table 2.5.1a Characteristics of Production and Marketing by Category of Maize Production and Sales Behavior Among Rural Households of Mozambique: Northern Region

Characteristics of Maize Households	Households With No Production	Households With Production But No Sales	Household With Both Production and Sales by Quartile			
			1. Lowest Quartile	2.	3.	4. Highest Quartile
% of HH in Region	27.5	47.7	6.3	6	6.2	6.3
% of Maize Produced in Region	0	54.2	5	6.8	10.6	23.5
% Maize Sold in Region	0	0	3.3	8.3	17.2	71.2
Mean Quantity Produced per HH in Kg (Median)	0 (0.0)	334 (193)	233 (116)	329 (227)	503 (350)	1,102 (706)
Quantity Sold & Intended Sales per HH by Those Selling (Kg)	0	0	23	59	118	483
Average Percent of Production Sold (Median)	0 (0.0)	0 (0.0)	20.8 (15.0)	30.5 (25.8)	36.5 (30.0)	54.1 (50.0)
% of HH Buying Maize or Maize Meal (%)	72.6	58.5	49	42.3	50	33.7
Total Area Cultivated per HH (Ha)	1.01	1.16	1.02	1.18	1.35	2.00
HH Area per Capita (Ha/person)	0.37	0.34	0.32	0.35	0.37	0.71
Area in Maize per HH (Ha)	0.02	0.36	0.30	0.37	0.50	0.69
Maize Yield (Kg/Ha)	0	1,439	1,080	1,583	1,410	2,212

Data Source: TIA
Notes:
HH stands for households

The key point here is that the value of commodities consumed and sold are the crucial contributors to overall household income, with shares ranging from 71 percent in the first household production and sale category (households without any maize production) to 83 percent in the fifth household production and sale category (households in third quartile of sales).

Households' assets are also examined in Table 2.5.1b in each household production and sale category. The most important pattern that emerges is that the households in the largest quartile of production and sales are better off than other households. Indeed, the percentage of households having a bicycle and radio is higher in this household category. Furthermore, the average household income is also significantly higher in this category, and drawing on results from Table 2.5.1a, households in this group have total area cultivated roughly twice as large as a majority of other smallholder in the region, and they likewise have about twice the amount of land per person in their households, as compared to most others in the no production or production with no sales category.

Also in Table 2.5.1b, selected demographic characteristics of rural households are examined. The results show that at least nearly three quarters of households in each household category are headed by males, with households in the largest quartile of sales appearing less likely to be headed by females. Furthermore, the level of education is higher in this household category. With the lowest percentage of households whose heads are illiterate (29 percent).

Table 2.5.1b Rural Household Income, Asset Indicators, and Selected Demographic Characteristics by Category of Maize Production and Sales: North

Characteristics of Maize Households	Households With No Production	Households With Production But No Sales	Household With Both Production and Sales by Quartile			
			1. Lowest Quartile	2.	3.	4. Highest Quartile
Average HH Income (000 Mt)	4,671	5,200	3,356	4,870	5,751	10,305
Income per Capita (000 Mt)	1,166	1,204	914	1,187	1,230	2,392
----------Source of Income - Percent of Income Coming from this Source----------						
Value Cereals *	12.1	29.3	29.2	28.9	37.8	42.4
Value Other Crops *	59.0	47.4	52.2	53.2	44.8	34.6
Salary	6.6	6.6	7.2	3.6	4.6	2.3
Own Business Activities	16.3	10.9	8.2	10.5	10.1	15.6
Other**	6.0	5.8	3.2	3.8	2.7	5.1
----------Assets Owned - Percent of Household with this Asset ----------						
Bicycle	13.5	28.6	23.6	25	48.5	53.5
Radio	35.2	48.9	44	49.4	55.9	62.6
Animal Traction	0	0	0	0	0	0.1
Cattle 1-9 Heads	0	0	0	0	1.1	0.1
Goat 1-19 Heads	15.3	16.8	18.6	17.5	20.4	23.1
----------Household Characteristics – Percent of Households with this Characteristic----------						
HH Headed by Female	26.4	22.6	26.5	15.6	16.6	10.4
Head Illiterate	48.0	34.8	38.4	43.5	38.7	28.9
Age of HH Head (Median)	39	39	37	35	38	37
---------- Household Size - Average Number of Persons in Each Household ----------						
HH Size	4.2	4.8	4.5	4.5	5.0	5.1

Data Source: TIA

* Includes value of both production that is consumed on farm and value of sales

****** Include value of livestock production consumed and sold, remittances, pensions, and land rent

In addition, 50 percent of the households in this category have more than 3 years of schooling. Recall that this household category has the highest percentage of maize production sold (54 percent), and also the highest concentration of maize sales (71).

2.5.2 Central Region

In the Central Region, the results of the household-level distribution of maize production and sales show that 10 percent of rural households do not produce maize (Table 2.5.2a). An additional 66 percent do produce, but do not sell any maize.

The concentration of production and sales in the Center is remarkable similar to that in the North. Actual levels of production and sales, however, are much higher in the Center.

Among households that both produce and sell maize (about 24 percent of the population), production and especially sales are highly concentrated. The top sales group (highest quartile), representing only 6 percent of the rural households, accounts for 22 percent of all production and 72 percent of all sales in the Central Region. They produce on average at the household-level over two tons of maize and sell nearly one ton. Both figures are about double those in the North.

Among households without maize production (10 percent), results in Table 2.5.2a show their strong use of the market for purchasing. Indeed, the results in the column "Percentage of households buying maize or maize meal" indicates that 9.2 percent of households without production are net buyers (60 percent including those with production and no sales) as in the Northern region. As we move into the household production and

sale categories, the results indicate that in the first group of households, over 80 percent of the households bought some maize, while in the fourth category (highest producers and sellers) some 43 percent bought maize. Therefore, as in the Northern region, purchases of maize grain or maize meal are widespread in rural areas, but even more so in the category of households without maize production.

Area in maize per household is significantly higher in the Central Region (compared to the other regions) with the exception of the highest production and sales quartile in the Southern region. Both maize area cultivated and yields are relatively high for those households with the most interaction on the sales side of the market (Table 2.5.2a). This group has total area cultivated almost twice as large as a majority of other smallholder in the region. They also have about 53 percent more land per person in their households, as compared to the large category of households with production but no sales.

In Table 2.5.2b we present income and asset information for the Central region by the same six mutually exclusive household groupings. Among those households without maize production, the main source of income was formal salary, contributing with nearly 30 percent of the total income.

In all other household categories, contrary to what was observed in the Northern Region, in the Central Region cereals production accounts for the highest share of total income, and represents almost 50 percent of the total income in households with maize sales. This difference may be explained by the higher average quantities of maize produced, consumed, and sold per households in the Central Region.

Table 2.5.2a Characteristics of Production and Marketing by Category of Maize Production and Sales Behavior Among Rural Households of Mozambique: Central Region

Characteristics of Maize Households	Households With No Production	Households With Production But No Sales	Household With Both Production and Sales by Quartile			
			1. Lowest Quartile	2.	3.	4. Highest Quartile
% of HH in Region	10	65.7	6.1	5.8	6.1	6.3
% of Maize Produced in Region	0	53.2	6	7.1	11.4	22.4
% of Maize Sold in Region	0	0	2.8	8	17.5	71.6
Mean Quantity Produced per HH in Kg (Median)	0 (0.0)	545 (346)	662 (500)	827 (639)	1,251 (850)	2,397 (1,751)
Quantity Sold & Intended Sales per HH by Those Selling (Kg)	0	0	44	131	269	1071
Average Percent of Production Sold (Median)	0 (0.0)	0 (0.0)	10.7 (7.5)	25.9 (20.0)	36.3 (26.7)	52.2 (50.0)
% of HH Buying Maize or Maize Meal	92.4	77.6	80.2	68.3	68.9	43.4
Total Area Cultivated per HH (Ha)	1.54	1.73	1.73	1.79	2.02	2.95
HH Area per Capita (Ha/person)	0.39	0.45	0.46	0.42	0.51	0.69
Area in Maize per HH (Ha)	0.25	0.89	1.06	1.01	1.20	1.64
Maize Yield (Kg/Ha)	0	900	1,067	1,355	1,177	2,565

Data Source: TIA
Notes:
HH stands for households

The key point is the same as in the case of the Northern Region, that is, commodities produced for own consumption and sales, are the crucial contributors to overall household income. The difference is that in the Northern Region the major share comes from commodities other than cereal, while in the Central Region this is the reverse.

Households' assets are also examined in Table 2.5.2b in each household production and sale category. The most important pattern that emerges is that the households in the largest quartile of production and sales are better off that other households, as in the Northern region. The percentage of households having bicycles, radios, animal traction, heads of cattle, and the highest average household income is higher in this category. The only difference noticed between both regions is that the percentage of households having animal traction, and between one and nine heads of cattle, is much higher in the Central than in the Northern region.

Also in Table 2.5.2b, selected demographic characteristics of rural households in the region are examined. The results show that households in highest two quartile of production and sales appear less likely to be headed by females. Furthermore, the level of education is higher in these last two quartile of production and sales. In fact, this category has the lowest percentage of households with heads that are illiterate (less than 30 percent), and nearly 50 percent of the households have more than 3 years of schooling.

Table 2.5.2b Rural Household Income, Asset Indicators, and Selected Demographic Characteristics by Category of Maize Production and Sales: Center

Characteristics of Maize Households	Households With No Production	Households With Production But No Sales	Household With Both Production and Sales by Quartile			
			1. Lowest Quartile	2.	3.	4. Highest Quartile
Average HH Income (000 Mt)	6,443	7,937	4,812	7,149	9,250	13,452
Income per Capita (000 Mt)	1,332	1,613	1,108	1,367	1,882	2,904
----------Source of Income - Percent of Income Coming from this Source----------						
Value Cereals *	22.9	29.8	45	49.9	48	55.7
Value Other Crops *	19.4	29.1	27.4	24.1	28.4	22
Salary	29.8	13.6	6	11.6	7.4	3.4
Own Business Activities	7.7	17.9	14	7.9	11	9.3
Other**	20.2	9.6	7.6	6.5	5.2	9.6
----------Assets Owned - Percent of Household with this Asset ----------						
Bicycle	15.1	25.2	17.8	18.3	38.1	48.1
Radio	53.7	55	38.8	54.8	62.5	70.1
Animal Traction	23.3	17	10.2	14.3	27.4	33.6
Cattle 1-9 Heads	12	5.8	5.9	6.2	8.4	14.2
Goat 1-19 Heads	39.5	44.4	42.1	41.8	53.3	63.2
----------Household Characteristics – Percent of Households with this Characteristic ----------						
HH Headed by Female	28.5	25.3	31.1	29.5	8.2	9.6
Head Illiterate	40.6	41.3	47.4	41.3	26.4	30.1
Age of HH Head (Median)	38	42	38	38	37	41
---------- Household Size - Average Number of Persons in Each Household ----------						
HH Size	5.0	5.6	5.1	5.3	5.4	5.7

Data Source: TIA

* Includes value of both production that is consumed on farm and value of sales

****** Include value of livestock production consumed and sold, remittances, pensions, and land rent

2.5.3 Southern Region

In the Southern region, the results of the distribution of maize production and sales show that 23 percent of rural households did not produce maize in 2002 (Table 2.5.3a). In addition, 73 percent did produce, but did not manage to sell any maize. These households accounted for slightly more than three-fourths of all maize production in the region, so in the South as compared to the Center and North, a much higher percentage of maize producing households retained for own consumption what they can manage to produce.

Among households that sell maize (about 4 percent of the population), production and especially sales are also highly concentrated. The top production and sales group (highest quartile), representing only 1 percent of the rural households in the region, accounts for 14 percent of all production and 77 percent of all sales. They produce on average over two tons of maize and sell nearly half a ton.

As in the other two regions, households with no maize production are also significant net buyers, with 82 percent of the households buying some maize grain or meals. This means that at least 18.5 percent (0.225*0.822) of rural households with no maize production were net buyers of maize in 2002, and that percentage increases to 76 percent when households with production and no sales were included (0.225*0.822 + 0.731*0.79). This pattern is also observable in all other household categories, especially among the large majority of households producing but not selling, where average production per household was only about 200 Kg.

Table 2.5.3a Characteristics of Production and Marketing by Category of Maize Production and Sales Behavior Among Rural Households of Mozambique: Southern Region

Characteristics of Maize Households	Households With No Production	Households With Production But No Sales	Household With Both Production and Sales by Quartile			
			1. Lowest Quartile	2.	3.	4. Highest Quartile
% of HH in Region	22.5	73.1	1.1	0.8	1.4	1.1
% of Maize Produced in Region	0	76.7	2.5	2.1	4.9	13.7
% of Maize Sold in Region	0	0	2.5	5.2	15.3	77
Mean Quantity Produced per HH in Kg (Median)	0 (0.0)	203 (87)	438 (104)	512 (289)	670 (482)	2,459 (1,386)
Quantity Sold & Intended Sales per HH by Those Selling (Kg)	0	0	15	44	74	488
Average Percent of Production Sold (Median)	0 (0.0)	0 (0.0)	12.2 (11.5)	17.2 (15.5)	16.5 (13.5)	33.5 (16.2)
% of HH Buying Maize or Maize Meal (%)	82.2	79	94.1	63.2	84.1	57.2
Total Area Cultivated per HH (Ha)	1.02	1.38	1.29	1.25	2.02	2.64
HH Area per Capita (Ha/person)	0.49	0.45	0.60	0.58	0.67	1.00
Area in Maize per HH (Ha)	0.17	0.64	0.80	0.68	0.72	1.86
Maize Yield (Kg/Ha)	0	685	1,344	1,824	2,290	3,095

Data Source: TIA
Notes:
HH stands for households

Area in maize cultivated per household is significantly higher in the highest production and sales quartile in the Southern region, being the highest among all regions. This group has total area cultivated almost twice as large as a majority of other smallholder in the region. They also have about 122 percent more land per person in their households, as compared to the large category of households with production but no sales.

Among those households without maize production, the main source of income was coming from commodities produced for consumption plus sales for other than cereals, contributing with 56 percent of the total rural households income (Table 2.5.3b). This pattern was also observed in the first household maize production and sale categories, while in the second, third, and fourth category, cereals consumed and sales accounted for the highest share of total rural household income.

The percentage of households having bikes is not widespread in this region, except in the last quartile of production and sales where 41 percent of households have bicycles. However, the percentage of households having radio is comparable with figures for the other two regions.

Another aspect that distinguishes this region from the Central and the Northern Region is the percentage of households having animal traction, which is much higher in the former region. The Southern Region has a long tradition of cattle raising compared with other regions, a factor explained by its marginal agro-ecological conditions for agricultural practices.

Table 2.5.3b Rural Household Income, Asset Indicators, and Selected Demographic Characteristics by Category of Maize Production and Sales: South

Characteristics of Maize Households	Households With No Production	Households With Production But No Sales	Household With Both Production and Sales by Quartile			
			1. Lowest Quartile	2.	3.	4. Highest Quartile
Average HH Income (000 Mt)	11,537	11,528	7,755	6,636	16,166	38,824
Income per Capita (000 Mt)	3,171	2,443	1,593	1,166	3,370	4,454
----------Source of Income - Percent of Income Coming from this Source----------						
Value Cereals *	0.0	12.7	22.3	51.7	31.9	28.3
Value Other Crops *	55.9	44.2	39	30.6	31.7	19.7
Salary	18.1	14.9	9.1	13.5	21.5	17.5
Own Business Activities	17.4	15.2	18.9	2.5	3.6	14.8
Other**	9.4	13	10.7	1.7	11.3	19.7
----------Assets Owned - Percent of Household with this Asset ----------						
Bicycle	3.4	7.4	1.9	22.9	7.1	41
Radio	50.3	54.2	28.8	49.4	50.7	75.1
Animal Traction	38	42.4	34.1	41.2	45.7	22.4
Cattle 1-9 Heads	8.3	10.1	3.2	19.1	14	34.5
Goat 1-19 Heads	27.3	36.3	42.4	36.8	33.7	43.4
----------Household Characteristics – Percent of Households with this Characteristic ----------						
HH Headed by Female	36.1	29.5	46.3	43.4	31.5	33
Head Illiterate	49.8	40.1	39.9	42.7	49.9	25.6
Age of HH Head (Median)	50	48	46	36	52	42
---------- Household Size - Average Number of Persons in Each Household ----------						
HH Size	4.9	5.6	4.4	4.4	5.7	8.3

Data Source: TIA

* Includes value of both production that is consumed on farm and value of sales

****** Include value of livestock production consumed and sold, remittances, pensions, and land rent

2.6 Maize Consumption Patterns

2.6.1 Population of Mozambique

According to the National Population Census (1997), projections for 2005 indicate that the total population of Mozambique is nearly 19.5 million, with 71 percent living in rural area. In the Southern region, nearly 2.5 million live in rural areas, almost 13 percent of the total population. Table 2.6.1 presents the total population of Mozambique per province, as well as population living in rural and urban areas.

Table 2.6.1 Population of Mozambique per Province

Region	Province	Population	Urban	Rural	Urban	Total
		(Habitants)			%	%
North	Niassa	999,332	230,005	769,327	23.0	5.1
	Cabo Delgado	1,617,165	272,457	1,344,708	16.8	8.3
	Nampula	3,676,003	919,001	2,757,002	25.0	18.9
Center	Zambezia	3,710,011	500,313	3,209,698	13.5	19.1
	Tete	1,511,832	223,144	1,288,688	14.8	7.8
	Manica	1,320,232	371,400	948,832	28.1	6.8
	Sofala	1,637,821	675,966	961,855	41.3	8.4
South	Inhambane	1,381,023	270,548	1,110,475	19.6	7.1
	Gaza	1,304,798	321,899	982,899	24.7	6.7
	Maputo	1,044,946	656,008	388,938	62.8	5.4
	Maputo City	1,216,873	1,216,873	0	100.0	6.3
	Total	19,420,036	5,657,614	13,762,422	-	100

Data Source: INE 2005

Notes: The rural and urban breakdown was obtained by using as a base the 1997 population census for urban and rural population, and then applying this to the 2005 estimates

2.6.2 Consumer Expenditure Patterns: IAF Results

In 1996, a collaborative research effort between Ministry of Planning and Finance (MPF) of Mozambique and International Food Policy Research Institute (IFPRI) produced the first national assessment report on poverty and well being in Mozambique. This assessment was based on household survey data collected in 1996. Data from that household expenditure survey (IAF, 1996) suggest that cereals, tubers, and roots accounted for about one-half of the household food expenditure and one-third of total household expenditure. The definition of expenditures includes an estimate of the value of own produced commodities that were consumed, plus the value of purchases in the market.

Results in Table 2.6.2a reveal that the proportion of total household expenditure allocated to cereals was 23 percent nationally, with almost no difference between rural and urban. Furthermore, expenditure on roots and tubers was much higher in rural areas.

Table 2.6.2a Percentage of Total Expenditure Allocated to Food Items in 1996

Commodity	Rural	Urban	National
	Percent		
All foods	67.6	51.6	61.9
Cereals	22.8	22.7	22.8
Roots and tubers	11.0	4.1	9.6
Beans	5.8	2.9	5.2

Data Source: IAF 1996

Among cereals, results in Table 2.6.2b show that both rural and urban households in 1996 spent more on maize and maize derivatives than in any other cereal or root and tuber. Furthermore, in rural areas cassava was the second most consumed staple, while in urban areas rice and wheat products stood in second and third place, respectively.

Table 2.6.2b Percentage of Total Expenditure Allocated to Cereals, Tubers, and Roots in Rural and Urban Areas as Well as in All Country in 1996

Commodity	Rural	Urban	National
	Percent		
Wheat and derivatives	0.74	5.28	1.66
Maize and derivatives	16.68	10.56	15.44
Rice	3.09	6.77	3.84
Sorghum and Millet	2.31	0.08	1.85
Cassava	9.54	2.93	8.19
Other roots and tubers	0.13	0.62	0.23

Data Source: IAF 1996

In 2002, the Ministry of Planning and Finance (MPF) of Mozambique produced the second national assessment report on poverty and well being in Mozambique. Data from this last expenditure survey are compared with the 1996 assessment, and the results are reported in Table 2.6.2c.

Table 2.6.2c Percentage of Total Expenditure Allocated to Cereals; National

Cereal	IAF 1996	IAF 2002
	Percent	
Rice	3.84	3.76
Maize and Derivatives	15.44	15.45
Wheat and Derivatives	1.66	1.31

Data Source: IAF 1996 and 2002
Notes: 2002 results computed by the authors

As shown in Table 2.6.2c, there is basically no change in national average percentage of total households' expenditures allocated to cereals. In 1996, households spent on maize as much as in 2002, registering a small decrease on total expenditures for wheat and rice.

2.6.3 IAF Expenditure Disaggregation: Rural Areas

The national averages tend to hide important regional and other differences. Results in Table 2.6.3 show that, in 2002, households in the rural Province of Maputo spent more in rice (nearly double of 1996), followed by expenditures on maize that clearly decreased from 16 to 9 percent. Expenditures on wheat increased slightly compared with 1996.

In Gaza and Inhambane, rural households spent more on maize and its derivatives than on other staples during both years, but the share allocated to maize fell sharply in 2002; households in these provinces spent more on rice and wheat together in 2002 than they did on maize and derivatives. While expenditures on maize decreased relative to

1996, they nearly doubled for rice. In the case of wheat, the expenditure did not change significantly.

In summary, it seems that throughout rural South, expenditures on maize and its derivatives decreased at the expenses of rice and wheat among cereals. However, rural households' expenditure increased dramatically for fish, leaves, and fruit throughout the South.

In rural patterns of Central Region, in 2002, households were still spending more on maize and its derivatives, and even more than in 1996. The expenditures on rice increased slightly in Manica and Tete, remaining almost the same in Sofala and Zambezia. However, expenditures on wheat increased slightly in all rural Central as in rural South, particularly in Maputo.

In Sofala and Zambezia, the expenditure on cassava increased significantly, from 14 to 18 percent, being the second most important commodity in terms of households' expenditure. Also, households' expenditure for sorghum and millet increased from 3 to 5 percent, a pattern that is not observable in other provinces in the Central and in all Southern provinces.

In summary, in the rural Central, among cereals, households were spending more on maize and its derivatives, followed by rice in Manica and Tete. In Sofala and Zambezia, expenditures on cassava were occupying the second place.

Table 2.6.3 Percentage of Total Food Expenditure Allocated to Food Items; Rural

Food Items	Maputo		Gaza and Inhambane		Manica and Tete		Sofala and Zambezia		Nampula		Niassa and Cabo Delgado	
	1996	2002	1996	2002	1996	2002	1996	2002	1996	2002	1996	2002
	Percent											
Maize	16.4	9.1	22.4	12.2	23.2	**48.0**	18.8	**26.7**	10.4	7.9	24.1	**35.4**
Rice	6.2	**11.4**	5.7	**9.5**	1.1	**2.5**	7.8	6.5	6.8	2.3	7.2	6.7
Wheat	6.1	**7.4**	3.4	3.2	0.9	**1.4**	0.5	**1.7**	1.8	0.6	0.9	**1.0**
Cassava	7.2	4.7	14.5	8.4	0.8	0.5	13.9	**17.6**	22.1	**32.3**	12.4	10.8
Sorghum and Millet	0.0	0.0	0.9	0.08	6.0	2.5	3.2	**4.7**	1.6	**4.3**	1.8	**4.7**
Irish Potatoes	0.1	0.1	0.1	0.1	0.5	0.5	0.1	0.07	0.1	0.1	0.6	0.1
Meat	0.2	**1.9**	0.7	**1.8**	4.5	2.3	2.7	1.2	1.3	**2.3**	1.7	0.9
Poultry	2.9	2.9	2.8	2.5	3.9	2.9	6.6	2.4	4.5	3.4	2.0	**2.3**
Fish	7.7	**11.1**	2.7	**5.2**	7.9	6.1	12.1	8.9	20.1	9.7	11.6	8.5
Leaves	16.4	**19.7**	12.7	**19.2**	11.5	6.5	4.6	**5.7**	4.8	3.7	9.4	4.4
Fruit	2.8	**7.9**	9.6	**16.9**	1.5	**3.2**	5.1	**5.6**	2.7	**11.7**	2.1	**6.1**
Beans	3.6	2.9	8.4	3.1	9.2	5.5	5.6	4.9	11.2	10.5	11.6	8.7
Vegetables		6.2		6.3		6.1		3.8		3.3		4.5
Other Food	30.4	14.6	16.1	11.4	30.0	11.7	19.0	10.3	12.6	7.8	14.6	6.0

Data Source: IAF 1996 and 2002, according to their definition of rural and urban
Notes: 2002 results computed by the authors

2.6.4 IAF Expenditure Disaggregation: Urban Areas

In Maputo Province, urban households, as in 1996, were still spending the most on wheat and its derivatives, although less than in 1996 (Table 2.6.4). Expenditures on rice were still in second place as in 1996, despite the fact that expenditures on it have also decreased from 1996 to nearly half in 2002. A partial explanation for the small rise in the maize expenditure share and the fall in rice, is that the real price of maize meal rose sharply between the two years, while the rice price fell substantially. Apparently, expenditures on cereals from urban households in Maputo decreased between 1996 and 2002, and from Table 2.6.4, it is clear that expenditures on fish, leaves, and fruit went up significantly to compensate for the decrease in cereals. The rise of households' incomes may have driven the households' expenditures to these food categories, but this issue needs further research.

