

**MINISTRY OF AGRICULTURE
AND RURAL DEVELOPMENT**

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Research Paper Series

**TOWARD IMPROVED MARKETING AND TRADE
POLICIES TO PROMOTE HOUSEHOLD FOOD
SECURITY IN CENTRAL AND SOUTHERN
MOZAMBIEQUE: 2007 UPDATE**

By

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Research Paper Series

The Directorate of Economics of the Ministry of Agriculture maintains two publication series for research on food security issues. Publications under the Flash series are short (3-4 pages), carefully focused reports designated to provide timely research results on issues of great interest. Publications under the Research Paper series are designed to provide longer, more in-depth treatment of food security issues. The preparation of Flash reports and Research Reports, and their discussion with those who design and influence programs and policies in Mozambique, is an important step in the Directorate's overall analyses and planning mission.

Comments and suggestion from interested users on reports under each of these series help identify additional questions for consideration in later data analyses and report writing, and in the design of further research activities. Users of these reports are encouraged to submit comments and inform us of ongoing information and analysis needs.

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Toward Improved Maize Marketing and Trade Policies to Promote Household Food Security in Central and Southern Mozambique: 2007 Update

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This paper draws on insights generated from previous and on-going research on agricultural marketing and policy issues conducted by the Department of Agricultural Economics at Michigan State University (MSU) in collaboration with colleagues in the Ministry of Agriculture of Mozambique. Support for this analysis was provided by the Rockefeller Foundation, USAID/EGAT and Africa Bureau, and the World Bank. Support from the USAID mission, and from the Ministry of Agriculture and Ministry of Plan and Development in Mozambique, is also acknowledged for their role in financing the collection and analysis of household survey data reported in this study.

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LIST OF ACRONMYS

CIM	<i>Companhia Industrial de Matola</i>
DAP	Ministry of Agriculture's Policy Analysis Department
FEWS NET	Famine Early Warning Systems Network
IAF	<i>Inquérito às Famílias</i>
IIAM	Institute of Agricultural Research of Mozambique
IPP	Import parity prices
MOA	Ministry of Agriculture
MSU	Michigan State University
RSA	Republic of South Africa
SIMA	Agricultural Market Information System of Mozambique
SSA	Sub-Saharan Africa
TIA	National Agricultural Household Surveys
USAID/EGAT	United States Agency for International Development/Economic Growth and Trade
VAT	Value Added Tax

EXECUTIVE SUMMARY

As indicated by the title, this paper is an update of Research Paper 60E. While some of the wording and material are very similar to that paper, this new paper updates nearly all figures, and also deals in more detail with selected topics. Of special focus in this paper is demonstrating, explaining the reasons for, and assessing the importance of the very high prices of food staples in Mozambique.

Mozambique's food production and marketing system faces a huge set of challenges now and over the next decade, driven by structural constraints, population and income growth, and a rapidly rising urban share of population. We examine this challenge through the lens of the country's primary staple, maize, focusing primarily on the central and southern regions of the country.

After presenting summary information on data sources, we examine trends in population growth, urbanization, and consumption patterns, highlighting the production and marketing challenge that the country faces. Section 4 examines the structure of maize production and farm level marketing. Section 5 reviews urban and rural consumption shares of maize relative to other staples, and estimates the proportion of net maize buyers in rural areas. Section 6 asks why maize meal prices are so high in Mozambique and examines the structure of maize milling, along with policy issues, for potential explanations. Section 7 asks to what extent these high prices matter to consumer welfare. Section 8 concludes with suggestions for policy steps which might address some of the constraints identified, and for further research.

Mozambique's urban population share is estimated to be above 35%. Rural population growth rates were barely positive between 2000 and 2005, compared to about 4% annual urban growth rates. These growth rates will lead to an urban population share of 44% by 2017. Even if economic growth slows from recent rates, total urban demand for maize is likely to double over the next decade while the number of farmers will increase only slightly. The country will also need to continue feeding a large number of rural net buyers. The rise in urban demand represents a huge growth opportunity for Mozambican farmers. Yet the growth in demand could easily be satisfied by imports from South Africa if productivity in production and marketing in Mozambique does not improve.

Less than 5% of maize producers account for over 50% of production and over 70% of sales. Unit marketing costs are high, quality is generally poor, and it is difficult to provide reliable supplies to large buyers, especially in the South. As a result, the largest millers in the country, located in Maputo, rely almost exclusively on maize grain imported from South Africa. Medium-scale millers in the Center and South rely primarily on local production, but hold very small market shares. Penetrating the growing industrial maize milling market will require major public and private investment in supply chain development (see the final section of this Summary for details).

About 70% of rural households in the Center and South are net buyers of maize; total rural market demand for maize rivals that in urban areas. Especially in the deficit rural South, this means that maize grain availability and prices during the hungry season can have major impacts on household real incomes.

Maize shares in total food expenditure in urban Maputo province are 2.4%, compared to 7.4% for rice and 15.5% for wheat. The maize share rises outside of Maputo, to 14.5% in other southern provinces and 40% in the Center.

Only about one-third of maize consumers in Maputo rely primarily on maize grain for their maize supplies; about two-thirds primarily purchase refined maize meal. In cities outside of Maputo, about 70% of consumers rely primarily on maize grain. We attribute the surprisingly low share of consumers in Maputo relying on maize grain to the low price and widespread availability of rice, the resulting very low budget share of maize, especially for higher income consumers, and the buying habits of low income consumers, who tend to buy very small quantities at a time, making hammer milling infeasible and hand pounding less desirable.

Maize meal prices are extremely high in Mozambique. The leading brand cost about US\$680/mt in early 2007, while the cheapest was about US\$440. Maize grain at retail was about US\$270/mt during the same period in Maputo. These prices compare to a range of US\$250-US\$330 for comparable meals in Zambia, and grain prices of US\$190. This very wide differential between grain and meal prices in Mozambique may be related to the structure of the industry: the largest miller in the country holds as high as 80% of the market in Maputo, and the closest competitor holds nearly all the remaining 20%. Both also sell into major cities and rural areas throughout the country. A 20% duty on imported maize meal effectively eliminates the possibility of competition from that source. At least four new millers have come into the market over the past six years, but they have much lower milling capacity. At least in the South, they have a very small market share and have had no appreciable effect on prices charged by the leading millers.

The small-scale milling sector provides little competition for industrial milling in the South; after booming in the early 1990s, the sector began to decline with the end of large food aid arrivals after 1993, and by 2003 it was difficult to find hammer mills in the city. The decline of this sector in the South is related primarily to a lack of demand for its services, and much less to policy.

Mozambique's 17% Value Added Tax (VAT) is applied to imported maize but not rice or wheat. Maize meal is exempt but maize grain is not, meaning that grain imported for sale as grain must pay the VAT, while grain imported for meal receives a reimbursement. Thus, in principle, the application of the VAT favors rice and wheat relative to maize, favors the availability of maize meal over maize grain at retail, and favors large industrial millers over smaller traders and hammer millers. In practice, however, imports of grain for sale as grain have not occurred despite several prolonged periods where such imports would have been profitable. We attribute the absence of imports by small traders to complexities in import procedures and to the high degree of formality and large scale of the South African maize marketing system. The lack of imports by larger scale formal traders is due to a combination of factors: consumers in Maputo have access to a low cost option in rice, they spend very little on maize, and most of them are therefore willing to pay the high premium for refined meals on the small quantities that they buy.

Given the high budget shares for maize in the Center of the country, high prices for industrially processed maize meal have always been a matter of concern in that region. In the South, where the maize budget share is much lower, high maize meal prices matter more now than they did two years ago because the real price of rice has risen 40% during

that time. By late 2006, the prices of breakfast meal and rice were about \$0.68/kg and \$0.56/kg, respectively. In Zambia, breakfast meal prices (rice has a very low budget share in Zambia) ranged from about \$0.25 to \$0.33/kg. Staple food prices are, thus, much higher in Mozambique than they are in Zambia. In this context, the high price of industrially processed maize meal must be considered an important policy issue. Additionally, policy makers need a much better understanding of the market for rice imports, especially the extent to which it is competitive and fairly transmitting world prices to Mozambican consumers.

Government could take several steps to improve competition in the maize milling sector. The most immediate impact on competition would be achieved through a reduction in the current 20% import duty on maize meal. This is scheduled for eventual elimination by 2015 for imports from South Africa, and 2012 for all other imports. More rapid reduction, perhaps to 10% starting January 2008, could provide meaningful competition to domestic millers. Other steps involve reducing the cost of supplying maize grain to Maputo and the rural South – whether through domestic production or imports – so that more consumers can choose to purchase grain rather than meal, and either hand pound it or take it to hammer mills. To reduce the cost of maize supplies from domestic production, government should collaborate with private sector in a maize supply chain development program. Key elements in this program would include:

- More active market information focused on farmers in the Center (and promising areas of the South) and the traders that supply the South from the Center;
- Training of farmers in post-harvest handling procedures to improve quality, and programs to facilitate adoption of improved on-farm storage technology;
- Training for these traders in basic accounting and post harvest handling;
- Promoting more efficient rural assembly of grain through recognized market days, improved physical infrastructure in assembly points, and improved transport services linked to these assembly points;
- Focusing investments in road infrastructure on feeder roads into and trunk roads out of these assembly points; and
- Improved marketing infrastructure in public terminal markets of Maputo, Beira, and perhaps other key cities of the South and Center. Improved storage and sales point infrastructure would be especially useful.

Financing of the program would need to involve public, private, and donor funds.

Maize grain imports for the South will be a crucial complement to domestic production for the foreseeable future. At least two measures could be taken by government to facilitate efficient trade in maize. First, government might consider converting the value limit in the simplified regulatory procedures for small-scale maize imports to a volume limit, and increasing this limit to perhaps 20 metric tons per month. This change would substantially expand the number of informal traders who could take advantage of these provisions, and would reduce their unit costs. Second, government should consider phasing out the VAT on maize grain. Because all imports currently are for processing into meal, resulting in eventual reimbursement of VAT, the tax generates no permanent income for the state. Furthermore, although the VAT alone has not acted as a binding constraint on maize imports for sale as grain, it could become a constraint if the reforms in import procedures suggested above are instituted. Finally, if the above two measures are taken, government and donors could consider special programs to facilitate rehabilitation of the hammer milling sector in the South, which has steeply declined over the past decade.

Toward Improved Marketing and Trade Policies to Promote Household Food Security in Central and Southern Mozambique: 2007 Update

David Tschirley and Danilo Abdula

1. INTRODUCTION

Mozambique's food production and marketing system faces a huge set of challenges now and over the next decade, driven by structural constraints, population and income growth, and a rapidly rising urban share of population. Decisions the country makes now, and actions it takes over the next decade to meet these challenges, will have major impacts on its macro-economy, on the level and distribution of income growth in rural and urban areas, on rural-urban migration, and through these on the economic, social, and political dynamics of the country for many years to come.

In this paper we examine this challenge through the lens of the country's primary staple, maize. As indicated by the title, the paper is an update of Research Paper 60E of the same title. While some of the wording and material are very similar to that paper, this new paper updates nearly all figures, and also deals in more detail with selected topics. Of special focus in this paper is demonstrating, explaining the reasons for, and assessing the importance of the very high prices of food staples in Mozambique. We choose maize among the country's several staple foods (including cassava, rice, and wheat products) for a combination of reasons. First, it is the most widely produced staple in the country. In no province do fewer than two-thirds of rural households produce maize; rice's participation, in contrast, falls below 10% in four provinces, and wheat is not produced locally at all. Second, maize is the most widely sold staple in the country: cassava rivals maize in breadth and level of production, but three times more households sell maize than sell cassava. Third, maize is the only staple food in Mozambique which is regularly exported, generating substantial income for smallholder farmers in the Center and North of the country. Finally, maize is the most widely consumed staple across the country, occupying as much of the average national budget share in 2002 as rice, cassava, wheat, sorghum, and millet combined.

We focus this paper primarily on the central and southern areas of the country, because these regions, with South Africa, form a natural "marketshed" due to production patterns and costs of transport. Maize from Mozambique north of the Zambezi River flows almost entirely to northern cities or to Malawi, or feeds net buyers in rural areas of the North.

The paper is organized as follows. First we present summary information on the various data sources used in the paper. Next we briefly examine trends in population growth, urbanization, and consumption patterns, highlighting the dimension of the production and marketing challenge that the country faces. Section 4 examines the structure of maize production and farm level marketing in the country. In Section 5 we review urban and rural consumption shares of maize relative to other staples, including the extent to which farming households rely on purchases of maize and other staples to meet their needs. Section 6 asks why maize meal prices are so high in southern and central Mozambique compared to neighbors in southern Africa, and section 7 asks to what extent this matters for poor consumers. Section 8 concludes with suggestions for policy steps which might address some of the constraints identified, and for further research.

2. DATA

This paper relies on a broad range of data sources. Overall population and rural/urban growth rates in section 3 come from the United Nations *World Population Prospects: The 2005 Revision*. More detailed information by province and city are from <http://www.citypopulation.de>. The Ministry of Agriculture's 2002 and 2005 National Agricultural Household Surveys (TIA 2002 and TIA 2005) provide nationally and provincially representative data on smallholder households' income strategies, including the production and marketing of food crops. These data sets form the basis for the analysis in section 4. The Ministry of Plan and Finance (now Ministry of Plan and Development) carried out its *Inquérito às Famílias* in 1996 and 2002 (IAF 1996 and IAF 2002). These expenditure surveys provide nationally and provincially representative data for urban and rural areas on total household expenditure and budget shares for specific items or groups. These data are utilized in section 5 when we examine urban and rural consumption patterns. Data from TIA 2002 indicating whether or not households purchased selected staple foods are also used in this section. Because available IAF data do not distinguish between purchases of maize grain and maize meal, nor between various types of meal, the Ministry of Agriculture's Policy Analysis Department (DAP) and Agricultural Market Information System (SIMA) have collaborated on several smaller-scale surveys over the years, including:

- The 1994 Maputo Maize Consumer Survey, which randomly selected 388 households in poor neighborhoods of Maputo and interviewed them about their maize grain and meal purchasing and processing practices;
- The 2003 Consumer and Small-Scale Miller Survey, a follow-up to the 1994 survey, which randomly selected 305 households in poor neighborhoods of Maputo, Xai-Xai, and Beira;
- The 2005 Maize Trader and Miller surveys. This set of surveys included interviews with the top five millers in the country, and 100 rural traders across the country; and
- Small special purpose surveys of food staple retailers in Maputo during early 2005 and again in early 2007.

Time series price data come from SIMA's data base of weekly prices in 25 markets across the country, spanning 1991 to the present.

3. KEY TRENDS AND CHALLENGES

Urbanization in Mozambique has proceeded at a very rapid pace over the past two decades¹. From official figures of less than 10% in the 1970s, and a commonly cited figure of 15-20% in the early 1990s, the country's urban population share is now estimated to be above 35%. After a brief surge following the end of the civil war in late 1992, rural population growth rates are currently estimated at about 0.5%, compared to 4% annual urban growth rates. At expected growth rates over the next decade, the urban population share will reach 44% by 2017. These patterns mean that a key challenge for Mozambique over the next decade – as for most other Sub-Saharan Africa (SSA) countries – will be how to feed a rapidly rising urban population. In the Center and South of the country, this population is expected to rise by two- to three million people over the next decade, while the rural population is expected to rise only slightly. Fifteen years ago there were about four rural residents (nearly all of them farmers) for every urban resident. Today that ratio is less than 2:1, and in a decade's time will fall to about 1.25:1.

Economic growth will increase the size of this challenge. Even if growth slows from the strong and sustained levels it has registered over the past decade, total urban demand for maize grain for human and animal consumption is likely to increase by 75% over the next decade² while the number of farmers available to meet that demand will rise by less than 5%.

The country will also need to continue feeding a large number of rural net buyers. In 2002 and 2003, nearly three-quarters of the households in the South and two-thirds in the Center purchased maize and either did not sell any, or sold less than they purchased: they were net buyers of maize. This fact, along with current urbanization levels, means that in 2005 rural *market* demand for maize was comparable to urban market demand; although the share of rural market demand in total demand will fall over the next decade due to the growth patterns explained above, it will remain an important part of the national market for years to come.

In meeting the challenge of rapidly increasing urban maize demand and continuing high levels of purchases in rural areas, Mozambique will need to provide remunerative prices to farmers to stimulate production, but accessible prices to consumers (both rural and urban), the vast majority of whom remain very poor. In general, this needs to be done through an efficient combination of domestic production and marketing, and imports. Yet the share of domestic and imported maize that constitutes an “efficient combination” depends critically on productivity and the level of competition throughout the domestic production and marketing system. If Mozambican production and marketing are very inefficient, then it is economically “efficient” to import relatively larger quantities; yet the country would be much better off if it could increase the efficiency of its domestic system and reduce imports in that way.

The challenge and opportunity can be seen by examining current and future patterns of urban demand and imports. Currently, urban demand for maize in the South and Center of the

¹ A change in the definition of “urban” in the 1999 census may have biased upwards somewhat the official figures on urbanization, but long-term trends from 1950 to present are consistent with the picture painted here. <http://www.NationMaster.com> is a helpful website for various types of national data, with good documentation of and links to sources. Tiffen (2003) is an important reference on the implications of urbanization for agricultural development policy.

² Increased demand for livestock products, especially poultry, will be a key driver of this derived demand for maize.

country is about 200,000 metric tons per year, of which perhaps 70,000 mt are imported³. This means that about 130,000 mt of domestic production flow to urban areas every year. By 2017, total urban demand is likely to be nearly 350,000 mt⁴. This represents a huge growth opportunity for Mozambican farmers; domestic marketing would have to nearly triple to displace imports and meet all this demand. Yet the growth in demand could very easily be satisfied by imports from South Africa – the country produces roughly 10m mt per year – if productivity in production and marketing in Mozambique does not improve. What needs to be done for domestic production and marketing to keep pace with this very rapid growth in demand, especially as the number of rural producing households falls? What will be the consequences if the country fails to meet this challenge? We begin to explore this question in the next section by examining the structure of production and marketing of maize at the farm level.

³ Urban demand figures are based on urban population data combined with maize calorie and budget shares from various sources; imports are based on reports from the major millers in the Center and South.

⁴ Based on projected population growth rates, annual per capita income growth of 3%, and an income elasticity of demand for maize of 0.50.

4. THE STRUCTURE OF PRODUCTION AND MARKETING AT THE FARM LEVEL

Discussions of agricultural production, marketing, and trade in Mozambique have a strong geographical focus due to distinctive features of the country's geography and related agro-climatic factors. In this paper, we define the South as the provinces of Maputo, Gaza, and Inhambane; the Center as Sofala, Manica, and Tete, and the North as Zambêzia, Nampula, Cabo Delgado, and Niassa (Figure 1). Rainfall in the northern four provinces is generally more reliable than in provinces to the south, and is less correlated with rainfall in the Southern Africa region. For example, during the devastating regional drought of 1992, and the less severe but still widespread drought of 1995, rainfall and production in these four northern provinces was relatively unaffected. Rainfall in the Center is strongly correlated with that in the Southern Africa region and is more variable than in the North, but is more abundant and more reliable than in the South. Geographically, the country is long and narrow along a north-south axis, with the major metropolitan area (Maputo/Matola)⁵ located in the far South. As a result, distances from northern production zones to consumption centers to the south are much longer – and transport costs higher – than they are to or from neighboring countries to the west. East-west rail links, built during the colonial era to facilitate trade with the colonial powers, reinforce the natural advantage of east-west, as opposed to north-south, trade. Finally, the Zambezi River separates Zambezia province from Sofala province to the south (and part of our Northern region from our Center) and has no bridge except in Tete province to the west. As a result, the river acts as a natural barrier to trade for a low value product like maize; as we show in Figure 1, maize leaving rural areas north of the river almost all flows into northern cities or Malawi, while south of the river it flows primarily to central and southern cities.

During any given year, the north of the country accounts for about half of Mozambique's maize production and nearly 60% of its sales, despite the fact that it has the lowest proportion of households growing maize of any region (Table 1). These patterns are driven by the concentration of rural population in the provinces of Zambezia and Nampula of the North, which between them have nearly 40% of the country's population. Production and sales in the South are very low, meaning that this region depends on production in the Center, complemented by imports from South Africa, to feed itself. Mean household maize production and sales are highest in the Center.

⁵ Together, Maputo and Matola have more than three times the population of Beira, the second largest city in the country, located in the Center.