In Gaza and Inhambane, urban households' expenditures on maize increased significantly compared to 1996, and households in these provinces were spending more on it, followed by rice and wheat. In these two provinces, expenditures on cassava increased slightly, and as in Maputo province, expenditures on leaves and fruit increased significantly.

In the Central Region, in 2002, urban households spent even more on maize and its derivatives (the budget shares for maize rose from 23 to 48 percent in Manica and Tete, and from 19 to 27 percent in Sofala and Zambezia) at expenses of wheat and its derivatives, whose expenditures on it decreased half in all region, and also rice, which decreased slightly in Manica and Tete. As in the South, part of the explanation for the

increased maize share is that real prices of meal and also grain were substantially higher in 2002 than in 1996.

Expenditures on sorghum and millet increase significantly in all urban Central Region, from 0 to 2 and 5 percent in Manica and Tete, and Sofala and Zambezia, respectively.

2.6.5 IAF Expenditure Disaggregation: Provincial Capital Cities

Looking only at 2002 households' food expenditures for just the Cities of Maputo and Xai Xai in the South, and Beira in the Center, results in Table 2.6.5 show that expenditures on rice were most important in Xai Xai and Beira, while in Maputo were on wheat. The weight of rice in households' expenditures, increase as we move from Maputo to Beira. Clearly, in all Southern Cities (Maputo and Xai Xai), expenditures on maize and its derivatives were not that important compared with Beira City in the Central Region.

Table 2.6.4 Percentage of Total Food Expenditure Allocated to Food Items; Urban

Food Items	Maputo		Gaza and Inhambane		Manica and Tete		Sofala and Zambezia		Nampula		Niassa and Cabo Delgado	
	1996	2002	1996	2002	1996	2002	1996	2002	1996	2002	1996	2002
	Percent											
Maize	1.1	**2.4**	10.1	**14.5**	24.6	**39.9**	19.4	**27.5**	21.6	11.4	26.7	**43.0**
Rice	15.0	7.8	16.2	9.8	6.1	4.4	8.9	**9.2**	5.5	4.9	3.6	**5.8**
Wheat	21.7	15.5	16.3	6.0	5.9	2.9	8.5	4.2	5.5	4.4	4.9	2.3
Cassava	5.0	1.3	2.9	**5.2**	0.5	0.5	1.1	**3.6**	13.7	**29.0**	1.3	**4.5**
Sorghum and Millet	0.0	0.0	0.0	0.0	0.0	**1.7**	0.0	**5.3**	0.3	**1.5**	0.1	**2.3**
Irish Potatoes	1.8	0.9	0.6	0.1	1.3	0.2	0.5	0.2	0.4	0.4	1.7	0.3
Meat	2.7	**3.7**	1.7	1.6	5.2	3.6	2.9	2.1	2.2	2.2	3.6	1.7
Poultry	3.8	**5.9**	1.3	**3.0**	2.5	**4.5**	1.9	**2.4**	1.2	1.0	1.7	**2.0**
Fish	6.9	**11.8**	9.7	5.6	11.4	9.2	17.0	10.3	17.7	**20.2**	14.0	9.3
Leaves	3.7	**12.1**	5.0	**15.0**	4.1	**6.0**	1.5	**3.7**	4.2	2.4	3.5	**4.1**
Fruit	2.2	**10.0**	5.7	**14.6**	1.2	**2.5**	4.2	**5.3**	1.8	**5.3**	1.9	**3.7**
Beans	2.2	**2.9**	3.2	**3.7**	7.8	4.9	4.2	3.9	3.8	3.5	11.2	7.2
Vegetables		8.9		7.5		5.3		5.5		1.5		5.0
Other Food	33.9	13.6	27.3	11.0	31.9	13.3	29.9	14.9	22.1	10.9	25.8	8.0

Data Source: IAF 1996 and 2002, according to their definition of rural and urban
Notes: 2002 results computed by the authors

Table 2.6.5 Percentage of Total Food Expenditure Allocated to Cereals in 2002; Capital Cities

Product	Maputo City		Xai Xai City	Beira City
	1996	2002		
			Percent	
Rice	18.1	7.1	13.7	15.9
Maize and Derivatives	5.2	1.6	4.7	10.9
Wheat and Derivatives	15.0	**17.5**	8.8	9.3
Other Food Items	61.7	**73.8**	72.8	63.9

Data Source: IAF 1996 and 2002, according to their definition of rural and urban
Notes:
2002 results computed by the authors
1996 data for Xai Xai and Beira cities were not available

2.6.6 Proportion of Total Food Expenditure Allocated to Food Item Categories by Tercile of Total Expenditure; Rural and Urban Areas

Table 2.6.6a presents information on the percentage of total food expenditure allocated to selected food items categories by tercile of total household expenditure. Maize clearly remains the dominant staple in rural areas, although in the Southern Region, the cassava share exceeds maize in the lowest tercile while rice equals maize. The convenience of rice in terms of cooking time, together with its availability throughout the year and much lower price relative to the predominated types of industrial maize meal than in past years, turn rice (as well as maize grain and cassava) as potentially important for the lowest income consumers.

Table 2.6.6a Percent of Total Food Expenditure Allocated to Food Item Categories by Tercile of Total Expenditure and by Rural Regions of Mozambique

Food Items Categories	North			Center			South		
	Total Expenditure Tercile			Total Expenditure Tercile			Total Expenditure Tercile		
	1	2	3	1	2	3	1	2	3
	Percent of Total Food Expenditure								
Maize and Derivatives	16.5	21.7	33.1	30.1	52.6	52.3	8.4	12.7	16.1
Rice	4.4	5.3	5.6	1.2	2.4	4.3	8.5	9.9	10.8
Wheat and Derivatives	0.3	0.5	1.2	0.3	0.4	1.6	0.9	3.1	6.4
Cassava	28.8	23.0	15.8	1.5	0.7	0.7	12.1	8.0	4.1
Leaves	6.7	5.1	2.8	11.9	5.1	3.0	29.2	16.9	11.6
Other	43.3	44.4	41.5	55	38.8	38.1	40.9	49.4	51

Data Source: IAF 2002

In urban areas (Table 2.6.6b), rice and wheat have gained major market shares in urban consumption habits of the South. Even in the lowest tercile, their combined share is nearly five times the maize share. This pattern is likely due to several factors. First, rice and especially bread (wheat) are more convenient ways to consumer cereals, and in many countries where these are grown and/or imported at relatively low costs, one sees a movement towards such staples as urbanization proceeds, as incomes rise and consumers seek less time consuming way to prepare basic foods. So in some respects, Mozambique may be experiencing similar patterns. But a second likely reason for the patterns can be related to policies that change the relative availability and cost of goods.

Indeed, import and tax policy in Mozambique affects maize grain prices and availability, and also rice and wheat availability. Business policies also affect the nature of commercial milling investments. And the price ratio between rice and maize meal has dropped dramatically over the past several years, due in part to the structure of the maize milling industry and the extremely high prices for most of the industrial maize meals in Mozambique. Second, limited availability of maize grain during the hungry season in the South of the country means that fewer consumers have the option of purchasing cheap grain and processing it themselves (or by buying milling services from small hammer mills) into much lower cost maize meal. Finally, rice is available year round through competitive and large scale formal imports, and there is no VAT assessed on rice.

Policy changes might bring down the price of maize meal and make maize grain more available throughout the year. But it is difficult to totally reverse the patterns of shift towards rice and bread observed in the urban South. However, if policies can be modified, they would almost certainly benefit low income urban consumers. The same policy issues apply in the rural areas, only much more so, because the shares of maize grain and meal in rural areas are much higher. In the South especially, the maize production levels per household are also quite low. Less expensive maize meal (or a wider range of commercial maize meal types with significant price differentiation) and year-round availability of maize grain would offer real options and potential benefits, especially to low income consumers.

Table 2.6.6b Percent of Total Food Expenditure Allocated to Food Item Categories by Tercile of Total Expenditure and by Urban Regions of Mozambique

Food Items Categories	North			Center			South		
	Total Expenditure Tercile			Total Expenditure Tercile			Total Expenditure Tercile		
	1	2	3	1	2	3	1	2	3
	Percent of Total Food Expenditure								
Maize and Derivatives	13.8	21.6	14.3	17.8	28.4	20.1	4.2	3.7	1.9
Rice	4.9	9.9	9.0	9.6	9.6	7.0	11.2	10.4	5.8
Wheat and Derivatives	1.6	4.9	9.2	3.7	6.2	10.3	8.6	14.0	18.0
Cassava	34.5	11.0	2.5	1.0	0.9	0.8	6.6	2.4	0.7
Leaves	3.5	2.4	1.9	8.8	3.8	3.1	17.8	12.2	8.4
Other	41.7	50.2	63.1	59.1	51.1	58.7	51.6	57.3	65.2

Data Source: IAF 2002

2.7 Chapter Summary

The analysis of maize grain in Mozambique smallholder livelihoods showed that maize grain is actively produced in all regions of the country. Large majorities of rural households (96 percent in the South, about 75 percent in the Center) either do not produce maize grain or produce it solely for home consumption. This was explicitly shown with the concentration and levels of maize production. In all regions, between 50 and 77 percent of the production of maize grain is concentrated among household who produce but do not sell.

The analysis also shows that maize sales are very concentrated. In all regions,

between 71 and 77 percent of the volume of maize sales was accounted for by the top 25 percent of sellers, representing only 6 percent of all households in the Center and North, and only 1 percent in the South.

The top 25 percent of sellers are clearly better off as compared to other rural households in all categories studied. Overall, the top producers and seller have the largest percentage of marketed production, have maize yields more than double the average, plant more than double the area, and have about double the amount of land per person in their households. Their incomes are also about double those of other rural households, they have significantly more assets and they are more literate, and have better access to price information. In addition, these households are less likely to be headed by females.

Based on IAF results, there was no change in national average percentage of total households' expenditures (budget shares) allocated to maize and its derivatives between 1996 and 2002. In 1996, households spent on maize and its derivatives as much as in 2002 (15 percent), registering generally similar patterns on total expenditures for wheat and rice over the period.

In general, the disaggregated picture from the IAF expenditure/budget share analysis reveals important changes from 1996 to 2002. There is a pattern of shifts into maize products in all areas studied, with the exception of the rural South where maize products lost the strong dominant budget share position held in 1996. And in the rural South, it appears that households tried to compensate with shifts into fruits and leaves, and also to rice to a lesser extent.

The key findings of this chapter for the rest of the thesis are that the large majority

of rural households do not produce enough maize grain to satisfy their consumption needs from their own production. Purchases of maize grain or maize meal are widespread in rural areas, and are not confined to one single type of household. Overall, in the South, at least 76 percent of rural households are net buyers of maize; based on production levels and the IAF budget share data, it is likely that many of these households are purchasing substantial quantities of maize or maize meal. Thus, the performance of rural maize markets for purchases - prices charged and availability of grain and various types of meals over the course of the year - will have more influence on the welfare of rural households, especially in the South, than will the market for sales. In the next chapter, the subsector analytical approach is applied to begin analyzing this performance.

CHAPTER THREE

OVERVIEW OF THE MAIZE SUBSECTOR IN MOZAMBIQUE

3.1 Introduction

As stated by Rubey (1995), an inefficient food marketing system is among the main causes of hunger. Good food system performance is also very important to meet the objectives of the participants in the food system such as remunerative producer prices and accessible retail food prices for the poor, each of which may reduce food insecurity.

Several approaches may be adopted to conduct a marketing study, but the most applied ones are: Industrial Organization (institutional) and the commodity subsector approaches. In this chapter, the subsector analytical approach was applied to provide a descriptive analysis of the maize grain marketing system at the producer level, passing by the wholesale and the milling industry level, evaluating opportunities for market expansion and improvements in vertical coordination. Particularly, in this chapter the specific question number three will be answered, that is, who are the major participants in the maize marketing system in Mozambique, what are their roles, and how is the system organized?

In the next section of this chapter, the two approaches mentioned above are briefly reviewed to enable the reader to link the economic theory to the issues addressed in the chapter. Then, the rest of the chapter is dedicated to the description of the maize marketing at the producer, informal wholesale, and the milling level.

3.2 Industrial Organization

According to Staatz (2003), Industrial Organization (I-O) is the study of the way in which the organization of sellers of a particular product affects the performance of the market and hence, the nation's economic welfare. In other words, I-O is the study of how productive activities are brought into harmony with society' demands for goods and services through some organizing mechanism such as the market, and how variations and imperfections in the organizing mechanism affect the degree of success achieved by producers in satisfying society' needs.

As stated by Marion and Mueller (1983), although individual firms may be the unit of observation in some I-O studies, the emphasis in industrial organization is mainly on understanding behavior of groups of firms that act as competitors (either selling or buying industry) or interact as suppliers and customers (Marion and Mueller, in Industrial Organization, Economic Power, and the Food System, 1983).

3.2.1 Structure-Conduct-Performance Paradigm

As a branch of applied price theory, the basic paradigm of I-O which was popularized by Bain in late 1950s, holds that market structure influence the competitive conduct of firms in the market, which in turn influences market performance. Therefore, structure, conduct and performance (S-C-P) is the basic framework of analysis in the theory of I-O.

In this framework, market structure is defined as characteristics of the organization of a market that seem to influence strategically the nature of the competition

and pricing behavior within the market (Bain, 1968, cited by Pomeroy and Trinidad, 1995). The three salient aspects of market structure include the degree of seller and buyer concentration, the degree of product differentiation, and the conditions of entry and exit. The greater the degree of concentration, the greater is the possibility of non-competitive behavior in the market. In addition, by creating high entry barriers or by attempting to drive out existing firms, firms can attempt to alter the structure of the market. The larger the deviation of these elements from perfect competition, the more imperfectly competitive is the market.

Market conduct was defined by Bain (1968) and cited by Staatz (2003) as a pattern of behavior that enterprises follow in adapting or adjusting to the markets in which they sell or buy. On the other hand, Caves (1992) defined conduct as a firm's policies regarding the product market and moves by its rivals. In the case of maize marketing in Mozambique, market conduct will define the conditions that make possible exploitative relationships between traders and buyers, especially in the milling industry. This may be done by aggressive tactics such as predatory pricing and exclusionary strategies with the only purpose to gain advantage over or eliminate rivals, and then discourage new entries in the market.

Market performance was defined by Brandow and cited by Staatz (2003) as how well an industry does what society might reasonably expect it to do. A distribution system displaying acceptable performance is one that, among other things, utilizes resources efficiently, and transmits prices that reflect costs. Since structure and conduct are instruments by which performance is influenced, the results of a specific structure as

well as aggressive tactics may result in poor performance, with levels of profits above marketing costs, for instance.

3.3 Subsector Approach

A subsector is defined as the vertical set of activities in the production and distribution of a closely related set of commodities (Shaffer, 1968 cited by Staatz, 2003). In another definition, Marion *et al* (1983) defined a subsector as an interdependent array of organizations, resources, laws, and institutions involved in producing, processing, and distributing an agricultural product.

Essentially, this approach is an extension of the S-C-P paradigm, but it differs in its reach and emphasis. Unlike the S-C-P paradigm that is focused on horizontal slices of the economy (one layer of transactions), the subsector approach looks at more than one stage of production, presenting therefore the processes and participants in the whole chain, from producers up to consumers.

Hence, the subsector approach is just a vertical way of looking at food system coordination, and captures the interdependencies between stages of production, recognizing that they have to be coordinated in order for the system to perform efficiently. Therefore, vertical coordination is the focus of subsector studies.

3.3.1 Vertical Coordination

As stated by Morris (1995), the inclusion of the vertical dimension is important because problems in the food system can frequently be attributed to poor coordination

between successive stages of economic activity. Vertical coordination is defined as all the ways (a process) of harmonizing the vertical stages of production and marketing (Mighell and Jones, 1963, cited by Staatz, 2003).

The harmonization that Mighell and Jones mentioned in their definition can take place through various market coordination mechanisms or institutional arrangements. For instance, in a competitive market, vertical coordination may take place through spot markets, but there are other mechanisms of coordination ranging from various types of contracting through full vertical integration. The desired outcomes of vertical coordination that is guided by some of these coordination mechanisms include effective market integration and provision of a desired product at prices that consumers are willing to pay.

Since the objective of subsector analysis is to describe the organization and functioning of the maize grain subsector, one of the main elements in the study of maize marketing in Mozambique will be marketing channels.

3.3.2 Marketing Channels

Coughlan *et al* (2001) stated that the originator of goods or services gains access to a market through marketing channels. Marketing channels are defined as a set of interdependent organizations involved in the process of making a product or service available for use or consumption (Coughlan *et al*, 2001). In simple words, marketing channels are the different routes that a specific product takes from producers to consumers. Thus, marketing channels provide a framework to clarify the factors

influencing the organization of maize marketing in Mozambique.

Even though this definition makes clear what a marketing channel is, it bears some explanation. First, it points out that a marketing channel is not just one firm doing its best in the market. Rather, many entities are involved, and each depends on the others to do their jobs. Second, the definition points out that the purpose of a marketing channel is to satisfy the end-users in the market.

In the context of this study, the term "marketing channel" will be used as a description of the set of firms or activities that add place, time, form or possession utility to a product as it is transformed from a raw material or intermediate product into one that is purchased by another firm or final consumers. In this way, there are two important functions carried out between producers and consumers. The first is the marketing function that includes exchange functions (buying and selling) as well as physical functions (transportation, storage, processing). The second function is the facilitating function which includes standardization, finance, information and risk bearing. Therefore, marketing channels through which maize move from producers to consumers will be identified, as well as the functions performed by each participant. In summary, the use of the marketing channel concept enables the discussions of which intermediaries (or participants) act in maize marketing and the functions carried out each.

3.3.3 Market Participants

Market participants are defined as marketing and facilitating intermediaries who perform one or more market functions and use institutional arrangements such as spot

markets, contracts, or vertical integration to coordinate their activities. In the case of maize grain in Mozambique, marketing participants are informal and formal traders (both wholesale and retail), millers, and owners of rural and urban shops, while facilitating participants are basically the transporters and government institutions.

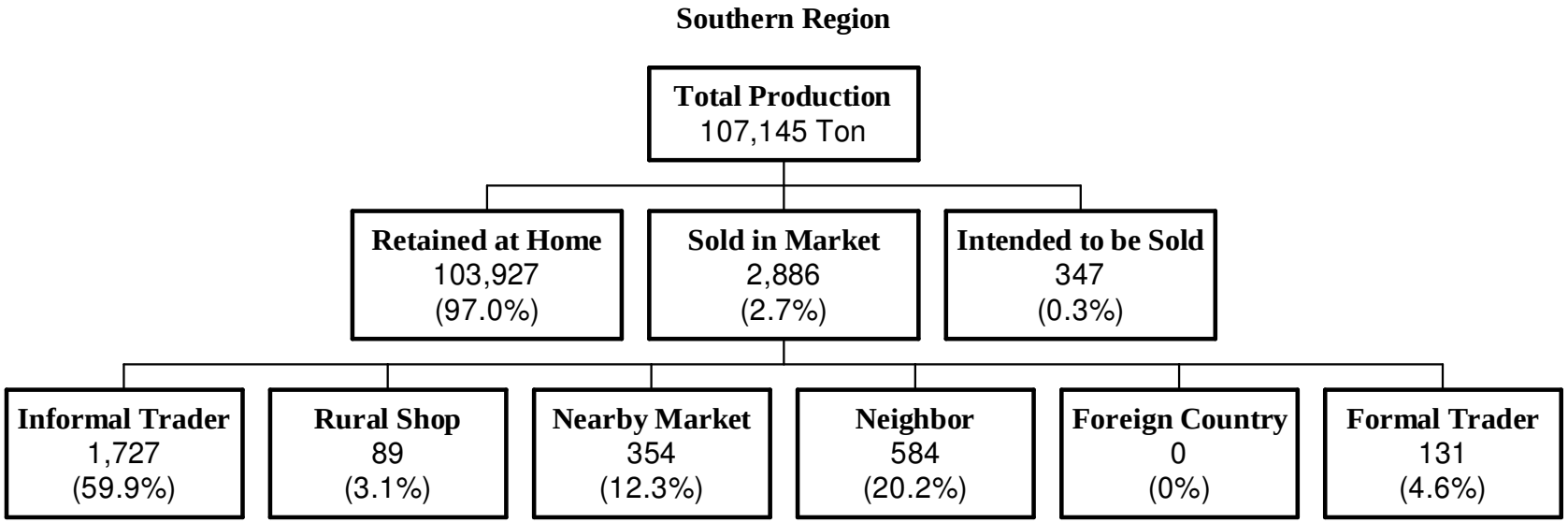
3.4 Marketing at Producer Level

Several characteristics of the production level such as structure of maize production and major zones of production, were already described in chapter two. Therefore, the focus of the analysis in this section is on marketing channels at the producer level.

TIA data showed in Chapter Two that production and especially marketing was relatively concentrated among a small group of farmers. In the South (Maputo, Gaza, and Inhambane provinces), we showed that about 1% of all farmers accounted for more than three-quarters of all maize sales. In the Center (Tete, Manica, and Sofala provinces), about 6% of farmers accounted for slightly less than three-quarters of all sales. TIA data also show that production in each region is geographically dispersed: In the South, no district had more than 12% of total regional sales, while in the Center no district exceeded a 15% share. These results make it clear that the large producers and sellers are spread over a large geographic area, implying high costs for assembling maize grain.

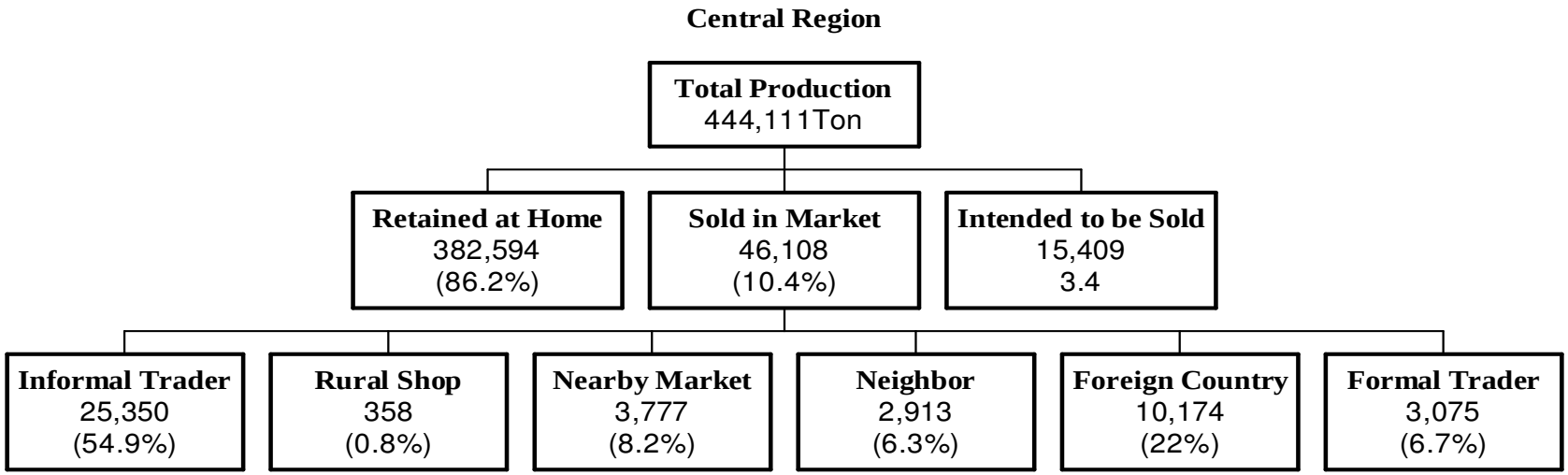
The relative importance of each type of "first buyer" is shown in figure 3.4.a for the Southern Region and 3.4.b for the Central Region.

Figure 3.4a Distribution Channel for Maize Grain in the Southern Region of Mozambique



Data Source: TIA 2002

Figure 3.4b Distribution Channel for Maize Grain in the Central Region of Mozambique



Data Source: TIA 2002

Based on the distribution channels for maize grain in the two regions, five important features are seen. First, 97 percent of the total household production in the South, and about 90 percent in the Center, was retained at home for consumption. Thus, maize markets in both regions can be characterized as very thin. As a consequence of these thin markets, large buyers or sellers may be able to influence maize prices, affecting therefore the performance of the sector.

Second, due to lack of data, only the first link in the marketing chain is shown, that is, the movement of maize grain from producers to the first buyer. Third, the most important first buyer for producers in both regions is the informal trader (assembler/wholesaler), with almost 60 percent of all purchases in the South and 55% in the Center. With low levels of invested capital, relatively low opportunity cost of time, and the ability to move as needed to reach dispersed production, these traders are well adapted to the structure of production in the country. Fourth, in the Center, the second most common sales destination is a foreign country. This reflects primarily sales from Tete Province into Malawi. Last, there are no reported sales from producers directly to the milling industry in either region.

3.4.1 Informal Traders

In theory, there is a clear distinction between a wholesaler and retailer of maize grain: A wholesaler is defined as a trader engaged primarily in buying products from other traders in relatively large quantities, and then reselling the products in smaller quantities to retailers, industrial or other institutional concerns

(Rosenbloom, 1999). The key point in this definition is that wholesalers purchase a product (maize grain in this case) from another trader in reasonable quantities, and do not sell any significant amount of maize grain to consumers.

In the maize subsector in Mozambique, it is not accurate to talk about the pure wholesaling function embodied in Rosenbloom's definition. Indeed, informal traders may sell the whole product in bulk to another buyer, but they may also sell maize grain in small amounts to consumers, acting therefore as retailers.