Figure 1. Map of Mozambique Showing Regions and Principal Maize Flows

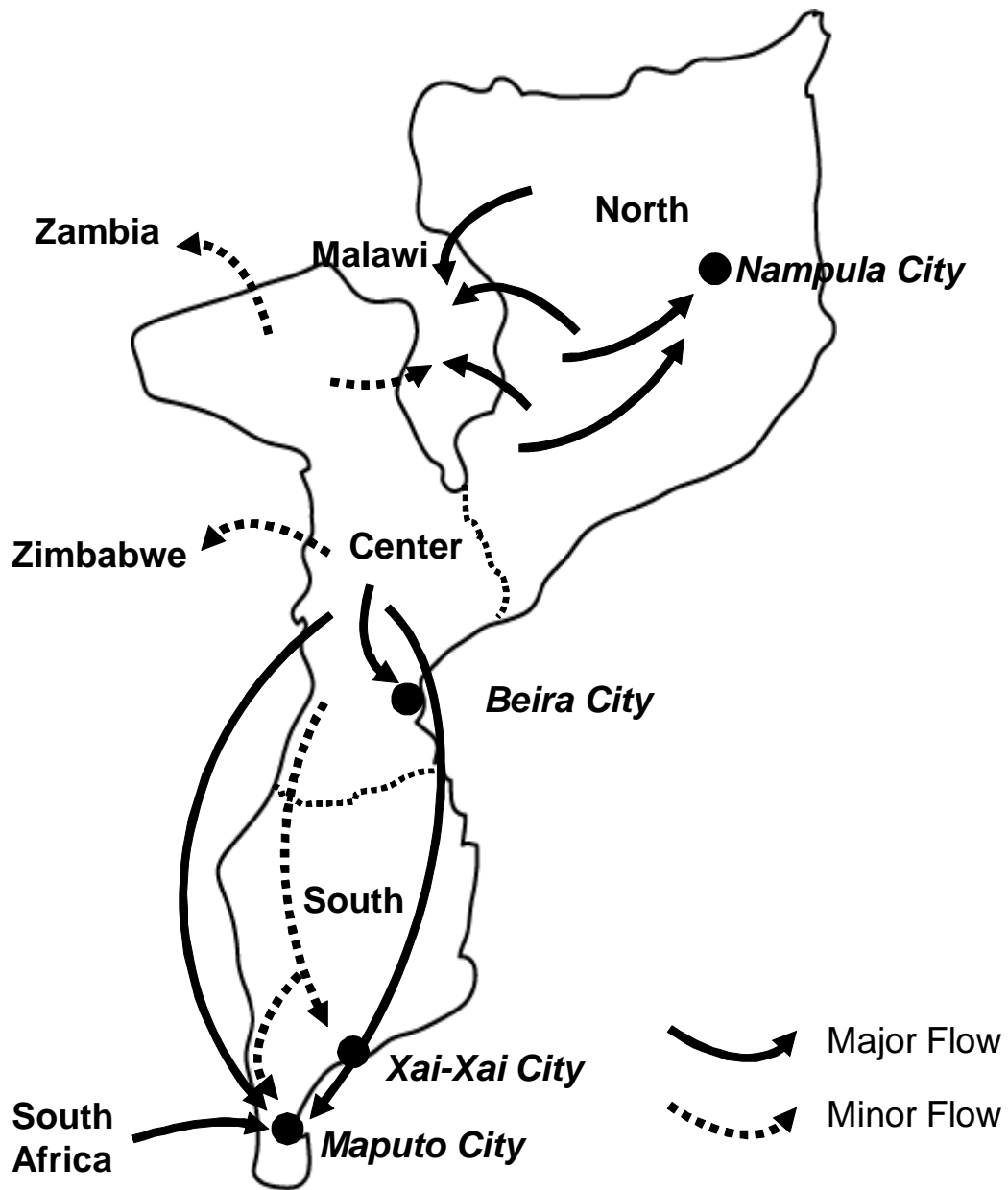


Table 1. Maize Production and Sales Indicators by Region of Country (2004/05 Production Year)

	Region			
	North	Center	South	Total
% of National Population	51	23	26	100
% of National Production	52	41	7	100
% of National Sales	57	41	2	100
Household Level by Region				
% Planting Maize	73	94	82	-
% Producing Maize	70	86	59	-
Mean Quantity Produced among Those Producing (Mean Kg)	339	659	192	-
% Selling Maize	28	24	4	-
Mean Quantity Sold among Those Selling (Mean Kg)	193	372	151	-

Data Source: TIA 2005

To examine the structure of production and marketing, we break smallholder households in each region into six mutually exclusive groups: those who did not produce maize, those who produced but did not sell, and quartiles of sales among those producing and selling (Tables 2-4). Several patterns stand out. First, production and especially sales are highly concentrated. In the North, only about 20% of households sell maize, and the top quarter (about 5% of the population) account for about 70% of all sales. Patterns are similar in the Center: about one-quarter of rural households sell maize, and those in the highest quartile (about 6% of the population) account for nearly 80% of all sales. In the South, less than 1% of households account for nearly 70% of sales. These top sellers cultivate more total area and devote more area to maize than other groups, and achieve substantially higher maize yields. Second, the largest producers and sellers are located in the Center. The largest quartile of sellers in that region achieve mean maize production more than double their cohort in the North and nearly double their cohort in the South; the sales of this group in the Center are more than double those of their cohort in both of the other regions. Finally, nearly 50% of households in the North and well over half of the households in the Center and South purchased maize grain or maize meal during the 2005 agricultural season: 48% in the North, 65% in the Center, and 75% in the South.

Table 2. Production and Marketing Characteristics by Category of Maize Production and Sales Behavior: Northern Region (2005 Harvest Season)

Indicator	Households With No Production	Households With Production But No Sales	HHs with Production and Sales (Sales Quartile)			
			1 (Lowest Sales)	2	3	4 (Highest Sales)
% of HH in Region	30.2	49.4	4.4	4.7	6.1	5.1
Median Years of Education of Household Head	1	2	2	2	2	3
% of Maize Produced in Region	0	51.5	4.0	6.1	11.7	26.7
% Maize Sold in Region	0	0	3.2	7.1	21.1	68.6
Mean Quantity Produced per HH in Kg (Median)	0	247 (135)	213 (145)	304 (208)	454 (360)	1,239 (805)
Mean Quantity Sold per HH, among those Selling in Kg (Median)	0	0	28 (35)	59 (50)	136 (139)	527 (400)
Average Percent of Production Sold	0	0	27.1	32.9	40.9	53.6
% of HH Buying Maize or Maize Meal	58	48	43	34	38	26
HH Area per Capita	0.37	0.34	0.32	0.35	0.37	0.71
Total Area of Maize per HH (Ha)	0.29	0.50	0.46	0.54	0.72	1.13
Mean Maize Yield (Kg/Ha)	0	611	627	813	818	1269

Data Source: TIA 2005

Table 3. Production and Marketing Characteristics by Category of Maize Production and Sales Behavior: Central Region (2005 Harvest Season)

Indicator	Households With No Production	Households With Production But No Sales	HHs with Production and Sales (Sales Quartile)			
			1 (Lowest Sales)	2	3	4 (Highest Sales)
% of HH in Region	14	63.2	5.8	5.5	5.5	6.0
Median Years of Education of Household Head	2	2	2	2	2	3
% of Maize Produced in Region	0	51.5	4	6.1	11.7	26.7
% Maize Sold in Region	0	0	2.5	6.2	13.1	78.2
Mean Quantity Produced per HH in Kg (Median)	0	451 (270)	480 (332)	794 (535)	958 (750)	2,610 (1,795)
Mean Quantity Sold per HH, among those Selling in Kg (Median)	0	0	36 (35)	97 (100)	204 (200)	1099 (539)
Average Percent of Production Sold	0	0	15.4	21.9	32.8	43.4
% of HH Buying Maize or Maize Meal	79	70	51	61	42	21
HH Area per Capita	0.39	0.45	0.46	0.42	0.51	0.69
Area in Maize per HH (Ha)	0.83	0.92	0.74	1.00	1.21	1.96
Mean Maize Yield (Kg/Ha)	0	664	964	1061	887	1818

Data Source: TIA 2005

Table 4. Production and Marketing Characteristics by Category of Maize Production and Sales Behavior: Southern Region (2005 Harvest Season)

Indicator	Households With No Production	Households With Production But No Sales	HHs with Production and Sales (Sales Quartile)			
			1 (Lowest Sales)	2	3	4 (Highest Sales)
% of HH in Region	40.8	56.0	0.9	0.7	0.8	0.7
Median Years of Education of Household Head	1	2	2	2	2	4
% of Maize Produced in Region	0	78.2	1.3	2.7	8.5	9.2
% Maize Sold in Region	0	0	4.4	9.1	18.7	67.8
Mean Quantity Produced per HH in Kg (Median)	0	158.(78)	171 (150)	428 (200)	1204 (700)	1404 (925)
Mean Quantity Sold per HH, among those Selling in Kg (Median)	0	0	24 (17)	59 (52)	111 (100)	430 (225)
Average Percent of Production Sold	0	0	18.6	26.7	14.1	35.6
% of HH Buying Maize or Maize Meal	76	76	23	73	57	41
HH Area per Capita	0.49	0.45	0.60	0.58	0.67	1.00
Area in Maize per HH (Ha)	0.65	0.61	0.75	0.75	1.30	1.36
Mean Maize Yield (Kg/Ha)	0	397	447	746	1455	1220

Data Source: TIA 2005

Two results from TIA 2005 data show that production in each region is geographically dispersed. First, in the South and Center, no district but one in each region had more than 8% of total regional sales. Second, in the Center and South, 86% of the variation in household maize sales quantities lies within villages, not across them⁶. This result suggests that smallholder households with high sales are spread across many villages rather than concentrated in a few. 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.

What do these patterns imply about the challenges we laid out at the beginning of this paper? First, production is spread over hundreds of thousands of farmers, nearly all of them very small and distributed across large geographical areas. Most of these farmers do not even produce enough maize to meet their own needs. External input use is rare, and educational levels are extremely low. Seed is typically saved from production or purchased in local markets, resulting in uneven color (yellow mixed with white, especially in the South) and milling characteristics (mixture of flint and dent). Post-harvest handling, including on-farm storage, is typically poor, exacerbating the quality problems just mentioned⁷. For Mozambique's maize production system to supply a growing modern milling industry at all, and to supply traditional markets more reliably and at lower cost, productivity and quality must be substantially raised. To do this under the current production and marketing structure requires major investments in improved seed systems, broader input systems, and extension. Currently, Mozambique ranks near the bottom of Sub-Saharan African countries in crop productivity.