Therefore, informal traders of maize grain in Mozambique can be defined as those traders buying maize grain in bulk and selling either in bulk or at retail. If these informal traders buy maize grain directly from producers as shown in Figure 3.4a and 3.4b above, then they are also acting as assemblers. So they can mix assembly, wholesale, and retail all in one person. Because retailing is less common than the other two functions among these traders, the term informal assembler/wholesaler will be used in this study to refer to informal traders.

This particularity of one trader being an assembler, wholesalers, and perhaps retailer at the same time is not exclusive to Mozambique. In her analysis of the structure of the wholesale cereals market in Mali, Mehta (1989) divided the wholesalers in two categories, namely, the wholesaler of wholesalers and semi-wholesalers. The main difference between the two categories was the sales clientele as well as the average volume of total sales. The latter category (semi-wholesaler) is quite similar to informal traders in Mozambique, since their clientele can include consumers and trading volumes are small.

The term “informal” is used to categorize these participants in the maize marketing system because, although they may have to pay some daily tax to operate in the physical market (stalls), they have no permanent physical infrastructure, nor do they have a unique tax identification number (NUIT). Formal traders, who do have physical infrastructures and are registered with the tax authorities, have to follow and pay all fiscal rules and taxes while informal traders only pay a daily tax by occupying a small stall in the maize market.

3.4.2 Neighbors

Rural producers in the Southern Region make 20.2 percent of their sales to neighbors, which makes this group the second most important buyer in this region after informal traders. The importance of this channel likely reflects the very small scale of sales in this region compared to the Center. In the Central Region, only 6.3 percent of maize production is sold to this group of actors. The destination of maize grain purchased from this group is unknown. Members of this group may be a deficit producer purchasing maize grain to supplement their home consumption, or another rural retailer purchasing maize to sell in the nearby market.

3.4.3 Informal Rural Retailers

Usually, informal rural retailers are local people, mainly women, who buy maize grain from local producers or informal assemblers/wholesalers in small quantities to sell in the nearby retail market. These retailers acquire 12.3 percent of the total production

sold by producers in the Southern Region, and 8.2 percent in the Central Region.

Based on conversation with informal rural traders and market observations, on average the quantity purchased each time by rural retailers does not exceed a 70-Kg bag. Commonly, rural retailers sell less than a kilogram per transaction, using non-standard measures such as small cans. Besides maize grain, they also sell other agricultural commodities such as beans and maize meals.

3.4.4 Rural Shops and Formal Traders

Rural retail shops are another key actor in the maize marketing system in Mozambique. Although this segment buys only 3.1 percent of the production sold by producers in the Southern Region, their presence in rural areas plays an important role because they are often the first source of supply of consumer goods in rural areas. In addition, they buy maize grain from local producers and transport it to consumers' markets. However, capital is a major constraint for them because many of their shops were destroyed during the civil war, and reconstruction has been difficult. In addition, it has been difficult to compete with the informal traders, since this last group does not pay taxes.

3.5 Marketing at Wholesale Level

As the structure of a subsector affects the conduct that also affects the performance (S-C-P Paradigm), the nature of informal assemblers/wholesalers (the most important link for producers) must be understood in order to design workable policies for

improving the performance of the maize subsector.

Hence, a survey with a structured questionnaire among informal retailers and assemblers/wholesalers was carried out in two major cities in the Southern Region, namely Maputo and Xai Xai. Twenty-nine interviews were conducted during July and August 2004, 22 in Maputo City, and 7 in Xai Xai City. Information regarding the traders' experience in the trade, types of products they transact, maize grain flows, transaction costs, risk, quality, transport, profitability, and access to credit were collected. The results are presented below.

3.5.1 Profile of Informal Assembler/Wholesaler Traders

Results from Table 3.5.1 show that nearly 100 percent of the total informal assemblers/wholesalers interviewed own and operate their businesses independently, for an average of 6 (Maputo) and 5 years (Xai Xai) in the business.

In addition, 43 percent in Xai Xai and 50 percent in Maputo indicated that they have only worked with maize grain. In Xai Xai, 57 percent of informal assemblers/wholesalers sell beans and groundnuts in addition to maize. However, due to the smaller sample included in this analysis, lack of specialization must be seen with caution.

The main reason for them to work with these products is because they are more profitable than maize, together with lack of credit to invest in other commodities. Only one of the seven traders interviewed in Xai Xai mentioned that they have experience dealing with products other than maize, beans and groundnut. When compared to other

commodities, maize trade is considered by two-thirds of traders to be less profitable.

In both cities, the majority of informal assemblers/wholesalers buy maize grain from producers in 20-Liter cans, and about 40 percent buy it strictly in 70-Kg bags. Five of the seven traders in Xai Xai sell their maize grain exclusively in 20-Liter cans, while in Maputo nearly 50 percent sell either in cans or bags. The frequent use of 20-Liter cans in sales suggest that some share of sales is being made directly to consumers, not other traders.

3.5.2 Maize Flows

Most informal traders in the South and Center are women. SIMA data shows that in Maputo, from October 1998 to June 2004, 67 percent of all traders were women, while in Xai Xai the percentage reached 96 percent. The dominance of women may be the result of men's immigration to South Africa to work in the mining industry.

From the selling points (terminal markets), these women use public transportation to reach the point of rural assembly. Once there, they establish a small tent and start buying maize in bulk from producers or other traders. Usually, maize sellers take maize grain to the assembly points, carrying it in small bags using a bicycle or by foot.

During the period of purchases, informal assemblers/wholesalers keep the product under the sun, spread on *lonas* (large tarp) to reduce the level of moisture. When the desired amount of maize grain is obtained (function of each trader's purchasing power), they start packing maize grain in bags, whose capacity varies from 70-Kg to 100-Kg. Since transporters charge a fixed price per bag not based on the bag weight, they prefer to

use large bags to reduce the costs. It is common to see informal assemblers/wholesalers tailoring a standard bag to increase their weight capacity.

Table 3.5.1 Description of the Activities Performed by Informal Traders

Item	Responses	Maputo	Xai Xai
Years in business of agricultural commodities	Number of years in the business (Median)	7(6)	8(5)
		Percentage	
Business ownership	Own business	96	100
Products sold	Maize plus beans, rice, or groundnut	40	57
	Maize bran	10	0
	Only maize grain	50	43
Reason to only sell these products	Not enough money to invest in other products	50	43
	Uncertainties with other products and heritage	0	14
	More profit with these products	50	43
Profitability of maize compared with other products	Less profitable	55	100
How maize grain is bought	Small cans (20-liter or 5-liter)	50	57
	Bags (70 Kg)	41	43
	Both	9	0
How maize grain is sold	Small cans (20-liter or 5-liter)	24	71
	Bags (70 Kg)	28	0
	Both	48	29

Data Source: Author Informal Wholesaler Survey Results

Transport back to the destination market depends largely on backhaul. As a result, most of the assembling points are located along the main roads. The relative lack of medium or large scale processing and manufacturing outside of major cities means that many trucks transporting consumer goods to rural areas from cities risk returning empty. As a result, informal assemblers/wholesalers are typically able to get very low transport costs for their goods back to cities in which they intend to sell, though this low rate is often at the cost (non-financial) of waiting several days for a truck to appear. Actual transportation costs per bag vary among regions. For instance, in May 2004, from Nhamatanda (a key collection point in the Center) to Maputo, transport of one bag cost 40,000 Meticais (nearly $USD 2), while transport from Nampula in the Northern Region to Maputo cost 120,000 Meticais (SIMA database).

In Maputo, at the time of these interviews, all maize grain available in the biggest wholesale market (Xiquelene) was purchased in Nhamatanda, district of Sofala Province, in the Central Region of the country. From this biggest informal wholesale market, small informal retailers buy and carry maize grain out to small informal retail markets, namely Xipamanine, Wancacana, Compound, and others. Small urban shops (*Mercearias*) and the increasingly common *Contentores* (rail cars adapted to sell products at retail, typically with a smaller selection than *Mercearias* but much larger than any market seller) almost never sell maize grain. In three smaller informal wholesale markets covered in this study, namely Santos, Bazuca, and Benfica, all informal assemblers/wholesalers had purchased their maize grain directly in the Central Region, more concretely in districts of Nhamatanda (Sofala Province) and Manica (Manica Province).

Figure 3.5.2a and Figure 3.5.2b depicts the flow of maize grain from the Central Region to Maputo and from Central Region to the Maputo informal wholesale market and to consumers, respectively, while Table 3.5.2a and 3.5.2b presents the main sources of maize grain for all informal traders interviewed in this study.

Figure 3.5.2a Flows of Maize from the Central Region to the Southern Region

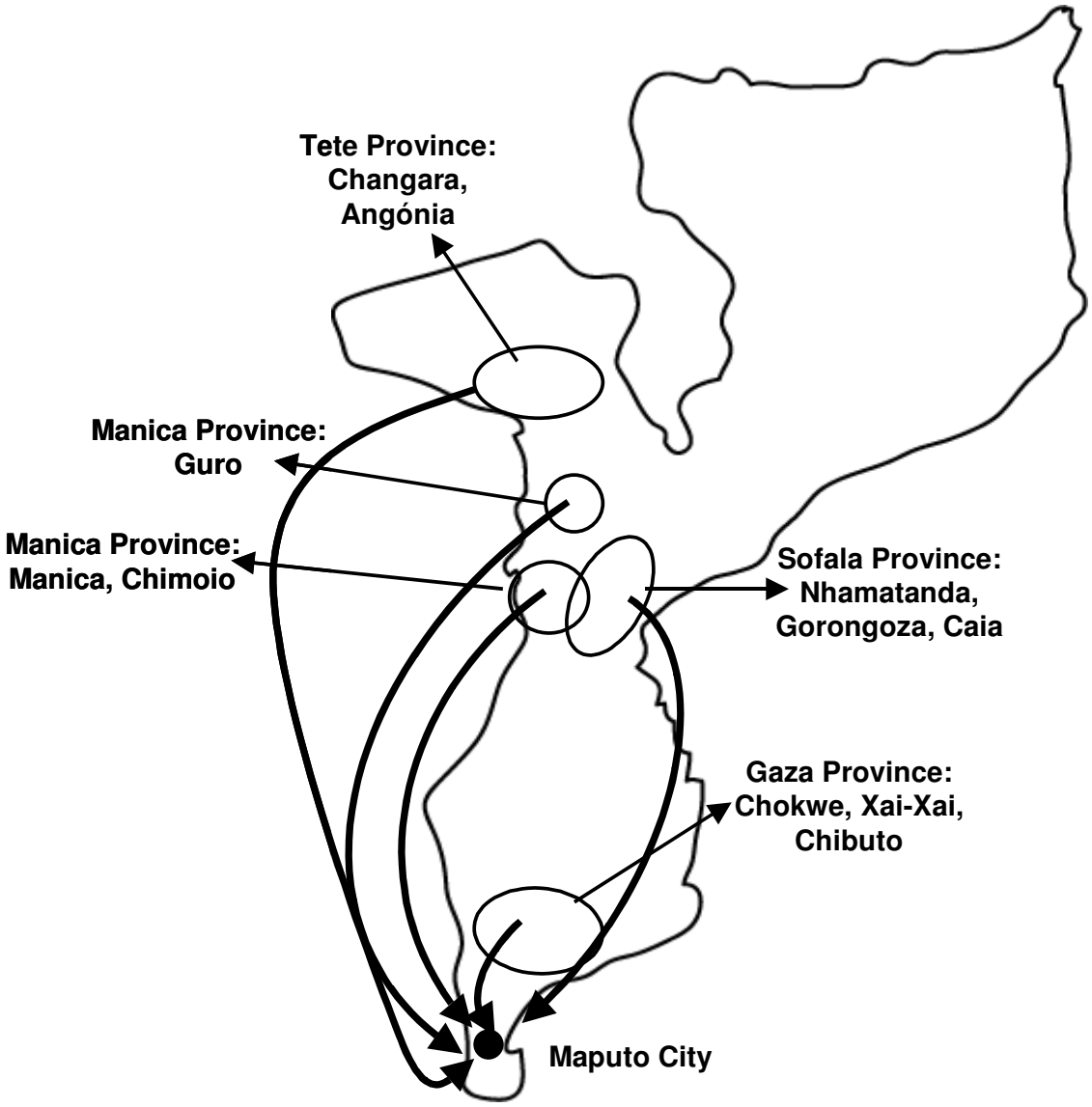
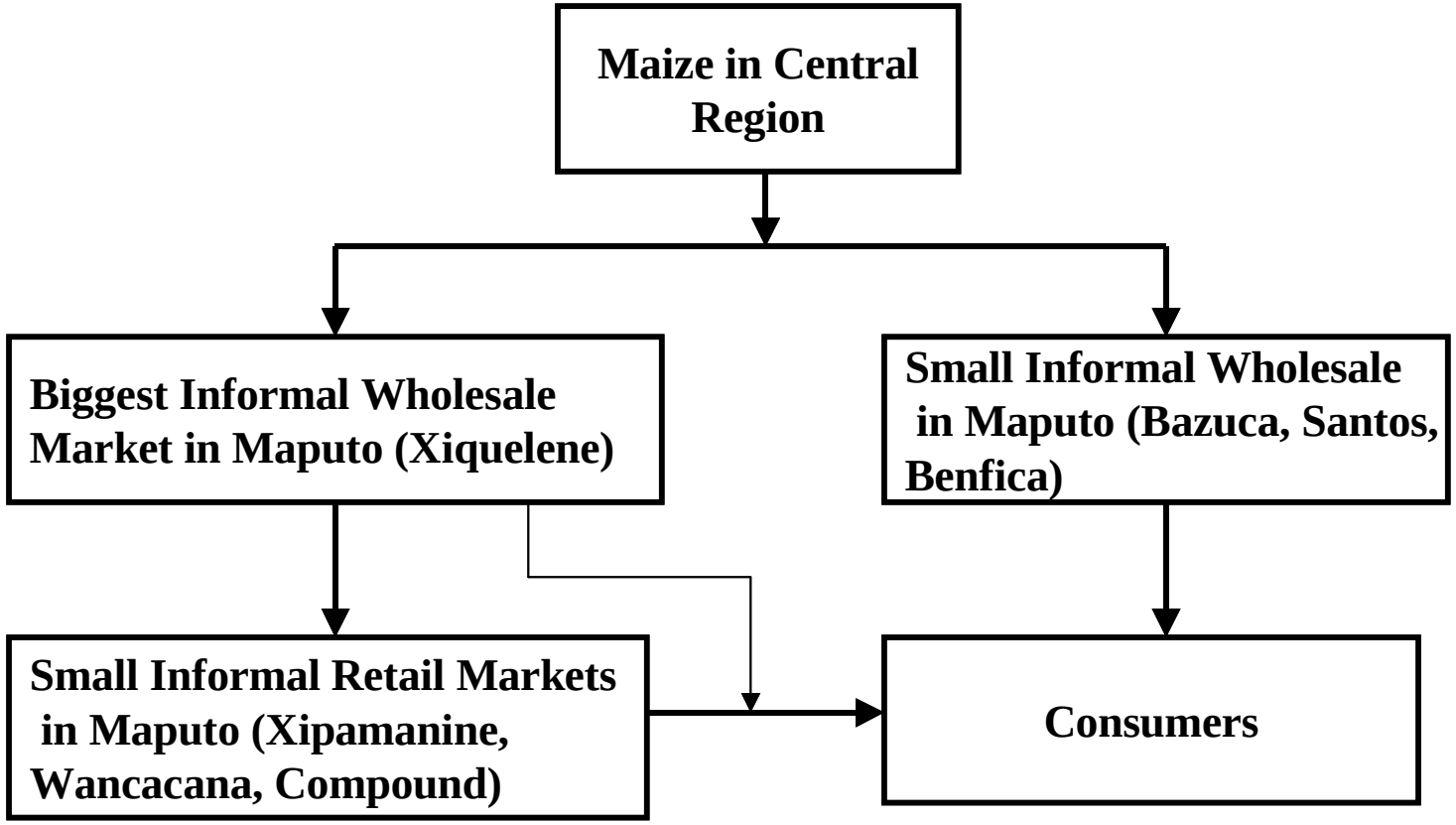


Figure 3.5.2b Flow of Maize Grain from the Central Region to the Maputo Informal Wholesale Markets and to Consumer



Notes: Thick arrows indicate the most important maize flow

Table 3.5.2a Source of Maize Grain in Informal Wholesale Markets in Maputo and Xai Xai, July 2004

Destination Market (Wholesale)	Point of Origin					
	Maputo	Xai Xai	Gorongoza	Nhamatanda	Manica	Tete
	Percentage of Traders in Destination Market Obtaining Their Maize from These Sources					
Xiquelene	0	0	0	100	0	0
Santos	0	0	0	0	100	0
Benfica	0	0	0	100	0	0
Bazuca	0	0	0	100	0	0
Xai Xai	0	43	29	14	14	0

Data Source: Authors Informal Wholesaler Survey Results

Table 3.5.2b Source of Maize Grain in Informal Retail Markets in Maputo, July 2004

Destination Market (Retail)	Point of Origin					
	Maputo	Xai Xai	Gorongoza	Nhamatanda	Manica	Tete
	Percentage of Traders in Destination Market Obtaining Their Maize from These Sources					
Wancacana	100	0	0	0	0	0
Compound	100	0	0	0	0	0
Xipamanine	75	0	0	0	0	25

Data Source: Authors Informal Wholesaler Survey Results

In Xai Xai on the other hand, 43 percent of traders had obtained their maize from within the city. This means that in Xai Xai, nearly half of informal traders were buying maize grain brought by other informal traders from the surrounding districts of Gaza Province or from the Central Region. Although they were buying considerable volumes,

maize grain was being sold mainly in cans as reported in Table 3.5.1 above, meaning that at least some sales were at retail.

When the SIMA data from October 1998 until June 2004 are used to analyze the flows of maize grain into Maputo's biggest informal wholesale market (Xiquelene) and into Xai Xai, the pattern is not different from what informal maize grain traders have told.

Maputo in the past was mainly supplied with maize grain from districts of the province of Manica located in the Central Region, especially from the district of Chimoio. However, preliminary examination of SIMA data suggests that this maize grain flow has decreased in recent years. Indeed, as shown in Table 3.5.2c below, in the last three marketing years (the marketing season in Mozambique begins in April when the harvest time of maize grain starts, and ends in March of the next year) the main source of maize grain for the Maputo informal wholesale market shifted from the districts of Manica Province to the districts of Sofala Province (especially Nhamatanda). Table 3.5.2c reports the source of maize grain sold in the Maputo informal wholesale market (Xiquelene) per marketing year.

Table 3.5.2c Source of Maize Grain Sold in Maputo Informal Wholesale Market per Marketing Year, 1998/99 - 2004/05

Marketing Year	Sources of Maize Grain to Maputo Market				
	Gaza Province	Manica Province		Sofala Province	
	Chokwe, Xai Xai, Chibuto	Chimoio	All Province	Nhamatanda	All Province
	Percentage of Traders Obtaining Maize Grain From These Sources				
1998-1999	24.7	35.6	35.6	0	0
1999-2000	22.3	45.8	56.3	0	0
2000-2001	30.7	6.7	6.7	0	0
2001-2002	22.2	31.3	35.5	0.0	14.6
2002-2003	13.4	14.0	18.0	54.0	60.7
2003-2004	0	6.0	45.8	34.4	35.8
2004-2005	0	13.5	29.7	62.2	67.6

Data Source: SIMA
Notes:
1. Data represent % of traders indicating each area as the source of their supply, from three trader interviews per week;
2. The percentage does not sum up to 100 percent because the rest of maize comes from other districts from the Central Region that account for small percentages;
3. 2004-2005 is only the first three months (April, May, and June).

From Table 3.5.2c, three important features in every marketing year stand out. First, since 1999-2000, well over 50 percent of maize grain sold in the Maputo informal wholesale market has come from the Central Region, either Manica or Sofala Province. The only exception was in the 2000-2001 market season due to the floods that devastated the Southern Region and halted the traffic between the Southern and the Central Region. Second, Chimoio as an assembly point has fallen in importance over the past 7 years. Despite the reduction in Chimoio's role as an assembly point, Manica province as a

source of supply has more or less “held its own” (its share in 03/04 was the second-highest of the past 7 years). Third, Sofala Province as a source of supply, and Nhamatanda as an assembly point, has grown greatly in importance.

Regarding the decreasing importance of the Chimoio area, among other reasons, informal traders interviewed in this study mentioned that it is easier to get transport from Nhamatanda to Maputo because there are more empty trucks returning to Maputo City from Beira City. In addition, the informal traders argued that they may buy maize grain at much lower prices in the production areas around Nhamatanda, compared to Manica and Chimoio. Before, maize grain was bought in Chimoio City through intermediaries who used to buy maize grain inside the production areas. Last, few maize traders in Chimoio and Manica said that there are some informal exports to neighbor countries such as Zimbabwe. Hence, the competition for maize grain produced within the Manica province may be high, a situation that may increase the prices during the harvest season, forcing therefore, informal traders to be concentrated in Nhamatanda.

However, the informal traders in the survey mentioned that when the availability of maize decreases in Nhamatanda, they still bring maize grain from Manica and Chimoio, as well as from other districts from the Central Region. SIMA data support this statement, showing that during most months of the 2002/03 and 2003/04 marketing season, both Chimoio and Nhamatanda were important suppliers to Maputo (Table 3.5.2d).

Table 3.5.2d Source of Maize Grain Sold in Maputo per Marketing Month, Marketing Years 2002/03 - 2003/04

Marketing Month	2002 - 2003 Marketing Year					2003 - 2004 Marketing Year				
	Southern Districts	Chimoio	Districts of Manica	Nhama tanda	Districts of Sofala	Southern Districts	Chimoio	Districts of Manica	Nhama tanda	Districts of Sofala
	Percentage of Traders Obtaining Maize Grain From These Sources									
April	92.3	0	0	0	0	0	0	0	100	100
May	77.7	0	11.1	0	11.1	0	30.0	30.0	70.0	70.0
June	63.6	18.2	36.4	0	0	0	20.0	80.0	20.0	20.0
July	0	20.0	20.0	46.7	80.0	0	50.0	50.0	50.0	50.0
August	0	8.3	66.7	8.3	33.3	0	0	8.3	83.3	91.6
September	0	53.8	53.8	46.2	46.2	0	0	33.3	66.7	66.7
October	0	50.0	50.0	50.0	50.0	0	0	33.4	8.3	8.3
November	0	0	9.1	81.8	90.9	0	25.0	41.7	16.7	33.3
December	0	0	0	100	100	0	0	41.6	8.3	8.3
January	0	8.3	8.3	91.7	91.7	0	0	41.7	0	0
February	0	8.3	8.3	91.7	91.7	0	0	100	0	0
March	0	0	0	100	100	0	0	80	0	0

Data Source: SIMA

In the case of Xai Xai, what informal traders have told in the survey is also consistent with data from SIMA, which show that there is some maize grain coming from districts from Gaza Province, and much more from the Central Region. Table 3.5.2e below presents the sources of maize grain sold in the Xai Xai market.

Table 3.5.2e Source of Maize Grain Sold in Xai Xai Informal Wholesale Market per Marketing Year, 1998/99 - 2004/05

Marketing Year	Sources of Maize Grain to Xai Xai Market				
	Gaza Province	Manica Province		Sofala Province	
	Chokwe, Xai Xai, Chibuto	Chimoio	All Province	Nhamatanda	All Province
	Percent of Traders Obtaining Maize Grain From These Sources				
2001-2002	12.2	64.6	82.9	0	0
2002-2003	24.7	39.8	43.0	0.0	9.7
2003-2004	1.3	33.3	41.3	25.3	46.6
2004-2005	4.2	8.3	45.8	25.0	25.0

Data Source: SIMA
Notes:
1. Data represent % of traders indicating each area as the source of their supply, from three trader interviews per week;
2. The percentage does not sum up to 100 percent because the rest of maize comes from other districts from the Central Region that account for small percentages.
3. 2004-2005 is only the first three months (April, May, and June).

3.5.3 Volume of Bags Marketed per Week

The scale of operation of informal assemblers/wholesalers is typically very small. In both Maputo and Xai Xai, more than half reported selling between 1 and 10 bags of 70-Kg of maize grain per week. The smallest traders indicated that they are selling more volume now compared with three years ago whereas those with sales above 20 bags per

week believed that they were selling less. Table 3.5.3a summarizes these results.

Table 3.5.3a Volumes Marketed by Informal Assemblers/Wholesalers per Week

	Number of Bags Sold (70-Kg)	Number of Observations	Maputo	Xai Xai
			Percentage	
Volumes Marketed per Week	1 - 10	17	57	71
	10 - 20	5	19	14
	> 20	6	24	14

Data Source: Authors Informal Trader Survey Results

3.5.4 Suppliers and Demanders of Maize Grain

When the informal assemblers/wholesalers within Maputo and Xai Xai were asked from whom they were buying maize grain, the most important suppliers for all of them were producers. Table 3.5.4a and 3.5.4b presents the results indicating the most important supplier for maize grain sold by informal traders included in the survey, for wholesale and retail market respectively.