Second, a small minority of farmers sells maize, and most of these sell only 100 or 200 kg – hardly enough to achieve economies of scale. Unit costs are therefore very high both for the farmer and the trader. Tripling the volume of maize marketed in the Center and South over the next decade, which is our estimate of what is needed if the country is to fully meet demand in these regions from domestic production, will not happen without major investments at the farm level, complemented by improved roads, storage infrastructure, and market information.

⁶ Based on one-way Analysis of Variance with village as the treatment variable.

⁷ On a more positive note, SIMA's annual windshield survey recently picked-up increased attention to moisture content of grain by farmers and small traders, driven by the trade with Malawi: Malawian buyers refuse to purchase grain judged to have too high a moisture content.

5. RURAL AND URBAN STAPLE CONSUMPTION PATTERNS

In this Section we first examine the share of rural net buyers of key staples, then focus on budget shares for staples in rural and urban areas, using data from the 1996 and 2002 IAF Surveys.

5.1. Rural Staple Purchases and Net Buying Status

By combining information on purchases and sales of staples, we can calculate the approximate share of rural households that were net buyers of each staple⁸. For maize, we define these as households who purchased more maize grain (or its equivalent in meal) than they sold. Table 5 shows that purchases of staples in addition to maize by rural households are quite common. In every region a majority of rural households were net buyers of maize during the 2001/02 agricultural season; in the Center and South this share was about 70%. A majority in the Center and South were also net buyers of rice, while in the North, where cassava predominates in the populous provinces of Zambêzia and Nampula, half the population was a net buyer of this commodity.

Production levels combined with information on calorie shares from maize suggest that, for many households, the quantities of maize or maize meal being purchased are substantial. Ministry of Agriculture's Policy Analysis Department (FEWSNET) estimates an average maize calorie share in Mozambique of 25% to 39%. The lower bound of this range implies per capita maize consumption per year of about 57 kg, or about 315 kg per household. In the South, 87% of households produce less than this amount, while in the Center 45% produce below this level. Among these households, production levels plus the FEWSNET calorie share data suggest that purchases average about 190 kg in the Center and 240 kg in the South. Overall, these calculations suggest that rural households in the Center and South are likely to be purchasing over 170,000 MT of maize per year. This is similar to our estimate of urban

Table 5. Share of Rural Smallholder Households Purchasing Selected Staples, and Share of Net Maize Buying Households in Rural Areas, by Region (2001/02 Production Season)

Region	% Buying			% Net Buyers		
	Maize	Rice	Cassava	Maize	Rice	Cassava
North	59%	48%	51%	53%	47%	50%
Center	76%	59%	34%	68%	59%	33%
South	80%	87%	18%	71%	87%	18%
National	67%	57%	42%	61%	57%	41%

Data Source: TIA 2002

⁸ Our share calculation is only approximate because we do not have data on quantities purchased. However, we can unambiguously determine whether a household a) was out of the market, b) only sold, c) only bought, or d) both bought and sold. Only the final group cannot be unambiguously classified as a net buyer or net seller. We computed percent net buyers by assuming that half of this group was a net buyer. Because this final group is under 10% for every staple in every region, actual percentages should lie close to this figure.

demand in the two regions. Because we chose the lowest figure in the FEWSNET range, this would seem to be a conservative estimate for rural market demand.

The high proportion of net buyers of staples in rural areas of the country, and the substantial volumes that are being purchased, have major implications for the demands being placed on the production and marketing system, and thus for policy in the country. We will return to this issue in later sections.

5.2. Rural and Urban Staple Budget Shares

Table 6 shows budget shares of key staples in rural and urban areas of the South and Center of the country. Maputo, Gaza, and Inhambane provinces are in the South, while Manica and Tete are in the Center.⁹ Perhaps the most telling result in this table is that maize is not the primary staple in either rural or urban areas of Maputo province; it is the primary staple in Gaza and Inhambane provinces, though by a slight margin, and is far and away the key staple in Manica and Tete provinces of the Center.

To provide insights to how expenditure patterns vary with income, we break households into three groups (terciles) of total expenditure, and report these shares for the lowest and highest terciles (Table 7). Several patterns emerge from the table. First, though maize remains the primary national food staple, consumption patterns in Mozambique are more diversified than they are in many other countries of Southern Africa. For example, the budget share of maize grain and meals is much lower in the South than it is in the rest of the country. While it remains the top staple in rural areas of the South, its urban budget share in the region lies below both rice and wheat (and even cassava among the lowest income households). In rural areas of all three regions, the maize budget share about doubles from the bottom to the top expenditure tercile; in urban areas, it holds steady in the North and Center and falls by more than half in the South.

Table 6. Percentage of Total Food Expenditure Allocated to Food Items in Rural and Urban Areas of Southern and Central Mozambique, 2002

	Food Items	Maputo Province	Gaza and Inhambane Provinces	Manica and Tete Provinces
Urban	Maize	2.4	14.5	39.9
	Rice	7.8	9.8	4.4
	Wheat	15.5	6	2.9
	Cassava	1.3	5.2	0.5
Rural	Maize	9.1	12.2	48
	Rice	11.4	9.5	2.5
	Wheat	7.4	3.2	1.4
	Cassava	4.7	8.4	0.5

Data Source: IAF 2002, according to their definition of rural and urban

⁹ The results are grouped in this way based on published results from IAF 1996, and because we have access only to the 2002 data set. Sofala province was grouped with Zambêzia in the 1996 results, and so is not included here (we have put Zambêzia in the North in our classification).

The consumption of wheat is greater in the South than in the other two regions, and much more is consumed in the urban South than the rural South, with a budget share about three times larger in the urban areas. Rice budget shares rise with income in rural areas (though much less than maize), but in the urban Center and South, they fall (by about half in the South).

Consistent with expectations, cassava budget shares fall sharply with income throughout the country in both rural and urban areas.

Table 7. Percent of Total Food Expenditure Allocated to Food Item Categories, by Tercile of Total Expenditure and Rural and Urban Region (2002)

Food Items Categories	Rural						Urban					
	North		Center		South		North		Center		South	
	Total Expenditure Terciles						Total Expenditure Terciles					
	1 (Lowest)	3 (Highest)	1 (Lowest)	3 (Highest)	1 (Lowest)	3 (Highest)	1 (Lowest)	3 (Highest)	1 (Lowest)	3 (Highest)	1 (Lowest)	3 (Highest)
	----- % of total expenditure -----											
Maize and Derivatives	16.5	33.1	30.1	52.3	8.4	16.1	13.8	14.3	17.8	20.1	4.2	1.9
Rice	4.4	5.6	1.2	4.3	8.5	10.8	4.9	9.0	9.6	7.0	11.2	5.8
Wheat and Derivatives	0.3	1.2	0.3	1.6	0.9	6.4	1.6	9.2	3.7	10.3	8.6	18.0
Cassava	28.8	15.8	1.5	0.7	12.1	4.1	34.5	2.5	1.0	0.8	6.6	0.7
Leaves	6.7	2.8	11.9	3.0	29.2	11.6	3.5	1.9	8.8	3.1	17.8	8.4
Other	43.3	41.5	55	38.1	40.9	51	41.7	63.1	59.1	58.7	51.6	65.2

Data Source: IAF 2002

6. WHY ARE MAIZE MEAL PRICES SO HIGH IN SOUTHERN AND CENTRAL MOZAMBIQUE?

Research in early 2005 showed that maize meal prices, and meal:grain price ratios, were substantially higher in Mozambique than in neighboring countries, and suggested that the reason may be the heavily concentrated structure of the milling industry (Tschirley et al. 2006). At the time, the market in Maputo was dominated by one market leader (*Companhia Industrial de Matola – CIM*) and a key competitor (MEREK Industries). Together, the two companies had nearly a 100% market share in Maputo and probably very high shares throughout the South of the country. CIM held more than 60% of the market in Maputo. Nearly two years later, in early 2007, prices remain exceptionally high by regional standards, and CIM's market share in Maputo may have increased. In this section we first present the evidence on price levels, comparing prices in Mozambique to those in Zambia¹⁰. We then examine the structure of the maize meal market in southern Mozambique as a possible explanation for observed price patterns and discuss policies that may also contribute to the patterns, before reviewing consumer staple purchase patterns in more detail and asking how important these elevated prices are for consumer welfare.

6.1. Price Patterns

Figure 2 shows the real exchange rates of the Zambian Kwacha and Mozambican Metical to the U.S. dollar from 1997 through 2006¹¹. The figure shows that the Kwacha consistently depreciated less or, since mid-2003, appreciated more relative to the dollar than did the metical. This difference became especially pronounced from late 2005, when the Kwacha appreciated very sharply. Figure 3 captures the relative movements of the two currencies to the dollar, showing the ratio of Zambia's real exchange rate to Mozambique's.

These relative exchange rate movements might have been expected to drive a sharp increase in the dollar price of maize meal in Zambia, compared to Mozambique. In fact, Figure 4 shows that the opposite happened: after tracking each other closely through late 2002 (though prices in Maputo typically exceeded those in Zambia by about 3-5 cents per kg.) retail prices of breakfast meal in Maputo began a tremendous surge, rising to a peak of over US\$.80/kg in late 2004 (when the metical sharply appreciated relative to the dollar) before falling back and then stabilizing during 2006 at more than US\$.60/kg. Though price data are less complete for Beira, in the Center of the country, the graph shows that, at least since mid-2004, prices there tracked those in Maputo and in fact moved above them during 2006. Meanwhile, prices for the same product in Zambia fell during the first part of this period, before surging to a peak of about US\$.52/kg during late 2005 and early 2006. This surge in Zambia was driven by the sharp appreciation of the Kwacha over that period. Yet even at their peak, prices in Zambia did not reach those in Mozambique. As a result, mean prices in Mozambique during this period were US\$.60/kg, compared to US\$.31/kg in Zambia.¹²

¹⁰ Prices of maize meal in Malawi are generally similar to those in Zambia.

¹¹ The graph takes a purchasing power parity approach. With calendar year 1996 as the base, we calculate movements in the Mts/US\$ and ZKW/US\$ exchange rates that would have maintained the purchasing power of each currency relative to the US\$. Purchasing power is based on relative movements in the Consumer Price Indexes for each country and the U.S. A value above 100 indicates that the currency had depreciated in real terms compared to 1996, while a value below 100 indicates real appreciation.