Table 3.5.4a Most Important Supplier of Maize for Informal Traders Selling in Wholesale Markets

Province	Wholesale Market	Number of Interviews	Most Important Suppliers	
			Percentage Indicating These as the Main Suppliers	
			Producer	Informal Assembler/Wholesaler
Maputo	Xiquelene	5	100	0
	Bazuca	1	100	0
	Santos	3	100	0
	Benfica	3	100	0
Gaza	Xai Xai	7	57	43

Data Source: Authors Informal Wholesaler Survey Results

Table 3.5.4b Most Important Supplier of Maize for Informal Traders Selling in Retail Markets in Maputo

Province	Retail Market	Number of Interviews	Most Important Suppliers	
			Percentage Indicating These as the Main Suppliers	
			Producer	Informal Assembler/Wholesaler
Maputo	Wancacana	3	0	100
	Compound	3	0	100
	Xipamanine	4	25	75

Data Source: Authors Informal Wholesaler Survey Results

In the case of demanders, consumers were indicated as the main demander for maize grain among informal assemblers/wholesalers. Some informal retailers in Compound and Wancacana Market have reported that they bought maize in Xiquelene,

which means that informal assemblers/wholesalers in Xiquelene are selling maize to retailers. However, at the time of the interviews none of the informal trader at Xiquelene mentioned that they were selling to retailers.

Nevertheless, in some markets within the Maputo area, assemblers/wholesalers sell their maize to retailers as in case of Bazuca Market. This informal wholesale market supplies the closest retail market (Xipamanine) with maize grain. Despite the Xipamanine being historically a retail market, one informal trader operating in this market acquired maize in the Central Region, and started to sell to other small retailers in that market. This probably is a new emerging pattern and reduces the transaction costs to small retailers operating in that market. Table 3.5.4c and 3.5.4d presents the results indicating the most important demander for maize grain sold by informal traders, for wholesalers and retailers respectively.

Table 3.5.4c Most Important Demander for Maize Among Informal Traders in Wholesale Markets

Province	Wholesale Market	Number of Interviews	Most Important Demanders	
			Percentage Indicating These as the Main Demanders	
			Consumer	Retailer
Maputo	Xiquelene	5	100	0
	Bazuca	1	0	100
	Santos	3	100	0
	Benfica	3	100	0
Gaza	Xai Xai	7	100	0

Data Source: Authors Informal Wholesaler Survey Results

Table 3.5.4d Most Important Demander for Maize Among Informal Traders in Retail Markets

Province	Retail Market	Number of Interviews	Most Important Demanders	
			Percentage Indicating These as the Main Demanders	
			Consumer	Retailer
Maputo	Wancacana	3	100	0
	Compound	3	100	0
	Xipamanine	4	75	25

Data Source: Authors Informal Wholesaler Survey Results

3.5.5 Quality of Maize Grain

When the informal assemblers/wholesalers buy maize grain, they identify the maize quality through visual inspection, focusing on the level of insects and the mixture of colors.

Usually, the majority do not pay any premium for good quality of maize nor receive any premium when they sell it. But when they do receive a premium during the selling process, it is because the level of insects is very low and maize grain is uniform in color.

Table 3.5.5 Most Important Quality Factor for Informal Traders

Do You: [a]	**Percentage Saying Yes**
Pay attention to Maize Quality During Purchases?	97
Pay a Premium for Maize Quality During Purchases?	38
For Which Quality Do You Pay a Premium During Purchasing? [b]	**Percentage**
Low Level of Insects	36
Homogeneous Color	64
Do You: [c]	**Percentage Saying Yes**
Receive a premium for Maize Quality During Selling?	21
For Which Quality Do You Receive a Premium During Selling? [d]	**Percentage**
Low Level of Insects	22
Homogeneous Color	78

Data Source: Authors Informal Wholesaler Survey Results
Note:
a, b, c, d. Direct quotation from the questionnaire.

3.5.6 Transportation

According to the informal maize traders, transportation is the biggest cost that they have to pay on their operations. The whole country has only 19 percent of its road surface paved, and only 27 percent in gravel (INE, 2002). The precarious conditions of the roads, as well as the high costs of diesel fuel (the real price increased 610 percent between February 1995 and December 2003), are among the main reasons pointed out by transporters.

Among the informal maize traders interviewed in this study, none owned their own transport, but the majority (65 percent) confirmed that the best way to transport

maize grain was by truck. Only 22 percent mentioned that there are some losses during transport, especially torn bags, and spoilage during the rainy period.

3.5.7 Credit

No interviewed traders indicated that they had access to credit to perform their operations, but 35 percent of them give credit to some maize suppliers. The inability to access credit by the informal assemblers/wholesalers is a huge barrier, and determines largely the volumes of purchases. Therefore, the degree of specialization is directly related to their financial capacity.

3.5.8 Access to Market Information

At the wholesale level, the access to market information is a crucial element in the maize marketing system, at least for 55 percent of the informal traders. Interview results reveal that personal contacts are the most important source of information (87 percent), followed by the weekly price bulletins provided by SIMA (13 percent). Most informal traders now use mobile phones to communicate and share market information within their group. For instance, at the time of one interview, in Xai Xai, one informal trader was in contact by cell phone with his partner who was in the purchase area acquiring maize grain. At the end of the contact, the informal trader already knew when the new maize grain shipment would arrive, as well as the number of bags and the purchase price.

3.6 Marketing at the Milling Industry Level

Maize millers may be divided in two groups, namely the industrial millers serving mostly the urban areas and producing mainly two types of refined maize meal for sale at retail, and small scale or hammer mills, serving the peri urban and rural areas and producing whole meal. This meal can be purchased in markets, or "produced" by households taking grain to the hammer mill. However, some households with access to maize grain prefer to hand-pound it themselves into maize meal at household level. This home processing is preferable over maize meal from both small scale and industrial millers, and carries a price premium when sold in the market.

3.6.1 Attributes of Maize Meal Consumed in Mozambique

Maize grain in Mozambique is mainly consumed as processed maize meal. Both refined and whole meal can be eaten as porridge or as a stiff mass known as *chima or uxua*. Characteristics and some attributes of the various maize meals in Mozambique are reported in Table 3.6.1. The types of maize meal can vary by the product extraction rate in processing, which generally varies from 65 percent to almost 100 percent. In a low extraction rate maize meal, a large portion of the maize germ and pericarp is removed in processing. A hundred or very high extraction rate is obtained by hand pounding the whole grain, or by sending whole maize grain to a small hammer mill where the final maize meal contains virtually 100 percent of the whole maize grain sub components. Maize meals produced industrially (highest extraction rate) are the more expensive in the urban markets of the South, especially the first two in Table 3.6.1.

Table 3.6.1 Attributes of Maize Meals Consumed in Mozambique

Mill Name	Product and Extraction Rate	Characteristics (Who Made; Where Consumer Acquire)	Price * (Mt/Kg)
CIM	1 Top Score (65%)	Industrial millers. Buy at retail	11,800 - 15,000
CIM	2 Matabicho (75%)	Industrial millers. Buy at retail	8,000 - 8,300
MEREC	3 Mpupu (65-75%)	Industrial millers. Buy at retail	8,000 - 8,300
SMC	4 Mananga (80%)	Industrial millers. Buy at retail	7,000 - 8,000
VONK	5 Power (80%)	Industrial millers. Buy at retail	8,300 - 11,000
Hammer Mill	6 Mugaiwa (100%)	Small hammer millers. Buy at retail. Well known as Mugaiwa	
Hammer Mill	7 Mugaiwa (80-100%)	Small hammer millers. Maize grain is produced or bought at retail, then milling service is sought. The extraction rate depends on degree of hand pounding done before taking for milling. Also well known as Mugaiwa	
Home Made	8 Hand Pound Maize Meal (65-85%)	Home made. Maize grain is produced or bought at retail, then make own meal using the "*pilão*"	
Home Made	9 "Alguidar Maize Meal (65%)	Home made. Maize Grain is produced or bought at retail, hand pounded to remove germ, and then soaked overnight. Then make meal at home using an "*alguidar*" method	

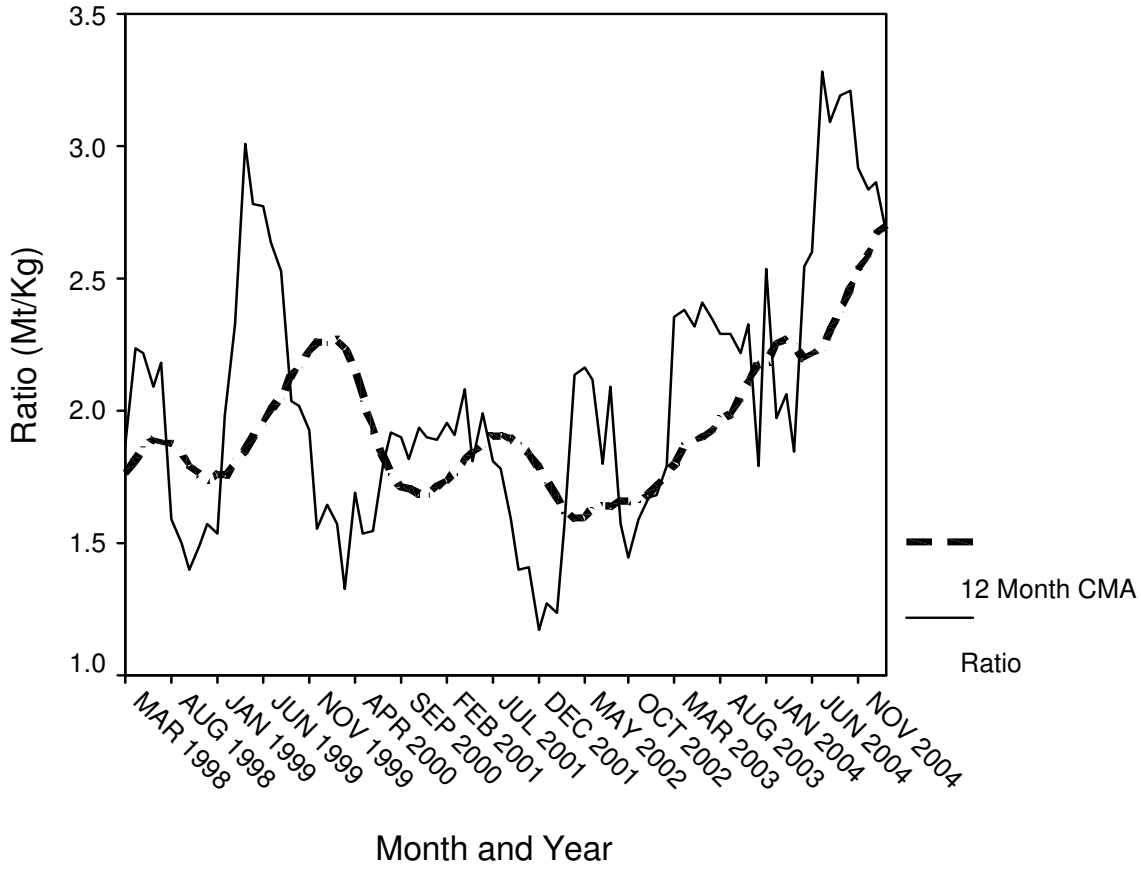
Notes:
* Cash Price. Assumes that hand pounding labor costs are zero

Since the majority of maize consumed in Mozambique is consumed by the households growing it, the method of processing maize in rural areas (method 6, 7, 8 and 9 in Table 3.6.1) is the most common in the country, depending on the Region. Method 6, where consumers purchase "mugaiwa" made by small retailers who sent grain to small hammer millers, has virtually disappeared in the Maputo market, but is still present in areas of Central and Northern Mozambique.

The price of maize meal varies per brand, being highest for the most refined meals. In Table 1.2 in Chapter 1, the price of the top selling refined meal (Top Score) in Mozambique between January 1996 and August 1998 was the second highest in Southern Africa, and in late 2004, SIMA data show that the price was even much higher (over US$600 per metric Ton).

The price ratio between refined meal and maize grain is very high in Maputo, as seen in Figure 3.6.1, and this ratio is rising to historically high levels. This high price ratio may be an indication that production of maize meal may provide high profits for millers, and this evidence provides a room for new entrants into the milling industry.

Figure 3.6.1 Price Ratio Between Refined Meal and Maize Grain in Maputo, with a 12 Month Prior Moving Average (March 1998 - February 2005)



A simple description of the main characteristics of small and large maize millers is presented below.

3.6.2 Small Maize Millers

The technology used by these millers does not separate the bran in the maize grain, but rather it grinds the whole grain. The role of these small scale millers is quite

different from that of industrial millers. While the industrial millers usually buy maize grain, process it to flour, and then sell it to retailers, the small scale millers typically act as custom millers, processing maize grain owned by small retailers and consumers and receiving a payment for this service.

TIA data (2002) show that small maize mills are quite common in villages of the various districts of Mozambique (Table 3.6.2). Some rural villages in all regions of the country have small mills, but the concentration is clearly low in the South, high in the Center (where production and consumption is more oriented towards maize), and medium in the North. Given that maize grain is broadly consumed in rural areas, mostly as meal of some sort, overall, the existence of small hammer mills and hand pounding of maize grain seems well alive in the rural areas (Table 3.6.2).

The reason for not seeing small scale or hammer millers entering in the market with a branded product is unclear. However, some plausible reasons may be embodied in some characteristics of this group of millers. First, they can be characterized as small business enterprises employing no more than one or two employees. In addition, they are also characterized by high turn over rates because of ease of entry and exit. Indeed, during the period of distribution of maize grain as food aid in the early 1990s, the number of small scale millers operating especially in Maputo was large, but numbers have fallen substantially since that time. Third, they do not have any transport to put the product into the marketing chain. Fourth, straight-run meal is relatively perishable, lasting only a few days on the shelves. Fifth, if they try to invest in order to produce a better product with more quality, they would be competing directly with large millers, who are much better

capitalized and have much more marketing power.

Table 3.6.2 Percentage of Villages Having Maize and Cassava Mills

Province	Percentage of Villages Having Mills for			
	Maize	N	Cassava	N
Niassa	45.7	77	0.0	77
Cabo Delgado	27.0	63	1.6	63
Nampula	18.0	77	0.0	77
Zambezia	33.0	91	0.0	91
Tete	56.4	55	0.0	55
Manica	67.3	55	0.0	55
Sofala	69.4	49	0.0	49
Inhambane	18.7	49	2.1	48
Gaza	16.3	48	0.0	49
Maputo	28.6	35	2.9	35

Data Source: TIA

3.6.3 Industrial Maize Millers

Among industrial maize millers, Mobeira and V & M located in the Central Region, and CIM, Merec Industries, and Sociedade Moageira do Chibuto in the Southern Region, are the most important in terms of final output produced. They produce either a super refined or a refined meal, whose extraction rate is around 65 and 80 percent, respectively.

To understand the structure of maize milling in Mozambique, face-to-face interviews with managers and/or directors were conducted with four millers. The

questionnaire, which is presented in appendix 2, was divided in seven sections and it was designed as simply as possible in order to be easy to obtain answers from managers and/or directors. It covered aspects such as maize purchases from national production versus imports, sales strategy, quality problems, needing for further research as well as opportunities for the milling industry in general. Annex 3 presents a write-up of interview results for each of the four millers; here we present a more summary discussion.

The four millers interviewed vary substantially in terms of production capacity, although the largest two millers (CIM and MEREC) are nearly equivalent in terms of capacity. These two largest millers are located near Maputo area in the South. CIM (the largest) is operating in the market since 1997. Top Score, the brand name of the most refined meal produced by CIM (and the one that they market most aggressively) is found throughout the country, but the Southern Region is the main target area. This pattern is similar with Mpupu, the brand name of maize meal produced by MEREC, which is more available in the South.

In the last five years, three more industrial mills entered in the market, namely SMC, Inacio de Sousa, and Vonk. Two of these mills are located outside of Maputo in the South (SMC and Inacio de Sousa) and the other one in the Center. These millers are producing a less refined maize meal compared to that produced by CIM and MEREC, and their main targets are the markets where they are operating. SMC and Inacio de Sousa, for example, do not market aggressively in Maputo, sticking primarily to outlying markets in the South. Nevertheless, Vonk is shipping maize meal to the South, particularly to Maputo. This suggests that the very high prices for refined meal in the

country have created space for competition from new companies, even after paying substantial transport costs from the Center of the country.

The national concentration ratio of top 4 millers (CR4) is very high, about 92 percent, with CIM and MEREC together having 72 percent of the market share, as shown in Table 3.6.3.

Table 3.6.3 National Market Share of Maize Millers Interviewed in the Study

Name of Miller	Starting Year of Operation	Name of Meal Produced	Current Milling Capacity (Ton/Month)	Location	National Market Share (%)
CIM	1997	Top Score, Matabicho	2350	South	38
Merec	1999	Mpupu	2100	South	34
MOBEIRA*	1997	?	900	Center	14
Vonk	2003/04	Power	400	Center	6
SMC	2000/2001	Mananga	240	South	4
Inácio de Sousa*	2002	Palmeira	240	South	4
Total		-	6,230		100

Data Source: Authors miller survey results
Notes:
* Not included in the Study

3.7 Chapter Summary

As shown in chapter two, the Central and Southern Region of Mozambique produce together 49 percent of the total maize production. In the Southern Region, after retaining 97 percent of the total production at home for household consumption, maize

producers sell their remaining harvest to informal assemblers/wholesalers (60%), directly to individuals at nearby markets (12%), neighbors (20%), and the remaining to other small participants.

The flow of maize grain from producers to consumers is mainly done by informal traders. They are the principals responsible to stabilize maize prices in consumer markets, besides the fact that they are the principals "engines" that create incentives for production.

The key role of informal traders within the producer marketing system is explained by the relative dispersion of the production. These informal traders are the only market participants willing to bear all costs of collecting the disperse maize grain production.

Nevertheless, the growth of this sector is constrained by limited access to formal credit, which hinder informal traders from specializing and increasing the scale of their operation. Absence of market information widely and timely available as well as high transportation costs are other constraint that impedes the growth of these participants.

Districts from the Central Region are still the major suppliers of maize grain to the informal wholesale markets in the South during most of the year, regardless of competition from neighbor countries. Despite the increasing importance of the district of Nhamatanda in supplying Maputo with maize grain in the last three marketing years, this market is still supplied with maize grain from districts of Manica Province, inclusive Chimoio. In fact, between February and May, the major suppliers are the districts from the Southern Region. However, is during this period where the quantity of maize grain

coming from Nhamatanda exceeds by far the quantity coming from Chimoio. In the remaining months, most of the maize grain comes from the districts of Manica Province.

The percentage of villages with small hammer mills is very high in the rural areas of Central Region, followed by Northern, and Southern Regions, respectively.

The price ratio between refined meal and maize grain is increasing over time, and this increases may be seen as a potential opportunity window for new entrants in the milling industry, and one would expect to see more entries into the milling market, at least until the price ratio between refined meal and maize grain starts coming down.

Based on the number of industrial maize millers (does not exceed six) operating and producing branded products in the Central and Southern Region of Mozambique, it seems that there is a significant market power, reflected in a high concentration on the milling industry since the largest two millers (with production capacity above 2,000 Ton per month) are holding 72 percent of the market.

CHAPTER FOUR

THE IMPACT OF VAT ON MAIZE GRAIN IMPORTS

4.1 Introduction

This chapter presents an analysis of the impact of the value-added tax (VAT) imposed by the Mozambican government on maize grain trade, either transacted locally or imported. More specifically, the specific research question number three will be answered.

The chapter is divided in eight sections. In the next section, a brief description of the VAT code is presented. This section summarizes the main points included in the code. It serves as a guide to link the reader to the material covered in other sections. In section three, the behavior of price of maize meal in Maputo is presented. In this section, the evolution of maize meal prices is shown, covering the period before the introduction of VAT until more recent days. In addition, prices of maize grain are plotted together with rice prices and maize meal prices in order to assess the magnitude of price differences among them. Section four presents an assessment of the impact of VAT charged on imported maize grain. In this section, import parity prices for maize grain in Maputo were computed for two scenarios, one with VAT charged on imports, and one without charging VAT. Both scenarios are then compared with prices of maize grain landed in Maputo from the Central regions. In section five, the regulation to import maize grain in Mozambique is presented. This is important to get insights about the problems faced by anyone intending to import maize grain, especially informal traders.

In section six, a brief overview of the South African maize marketing system is presented, emphasizing the potential problems faced by any maize importer. Section seven summarizes the fiscal incentives given by the Mozambican authorities and possible impacts of them for the milling industry. The last section presents the chapter summary.

4.2 The Code of Value Added Tax (VAT)

On 29 September 1998, the Council of Minister of Mozambique approved the code of Value-Added Tax, which replaced previously existing "circulation" and sales taxes. The VAT took effect five months later, in April 1st, 1999, and its value was fixed at 17 percent.

The VAT code states that every transmission of goods or services carried out by a passive person inside the national territory is subject to VAT. In addition, the code states that all imports of goods are also subject to VAT charges, unless specifically excluded.

A passive person[3] in the VAT code is defined as a person, either single or collective, resident, with a stable establishment or representation in the national territory, performing production, business, or services activities, including extractive activities, cattle raising, fishing, or agriculture. In addition, a passive person is also defined as a person, either single or collective, that even not performing any activity, is carrying out any operation susceptible to be taxed since it follows the presupposes of real incidences of industrial tax or tax above income work. Furthermore, a person, either single or

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3 For a more complete definition of a passive person, see *Codigo do IVA e do Imposto sobre Consumos Especificos*, article 2nd, on page 18.

collective that is carrying out imports of goods, is also defined as a passive person.

How is the VAT charged? Apparently, the mechanism is not that complicated. If the VAT amounts that a company paid to acquire any product in a specific month is greater than the amount of VAT charged selling the same product, the difference between these two amounts is the total value that the government has to reimburse to that company. On the other hand, if the amount of VAT paid on purchases is smaller that the amount of VAT charged on sales, the difference is the amount that the company has to pay to the government.

As an example, lets supposed that in a specific month a company spent $US400,000 on local purchases. If the products purchased by that company is not exempt of VAT, the amount of VAT that has to be paid is 17 percent of that amount, that is, $US68,000. If that company also imported certain products with VAT payments of US$7,000, the total amount of VAT paid by the company is US$75,000.

If the total sales of that company in the same month were US$1,000,000, the company will have charged US$170,000 in VAT. Then, as the company paid US$75,000 on purchases and charged US$170,000 on sales, the company has to pay to the government US$95,000. In summary, this company recovered the VAT they paid on their purchases (US$75,000), and generated an additional US$95,000 for the government. This is the motivation for the government to introduce the VAT in Mozambique, that is, generate revenues.

On the other hand, if the same company only sold the equivalent of US$200,000 instead of US$1,000,000 as before, the amount of VAT charged is US$34,000. In this case, the company invested US$75,000 and generated only US$34,000. Therefore, in this case the government has to reimburse US$41,000 to that company.

Maize meal is exempt from VAT, along with rice and bread. Maize grain is not exempt. The recovery mechanism just described means that maize grain imported and then processed into maize meal will in practice be exempt: If a maize miller imports maize grain and pays US$75,000 in VAT, it will not charge any VAT on maize meal sales because this product is exempt. Therefore, the government should reimburse the US$75,000 incurred by the company during the imports. Any trader importing maize grain for sale as grain will have no right to VAT reimbursement on the purchase, because he or she must legally charge VAT on the grain sales.

To receive reimbursements from the government, the company has two options. In the first option, the company may prefer to keep the amount to be available for the next month as a credit. In the second option, the company may request the reimbursement, something that the National Directorate of Tax and Auditing should do within three months after the appropriate request from the company side. After this period of time, the amount due to the company incurs interest. In practice, however, reimbursements are reported to take at least six months and sometimes more, and payment of interest is not assured.

4.3 VAT and Price of Maize Meal in Maputo

As mentioned in chapter three, due to problems regarding the quality of local maize grain, large industrial millers rely mostly on imports of maize grain to satisfy their necessities, either from U.S.A. or South Africa. To import maize grain, the millers have to pay officially a duty of 2.5 percent over the CIF price for maize grain, plus a 0.5 percent for other small duties. Over this total value, the millers also have to pay the VAT of 17 percent.

The price of maize meal processed by large industrial millers has shown increases over the years. Figure 4.3a presents the real price of maize grain produced locally, maize meal processed by local mills, as well as the price of imported rice in the Maputo retail market. Figure 4.3b and 4.3c shows, respectively, the price of grain relative to maize meal, and the price of maize meal relative to rice. Three patterns are apparent in these graphs. First, real maize meal prices have risen dramatically since late 2001. Second, the real price of maize meal relative to rice has risen dramatically from the same time. After trading around par from 1997 through late 2001, the relative price of maize meal has risen dramatically. Third, the price of maize grain relative to maize meal has fallen dramatically since about the same time: In late 2001 maize meal prices rose, whereas maize grain prices have fell slightly.