¹² Price patterns on roller meal, a lower priced product, are similar in both Maputo and Beira compared to Zambia. From January 2005 (when data on this product in Mozambique are first available) through 2006, prices averaged US\$.26/kg in Zambia and US\$.48/kg in Mozambique.

Figure 2. Real Exchange Rates of Mozambican Metical and Zambian Kwacha, 1997 - 2006

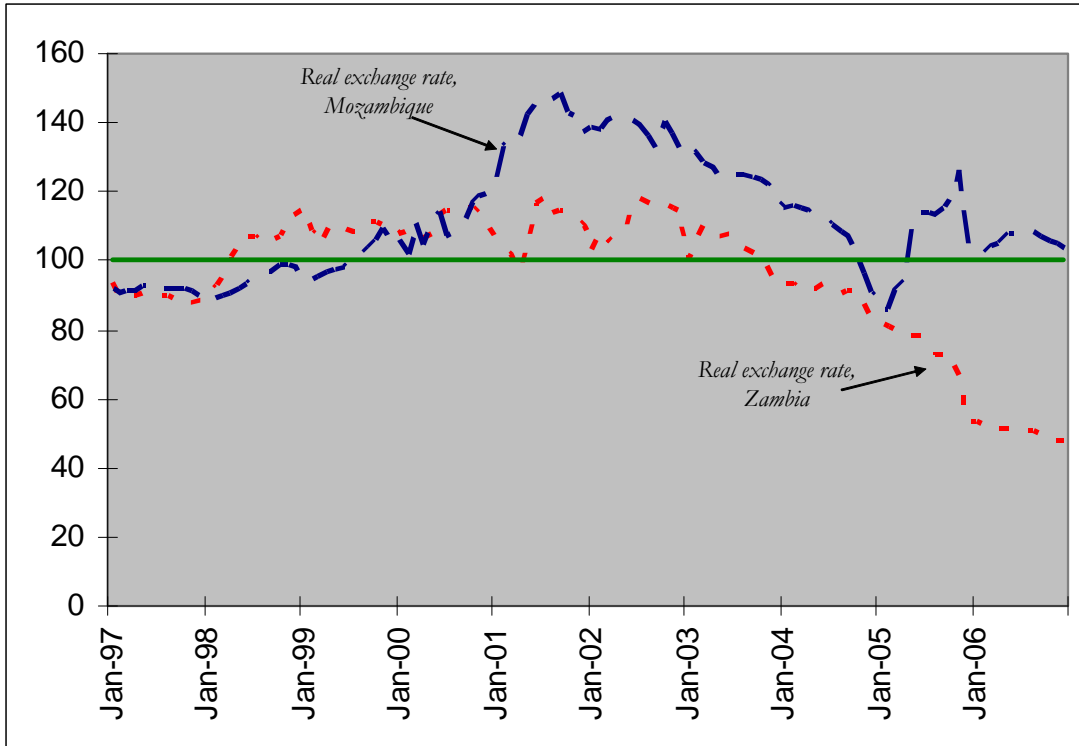


Figure 3. Ratio of Real Exchange Rates, Zambia/Mozambique, 1997-2006

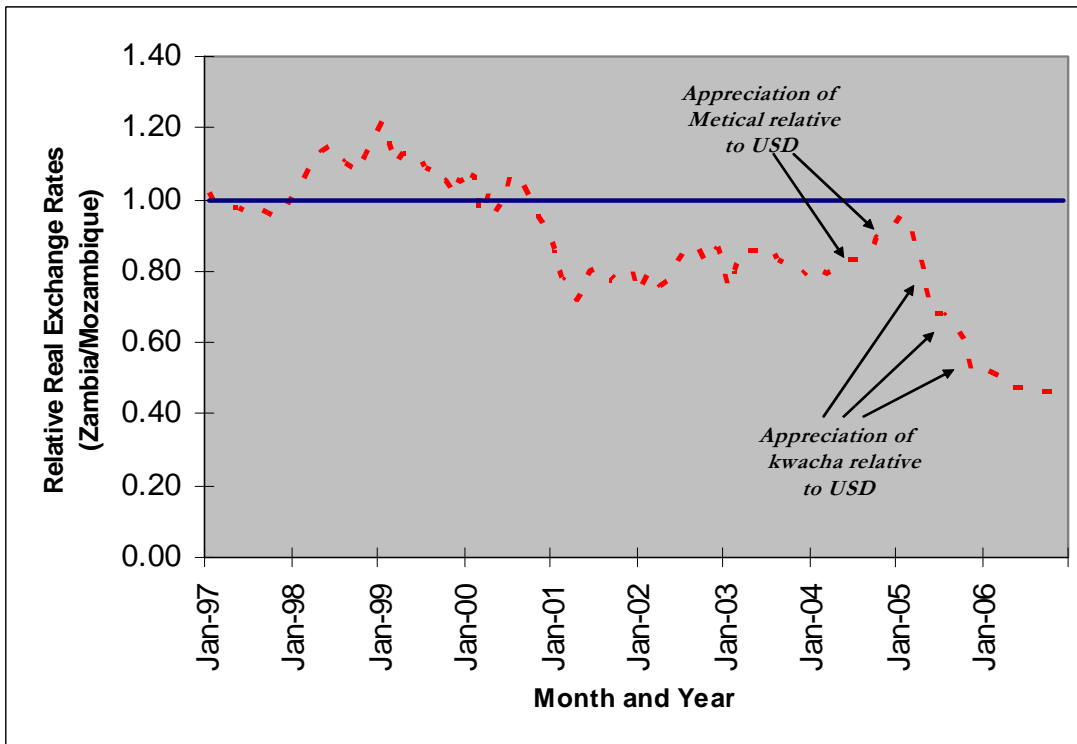


Figure 4. Breakfast Meal Prices at Retail in Zambia and Mozambique, 1997-2006

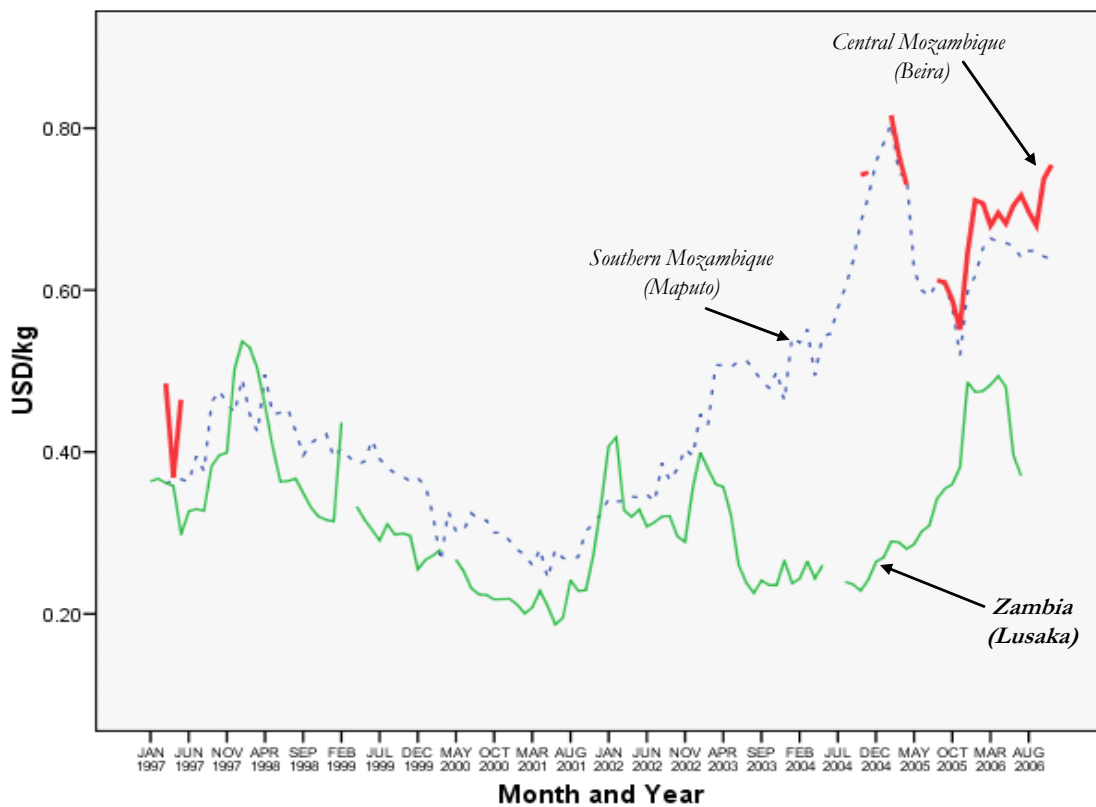
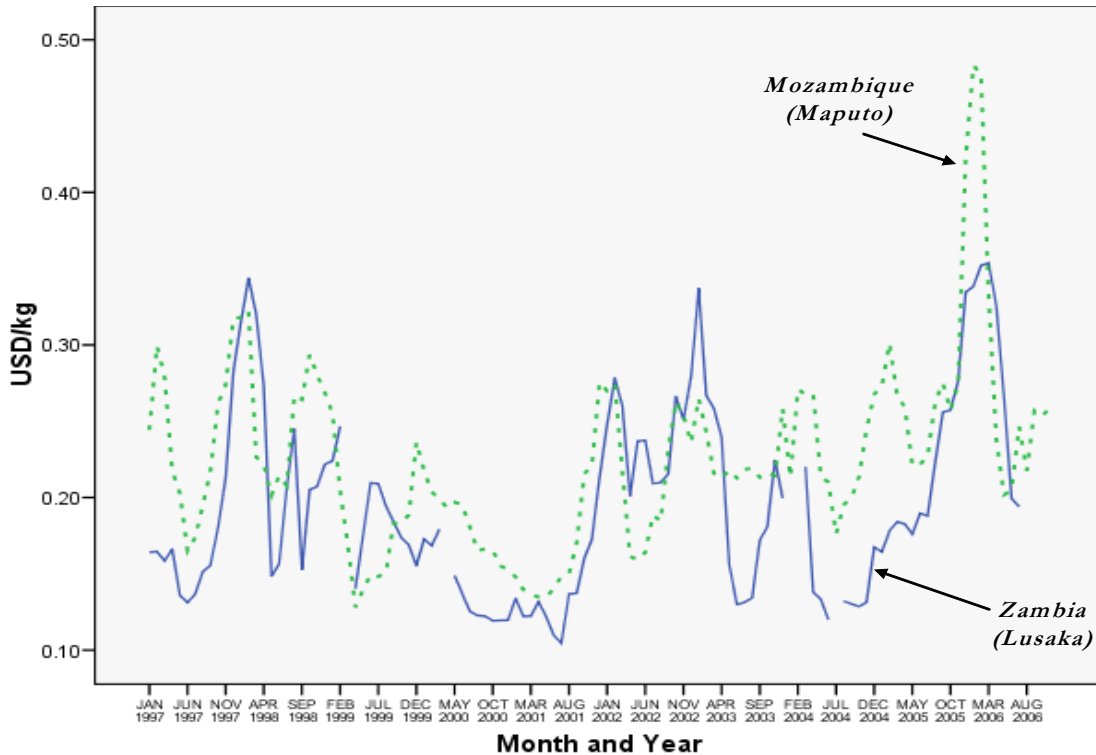


Figure 5. Maize Grain Prices at Retail in Zambia and Mozambique, 1997 - 2006



These price differences for breakfast meal are not explained by differences in grain prices: retail maize grain prices in Maputo were comparable to those in Zambia during the first period, and exceeded those in Zambia on average by only 5 cents per kg during the second period (Figure 5); prices in Beira were consistently below those in Zambia. Import parity prices for grain from South Africa also do not explain this price differential, since import parity prices (IPP) in southern Mozambique is about \$65/mt lower than in Zambia, based on much shorter transport distances. This fact is especially relevant, since CIM imports nearly all its grain supplies from South Africa, rather than purchasing locally.