Figure 4.3a Real Retail Prices of Maize Grain, Refined Maize Meal, and Rice in Maputo (January 1993-January 2005)

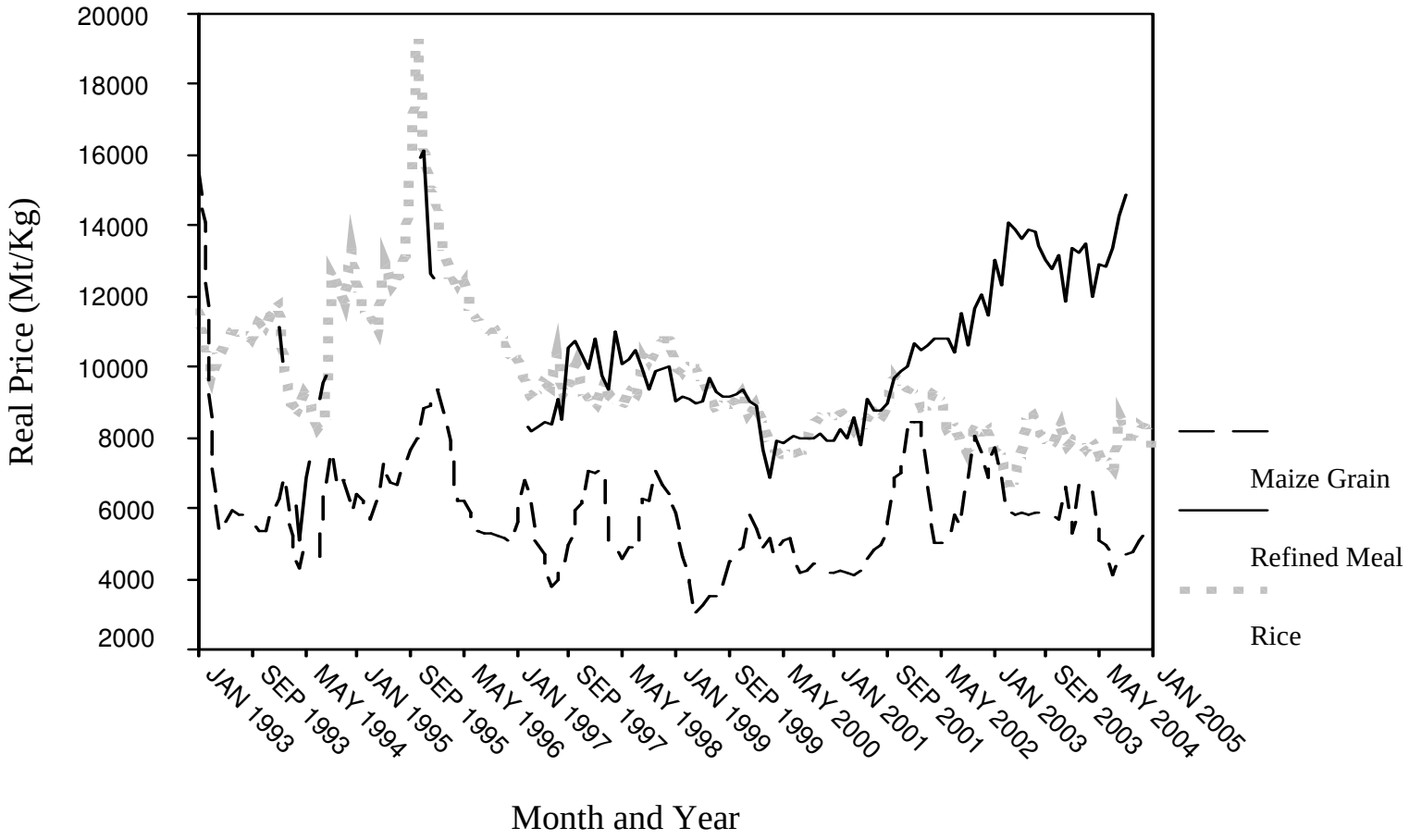


Figure 4.3b Real Retail Price Ratio of Maize Grain Relative to Maize Meal in Maputo (January 1993-January 2005)

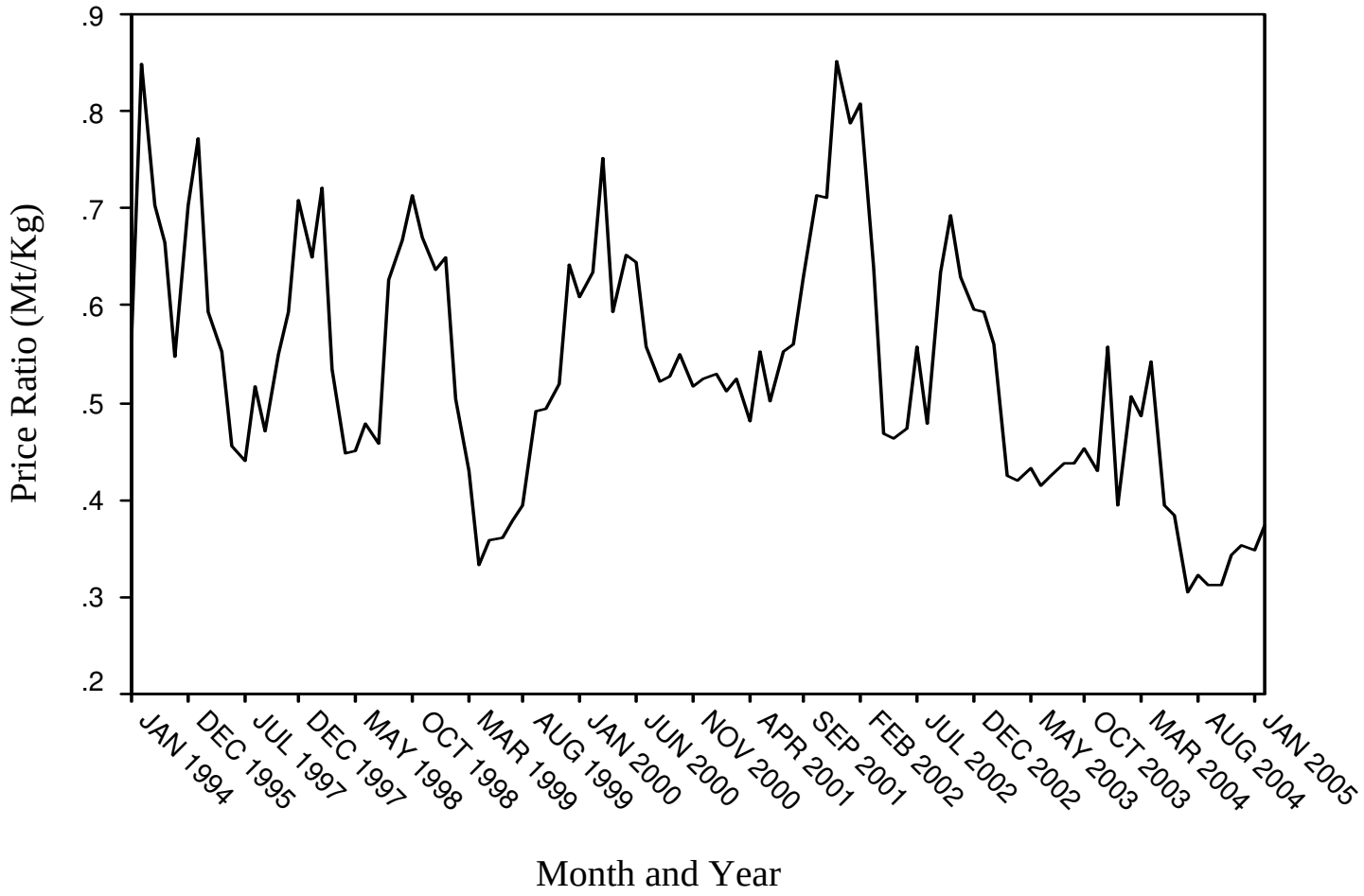
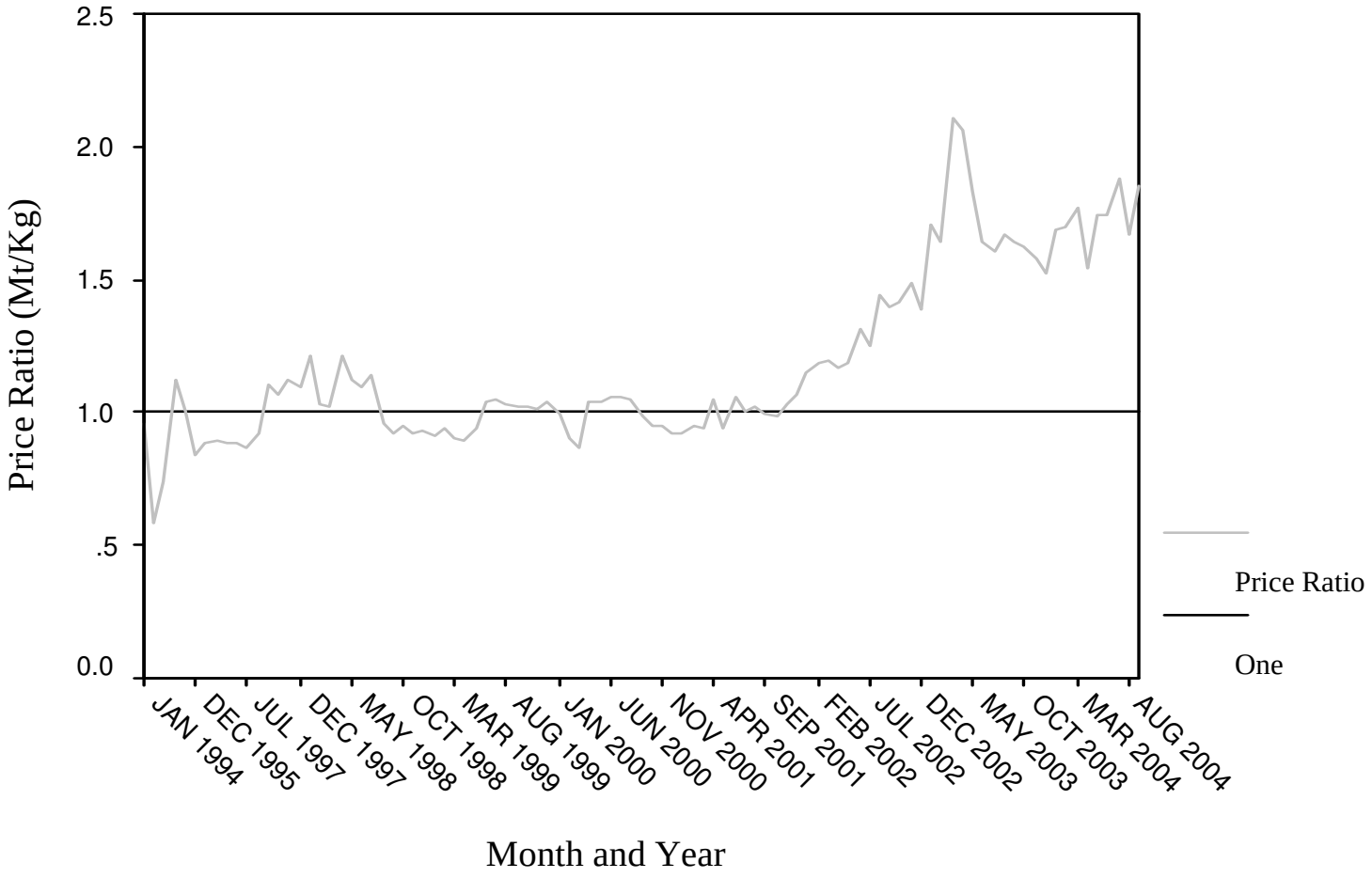


Figure 4.3c Real Retail Price Ratio of Refined Maize Meal Relative to Rice in Maputo (January 1993-January 2005)



4.4 Assessing the Impact of VAT Charged on Imported Maize Grain

To assess the impact of VAT charged on imported maize grain, import parity price (IPP) for maize grain imported from six different locations of South Africa (Gauteng province) were computed and compared with maize prices landed in Maputo from the Central region of Mozambique.

To compute the IPP price, prices from the South Africa Futures Exchange **(**SAFEX) were used as a simple proxy for the price in one silo. From this price, rail road transport and insurance costs were added to obtain the Cost Insurance and Freight (CIF) price at Ressano Garcia Border (RGB). Then, the official duty of 2.5 percent plus 0.5 percent charged to maize grain was added to the CIF price. After the duties have been added to the CIF price, 17 percent of VAT is added to the RGB CIF plus the duties charged.

Rail transport costs and insurance charged by Mozambican Rail Road Company (CFM) to transport maize grain from RGB to Maputo are then added, as well as the VAT charged for any internal transport transaction. The result is the IPP in Maputo.

A simple scheme of this calculation is shown below in Figure 4.4a, and IPP results for maize grain from all six origins in Maputo (railroad) during June 2004 are presented in Table 4.4a. VAT is included in these calculations because informal traders do not recover the VAT. Therefore, including VAT on IPP calculation gives the price at which maize grain will land in the market if imported by the informal sector.

Figure 4.4a Scheme for Import Parity Price Calculation

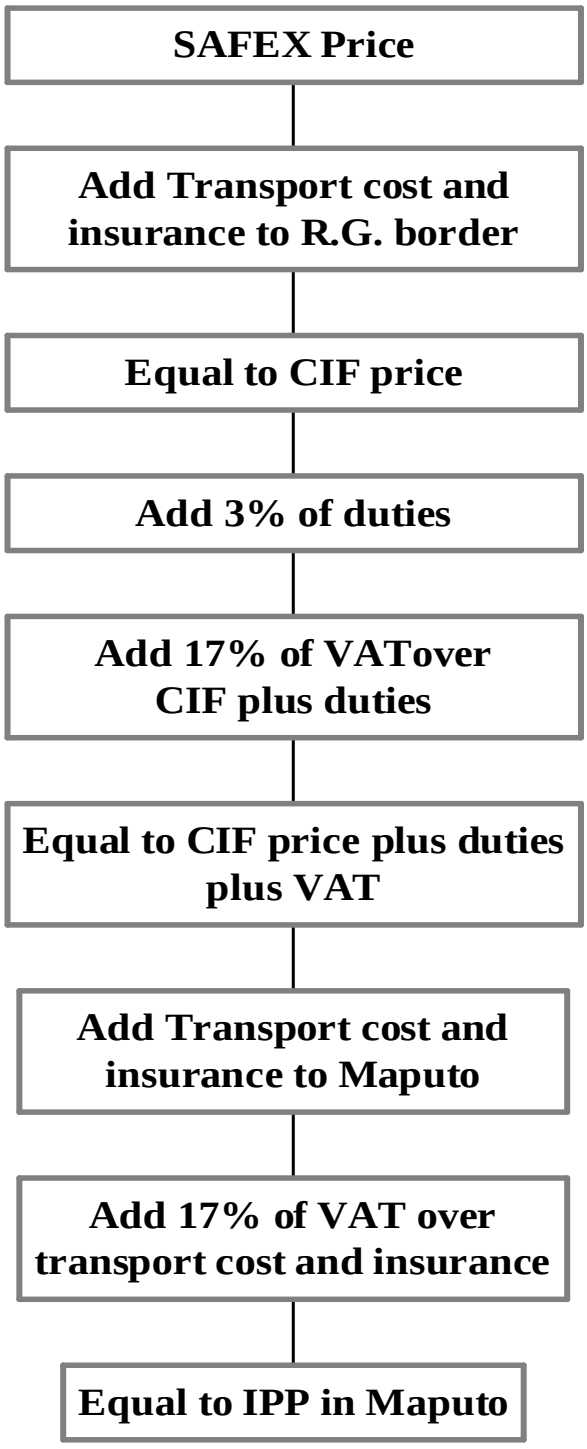


Table 4.4a IPP in Maputo for Maize Grain Imported from Six Different Location of South Africa by Rail, June 2004

Cost Item	Unit	Point of Origin in South Africa (Gauteng Province)					
		Kaserne	**Pen**	**Bronkospruit**	**Nylstroom**	**Ruto Mills**	**Marble Hall**
SAFEX Price[1]	Rd/Ton	900.0	900.0	900.0	900.0	900.0	900.0
Transport cost[2]	Rd/Ton	98.4	92.6	123.0	186.1	155.9	191.8
CIF	Rd/Ton	998.4	992.6	1023.0	1086.1	1055.9	1091.8
Duty (3% of CIF)	Rd/Ton	29.9	29.7	30.7	32.6	31.7	32.8
CIF + Duty	Rd/Ton	1028.3	1022.3	1053.7	1118.7	1087.6	1124.6
VAT(17% of CIF + Duty)	Rd/Ton	174.8	173.8	179.1	190.2	184.9	191.2
CIF + Duty + VAT	Rd/Ton	1203.1	1196.1	1232.8	1308.9	1272.5	1315.8
Transport cost (TC)[3]	Rd/Ton	29.99	29.99	29.99	29.99	29.99	29.99
VAT(17% of TC)	Rd/Ton	5.0	5.0	5.0	5.0	5.0	5.0
IPP in Maputo	Rd/Ton	1,238.1	1,231.1	1,267.8	1,343.9	1,307.5	1,350.8
IPP in Maputo[4]	Mt/Ton	4,457,124	4,431,924	4,564,044	4,838,004	4,706,964	4,862,844
IPP in Maputo	Mt/Kg	4,457	4,432	4,564	4,838	4,707	4,863
Wholesale Market Price in Maputo[5]	Mt/Kg				3,600		

Notes:
[1] SAFEX prices in July 2004.
[2] Transport cost from the departing point to Mozambican Border (Ressano Garcia), charged by Spoornet.
[3] Transport cost from Mozambican Border (Ressano Garcia) to Maputo City (88 Km), charged by CFM.
[4] Exchange rate Rand to Metical on August, 2004: 3,450 Mt.
[5] Average price of maize grain landed in Maputo from the Central region in June 2004.

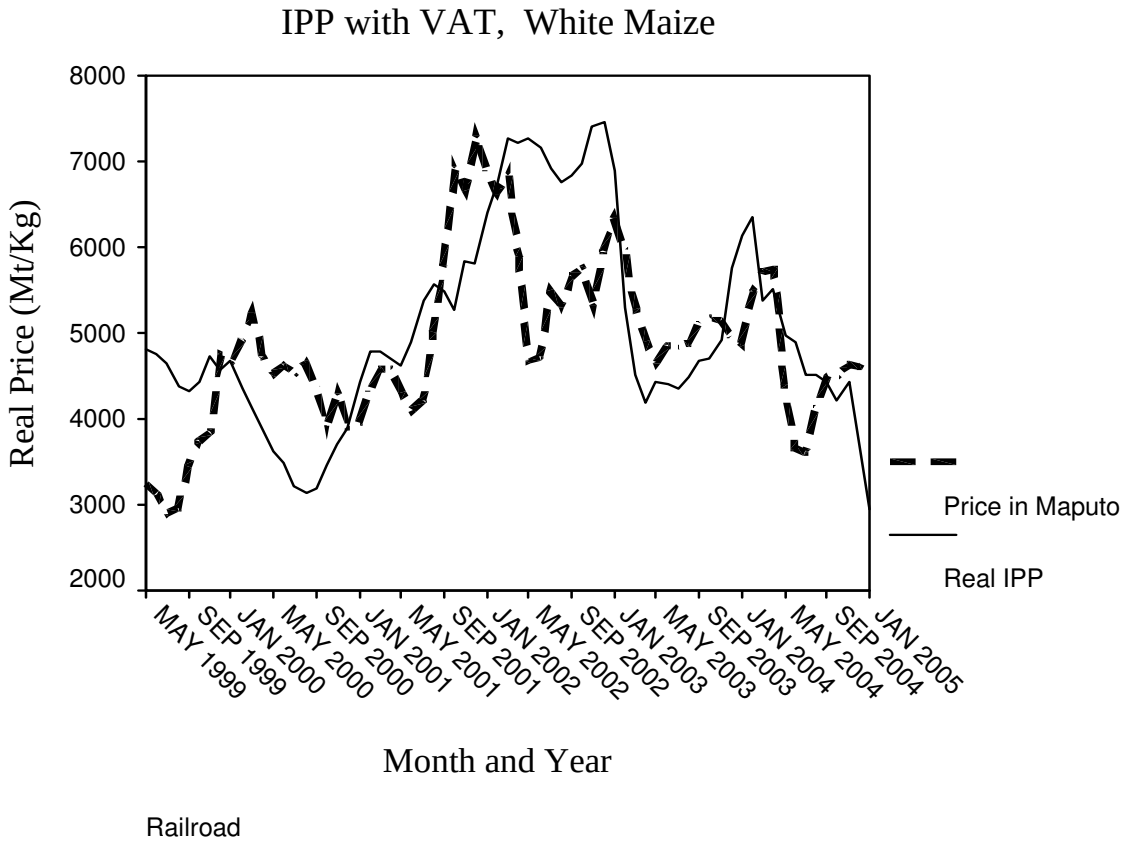
An IPP time series was also computed based on a silo at Ermelo. During the authors' interviews in Johannesburg, South Africa, with traders involved on maize trade, Ermelo was cited as a logical spot from which to export to Mozambique. Also, it was emphasized that a good proxy for cash price at this silo is SAFEX price minus a difference representing the transport cost between this silo and SAFEX, plus 30 Rand per Ton. The transport cost differential is computed by SAFEX once a year based on a weighted road transport cost (60%) and rails (40%). Therefore, in this analysis is assumed that the maize grain is purchased at one silo located at Ermelo that is located 312 Km aside from RGB, at a cash price of SAFEX minus transport cost differential plus 30 Rand per Ton.

SAFEX price minus transport differential plus 30 Rand creates a floor on cash prices in a region, and if a silo offers a price below this floor, it is better for producer to deliver to SAFEX Silo because they will receive a better price. If the market is at all efficient, that is, the participants have the correct information and know how to deliver to SAFEX, then the market price should not go under that level.

We calculate two scenarios, imports with and without VAT. In both scenarios, the IPP series are graphed together with the prevailing wholesale maize price in Maputo, which largely reflects landed cost from the Central region of Mozambique.

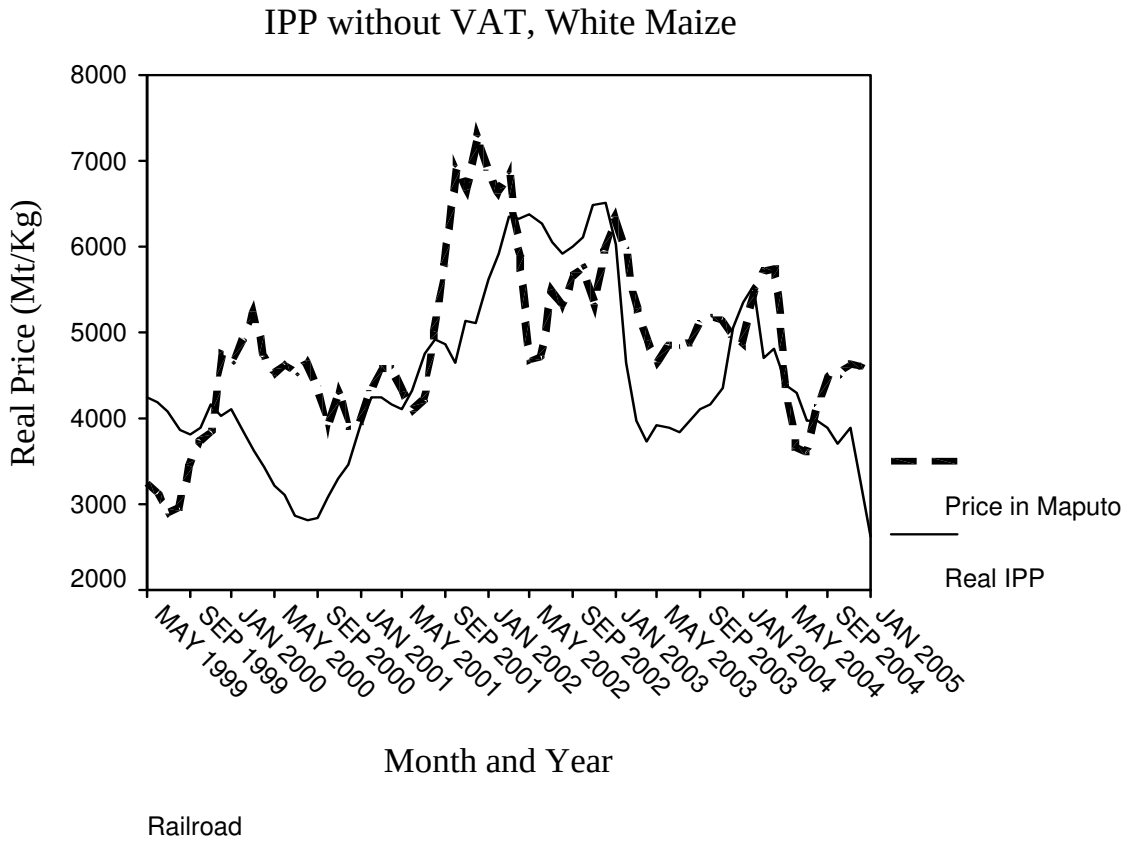
In Figure 4.4b (with VAT), the evidence shows that first, with VAT charged, it was usually not profitable to import (in 48 percent of the weeks), but second, there were some extended periods (February to November 2000; September 2001 to January 2002; February 2003 to November 2003; March 2004 to Apr 2004; September 2004 to January 2005) when it was still profitable, but trade did not occur.

Figure 4.4b Price of Maize Grain From Central Region Versus IPP; With VAT



On the other hand, Figure 4.4c which shows the IPP from the second scenario (without VAT), the evidence shows that it would have frequently been profitable to bring in maize grain if no VAT were charged. In other words, IPP without VAT was smaller than price in Maputo from Central Region in 66 percent of the weeks.

Figure 4.4c Price of Maize Grain From Central Region Versus IPP; No VAT



In summary, although elimination of VAT would have made it more profitable to import, profit opportunities even with VAT in place were foregone – traders never imported even when there was a potential profit.

If maize imports from South Africa done by local traders other than millers would be doable, the competition in the maize subsector would thus increase. The first consequence of this increase on maize competition would be a decrease on maize prices in the local markets, especially in Maputo, as a result of increases on the supply side. The consumers would then be better off with an increase on the consumers' surplus.

4.5 Regulation to Import Maize Grain in Mozambique

Act number 206/98 signed by the Ministry of Planning and Finance of Mozambique on November 25th, 1998 establishes the main guidelines for importing maize grain into Mozambique.

Under this regulation, the importer first of all has to fill and present a document called pre-declaration to the customs, together with the following documents:

1. The importer's identification card.

2.Quotation showing:

a. Name, complete address, country, phone, and fax number of the supplier.

b. Name and complete address of the importer.

c. Date of the emission of the quotation.

d. Country of origin of the commodity.

e. Boarding port.

f. Landing port.

g. Complete designation of the commodity, including technical specification.

h. Quantities imported, total weight, volume or metric units.

i. FOB price of each imported commodity in the currency shown in the quotation.

j. FOB price of the total commodity in the currency shown in the quotation.

k. Value of the total freight in the currency shown in the quotation.

l. Value of the insurance in the currency shown in the quotation.

m. Time limit of delivery.

n. Expiry date of the quotation.

o. Form of payment.

If the value of freight and/or insurance is not available at the time of the pre-declaration filling, a premium of 12 percent over the FOB value (10% for freight and 2% for insurance) must be used to calculate the CIF price.

The pre-declaration must be presented to the customs before the commodity leaves the country of origin. It takes one day for customs to process and return it to the importer. If everything is in order, the pre-declaration is accepted, and the importer has to pay a deposit amount within 10 business days.

When the commodity reaches the port of entry, the importer must complete a declaration form called *Documento Único* (DU). The DU must be accompanied by the pre-declaration properly certified by the customs, plus a document proving that the commodity belongs to the importer, as well as the final receipt. If all is in order, the

importer pays the amount that corresponds to the official duty charged for that commodity, plus the VAT if that commodity is not exempt.

It is clear that, under the new regulation, it will be difficult to an informal trader to import maize grain from South Africa. First, they have to have an importer card, which is not easy to obtain for an informal trader. Second, to get a quotation from the maize supplier, an informal trader would need some detailed knowledge of how the South Africa maize trade is done. We'll return to this issue in the next section.

Act 206/98 provides for a simplified system to import any good. Any importer with goods whose FOB value does not exceed US$500, and who has not imported during the previous 30 days, may have a simplified dispatch emitted at the port of entry. In this case, the importer does not have to complete the pre declaration. This simplified system to import seems to be a good option only for the small traders, since with US$500 it is possible to import from South Africa only three tons of maize grain, equivalent to forty-three bags of 70-Kg each. Our data show that 40 percent of the traders involved in maize trade between the Center and South of Mozambique trade at least this much per month. Thus, current regulations on imports would seem to create significant barriers for informal traders wishing to engage in maize trade between the two countries in anything other than very small scale.

4.6 The South African Maize Marketing System

Before 1995, maize marketing in South Africa was done under a one-channel market run by the government through a maize board. Maize sales and purchases had to

be made through this board, which also was responsible for providing market information and other services.

Since 1995, maize producers are no longer forced to sell to the maize board. The risk faced previously by the maize board shifted to maize producers. To sell their maize grain, producers in South Africa have several options. For instance, they can sell to the nearest silo, which is now a private company, though some are cooperatively owned. On-farm storage is not widespread because before, maize price was determined by the maize board, eliminating therefore any reason to store with the purpose of receiving better prices. Another option that a maize producer has is to sell to any buyer that directly approaches them.

At the time that we were in South Africa trying to learn and understand more about the marketing system there, their high level of formality came up. Unlike what is observable in Mozambique, where all maize transaction is done in spot markets, in South Africa it is almost impossible to buy maize grain in wholesale outlets. In fact, we found no evidence of any source of maize besides that in silos that informal traders from Mozambique could access for import. The high level of formality reduces the probability of informal traders of Mozambique being well succeed while buying maize grain there. For instance, besides the language barriers, no maize grain will be loaded for Mozambique until the importer presents a letter of credit issued by a reputable South African Bank. This bank will only issue the letter after the importer proves that has capital.

4.7 Incentives to the Milling Industry

The government has shown some flexibility on light of milling industry complaints regarding the impact of duties and VAT on their imports of maize grain. In August 2003, the government approved a special act for the industry with the main objective of creating more employment, and reducing the price of processed products to consumers. The act says that every processing industry[4] will not pay any duty for imported raw material if and only if:

1. They have annual gross revenue of at least six billion Meticais.
2. The value added to the final product is at least 20 percent. This valued added was defined as the valued of final products divided by (remunerations to the employers plus financial costs plus taxes plus amortization, plus results of the exploration).

However, at the time of the interviews conducted in this study, none of the millers interviewed had already got any benefit from this act, apparently due to heavy bureaucracy.

4.8 Chapter Summary

The main finding in this chapter is that, while the VAT clearly made maize grain imports less profitable, imports did not occur even when such trade would still have been

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[4] Industries included in the amendment include the agricultural processors, textiles and shoes, graphic industry, mechanic industry, as well as chemistry, plastic, and rubber industry.

profitable. This suggests that, while the unequal application of the VAT (due to the VAT exemption on maize meal, which results in an exemption on grain imports for millers but not traders) is one relevant issue, it is not the only reason for the poor state of trade in maize grain between Mozambique and South Africa. Indeed, the regulation to import maize grain is very heavy for an informal trader, contributing therefore for the poor state of trade between these two countries. Also, the high level of formality within the South Africa system contributes for this situation.

However, this topic does not end here. Further research should be done to explore other options for this trade. For instance, use of the road rather than rail transportation should be investigated.

CHAPTER FIVE

ANALYSIS OF VERTICAL AND SPATIAL PRICE RELATIONSHIP AMONG GRAIN MARKETS IN MOZAMBIQUE

5.1 Introduction

In this chapter, time series models will be used to evaluate the performance of spatially differentiated maize markets and vertical maize marketing levels in Mozambique. The evaluation contributes to the understanding of the functioning of maize markets in Mozambique by testing for spatial market efficiency among four maize grain markets (Maputo, Xai Xai, Chimoio, and Beira), and two marketing levels (wholesale and retailer).

The chapter is organized as follows. The idea of market performance within the industrial organization framework is presented in section two. In section three, the concept of market integration and marketing margins and their importance as measures of market performance is discussed. In section four, the conceptual framework to test market integration is presented. In section five, the scope of the study is presented, and in section six, as a preparation to the econometric tests, a preliminary data analysis is used to assess the efficiency of the vertical and spatial integration market. Brandow (1976) mentioned that systems analyses are required to identify the ways of moving foods from the raw material to consumers' bags at the least possible cost. Efficiency in this sense requires the use of modern technology, achievement of economies of scale, the effective use of transportation facilities, and so on. In the study of maize market performance in

Mozambique, operational efficiency is concerned whether maize grain is moved from producer to consumer at the lowest possible marketing cost. In this preliminary analysis, food price evolution are analyzed, as well as price volatility and spreads. In section seven, the econometric tests for market integration are presented, and last, the chapter summary is presented in section eight.

5.2 Market Performance

Marketing performance is defined as how well the marketing system performs what society and the market participants expect of it. It is the outcome that results from the group of firms in an industry pursuing their respective lines of conduct.

Three steps are involved in evaluating market performance. The first step is defining the performance dimensions, that is, what types of outcomes are most important for the society. In the second step, it is important to define the performance norms, that is, what is the standard of performance against which performance can be measured. The last step is defining performance measures, that is, what metric or criteria will be used to measure actual performance against the norms.

Price coordination requires that price signal from the food industry to upstream producers or downstream consumers be appropriate for guiding their production and consumption decisions. One aspect of price coordination is how closely producer and consumer prices move together, as well as price differences between points in time. Hence, to analyze how the maize markets in Mozambique are performing, two performance measures will be used, namely the degree of integration between markets

and levels of marketing, and marketing margins.

5.3 Indicators of Market Performance

5.3.1 Market Integration

The role of markets in assuring economic welfare and food security is well known. Deficient functioning of the marketing system is one of many reasons for poor levels of production and productivity, low earnings and food insecurity. Therefore, the contribution of agriculture to the economic growth of Mozambique, reducing income inequalities, and poverty, depends in part on the performance of agricultural markets.

These markets in developing countries frequently suffer from many structural deficiencies which leads to spatial market inefficiency, that is, inefficient flows of information and trade among spatially distinct markets. Hence, one of the indicators commonly used in the analyses of market performance is the level of market integration.

In a competitive environment, arbitrage will ensure that prices of a homogeneous product such as refined maize meal, will be linked in two different markets. Hence, two markets are said to be integrated if prices in the importing market equal the prices in the exporting market plus marketing costs (Tomek and Robinson, 1990). This definition implies that, first, there is some trade between markets, and second, the price differentials between them cannot exceed the marketing costs necessary to move the product from one market to another.

Market integration can be seen in three dimensions, namely, spatial market integration (location), vertical market integration (product form), and temporal market

integration (time). The first case reflects the effect of a price change in one market location on the price of the same commodity in another market location. If there is no linkage between two market prices, then markets are said to be separated.

Vertical market integration reflects the passage of a price change across steps in the marketing chain. A price relationship between raw and processed products is a good example of this vertical integration. In this case, the movement of a product is combined with some form of processing such as in the case of maize grain as a raw product and maize meal as a processed product. Another example of this vertical integration is a movement of a product from one level to another level without changing its form. For example, a movement of maize grain from wholesale to retail is a good example of this kind of integration.

Last, temporal market integration reflects the effects of a present price change on future prices. This kind of integration will not be analyzed in this study because it is out of the purpose of the study.

5.3.1.1 Importance of Market Integration

In the context of Mozambique, there are several reasons to analyze the performance of maize markets. First, price is a product of market performance. If a shock occurs in a market, it is expected that price will adjust in other markets to reflect the changing conditions imposed by that shock. The change in price is a signal that then facilitates market adjustment of quantities, etc. For instance, if there is a maize shortage in the Southern region of Mozambique, well-integrated markets will quickly reflect this

shortage through appropriate price relationship, creating signals for the imports of maize grain to Maputo and other Southern markets.

When spatially markets are not integrated, price signals among markets will be transmitted imperfectly and with delays. One of the main consequences of this poor price transmission is high price volatility that weakens the food security of both farmers and consumers.

Second, in poor countries such as Mozambique, market interventions are constrained by lack of financial resources. Knowing that markets are integrated and will therefore efficiently transmit information and guide trade flows between surplus and deficit areas can make it easier for governments to allow markets to work, while concentrating their scarce resources on investments that will reduce marketing costs or target needy households in a way that does not disrupt markets.

Third, as stated by Goletti *et al* (1995), knowing the relationship among spatial market prices makes forecasting analysis more doable. For instance, knowing the direction of price signals between integrated markets, enables prediction changes in food security among farmers and consumers in one market as a result of changes in another market.

In summary, prices in different markets are important in the decision on where to buy and sell. In other words, "regulates" trade flows. Therefore, the arbitrage activity of traders connects spatially separated markets, and market integration analysis provides a better understanding of the dynamic interaction of prices and the degree by which physically separated markets are connected.

5.3.2 Marketing Margins

Another performance measure that will be used in this study is marketing margins. A marketing margin is the price spread between the price paid for a commodity and the price at which it is sold (Tomek and Robinson, 1990). It represents the value of the marketing services (transport, storage, processing, and others) that are performed on a commodity, including a normal profit. Therefore, the margin includes costs incurred by traders plus a mark-up that is added by the trader as a return to their investment, management, and risk.

Ideally, an efficient marketing system should provide the right good, at the right place and time, in the right quantity, and at an affordable price. In addition, profit levels should be reasonable for all participants in the chain. Hence, the analysis of marketing margins provides useful insights on how marketing costs have changed through time, and whether they are reasonable or not.

Stable margins are consistent with efficiency in the market, but non constant margins per se do not reflect lack of efficiency in the market. Brandow (1976) mentioned that a single industry should not be expected to have stable prices, output, or employment when changes in the economy impose instability upon the industry. This is true because marketing costs do not remain the same throughout the time, and therefore, neither can the final price. Thus, increasing costs in the maize marketing system increase marketing margins, and changes on it may affect market participants in different ways, depending on their respective elasticities of supply and demand.

5.4 Analytical Framework for Analysis of Market Performance

5.4.1 Marketing Margins

We focus on the retail-wholesale margin in this study, defined as the simple difference between the retail and wholesale prices of maize grain in a single market.

$$PMR_{it} = (PR_{it} - PW_{it}) / PW_{it} \quad (5.4.1a)$$

where PMR_{it} is the margin gained by retailer over the wholesaler at market i at time t, and PR_{it} and PW_{it} are retail and wholesale price of maize grain at market i at time t, respectively.

Using PMR_{it}, a stability test is performed to determine statistically the magnitude of retailers' margin over time. This test is performed running the following regression:

$$PMR_{it} = \alpha + \beta T + \mu_t \quad (5.4.1b)$$

where T is the time trend,

α and β are the coefficients to be determined, and

μ is the error term.

β coefficient should be interpreted as follow: One percent increase in T increases PMR by β units.

In addition, marketing costs budgets collected in July 2004 will be presented with a structure of all costs and net margins incurred by informal maize traders in Maputo.

This analysis will be useful to analyze the competitiveness of maize grain transportation from the Central to the Southern region.

5.4.2 Unit Root Test and Cointegration Analysis

In this study, time series price models will be used to evaluate the performance of spatially differentiated maize markets and vertical maize marketing levels in Mozambique. More specifically, a cointegration model is the base of analysis.

Most of economic time series such as prices, behave in a nonstationary manner, that is, the mean is not constant and the variance is time dependent (Enders, 1995). A time series is said to be stationary if its mean fluctuates around a constant long-run mean and the variance is finite.

The assumption of stationarity for modeling is important because, when data mean and variance are not constant, it means that observations come from different distribution over time, which causes statistical problems.

If a time series is non stationary, in econometric language, it is said that the series suffers from a unit root problem. In this case, the standard regression models such as Ordinary Least Square (OLS), cannot be used to perform regression analysis because under the presence of a unit root, statistical inferences are biased and inefficient (Pyndick and Rubinfeld, 1997). Thus, alternative models should be used, one of them being the cointegration models.

The idea of cointegration is that although each of two or more price series may be individually nonstationary, a linear combination of them may have the trend terms

mutually cancel out so that it becomes stationary (Intriligator *et al*, 1996). Basically, the cointegration analysis identifies whether or not there exists a long-run equilibrium between two or more price series. Therefore, the presence of cointegration is indicative of interdependence, and its absence indicates market segmentation (Golleti and Tsigas, 1995).

The attractiveness of cointegration analysis is that it does not require that price series be transformed into stationary series. Furthermore, there is no need to check for autocorrelation and heteroskedasticity because OLS is consistent (Tomek and Myers, 1993).

To test for market integration using a cointegration approach, the Engle-Granger methodology is applied. This methodology is composed of two steps. In the first step, price series must be tested for order of integration using the Dickey-Fuller Test (DF) or Augmented Dickey Fuller Test (ADF). The Dickey-Fuller test, which tests for the presence or not of a unit root, is performed by running the regression model specified as:

$$P_t = \beta_1 P_{t-1} + \varepsilon_t \qquad (5.4.3a)$$

where P_t is the time series price for maize grain at time t,

P_{t-1} is the lagged time series price,

β_1 is the coefficient on the lagged term, and

ε_t is the error term.

Subtracting P_{t-1} from both sides of this equation gives:

$$P_t - P_{t-1} = \beta_1 P_{t-1} - P_{t-1} + \varepsilon_t \Rightarrow \Delta P_t = (\beta_1 - 1)P_{t-1} + \varepsilon_t \Rightarrow \Delta P_t = \delta P_{t-1} + \varepsilon_t \quad (5.4.3b)$$

where ΔP_t is the price first difference ($P_t - P_{t-1}$), and

δ is equal to ($\beta_1 - 1$).

The DF Test can also be used for testing a unit root in the presence of a drift and/or trend. In the presence of drift and no trend, the regression model is specified as:

$$\Delta P_t = \beta_0 + \delta P_{t-1} + \varepsilon_t \quad (5.4.3c)$$

where β_0 is the intercept term (drift).

On the other hand, when trend term is included in model 5.4.3c to make sure that the apparent lack of stationarity is not due to the presence of a deterministic trend (Bopape, 2002), the regression model is specified as:

$$\Delta P_t = \beta_0 + \beta_1 T + \delta P_{t-1} + \varepsilon_t \quad (5.4.3d)$$

where β_1 is the coefficient of the trend term, T.

In these two last cases as well as in the first case (without drift and trend), the coefficient of interest is δ. If δ is equal to 0, the price series is nonstationary. In other words, the price series contains a unit root.

The number of times that is necessary to differentiate each price series to turn it stationary gives the order of integration of the series. For instance, if a price series is

differentiated once to turn it stationary, this series is integrated of order 1 and is symbolized as I(1).

In the second step of Engle-Granger methodology, the long-run relationship between markets is determined. Based on the idea of cointegration, if two series I(1) can be combined and the series resulted from this combination are I(0), then the series are cointegrated and exhibit a long-run relationship. If P^j_t denote the price at market j at time t, and P^k_t denote the price in market k at time t, the coefficient β_1 in the regression model 5.4.3e below gives the long-run relationship between these two markets only if the error term (ε_t) in the same regression model is stationary.

$$P^j_t = \alpha_0 + \beta_1 P^k_t + \varepsilon_t \qquad (5.4.3e)$$

More simple, in the second step, the OLS residual from equation 5.4.3e is taken and then tested for a unit root using the DF test. The procedure is the same as testing for a unit root in a single series. The only difference is that the distribution of the test statistic is different because now the residual is used instead of the observable variable (Wooldridge, 1999).

5.4.3 Granger Causality

In order to assess the nature of maize price transmission across markets (and through different marketing levels), the Granger causality test is used. Basically, Granger Causality Test is another approach to test market integration. A time series prices P^k_t is

said to "Granger cause"another time series price P^j_t if current and lagged values of P^k_t improve prediction of P^j_t (Gujarati, 2003). In other simple words, causality is basically a measure of the predictability of prices, that is, price movements in one market can be used to forecast price changes in other markets (Minten and Mendonza, 1998).

The Granger test involves the estimation of the following regressions (Gujarati, 2003):

$$P^j_t = \theta_1 + \sum\alpha_i P^j_{t-i} + \sum\beta_i P^k_{t-i} + \varepsilon_{1t} \qquad (5.4.3a)$$

$$P^k_t = \theta_2 + \sum\gamma_i P^j_{t-i} + \sum\delta_i P^k_{t-i} + \varepsilon_{2t} \qquad (5.4.3b)$$

where θ_1 and θ_2 are the intercept terms,

α_i, β_i, γ_i, δ_i are the coefficients on the lagged values of both P^j_t and P^k_t,

i is the lag length used for both price series, and

ε_{1t} and ε_{2t} are the error terms.

Causation can occur in two ways, unidirectional– where shocks in one market affect another market but not the reverse – and bidirectionally where shocks in one individual market are transmitted both ways. Therefore, based on models 5.4.3a and 5.4.3b, four hypotheses of causality can be tested. They are:

1. Unidirectional causality from P^k_t to $P^j_{,t}$ if the coefficients β_i are statistically different from zero and the coefficients γ_i are not statistically different from zero.

2. Unidirectional causality from P^j_t to P^k_t if coefficients β_i are not statistically different

from zero and the coefficients γ_i are statistically different from zero

3. Bilateral causality (both P^j_t and P^k_t cause each other) if all coefficients α_i , β_i , γ_i , and δ_i are statistically different from zero.

4. Independent causality (both P^j_t and P^k_t do not cause each other) if all coefficients α_i, β_i, γ_i, and δ_i are not statistically different from zero.

To test these hypotheses of Granger causality, a F-test is used. The test is conducted first regressing P^j_t on their own lagged values. This is called the restricted regression. Second, P^j_t is regressed on their own lagged values and the lagged values of P^k_t . This is called the unrestricted regression. Then, the F-test that follow the F distribution with m and n-k degrees of freedom is computed as:

$$F = [(SQR_r - SQR_{ur}) / m] / [SQR_{ur} / (n-k)] \qquad (5.4.3c)$$

where SQR is the sum square of the regression,

r stands for restricted,

ur for unrestricted,

m is the number of lagged values in P^k_t , and

k is the number of parameters estimated on the unrestricted regression.

The number of lags to include in the models is determined by Akaike Information Criterion, AIC. The AIC model states that different lag length is used to compute the AIC value, and the lag yielding the smallest value of AIC is the one chosen.

5.4.4 Dynamic Adjustments

Cointegration analysis is very important in understanding if a long-run relationship exists between two markets. However, the analysis does not answer two important questions. First, if there is a shock in one market, how much of that shock will be transmitted to the other market? Second, how long does it take for a price shock in one market to be transmitted to another market?

The magnitude of the influence between markets and the speed of adjustment to shocks can be measured to determine the strength (or weakness) of the market linkage, and the rapidity (or sluggishness) by which markets responds and adjust to shocks. Where markets are perfectly integrated, price changes in one market are exactly translated as price changes in another market. In this case, the long-run multiplier or the contemporaneous price effect that measures the extent of the market linkage will be equal to unitary, while market isolation is indicated by contemporaneous price effects equal to zero (Bopape, 2002; Mendonza and Rosegrant, 1995; Minten and Mendonza, 1998).

An autoregressive model representing a marketing system is used to study the dynamics of price transmission. This autoregressive model is specified as (Mendoza and Rosegrant, 1995):

$$\Delta P^{j}_{t} = \theta_{1} + \sum \alpha_{k} \Delta P^{j}_{t-k} + \sum \beta_{l} \Delta P^{k}_{t-l} + \varepsilon_{t} \qquad (5.4.4)$$

where ΔP^{j}_{t} is the contemporaneous price changes in market j,

ΔP^{k}_{t} is the contemporaneous price changes in market k, j not equal to k,

subscripts t-k and t-l are the historical price changes in each market, and α_k and β_l are the parameters to be estimated.

Price changes in equation 5.4.4 are calculated by obtaining the first difference of the price logarithms. The use of first price differences is desirable because the problem of autocorrelation is eliminated (Mendoza and Rosegrant, 1995), while the uses of prices in logarithms form can be interpreted as the intertemporal changes in prices in one market in response to price changes in another market (Mendoza and Rosegrant, 1995; Goletti and Tsigas, 1995).

5.5 Markets, Products and Price Data

In chapter two and three, central Mozambique was identified as the surplus region while the southern region was identified as deficit.

We postulated that maize price formation is centered around Maputo City which is by far the largest in terms of population size and maize demand, and is the location of the largest maize millers and feed producers.

For the analysis of market integration among spatially differentiated maize markets and vertically integrated marketing levels, four markets were chosen, namely Chimoio and Beira in the Central region, and Xai Xai and Maputo in the Southern region. Chimoio is chosen because of its importance as a supply source for Beira and for the Southern regions. Beira is supplied by surplus from the Central provinces of Sofala and

Manica, and is the main consumption center in the Central region. Xai Xai is the second consumer center in the Southern region, and also an important center of distribution for those districts located in the interior, not only for maize but for other food products.

All four markets have a long and continuous price series available at retail and wholesale level. The data consist in weekly retail and wholesale maize prices collected from October 1998 to June 2004 by SIMA. SIMA collects the producer, wholesale, and retail prices of several commodities, including maize grain and its derivatives, tubers such cassava, and commercial commodities such as sugar, at 22 different markets scattered throughout the country. Prices are collected every Monday, and after verification and validation, the price information is released to SIMA users every Wednesday afternoon.

All prices used in this analysis were deflated by the consumer price index for Maputo (CPI, 1998 = 100).

5.6 Results of Descriptive Statistics

5.6.1 Price Pattern at Retail Level

Tomek and Robinson (1990) state that graphical methods provide a simple means of identifying trends, cycles or seasonal patterns of behavior in time series data. Figure 5.6.1a to 5.6.1d depicts the real monthly retail and wholesale prices for maize in Maputo, Xai Xai, Beira, and Chimoio, respectively. All price series exhibit typical annual variability very common for agricultural commodities. At the harvest period, prices tend to drop due to high level of supply and then rise over the remainder of the season because of shortages on supply.