Differences in government policy in the two countries may explain some of the differential during some periods. The government of Mozambique has no direct involvement in maize grain imports. Zambia's government, on the other hand, periodically imports grain during short years and sells it at a subsidized price to industrial millers in an effort to keep prices for breakfast and roller meal within the reach of most consumers. In the absence of a full data series on government imports and sales prices to millers in Zambia, we cannot fully examine the contribution of this policy to lower maize meal prices in that country. We do know, however, that this policy has affected prices only during the hungry season of selected years. We also know that this policy frequently leads to price spikes for maize grain and meal, due to delays in government action, and to inaction by the private sector due to confusion regarding what government is going to do and when (see Mwanaumo et al. 2005; Tschirley et al. 2005). These observations make it clear that Zambian government policy can in no way explain the large and persistent price differential that has opened up between it and Mozambique since late 2002.

6.2. Structure of the Industrial Maize Milling Sector in Southern Mozambique

The structure of the milling industry in southern Mozambique may provide more insight to the causes of the very high prices in Mozambique. Tschirley et al. (2006) showed that the two largest industrial millers – CIM and MEREC – held over 70% of the market for industrial maize meal in southern and central Mozambique in early 2005 (Table 8); these same two held nearly a 100% share in Maputo.

Small retail and consumer surveys in early 2007 provide more detail and suggest that CIM's share may have increased since 2005. Interviews with 87 retail traders in the two largest open air markets of Maputo showed that CIM held nearly a 70% market share (value based) in that channel, that maize grain constituted over 30% of the market, and that whole meal from small hammer mills (*mugaiwa*) and refined meals from MEREC were nearly absent from the channel (Table 9). In a separate survey of a new retail segment in Maputo, the so-called *Contentores*¹³, none of the 27 surveyed sellers sold maize grain. CIM had about a 75% market share in this channel, with MEREC holding the balance. Surveys of shelf space in supermarkets showed that CIM's two meals held over 70% of all shelf space devoted to maize meal, followed by MEREC with 13%, and meal imported from South Africa with 5%. These supermarkets sold no maize grain, nor did they sell whole meal.

¹³ The word *contentores* refers to the shipping container cars that are retrofitted and used as retail shops. This retail segment has emerged in Maputo over the past two- to three years, driven by the arrival of refugees from the Great Lakes region and their investment in this business. The *contentores* appear to serve a lower-middle income demographic, between the low income consumers frequenting open air markets and the higher income consumers which frequent the traditional shops (*lojas* or *mercearias*).

Table 8. Milling Company Shares of Industrial Maize Meal Market in Southern and Central Mozambique, Early 2005

Name of Miller	Starting Year of Operation	Name of Meal Produced	Milling Throughput, all Brands, early 2005 (MT/Month)	Location	Apparent Market Share in South and Center (%)
CIM	1997	Top Score, Matabicho	2350	South (Matola)	38
MEREC	1999	First Choice, Mpupu	2100	South (Chibuto)	34
MOBEIRA	1997	?	900	Center (Beira)	14
Vonk	2003/04	Power	400	Center (Chimoio)	6
SMC	2000/2001	Mananga	240	South	4
Inácio de Sousa	2002	Palmeira	240	South	4
Total	-	-	6,230	-	100

Data Source: 2005 Miller Survey (Adapted from Tschirley et al. 2006)

Table 9. Estimated Maize Market Shares (by Value) in Maputo of Maize Grain and Various Maize Meals in the Three Main Retail Market Channels, January 2007

	Retail Channels		
	Open Air Markets	Contentores	Supermkt
	---- Share of total maize market, by channel ----		
Maize grain	0.31	0.00	0.00
Maize Meals			
Top Score (CIM)	0.41	0.41	0.59
Matabicho (CIM)	0.28	0.36	0.02
<i>Total CIM</i>	<i>0.69</i>	<i>0.77</i>	<i>0.61</i>
Mpupu (MEREC)	0.01	0.23	0.02
Sasseka (MEREC)	0.00	0.00	0.12
<i>Total MEREC</i>	<i>0.01</i>	<i>0.23</i>	<i>0.15</i>
Imported from the Republic of South Africa (RSA)	0.00	0.00	0.24
Mugaiwa	<0.01	0.00	0.00
TOTAL	1.00	1.00	1.00

Source: SIMA 2007 Trader Surveys

In the absence of a statistically designed sample survey of consumers, or reliable data on total volumes transacted in each channel, definitive estimates of the market shares of each channel – and thus of shares of different maize millers – cannot be computed. We therefore generate two scenarios that we expect to set the likely bounds on these market shares (Table 10).

Table 10. Estimated Market Shares in Maputo of Maize Grain and Various Maize Meals under Two Scenarios, by Value, January 2007

	"Traditional" scenario (60% open air mkts, 30% contentores, 10% supermkts)		"Transitional" scenario (40% open air mkts, 40% contentores, 20% supermkts)	
	Total Maize Mkt Share	Maize Meal Mkt Share	Total Maize Mkt Share	Maize Meal Mkt Share
Maize grain	0.19	-----	0.12	-----
Maize Meals				
Top Score (CIM)	0.43	0.54	0.45	0.52
Matabicho (CIM)	0.28	0.35	0.26	0.31
<i>Total CIM</i>	<i>0.71</i>	<i>0.89</i>	<i>0.71</i>	<i>0.83</i>
Mpupu (MEREK)	0.08	0.08	0.10	0.10
Sasseka (MEREK)	0.01	0.01	0.02	0.02
<i>Total MEREK</i>	<i>0.09</i>	<i>0.09</i>	<i>0.13</i>	<i>0.13</i>
Imported from RSA	0.02	0.02	0.05	0.05
Mugaiwa	0.00	0.00	0.00	0.00

Source: SIMA 2007 Trader Surveys; Supermarket Shelf Space Surveys; supermarket share estimated from literature and knowledge of Mozambique

In the "Traditional Scenario", we assume that open air markets carry 60% of all food staple transactions, that *contentores* have captured 30%, and that supermarkets have captured only 10%. The "Transitional Scenario" assumes that the open market share has fallen to 40%, that the *contentor* share has risen to the same, and that the supermarket share has risen to 20%. Under these scenarios, CIM's share of the total maize market (including grain) remains steady at 71%, MEREK's ranges from 9% to 13%, and imported meal's share ranges from 2%-5%. Maize grain holds a 12%-19% share. Under either scenario, CIM holds more than 80% of the maize **meal** market.

Differences in milling costs between Zambia and Mozambique would have to be enormous to explain the differences in maize meal prices in the two countries. Typical margins between wholesale maize grain prices and retail breakfast meal prices have been USD125-USD150/ton since 2003 in both Zambia and Kenya. In Mozambique, this margin has been about USD390/ton. Thus, milling costs would have to be about 2.5 times higher in Mozambique to explain the observed price differences. In addition, such a cost difference would not be consistent with the fact that prices in Mozambique only slightly exceeded those in Zambia from 1997 through 2002.

To summarize, we have shown that maize meal prices in southern and central Mozambique are nearly double those in Zambia, that this price difference has persisted for over four years, that the price of domestic or imported maize grain in each country cannot explain the difference, that policy differences between the two countries may explain only some of the difference during some periods of some years, and that differences in milling costs would have to be implausibly large to explain the difference.

The heavily concentrated structure of the maize milling sector in southern and central Mozambique must be considered a key part of the explanation. Yet an overriding question remains: why have other firms, including industrial millers and the small-scale hammer

milling sector, not been able to provide sufficient competition to force CIM and MEREC to reduce their prices? While we cannot address the question of other industrial millers in this paper, we turn in the next section to the role of the hammer milling sector.

6.3. Small-Scale Hammer Milling

In Malawi, Zambia, and Kenya, the small-scale hammer milling sector provides substantial competition for large industrial millers. Jayne and Chapoto (2006) attribute declining real prices of maize meal in Zambia and Kenya to this competition from small-scale milling. In Mozambique, Tschirley et al. (2006) found that this small-scale sector had declined dramatically in Maputo by 2003, with perhaps 5% of poor households regularly using it to process grain. The sector remained much more important outside of Maputo, with its market share rising steadily as one moves towards the Center of the country; in Beira in the Center, over 60% of poor households regularly used hammer mills for grain processing. Rural patterns were similar: national agricultural survey data from 2002 show that about two-thirds of rural villages in the Center had hammer mills, while only about 20% of southern villages reported having them.

The most frequent explanation for the weakness of the small-scale hammer milling sector in southern and eastern Africa is lack of availability and high prices of grain during the pre-harvest hungry seasons (Jayne and Chapoto 2006). Frequently, these shortages are due to government policy which controls imports and then preferentially allocates imported grain at below market prices to industrial millers when maize is scarce. Mozambique does show some evidence of reduced availability and higher prices of grain in the hungry season. For example, in Maputo in 2003, the share of households relying on maize grain as their main source of maize fell from 36% during the harvest season to 24% during the hungry season, while in Xai-Xai (another city in the South) and Beira the share fell more modestly, from 70% to 61%. A survey of 38 consumers early in the 2007 hungry season in Maputo's two main retail markets (the only channels where maize grain is available; see Table 9 above) showed that 45% had not purchased maize grain during the past month; only 26% of these same consumers had not purchased grain during the previous harvest season.

Yet several pieces of evidence suggest that the decline of the hammer milling sector in Maputo is due primarily to lack of demand for its services, not to policy induced scarcity of grain. First, among the 45% of interviewed consumers in Maputo not buying grain during the hungry season, half indicated that the main reason was not lack of availability and high prices, but rather that they consumed too little maize to make it worth their time to purchase grain and either hand pound it or take it to a hammer mill.

Second, Mozambique in general, and Maputo in particular, typically has the lowest seasonal maize price rise of any country in the region except South Africa (Tschirley et al. 2005), suggesting that seasonal scarcity is less severe in Mozambique than in those countries. Finally, the Mozambican government does not control maize imports and does not have the structures in place to directly allocate grain in a preferential manner to large-scale millers.

6.4. Explaining the Absence of Imported Maize Grain at Retail in Mozambique

This demand-based explanation for the decline of the small-scale maize milling sector in southern Mozambique is consistent with the observed lack of importation of maize grain for sale as grain, despite apparently profitable opportunities to do so. To understand this issue, we first examine how Mozambique's 17% Value Added Tax is applied.

Two peculiarities of the VAT suggest *apriori* that it may negatively affect maize grain imports and the availability of maize grain for retail purchase. First, the tax is charged on maize grain transactions, but not on rice and wheat. Thus, imported rice reaches consumers, and wheat reaches millers, paying only normal import costs plus a modest 2.5% import duty. If maize grain were to be imported, it would pay the 17% VAT in addition to normal duties and other costs, creating an immediate cost disadvantage for this product. Second, sales of maize meal are exempt from VAT, but sales of maize grain are not. This means in practice that anyone importing grain and processing that grain into meal is entitled to a full reimbursement of the VAT paid on the imported grain¹⁴; a trader importing grain to sell as grain would not be entitled to this reimbursement. Maize grain is thus specifically disadvantaged by this policy relative to maize meals, rice, and wheat. By favoring maize meal over maize grain, the VAT also favors large industrial millers over small hammer mills, since the latter provide only custom milling services, and the grain entering their mills, if imported, would have paid the 17% VAT.

Yet, in an analysis spanning May 1999 to January 2005, Tschirley et al. (2006) identify four periods of at least five months' duration each, during which import parity from South Africa, even including VAT, was below the prevailing wholesale market price in Maputo; in principle, traders importing grain at those times would have been able to resell it and make a profit. Yet they note that the only imports of maize grain of any significant volume during that time were by the industrial millers, especially CIM and MEREC. Maize grain for sale at retail was and remains entirely of domestic origin.

For small-scale importers of the type that supply southern markets with production from the Center, Tschirley et al. (2006) attribute the absence of imports to the complexity of import procedures, and to aspects of the South African maize marketing system that may make it difficult for a small trader to operate effectively. First, an importer needs to be officially registered as such with Mozambican authorities, a requirement which will be an impediment for many small traders, who tend to operate informally. Second, the trader must present at the border a formal price quote (as part of the so-called "pre declaration") for the commodity they are importing; for traders accustomed to operating on a cash basis in a traditional open-air marketplace, this too can be an impediment. Finally, the importer must have a phytosanitary certificate obtained in South Africa, which may be the biggest regulatory impediment of all for these types of traders.

The main Act regulating maize imports in the country (Acta 206/98) provides for a simplified system for any importer with an FOB value not exceeding US\$500, and who has not imported during the previous 30 days. In this case, a formal quotation and other requirements in the pre declaration are dropped. This simplified system can be exploited only by the

¹⁴ Maize millers complain that the VAT reimbursement process is complicated and slow, but it appears that they do receive the reimbursements.

smallest traders since, with US\$500, it is possible to import from South Africa only about three tons of maize grain. One trader working alone would have to pay relatively high unit transport costs on this volume, and would also require high unit mark-ups to earn an acceptable return on her time and capital. Thus, current regulations on imports would seem to create significant barriers for traders wishing to engage in maize trade between the two countries in anything other than very large or very small scale. Basing the limit for application of the simplified regulations on a volume of, say, 20 metric tons¹⁵, rather than on a the very low value of US\$500, would make this provision a potentially more useful tool in promoting more active trade.

Within South Africa, the maize marketing system is highly formalized and large scale. Maize grain is not easily found in markets; open air markets are not nearly as common in South Africa as in Mozambique, and few if any traditional “Cash & Carry” wholesalers carry maize grain¹⁶. Unless a trader has direct contact with a farmer wishing to sell, maize grain would have to be purchased in a large, modern grain silo operated by private trading firms. Though managers of these facilities in Mpumalanga province (eastern South Africa) indicate that they would be willing to sell quantities as small as 3-4 tons, it is the rare small trader from Mozambique who would have the cultural, linguistic, and commercial ability to purchase regularly from such a source.

This explanation for the absence of imports from South Africa by small traders leaves open the question of why larger formal traders, such as those already importing large quantities of rice from the world market, do not also import maize grain and sell it into the same distribution channels they use for rice. A partial answer to this question lies with a combination of factors: the low price and widespread availability of rice, the resulting very low budget share of maize, especially for higher income consumers, and the buying habits of low income consumers. We will briefly discuss each of these factors.

The retail prices of maize grain and rice in Maputo during the first three months of 2005 were about US\$280/mt and US\$410/mt, respectively, giving a maize:rice price ratio of 0.68. During the same period in Lusaka, maize and rice prices were US\$180 and US\$440, respectively¹⁷, for a maize:rice price ratio of 0.41. Maize is much more affordable relative to rice in Lusaka (and Zambia as a whole) than it is in Mozambique. When one further considers that rice needs no processing prior to cooking, while maize does, and the common perception among consumers in Maputo that rice “fills the belly” more than *shima*, the overall advantage of maize grain relative to rice is further diminished in southern Mozambique. In central areas of the country, where the maize price is lower and rice slightly higher, maize grain is a better option, and in fact the overall maize budget share and reliance on maize grain over maize meal are both substantially higher in those areas.

Table 6 showed that the 2002 budget share for maize grain and meal in urban Maputo province was 2.4%. Rice’s budget share is three times higher, and wheat is seven times higher. At prevailing income levels and prices, maize’s budget share implies purchases of about 10 kg per capita per year, or less than one kilogram per capita per month. An average

¹⁵ This limit would allow traders to fill a 20 ton truck and thus achieve much lower unit transport costs.

¹⁶ Personal observations in numerous C&C wholesale operations in Mpumalanga province, July 2004.

¹⁷ Rice prices in other major cities of Zambia were higher, ranging from US\$490/mt to US\$590/mt; in Mozambique, rice prices in other major cities did not exceed US\$440/mt. Thus, on a national level, rice is much cheaper in Mozambique than it is in Zambia.

family of five is thus purchasing only about 4 kg of maize, either as grain or meal, per month. These are not large quantities, certainly too small in many consumers' minds to justify a monthly trip to the hammer mill¹⁸. This leaves hand pounding as the most reasonable alternative. The lowest income consumers are those most likely to be attracted to the cost savings attainable by purchasing maize grain; yet previous research (MOA/MSU Research Team 1994) has shown that these consumers are also the most likely to face cash flow constraints and therefore to make frequent purchases of small quantities. Our conclusion is that such consumers are, *ceterus paribus*, more likely to choose maize meal over maize grain in their purchases due to the inconvenience of having to frequently process small quantities of maize grain.

6.5. Summing Up

This section has shown that maize meal prices in Mozambique are exceptionally high, and that this difference cannot be explained by high maize grain prices nor, plausibly, by higher processing costs in Mozambique than in other countries in the region. It has suggested that the most plausible explanation for these prices – but only a partial explanation – is the highly concentrated structure of the industrial milling sector. The section has also shown that the small-scale milling sector has diminished dramatically in the South of the country, though not in the Center; the decline in the South is due primarily to lack of demand, not to policy distortions, though some policy adjustments might help it strengthen its role. Finally, the section showed that the application of the VAT favors the import of rice and wheat over maize, favors the availability of maize meal over maize grain at retail, and favors large industrial millers over smaller traders and hammer millers; but the analysis also shows that imports of grain for sale as grain have not occurred despite several prolonged periods where such imports would have been profitable. It attributes the absence of imports by small traders to complexities in import procedures and to the high degree of formality and large scale of the South African maize marketing system. The lack of imports by larger scale formal traders is likely due to a combination of factors: consumers in Maputo have access to a low cost option in rice, they spend very little on maize, and most of them are therefore willing to pay the high premium for refined meals on the small quantities that they buy.

The section started by asking why maize meal prices are so high in Mozambique. The findings suggest the following hypothesis: CIM, in an environment of low and inelastic demand for maize meal in the South, has decided to maximize profits by maintaining very high prices for its products, supported by heavy advertising. In the Center, demand for maize is substantially higher and the small-scale milling sector appears to have a higher market share. Reducing prices in the Center to compete more effectively with the small-scale sector in that region would cause obvious problems for CIM, as arbitrage by traders would undercut its ability to keep prices high in Maputo.

The question which remains unanswered is why other industrial millers have been unable to force CIM prices down by undercutting it. Further research should shed light on this issue.