Figure 5.6.1a Real Price of Maize Grain at Wholesale and Retail Level; Maputo, October 1998 - June 2004

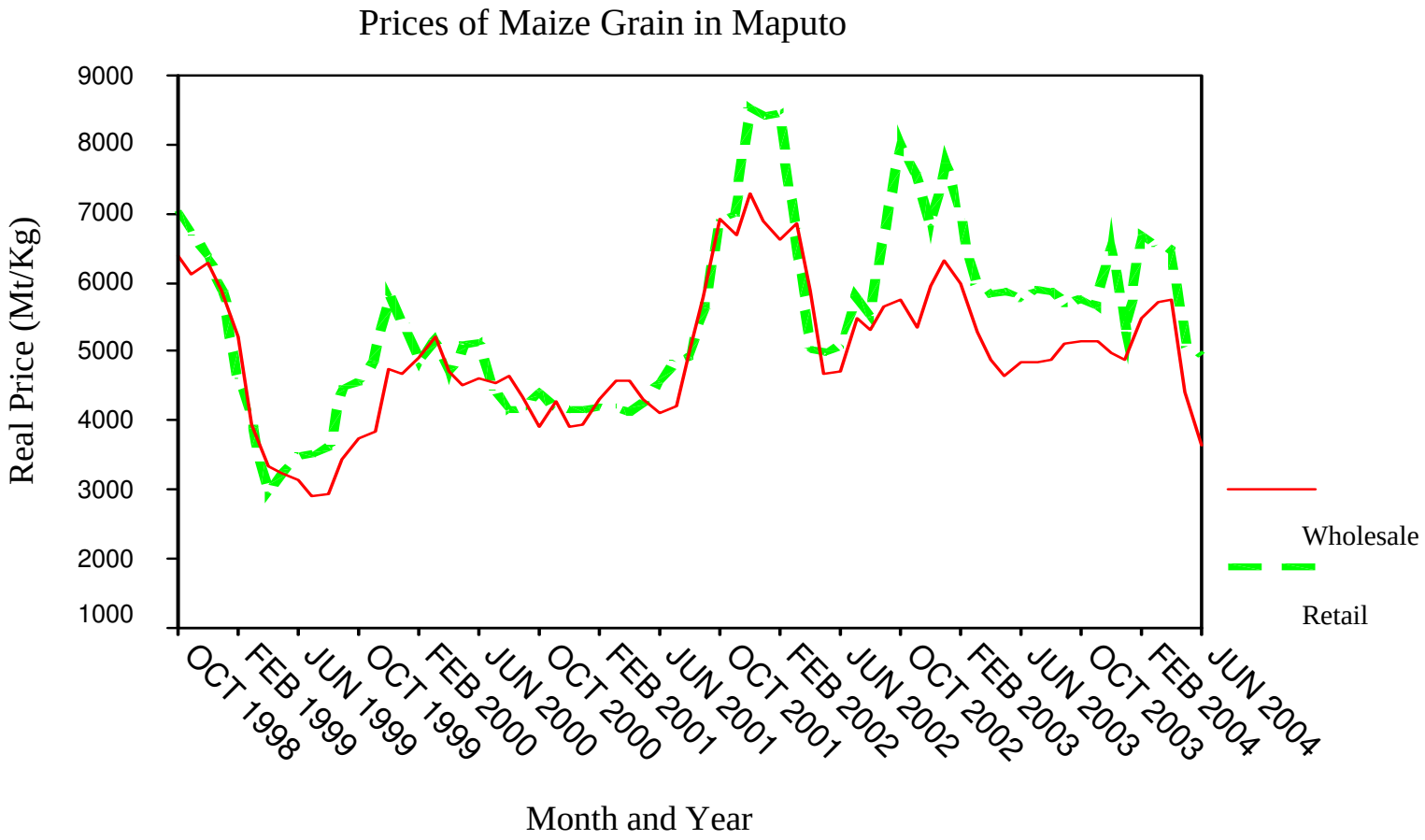


Figure 5.6.1b Real Price of Maize Grain at Wholesale and Retail Level; Xai Xai, October 1998 - June 2004

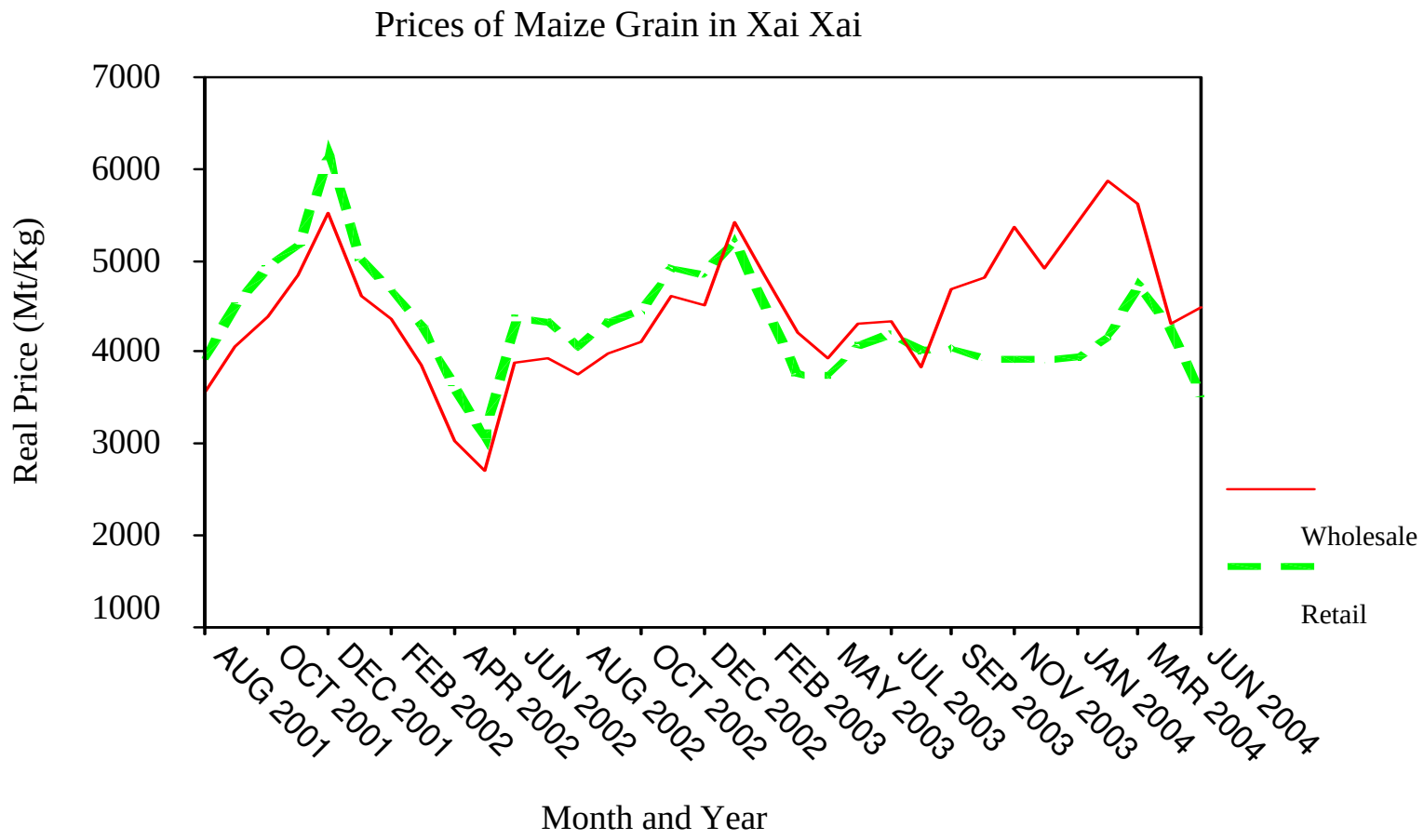


Figure 5.6.1c Real Price of Maize Grain at Wholesale and Retail Level; Beira, October 1998 - June 2004

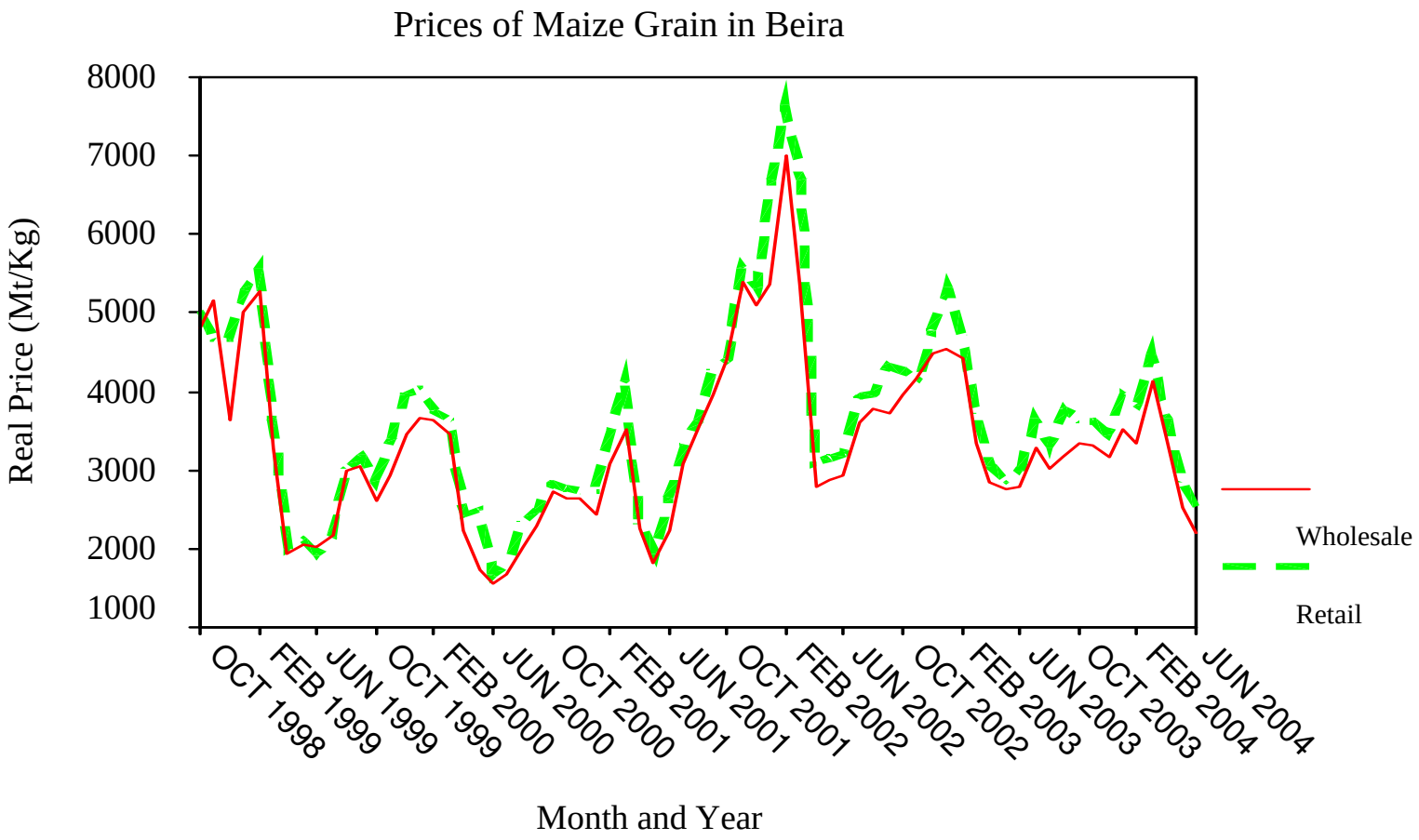
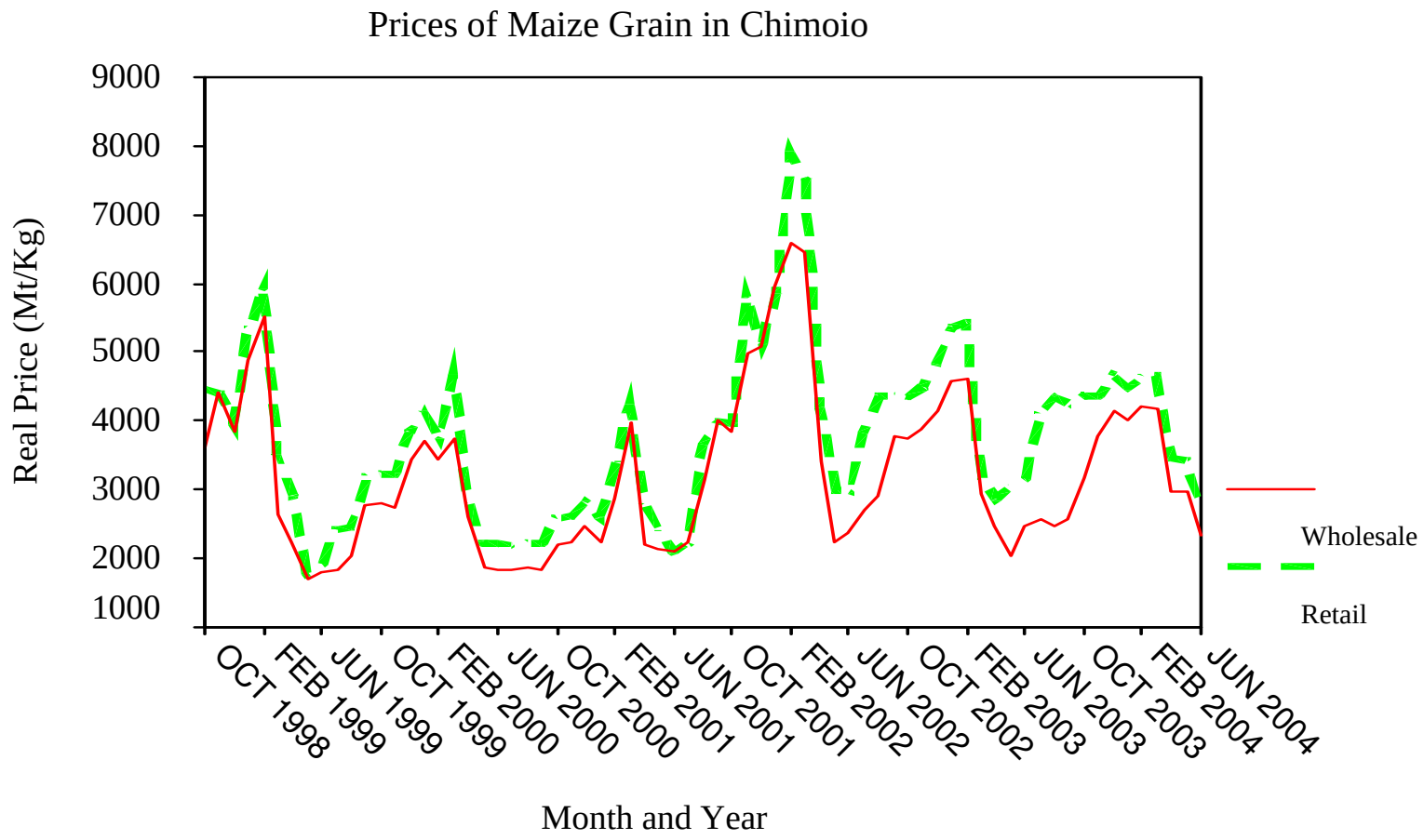


Figure 5.6.1d Real Price of Maize Grain at Wholesale and Retail Level; Chimoio, October 1998 - June 2004



The highest real retail price for maize grain across markets was observed in Maputo with a mean of 5,483 Mt per Kg (Table 5.6.1). In addition, a visual inspection suggests that prices in all retail markets seem to be somewhat volatile, with market prices in the Southern region (Maputo and Xai Xai) showing less volatility than market prices in the Central region (Beira and Chimoio). This situation is perhaps explained by a more stable maize supply, since the Southern markets are supplied by districts from the Central region, from their own region, and also from imports.

Table 5.6.1 Descriptive Statistics for Maize Grain at Retail Level (Real Prices)

Market and Observation	Mean Price (Mt/Kg)	Standard Deviation	Maximum Price	Minimum Price	CV (percent)
Maputo (N=300)	5,483	1,359	9,775	2,312	25
Xai Xai (N=226)	4,215	1,071	9,353	2,379	25
Beira (N=257)	3,635	1,366	8,271	1,500	38
Chimoio (N=292)	3,754	1,335	9,018	1,674	36

Data Source: SIMA

The results from Table 5.6.1 also show that the real retail prices in Beira and Chimoio seem to be very similar between each other, with almost the same mean and coefficient of variation. This may be an indication of integration between them. However, in some periods such as the last months of 2003, prices in Chimoio were higher than those in Beira as shown in Figure 5.6.1c and 5.6.1d, which may reflect the absence of trade between these markets. As mention in chapter 3, more recently the Beira market has been supplied by districts other than those from the province of Manica as in the past,

a fact that may explain lower prices in Beira as a result of low marketing costs (transport costs).

5.6.2 Price Pattern at Wholesale Level

At the informal wholesale level, the highest real wholesale price for maize grain across markets was observed in Maputo with a mean of 4,969 Mt per Kg (Table 5.6.2). Like in the case of retail markets, prices in all wholesale markets also seem to be volatile, with Maputo and Xai Xai prices showing less volatility than prices in Beira and Chimoio.

Table 5.6.2 Descriptive Statistics for Maize Grain at Wholesale Level (Real Prices)

Markets (Observations)		Mean Price (Mt/Kg)	Standard Deviation	Maximum Price	Minimum Price	CV (percent)
Maputo	(N=299)	4969	1048	7551	2887	21
Xai Xai	(N=113)	4360	734	6034	2631	17
Beira	(N=250)	3335	1277	7463	1381	38
Chimoio	(N=289)	3206	1232	7264	871	38

Data Source: SIMA

As shown in Figure 5.6.1c and 5.6.1d above, wholesale prices in Chimoio and Beira move together, with almost no difference between them. In addition, prices in Maputo follow the same pattern as in Chimoio and Beira, that is, when prices in these two markets increase, prices in Maputo also show increases, with the difference between them representing the marketing costs.

5.7 Results of Marketing Margins Analysis

The maize grain price spreads between retailer and wholesaler were computed for individual markets, and the results are reported in Table 5.7a. Surprisingly, Chimoio has the highest price spread. This spread in Chimoio was expected to be low because, as shown in chapter 3, most of the maize grain sold at the wholesaler in Chimoio goes to the local retail market, implying therefore few marketing costs to transfer maize grain from wholesaler to retailer. As a result of high retail price spread in this market, the wholesale share of retail price is low (86 percent), and therefore, the retail spread as of retail price is much higher than in other markets (14 percent). One potential explanation for this result may be the risks associated with moving maize grain from wholesale to retail level, particularly in Chimoio that is a surplus area.

In Xai Xai, the retail price spread is negative, which means that probably the wholesale market drifts apart of retail level. In other words, the retailers may have been supplied with maize grain from other marketing channel rather than the local wholesaler.

Table 5.7a Real Monthly Average Price of Maize Grain and Price Spreads

Market	Price Level (Mt/Kg)		Retail Spread (Mt/Kg)	Wholesale Share of Retail Price	Retail Spread as percent of Retail Price
	Wholesale	Retail			
Maputo	4,969	5,483	514	92.2	7.8
Xai Xai	4,360	4,215	-145	103.4	-3.4
Beira	3,334	3,635	306	92.2	7.8
Chimoio	3,205	3,754	548	85.7	14.3

Data Source: SIMA

The results of the stability test for the magnitude of the retail margin over time reveals that the retail margin as a percentage of the wholesale price is increasing significantly in Maputo and Chimoio, while in Xai Xai they are decreasing significantly. In Beira, the margin is also increasing, but the effect is not statistically significant (Table 5.7b).

Table 5.7b Stability Test of the Retail Margin (Mt/Kg) Over Time

Retail Market	Constant	Coefficient	t-statistic	p-value
Maputo	-0.13	0.0012	3.834	0.000***
Xai Xai	0.55	-0.0024	-11.783	0.000***
Beira	0.06	0.0002	0.553	0.581
Chimoio	-0.1	0.0016	2.485	0.014***

*** Significant at 1 percent level of significance.

Table 5.7c presents the results of the net margins calculated for informal traders in Maputo. Marketing costs were collected during the month of July (2004) from single interviews with informal traders, and thus they reflect the costs and earnings from the last purchase. All maize grain at the time of the interviews was coming from Nhamatanda.

Table 5.7c Net Margins for Informal Wholesaler in the Maputo Market

Parameters	Trader 1	Trader 2	Trader 3	Trader 4	Trader 5
Sales location	Maputo	Maputo	Maputo	Maputo	Maputo
Purchase location	Nhamatanda	Nhamatanda	Nhamatanda	Nhamatanda	Nhamatanda
Number of bags purchased	100	180	100	100	30
Number of days in purchase location	18	19	25	21	17
Cost Item (Mt/bag)					
Transport of trader to purchase location	4,000	2,222	4,000	3,500	11,666
Living expenses in purchase location	3,060	2,111	3,750	2,100	9,633
Purchase price	192,000	192,000	192,000	184,000	184,000
Transport of trader back to selling location	0	0	0	0	0
Loading, transport, unloading of bags	45,500	45,500	45,500	46,000	46,000
Storage and other costs in selling location	2,000	2,000	2,000	2,000	2,000
Total Cost per Bag	246,560	243,833	247,250	237,600	253,300
Selling Price	260,000	260,000	260,000	250,000	250,000
Net Margin	13,440	16,167	12,750	12,400	(3,300)
Return to Capital (net margin/total cost)	0.054	0.066	0.051	0.052	-0.013
Return per Day of Labor (000 Mt)	42 - 54	88 - 112	33 - 40	35 - 44	

Data Source: Author Informal Wholesaler Survey Results

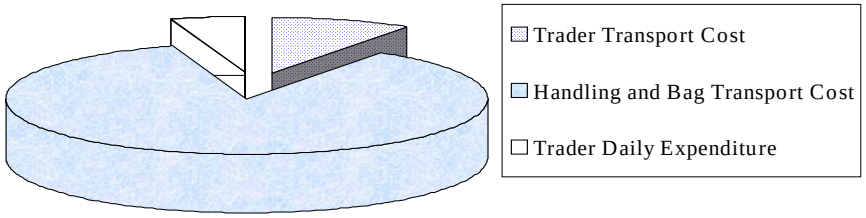
Table 5.7c (cont'd). Net Margins for Informal Wholesaler in the Maputo Market

Parameters	Trader 6	Trader 7	Trader 8	Trader 9	Trader 10
Sales location	Maputo	Maputo	Maputo	Maputo	Maputo
Purchase location	Nhamatanda	Nhamatanda	Nhamatanda	Nhamatanda	Nhamatanda
Number of bags purchased	50	70	80	500	25
Number of days in purchase location	10	24	17	33	10
Cost Item (Mt/bag)					
Transport of trader to purchase location	8,000	5,714	5,000	900	16,000
Living expenses in purchase location	3,000	3,429	2,125	990	4,800
Purchase price	184,000	192,000	160,000	160,000	160,000
Transport of trader back to selling location	0	0	0	0	0
Loading, transport, unloading of bags	46,000	46,000	46,000	40,500	44,500
Storage and other costs in selling location	2,000	2,000	2,000	2,000	2,000
Total Cost per Bag	243,000	249,143	215,125	204,390	227,300
Selling Price	250,000	250,000	250,000	250,000	250,000
Net Margin	7,000	857	34,875	45,610	22,700
Return to Capital (net margin/total cost)	0.029	0.003	0.162	0.223	0.099
Return per Day of Labor (000 Mt)	15 - 21	2 - 2	90 - 116	485 - 570	24 - 33

Data Source: Author Informal Wholesaler Survey Results

Three important points stand out from these results. First, the net margin for these traders was always greater than zero but one case, and range between 800 Meticais and 46,000 Meticais per bag of 70 Kg. Second, these results suggest that the size of the net margin is a function of the volume of products that the informal trader acquires (economies of scale). The smaller the number of bags purchased, the lower the net margin. Third, the transportation cost of maize is the major contributor on the total marketing costs, as shown in Figure 5.7.

Figure 5.7 Percentage of Each Marketing Cost in the Total Cost, Excluding Purchase Cost



5.8 Econometric Results for Market Integration Analysis

5.8.1 Correlation Coefficients

The correlation coefficients among selected retail maize markets in Mozambique are presented in Table 5.8.1a using nominal and real prices. These results suggest that the correlation coefficients are always highest on nominal prices. This was already expected because of the effects of the inflation in the economy.

Although the use of real prices may also indicate a presence of integration when in fact there is not (seasonality problems), the correlation coefficient based on them suggest that three of the observed relationships are weak, namely Xai Xai and Chimoio (0.46), followed by Xai Xai and Beira (0.49), and Maputo and Xai Xai (0.51).

Chimoio and Beira show the highest correlation (0.84), followed by Beira and Maputo (0.69) and then by Chimoio and Maputo (0.68). Chimoio and Beira, and also Chimoio and Maputo are direct linked in the maize trade, so it was anticipated that they would have among the highest correlations.

Table 5.8.1a Correlation Coefficients Among Maize Retail Markets

Markets	**Maputo**		**Xai Xai**		**Beira**		**Chimoio**	
	Prices (Nominal and Real)							
	Nom.	**Real**	**Nom.**	**Real**	**Nom.**	**Real**	**Nom.**	**Real**
Maputo	1	1	0.81	0.51	0.81	0.69	0.83	0.68
Xai Xai			1	1	0.74	0.49	0.72	0.46
Beira					1	1	0.92	0.84
Chimoio							1	1

Data Source: SIMA

Table 5.8.1b Road Distances Between Maize Markets (Kilometers)

	Maputo	Xai Xai	Beira	Chimoio
Maputo	1	210	1200	1000
Xai Xai		1	990	790
Beira			1	200
Chimoio				1

Data Source: Mozambique Map Distance.

5.8.2 Unit Root Test

Before testing for market integration, each price series was submitted to a unit root test (Table 5.8.2). The results of unit root test for maize grain at retail level using weekly maize prices show that the null hypothesis[5] of unit root would not be rejected at the 0.1 level of significance for every maize price series in the case of no drift and no trend test. The p-value is greater than 0.1 for every case, and thus, it can be concluded that the maize price series for Maputo, Xai Xai, Maxixe, Chimoio, and Beira suffer from a unit root at retail levels. However, in the case of drift and no trend test, three price series (Xai Xai, Beira e Chimoio) are stationary at levels in lower levels of significance.

When all price series are differentiated once, the results of the unit root test indicate that the null hypothesis of a unit root can be rejected at 0.01 level of significance. Indeed, the low probability values indicate that the null hypothesis is strongly rejected. Therefore, at first difference, all series of prices are stationary and thus I(1).

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[5] Null hypothesis: the maize price series is not stationary, that is, β_1 in equation 5.4.3a is equal to 1 or δ in equation 2 is equal to 0.
Alternative hypothesis: the maize price series is stationary.