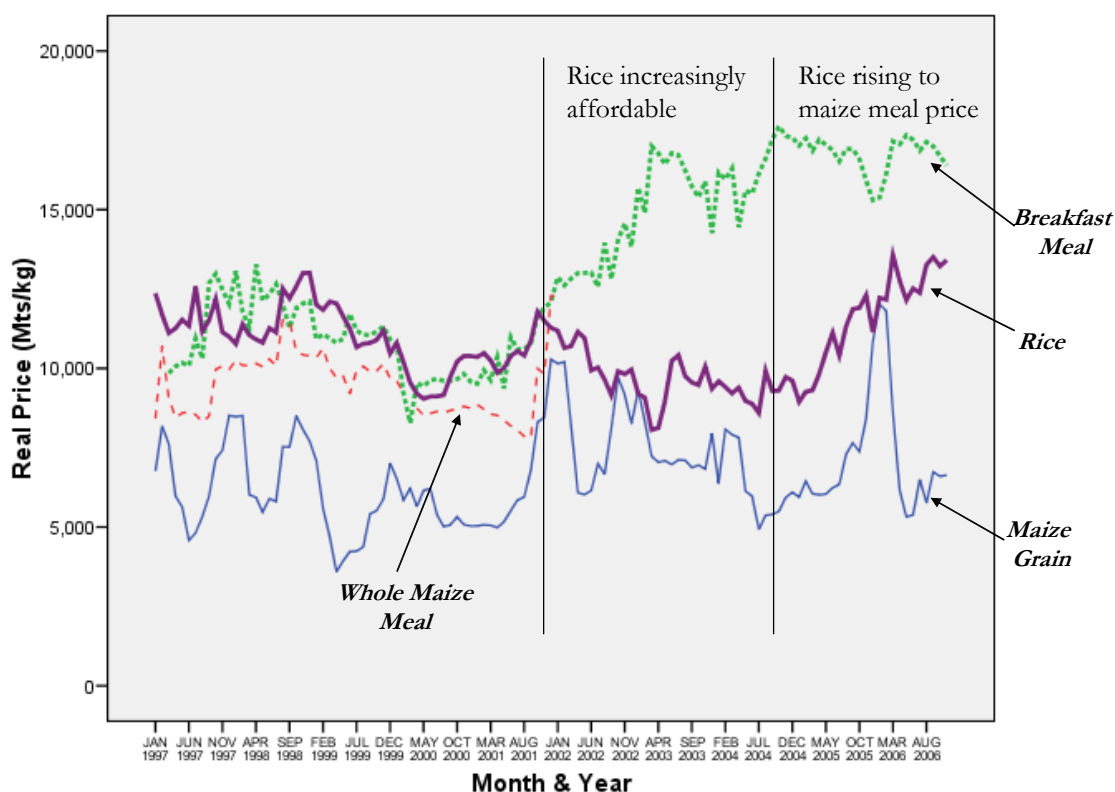
¹⁸ Survey responses from early 2007, reported above, confirm this opinion.

7. HOW MUCH DO MOZAMBIQUE'S HIGH MAIZE MEAL PRICES MATTER FOR POOR CONSUMERS?

This paper has shown that the 2002 food budget share for maize grain and meal in urban Maputo province was only 2.4%, one-third that of rice and one-seventh that of wheat, suggesting that the high maize meal prices there may not have major negative welfare effects. Yet the maize budget share is typically above 10% in rural areas of the South, around 20% in urban areas of the Center, and rises as high as 50% in rural areas of the Center. In that region, many more households choose to purchase maize grain and either hand pound it or take it to a hammer mill for processing. Thus, some are able to avoid the high cost of industrially processed maize meal. Yet the poor may be the least able to avoid this cost, due to cash flow and time constraints.

An additional concern since 2005 concerns the rapidly rising rice price (Figure 6). From 1997 through 2001, both rice and breakfast meal prices declined steadily, with nearly identical mean prices during that period. From early 2002, rice continued its decline while breakfast meal prices rose dramatically; during 2003 and 2004, rice prices averaged little more than 60% of breakfast meal prices. Since the beginning of 2005, however, breakfast meal prices have trended slightly negative, while rice prices have increased by nearly 40%. By late 2006, the prices of breakfast meal and rice were about \$0.68/kg and \$0.56/kg, respectively. In Zambia, breakfast meal prices (rice has a very low budget share in Zambia) ranged from about \$0.25 to \$0.33/kg.

Figure 6. Real Staple Food Prices at Retail in Maputo, 1997 - 2006



Staple food prices are thus much higher in Mozambique than they are in Zambia. In this context, the high price of industrially processed maize meal must be considered an important policy issue. Additionally, policy makers need a much better understanding of the market for rice imports, especially the extent to which it is competitive and fairly transmitting world prices to Mozambican consumers.

8. CONCLUSIONS AND POLICY IMPLICATIONS

This paper began by focusing on trends in rural and urban population growth, consumption patterns, and maize demand over the next 10 years, quantifying the dimension of the production and marketing challenge faced by the country, and asking what needed to be done for domestic production and marketing to keep pace with an anticipated very rapid growth in maize demand, especially in urban areas. Overcoming the cost disadvantages of the dispersed, small-scale structure of production and marketing that we documented in the smallholder sector requires major, long-term investment in basic education and health, in seed, broader input systems, and agricultural information systems including extension and marketing information, in improved post-harvest handling, including better on-farm storage, and in rural roads. Mozambique's productivity challenge at the farm level is made more difficult than its neighbors' because it has a substantially smaller share of its land area in high potential medium altitude zones, and because its use of external inputs (including animal traction) is much lower. On the other hand, the country has more abundant land than Malawi, and rainfall in the Center and North is more reliable than in large areas of South Africa, Zimbabwe, and southern Zambia.

A major concern cited by other researchers in Mozambique (Walker et al. 2004) is that returns to education are very low in agriculture, and much higher in non-agricultural self-employment and non-agriculture wage labor¹⁹. Related concerns included the extremely small size of the commercial smallholder sector, driven by low returns to greater land cultivation, the miniscule contribution of livestock earnings to rural household incomes, the poor performance of the cashew and cotton subsectors, and the particularly poor position of widow-headed households, driven primarily by low crop and livestock income. They note that "Mozambique has now reached a stage of economic development where growth in agriculture is constrained by the paucity of locally adapted research findings. Relying on off-farm income sources to grow the small-farm commercial sector may be a viable option in southern Mozambique where crop potential is limited and demand for labor from South Africa is a reality, but it is not a sustainable proposition in northern and central Mozambique where off-farm income hinges on growth in agriculture." (p. 50).

Mozambique's agricultural research institutions have for many years been woefully underfunded and as a result have lost qualified personnel. The recent consolidation of at least three separate institutes into one (*IIAM – Instituto de Investigação Agrária de Moçambique*), a more aggressive post-graduate training program, and improved operational funding prospects suggest that the country may be entering a period when it can begin more seriously to address its agricultural productivity constraints. Continued major investments from government and donors will be needed for several decades to realize this potential.

Mozambique can be clearly distinguished from its neighbors on the basis of its consumption patterns, the structure and behavior of its milling industry, and its policy and practice in maize trade. Each of these areas has policy implications. Staple consumption patterns in Mozambique are much more diversified than in other countries of the region, with the exception of South Africa. This means that maize does not have the same impact on consumer and producer welfare that it does in other countries with higher maize shares in production and consumption. Nationally, maize remains the most important staple in various

¹⁹ Tschirley and Benfica (2000), using a separate data set, also found this pattern. Boughton et al. (2005) also document concerns about limited progress in agricultural productivity.

dimensions, and therefore requires good policy and productive public and private investment. However, more than any other country of the region, Mozambique needs to avoid (and has so far successfully avoided) a “maize centric” development policy that prioritizes this crop over broader agricultural and rural development.

Maize milling is highly concentrated in Mozambique, with CIM having as much as 80% of the market in Maputo, and MEREC most of the other 20%. Prices for maize meal are by far the highest in the region, with the leading brand more than double the price of comparable meal in Zambia. Competition remains incipient: though four new mills have opened in the Center and South since 2000, together they produce only about one-fifth the volume of CIM and MEREC, have tiny market shares in Maputo despite plans in early 2005 to compete in that market, and have not appreciably affected the price surface for maize meal in the country: prices even at the bottom end in Mozambique are higher than the broadly prevailing prices in Zambia and Malawi.

Most competitors to CIM and MEREC lie outside of Maputo, suggesting that market concentration may be less in outlying areas of the South and Center, but we currently have no data to confirm this.

It would not be appropriate for the government of Mozambique to directly mediate competition between these companies, and there are no signs that it intends to do so. There are, however, several steps that the government could take to improve competition in the sector. The most immediate impact on competition would be achieved through a reduction in the import duty on maize meal, which is scheduled for full elimination only in 2015 (2012 for all imports except from South Africa, yet RSA is and is likely to remain the main source of imported grain). Reducing the duty more quickly, perhaps to 10% by January 2008, might provide meaningful competition for Maputo millers, as Cash&Carry prices in Mpumalanga province of eastern RSA are about US\$420/mt. Retail prices in the same area are around US\$500/mt.

Other steps involve reducing the cost of supplying maize grain to Maputo and other urban and rural areas of the South and Center, whether from domestic production or imports, so that more consumers can choose to purchase grain rather than meal, and either hand pound it or mill it in hammer mills. To reduce the cost of maize supplies from domestic production, government should collaborate with private sector in a maize supply chain development program. Key elements in this program would include:

- More active marketing information focused on farmers in the Center (and promising areas of the South) and the traders that supply the South from the Center. Making marketing information available through cell phones, possibly on a subscription basis, should especially be investigated;
- Training of farmers in post-harvest handling procedures to improve quality, and programs to facilitate adoption of improved on-farm storage technology;
- Training for these traders in basic accounting and post harvest handling techniques; such training has been provided to some formal sector store owners, but informal traders have benefited from little if any of these efforts, despite their predominant role in maize marketing;

- Promoting more efficient rural assembly of grain through recognized market days, improved physical infrastructure in assembly points, and improved transport services linked to these assembly points;
- Focusing investments in road infrastructure on feeder roads into and trunk roads out of these assembly points; and
- Improved marketing infrastructure in public terminal markets of Maputo, Beira, and perhaps other key cities of the South and Center. Improved storage and sales point infrastructure would be especially useful, and would have payoffs for many crops other than maize.

Financing of the program would involve public, private, and donor funds. Government must play the role of facilitating profitable private sector activity rather than unduly regulating or directly participating in private sector activities.

Activities such as these focused on the domestic supply chain will have important payoffs for farmers and consumers. Yet the payoff will take time to develop; maize grain imports for the South will be crucial complements to domestic production for the foreseeable future. Two and perhaps three actions could be taken by government to facilitate efficient trade in maize. First, government should consider converting the value limit in the simplified regulatory procedures for small-scale maize imports to a volume limit, and increasing this limit to perhaps 20 metric tons per month. This change would substantially expand the number of informal traders who could take advantage of these provisions, and would reduce their unit costs if they were to become involved in maize imports. Second, government should consider phasing out the VAT on maize grain. Because all imports currently are for processing into meal, resulting in eventual reimbursement of VAT, the tax generates no permanent income for the state. Furthermore, although the VAT alone has not acted as a binding constraint on maize imports for sale as grain, it could become a constraint if the reforms in import procedures suggested above are instituted. Finally, if the above two measures are taken, and as the cost of trade between Center and South also falls and grain becomes more available at lower prices, government and donors could consider special programs to facilitate rehabilitation of the hammer milling sector throughout the South, which has steeply declined in urban areas over the past decade.

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