Table 5.8.2 Results of Unit Root Test for Maize Grain at Retail Level

Market	No Drift, no Trend				Drift, no Trend			
	Level		1st difference		Level		1st difference	
	t-statistic (p-value)	Lag	t-statistic (p-value)	Lag	t-statistic (p-value)	Lag	t-statistic (p-value)	Lag
Maputo	-0.301 (0.5756)	4	-10.39*** (0.0000)	3	-1.665 (0.4491)	4	-10.37*** (0.0000)	3
Xai Xai	-0.686 (0.4184)	5	-9.43*** (0.0000)	4	-3.026** (0.0325)	5	-9.41*** (0.0000)	4
Beira	-0.983 (0.2948)	4	-9.76*** (0.0000)	3	-2.806* (0.0573)	3	-9.74*** (0.0000)	3
Chimoio	-1.077 (0.2543)	4	-8.69*** (0.0000)	3	-2.821* (0.0553)	6	-8.67*** (0.0000)	3

*** Significant at 1 percent level of significance.
** Significant at 5 percent level of significance.
* Significant at 10 percent level of significance.

5.8.3 Granger Causality Test

The results of the Granger Causality Tests are reported in Table 5.8.3. The results reveal that, at a probability level of 1 percent, only Chimoio and Beira show bidirectional causality. This result is consistent with the known fact that this market pair sometimes exhibits price inversions, with price levels in Chimoio exceeding those in Beira, and that the normal flow from Chimoio to Beira therefore stops at some times and is known on rare occasions to have been reversed.

Maputo-Chimoio and Maputo-Xai-Xai are clearly unidirectional, with Maputo Granger causing the price in the other market. Maputo-Beira and Xai-Xai-Beira are also plausibly unidirectional, with Beira being Granger caused by the other market in each case. The fact that Maputo always Granger causes any market with which it is paired is

consistent with Maputo's dominant position in price formation in the South and Center of the country. Chimoio and XaiXai is the only clear market pair with independent causality. This result too is consistent with expectations, as trade flows do not typically connect these markets.

Table 5.8.3 Results of Granger Causality Test for Pairs of Retail Markets

Null Hypothesis	F-test	Probability
Chimoio price does not Granger Cause Beira price	9.6932***	0.0000
Beira price does not Granger Cause Chimoio price	8.8496***	0.0000
Maputo price does not Granger Cause Beira price	6.5541***	0.0000
Beira price does not Granger Cause Maputo price	2.3487*	0.0544
Xai Xai price does not Granger Cause Beira price	2.7272**	0.0295
Beira price does not Granger Cause Xai Xai price	2.0149*	0.0923
Maputo price does not Granger Cause Chimoio price	6.6974***	0.0000
Chimoio price does not Granger Cause Maputo price	1.3675	0.2451
Xai Xai price does not Granger Cause Chimoio price	1.7623	0.1364
Chimoio price does not Granger Cause Xai Xai price	1.7267	0.1440
Xai Xai price does not Granger Cause Maputo price	1.3957	0.2354
Maputo price does not Granger Cause Xai Xai price	5.2819***	0.0000

*** Significant at 1 percent level of significance.
** Significant at 5 percent level of significance.
* Significant at 10 percent level of significance.

5.8.4 Spatial Market Integration

As mentioned before, two or more nonstationary time series are said to be cointegrated if a linear combination of them is I(0) even though individually they are each I(1). Thus, the hypothesis of cointegration consists of two parts: The first part consists of testing for I(1) of the individual series, and then testing for I(0) of a linear combination of

the series.

The results of cointegration test for maize grain markets at retail level are presented in Table 5.8.4. The specification of the equation for the cointegration analysis followed the results of Granger Causality Test. That is, if the direction of the causality is from j to k, then k=f(j), while in the case of bidirectional, we also estimate j=f(k).

Table 5.8.4 Results of Cointegration Test for Maize Grain at Retail Level

Market Pair k=f(j)	δ	t-statistic (p-value)	Number of Lags
Xai Xai . . . . . Maputo	-0.43	-5.2261 (0.000)***	3
Beira . . . . . Maputo	-0.69	-5.6133 (0.000)***	3
Chimoio . . . . . Maputo	-0.67	-4.9876 (0.000)***	7
Beira . . . . . Chimoio	-0.8	-4.4876 (0.0058)***	6
Chimoio . . . . . Beira	-0.81	-5.9646 (0.0000)***	3

*** Significant at 1 percent level of significance.

The results of the test statistic reported on Table 5.8.4 shows that the null hypothesis of a unit root in the cointegration regression can be rejected at 0.01 level of significance. Therefore, it can be concluded that the linear combination of any retail market price series with the Maputo retail price series is I(0), and thus, markets exhibit some level of integration in the long run.

Among all pair of markets, the results reveal that there is high degree of market integration or long-run relationship between Beira and Chimoio. This was already expected based on evidences from the correlation coefficient, and also from the maize

trade pattern, since the Beira terminal market is often supplied with maize grain from the districts surrounding Chimoio area.

5.8.5 Vertical Market Integration

The cointegration test was also performed between retail and informal wholesale levels within a given market. The results reported in Table 5.8.5 show that there is Long-run price relationship between retail and wholesale maize grain markets. In the case of Maputo, the retail market completely assimilates wholesale market information within four weeks, while in Beira and Chimoio, the results are almost the same although with some different time lags. Therefore, the level of market integration between vertically-related marketing levels is high in Maputo, Beira, and Chimoio, while in Xai Xai is very small. This result in Xai Xai was already expected, based on the results of marketing margins presented above. Indeed, the wholesale-retail margin in Xai Xai is negative, and the result of the cointegration analysis suggests that there is a lack of coordination between retail and wholesale levels.

Table 5.8.5 Results of Cointegration Test for Maize Grain at Vertical Levels

Wholesale . . . Retail	δ	t-statistic (p-value)	Number of Lags
Maputo . . . . . Maputo	-1	-5.0801 (0.000)***	4
Xai Xai . . . . . Xai Xai	-0.27	-3.9540 (0.031)**	6
Maxixe . . . . . Maxixe	-0.69	-4.6350 (0.003)***	3
Beira . . . . . Beira	-0.99	-4.4762 (0.006)***	9
Chimoio . . . Chimoio	-0.95	-4.4777 (0.006)***	7

*** Significant at 1 percent level of significance; ** Significant at 5 percent level of significance

5.8.6 Dynamic Adjustments

Results of estimation of equation 5.4.5, which followed the results of Granger Causality Test, are reported in Tables 5.8.6a and 5.8.6b. In Table 5.8.6a, results for Durbin-Watson statistic (indication for serial autocorrelation) are presented, as well as the adjusted R^2 (overall performance of the estimated equations). Results for Durbin-Watson statistic indicate that there is no serial correlation in each estimated regression, which implies that the lag length based on AIC is good enough to capture irregularities in prices.

However, the adjusted R^2 is quite low, which means that current changes in maize prices in each market could be explained only partially by changes in its own past prices as well as current and historical price changes in other markets. Therefore, in his dynamic model of spatial price differential, Ravallion (1986) included a vector X as another exogenous variable to represent other influences such as seasonality, for instance. Proceeding as Ravallion did, the overall performance of estimation is improved slightly.

Table 5.8.6a Validation of the Autoregressive Model in Maize Grain Markets

Endogenous Variable	Exogenous Variable			Exogenous Variable in Ravallion Model		
	Maputo	**Beira**	**Chimoio**	**Maputo**	**Beira**	**Chimoio**
	Durbin-Watson Statistic			**Durbin-Watson Statistic**		
Xai Xai	2.01	-	-	2		
Beira	2.02	-	2	2		1.99
Chimoio	2.01	2.03	-	2.05	2.05	
	Adjusted R^2			**Adjusted R^2**		
Xai Xai	0.25	-	-	0.27		
Beira	0.21	-	0.29	0.29		0.34
Chimoio	0.06	0.09	-	0.12	0.11	

In Table 5.86b, the results of the dynamic price analysis for maize grain markets in Mozambique are presented. The results show that there is no perfect price matching between maize markets in Central and Southern Mozambique, since the contemporaneous price effect is far from the unitary. A close examination of the contemporaneous price effect shows that the impact of Maputo seems to be larger for markets that supply it with maize grain. In fact, the analysis of maize flows to Maputo presented in Chapter 3 had shown that Chimoio was one of the major suppliers of maize to Maputo, while the role of Xai Xai was secondary. Furthermore, the same analysis of maize flows pointed out that there is no role for Beira in supplying Maputo. All these results are reflected in the dynamic price adjustments whose results are presented below.

Table 5.8.6b Dynamic Price Adjustment in Maize Grain Markets

Pair of Markets	Contemporaneous Price Effect	Lagged Price Effect	
		Magnitude	Lag Length (Weeks)
Xai Xai . . . . . Maputo	0.1146*	0.3048	1
Beira . . . . . Maputo	0.0445	0.4753	1
Chimoio . . . . Maputo	0.2258***	0.546	2
Beira . . . . . Chimoio	0.1013**	0.5823	3
Chimoio . . . . . Beira	0.1245**	0.8	3

*** Significant at 1 percent level of significance.
** Significant at 10 percent level of significance.
* Significant at 15 percent level of significance.

The role of Maputo in the process of price formation is also supported by the magnitude of the lagged price effect. Indeed, past price changes in Maputo exerted a large influence on contemporaneous price change in all other markets, especially in Chimoio. In other words, if a market shock occurs in Maputo, 55 percent of that shock will be transmitted to Chimoio within two weeks, while 30 percent will be transmitted to Xai Xai within 1 week but very little thereafter. Other small markets located between Maputo and Chimoio could be responsible for absorbing some of the price shocks, resulting in an incomplete adjustment following price shocks.

Since the maize grain markets supplying Maputo cannot completely assimilate market information from Maputo, the speed of response is relatively slow. For instance, shocks in Maputo take two weeks to cause an effect in Chimoio, inducing therefore low pricing efficiency. This is even worst in the case of Beira and Chimoio, where a shock Beira may take three weeks to be felt in Chimoio.

5.9 Chapter Summary

The major objective of this study was to assess the performance of maize markets in Southern and Central Mozambique at the individual market levels and for markets linked spatially. Two analytical techniques were used to assess that performance, namely the descriptive assessment of the levels and volatilities of maize prices (and price spreads too), and also the econometric tests of price transmission across spatial markets and within levels of transaction.

By examining the nature of relationships among wholesale and retail prices in individual markets and among different markets, the analysis provided useful information, important to improve our understanding of the maize marketing system. This information may promote further debates among all participants in the maize marketing system toward the formulation of effective maize marketing policies.

In general, our descriptive results reveal that maize price (either at retail or wholesale) in Southern and Central Mozambique exhibits some level of volatility, completely normal based on the strong seasonality observed in maize marketing. Overall, prices are much higher in Southern markets (Maputo and Xai Xai), but are more volatile in Central markets, represented in this analysis by Beira and Chimoio. Recall that the Central Region is the surplus area while the Southern is the deficit, being supplied by the Central Region as well as by the producers' districts from the Southern Region.

The retail spread is always positive in all markets, except in Xai Xai. In general, the wholesale share as retail price is between 85 percent and 92 percent. In other words, retailers are adding between 8 and 15 percent over the wholesale price. However, the

retail margin as a percentage of the wholesale price is increasing significantly in Maputo and Chimoio, while in Xai Xai they are decreasing significantly. In Beira, is also increasing, but not statistically significant.

The results of marketing margins show that in average, a trader buying maize grain in the Central Region and transporting to Maputo has a net return varying 900 Mt ($US 0.05) and 46,000 Mt ($US 2.3), which gives a minimum return per day of labor of 2,000 Mt ($US 0.10) and a maximum of 570,000 Mt ($US 28.5), depending on scale of operation of maize traders.

The result of Granger causality test position Maputo market as the price leader, "Granger causing" prices in Xai-Xai and Chimoio. Our econometric results reveal that price's responses are non-unitary, suggesting that price changes are not perfectly matched across markets, and that price adjustment to new information originating from another market is slightly delayed. In average, if a price shock occurs in one market, an average of 54.2 percent will be transmitted to the other markets, a process that takes in average 2 weeks.

CHAPTER SIX

CONCLUSIONS AND IMPLICATIONS

6.1 Introduction

In this thesis, it is argued that well functioning of food markets is a prerequisite for attaining food security. As discussed in Chapter one, Section 1.3, this thesis aims at reaching one broad objective that is to gain a better understanding of the maize marketing system, especially in Southern Mozambique, to contribute to more effective food security policies and market growth for the benefit of farmers and consumers. For this purpose, the preceding chapters sought to answers the five research questions presented in Chapter 1, namely:

1. What are the maize production, consumption and marketing patterns among the rural population of Mozambique?
2. Are consumers in the Southern region of Mozambique, especially poor urban consumers and net buying farmer households in rural areas, utilizing less maize grain at relatively higher prices than in the past? If yes, what is the cause?
3. How is the maize marketing system structured in Mozambique, especially in the Central and Southern Region? Who are the major participants in the maize marketing system in Mozambique, and what are their roles?
4. Would it be competitive to import more maize grain from South Africa for use in a broader array of maize meals and for sale as grain in markets in urban and rural areas of Southern Mozambique, and if so, why is there not more maize grain

imported from South Africa for these purposes?

5. What are the costs of trade between Central and Southern Mozambique, and how well integrated over space are maize markets in these two regions?

This last chapter will summarize the major findings of the study, and also suggest policy conclusions which can be drawn.

6.2 Major Findings

6.2.1 Maize Production and Marketing Pattern

The analysis of maize grain in Mozambique smallholder livelihoods showed that maize grain is actively produced in all regions of the country. A majority of rural households produce maize grain primarily for home consumption. This was explicitly shown with the concentration and levels of maize production. In all regions, between 50 and 77 percent of the production of maize grain is concentrated among household who produce but do not sell.

The analysis also shows that maize sales are very concentrated. In all regions, between 71 and 77 percent of the volume of maize sales was accounted for by the top 25 percent of sellers, representing only 6 percent of all households in the Center and North, and only 1 percent in the South.

The top 25 percent of sellers are clearly better off as compared to other rural households in all categories studied. Overall, the top producers and seller have the largest percentage of marketed production, have maize yields more than double the average,

plant more than double the area, and have about double the amount of land per person in their households. Their incomes are also about double those of other rural households, they have significantly more assets and they are more literate, and have better access to price information. In addition, these households are less likely to be headed by females.

Purchases of maize grain or maize meal are widespread in rural areas, and are not confined to one single type of household. In the Southern Region for instance, some 75 percent of rural households either do not produce or produce on average only 200 Kg, and these households are the ones who indicated they buy more from the market. This situation is also aggravated by the inability of emerging maize millers to get sufficient maize grain from domestic markets during the hungry season, thus reducing maize meal availability during this season. Perhaps more importantly, this inability of millers to source grain domestically is an indicator that households may not be able to purchase as much grain as they want. This is important because, when compared to maize meal, maize grain is the cheapest option, and would therefore be chosen by many poor households if they had the option. Therefore, if the market for maize grain and maize meal, as well as for other products, does not work well enough, a large number of rural households will be affected, especially during the hungry seasons.

6.2.2 Maize Expenditure

Based on IAF results, there was no change in national average percentage of total households' expenditures (budget shares) allocated to maize and its derivatives between 1996 and 2002. In 1996, households spent on maize and its derivatives as much as in

2002 (15 percent), registering generally similar patterns on total expenditures for wheat and rice over the period.

However, disaggregating the national picture, rural and urban expenditure patterns by regions of the country shifted significantly, and in patterns that reinforce the importance of the present research about the degree of availability and cost of maize products in Southern Mozambique. For example, in 2002, households in the rural South (Maputo, Gaza and Inhambane) were still relying significantly on maize and its derivatives, but its relative importance fell approximately in half compared to 1996. The budget share for cassava products also fell significantly, while expenditures on rice rose from 6 to 11 percent in rural Maputo, and from 6 to 9 percent in rural Gaza and Inhambane. The expenditures on wheat and its derivatives held about the same over the two periods in rural areas.

In contrast, households in rural areas of Central Mozambique (Sofala, Manica, Tete and Zambezia) expanded the share of maize and derivatives to much higher levels (almost doubling their already high share). Meanwhile, the importance of rice and wheat held about even, while the role of cassava products increased modestly, and were about half as important as maize in rural Sofala and Zambezia.

Turning to the urban areas, in 2002, the percentage of total food expenditure allocated to maize products went up in both the South and Center Regions, and while the absolute role was still modest in Maputo, it became much more important in the other parts of the urban South and Center (in urban areas of Gaza and Inhambane, maize surpassed rice in importance between 1996 and 2002). Maize products also became more

important in the urban as compared to rural areas of Gaza and Inhambane. Wheat products went down modestly or retained their relative position of 1996, and still dominated the basic commodity groups only in the South.

In urban areas, rice actually went down significantly in the South and remained about the same in the Center. Also, rice's relative position is strongest in Beira, lower in Xai Xai, and lower still in Maputo. Overall the share of basic cereals and cassava for urban households in Maputo (South) decreased from 1996 to 2002.

In general, the disaggregated picture from the IAF expenditure/budget share analysis reveals important changes from 1996 to 2002. There is a pattern of shifts into maize products in all areas studied, with the exception of the rural South where maize products lost the strong dominant budget share position held in 1996. And in the rural South, it appears that households may have tried to compensate with shifts into fruits and leaves, and to also a lesser extent into rice.

Nevertheless, the analysis of expenditure shares by tercile of total household expenditure pointed out that maize grain clearly remains the dominant staple in rural areas of Mozambique, although rice (as well as cassava) in the South is potentially important for the lowest income consumers. In urban areas, rice and wheat have gained major market shares in consumption habits of the South. Besides the specific characteristics of these products (convenience, for instance), a likely reason for this patterns can be related to policies that change the relative availability and cost of these goods.

6.2.3 Maize Subsector in Southern and Central Mozambique

In Chapter III, we analyzed the structure of maize market transactions in Central and Southern Mozambique. TIA data show that in the South (Maputo, Gaza, and Inhambane provinces), about 1% of all farmers accounted for more than three-quarters of all maize sales. In the Center (Tete, Manica, and Sofala provinces) and North (Zambezia, Nampula, Cabo Delgado and Niassa), about 6% of farmers accounted for about less than three-quarters of all sales. TIA data also show that production in each region is geographically dispersed: In the South, no district had more than 12% of total regional sales, while in the Center no district exceeded a 15% share. These results make it clear that the large producers and sellers are spread over a large geographic area, implying very high costs of assembly.

According to the marketing channel approach, in the Southern region, 97 percent of the total production in the region is retained at home, while the remaining is sold or intended to be sold in the market. In the Central region, the situation is also similar, with 86 percent of the regional production being retained at home and the remaining sold in the market.

In both regions, maize grain moves from producers to several buyers such as formal traders and owners of rural shops, but the most important ones are informal traders. Indeed, in the Southern Region and also in the Central Region, they are responsible for more than half of maize grain bought from maize producers. Therefore, informal traders are the more important participants willing to bear all costs of collecting the disperse maize grain production. Also, they are responsible to bring maize from

production areas to consumer markets.

It is interesting to note that in the Central Region, the second most important flow of maize grain from producers is to neighboring countries. This is important in the sense that these countries are competing with the Southern Regions for maize grain produced in the Central Region. The analysis of SIMA data as well as the results of maize traders surveys show that Central Region of Mozambique is the major supplier of maize grain for the markets in the Southern Region. Maize grain is still flowing from districts of the Manica and Sofala provinces to markets in the South, and this flow has been continuing since the end of the civil war in 1992 despite the pressure from neighboring countries.

The costs the informal traders incurred for bringing maize from Central to Southern Region can be classified in transport and other small marketing costs. This last cost includes the daily living expenses, and also handling costs.

Several problems in the maize marketing in Mozambique that impedes the growth of the market participants are related to lack of credit, absence of market information widely and timely available, and underdevelopment of tertiary roads. Because information on trade opportunities is difficult to obtain, it is important for these traders to set up an expensive network of assemblers who know local market conditions. Maize traders often spend several days waiting for transport, which is most of the times backhaul.

Medium and large maize millers are other important participants in the maize marketing system. However, contrary to informal traders that purchase maize grain from producers, large scale millers mainly rely on imports of maize grain to satisfy their

demand, while the medium scale depend primarily on local purchases, complemented by imports from South Africa, especially during the hungry season. The need for good quality grain as well as regular supplies throughout the year drives these imports.

The concentration is high in the milling industry, with the largest two millers holding about 70 percent of the market. The emergence of small to medium scale commercial millers increases the competition in the milling sector. These small to medium commercial millers are trying to carve out market niches for a quality of maize meal that is made primarily from national production, and that is priced to compete well with the highly refined maize meals made mostly from imported white maize grain from South Africa and the USA by large industrialized millers.

6.2.4 Impact of VAT on Maize Imports

Maize grain, on the contrary of rice, edible oil, bread, and maize meal, is not exempt of VAT payments during imports. But if it is processed into maize meal, the total amount paid on VAT during the process is reimbursed to the miller. This process of charging VAT on maize imports affects mainly those traders interested in importing maize grain to be sold as grain in the market, since they cannot get back the money invested on VAT payments.

The analysis of the impact of VAT on maize imports shows that it would have frequently been profitable to bring in maize grain from South Africa if no VAT was charged. With VAT being charged, the analysis shows that usually it was not profitable to import maize grain, even though there were some extended periods when it was still

profitable, but imports did not occur.

The VAT charges may be a potential disincentive to the emergence of more informal as well as formal maize trade from neighboring countries, especially from South Africa, to millers and consumers in the South. The fact that the VAT is reimbursable only if the grain is processed into meal creates an immediate disincentive for the importation of maize grain for sale as grain. Since there is evidence that maize grain becomes seasonally scarce in the South, this unlevel playing field for maize imports has serious implications for the welfare of rural households, most of whom are net buyers of maize.

The unequal application of the VAT is, however, not the only reason for the poor state of trade in maize grain between Mozambique and South Africa[6]. The regulation to import maize grain is very heavy for an informal trader, contributing therefore to the poor state of trade between these two countries. Also, the high level of formality, large scale of operation, and lack of easy availability of maize grain at what might be termed the "petty wholesale level" within the South African system contributes to this situation.

6.2.5 Performance of Maize Subsector

The results of net marketing margins analyzed at one point in the system (informal assemblers/wholesalers in Maputo) suggest that maize trade between Central and Southern Region is profitable when the destination market is Maputo, but that this

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6 This trade works well for large and some medium scale millers, but quite poorly for smaller importers

depends greatly on the scale of operation of the trader.

Results of the market integration analysis show that Central-South trade in Mozambique is still somewhat weak. Maize traders' responses to inter-market shocks are fragmented and incomplete, as indicated by the contemporaneous price effect being less than unitary, suggesting that market signals are inaccurately read and translated.

Reaction time to unanticipated market news is typically sluggish, exceeding one week, suggesting a break-down in the transmission and processing of new information. However, based on the structure of the maize subsector in Mozambique (majority of households do not sell any maize, disperse production, lack of credit, lack of access to market information, problems with transports, for instance), a price reaction that takes a week or two seems good, and may not be judged as a poor performance.

6.3 Policy Implications

The picture which emerges from our findings is that most rural households in the South and even in the Center purchase more maize and maize meal than they sell, that they are paying the highest maize meal prices in the Southern Africa region despite the recent emergence of medium-scale millers, and that they probably have difficulty obtaining maize grain – always the cheapest option – in markets during the hungry season, due in part to policy, regulatory, and other difficulties involved in importing maize grain for sale as grain.

Based on these findings, it is possible to formulate some recommendations that might be initiated by policy makers or development institutes. Nevertheless, it is

important to emphasize that implementing only a single improvement in the maize marketing system will not have the wished effects.

The policy implications of the above findings for the households' food security are all important, especially for households in the Southern Region. First, because most of the rural households are net buyers of maize grain, policies and investments to make maize grain more available in the South at prices much lower should be put in place to mitigate the high costs of maize meal.

Such policies may be the relaxation of some requisites to import maize grain by informal traders wishing to import FOB values above $500USD, for instance. If this seems so important for maize traders (not just informal), training them in issues related to import procedures (and perhaps issues related to maize marketing system in South Africa) is also crucial because part of the problem is that they just do not understand the procedures.

Another policy implication of the findings is related to VAT. Although it does not generate any revenue to the government, the government may be hesitant to remove it for any maize transaction. Removing VAT for maize grain may open a window to importers of other goods susceptible of VAT payments to also ask for VAT removals. Yet the government did remove permanently VAT during the last trimester of 2004 for edible oil, and sugar; also, rice, bread, and maize meal has been exempt from VAT since its introduction in 1999. Given this situation, and the way in which the VAT inhibits imports of maize grain for sale as grain (which would be the cheapest option for poor households), we believe that the government should seriously consider removing it for

maize grain.

Increased competition in the milling sector is desirable, and if it is true that this may happen through an "invisible hand" as small and medium commercial millers expand, it is also true that the government role may not be static. For example, government may reduce import taxes for milling machinery, especially medium and small scale machinery. This action may provide an incentive for new investments or even expansion of small and medium scale millers.

The Mozambican policy makers and development institutions should make a commitment to create and support local initiatives to improve maize production in rural areas, and also to strength the extension services, creating for instance, extension programs to make all participants in the maize marketing system sensible to the problem of maize grain quality.

Food security in rural areas should also be promoted by improving the production of cereals in general. This is reflected by the importance of the value of cereals consumed and sold on farms, especially in the Central Region. Improving households incomes by increasing sales of commodities with high monetary value only, will not have the desired effects on household food security.

Expansion of market information systems into more remote areas of the South, perhaps in collaboration with Early Warning and Vulnerability Assessment units, should be considered. More information on availability and prices of basic commodities in these areas may be useful to monitor how the current situation of food security hurts rural households, and then to inform policy makers. Timeliness of widespread dissemination

for this information should be stressed: If market participants have accurate and timely information on market conditions, maize markets may be able to respond more quickly to market shocks, and market linkages can efficiently and effectively distribute maize grain from surplus to deficit areas.

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