



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

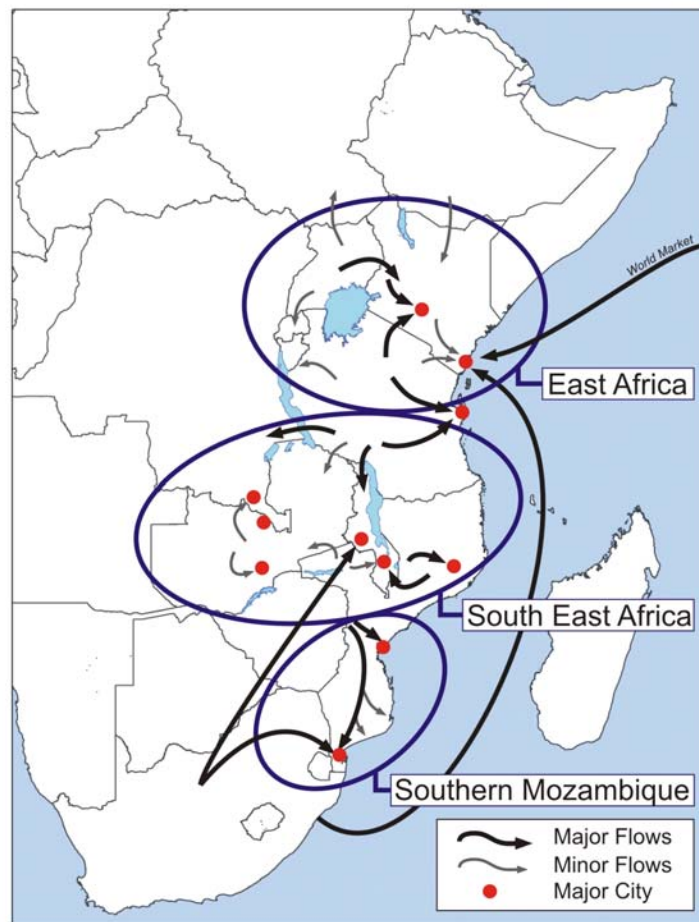
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Report 1. Maize Market Sheds in Eastern and Southern Africa

by
Jones Govereh, Steven Haggblade, Hunter Nielson and David Tschirley

with input from
Lucy Aliguma, Gasper Ashimogo, Geoffrey S. Mwale,
James Nyoro, Alexander Phiri, and Lulama Ndibongo Traub



A report prepared by Michigan State University
for the World Bank under contract No. 7144132, *Strengthening Food Security in Sub-Saharan Africa through Trade Liberalization and Regional Integration*

June 28, 2008

TABLE OF CONTENTS

1. INTRODUCTION
2. DATA AND METHODS
3. AN OVERVIEW OF MARKET SHEDS IN EASTERN AND SOUTHERN AFRICA
4. SOUTHERN MOZAMBIQUE MARKET SHED
5. SOUTH EAST AFRICA MARKET SHED
6. EAST AFRICA MARKET SHED
7. CONCLUSIONS

ANNEXES

1. South Africa Country Maize Profile
2. Kenya Country Maize Profile
3. Tanzania Country Maize Profile
4. Uganda Country Maize Profile
5. Malawi Country Maize Profile
6. Katanga and Kasai Province Maize Profile

FIGURES

1. Market Sheds in Eastern and Southern Africa
2. Net Official Maize Imports into South Eastern Africa, 1980 to 2004
3. Official Net Imports into East Africa, 1980 to 2004
4. Southern Mozambique Market Shed
5. Domestic and Import Prices in Southern Mozambique
6. South East Africa Market Shed
7. Domestic and Import Prices in South East Africa
8. Zones of Heavy Border Area Procurement by the Zambian Food Reserve Agency, 2006
9. East Africa Market Shed
10. Domestic and Import Prices in East Africa

TABLES

1. Size of Agricultural Markets in Sub-Saharan Africa, circa 2000
2. Quantity Flows in Major Maize Market Sheds
3. Food Expenditure Shares in Southern and Central Mozambique
4. High-Side Outliers Among Food Reserve Agency Purchases in 2006

LIST OF ACRONYMS

AAMP	African Agricultural Markets Programme
ACTESA	Alliance for Commodity Trade in Eastern and Southern Africa
COMESA	Common Market for Eastern and Southern Africa
CV	coefficient of variation
DRC	Democratic Republic of Congo
EAC	East African Community
FAO	Food and Agriculture Organization
FEWSNET	Famine Early Warning System Network
FRA	Food Reserve Agency
IFPRI	International Food Policy Research Institute
MSU	Michigan State University
RATES	Regional Agricultural Trade Enhancement Support
RATIN	Regional Agricultural Trade Intelligence Network
SAFEX	South African Commodity Exchange
VAT	value added tax
WFP	World Food Programme

1. INTRODUCTION

Over the next generation, growing trade in food staples appears poised to dwarf that in all other African agricultural markets. Currently, the market value of Africa’s food staples amounts to \$50 billion per year, or nearly three-fourths of the value of all agricultural production (Table 1). Given growing urbanization and the highest rates of poverty in the world, Africa’s market demand for food staples will grow dramatically in coming decades. As a result, production of food staples -- for growing urban markets and food-deficit rural areas -- represents probably the largest growth opportunity available to African farmers. Facilitating expansion of these markets will, therefore, be critical for efforts at stimulating agricultural production growth, broad-based income expansion and poverty reduction.

Africa’s surplus food production zones supply these growing food markets in large cities and in deficit rural areas, typically populous, land-scarce rural settings such as rural Malawi and rural Ethiopia or politically troubled rural areas, such as those in Zimbabwe, where political dislocations have stalled food production. In many cases, surplus food-producing regions emerge in areas of favorable soils and rainfall. In other instances, regular food surpluses emerge in flexible ecosystems that combine the production of multiple staples, particularly cereals in combination with perennial foodcrops such as bananas, cassava or root crops. Because farmers can harvest perennial foodcrops such as banana and cassava any time of year and over multiple years, they are able to release cereals for sale as a cash crop in domestic or regional markets. Key food surplus zones in Eastern and Southern Africa include: • South Africa, where mechanization, modern input use and increasing irrigation enable cereal export northward in most harvest seasons; • Northern Mozambique, where cassava provides local food security, enabling regular maize exports, • Tanzania, where a favorable climate and a blend of food staples including rice, cassava, banana and maize enable regular cereal exports both north into Kenya and south into Malawi and sometimes into Zambia; and • eastern Uganda, where favorable rains and multiple staples such as banana and cassava ensure food security, thereby enabling regular maize exports to Kenya.

Table 1. Size of Agricultural Markets in Sub-Saharan Africa, circa 2000

	Value (\$US billions)	Percent
Exports out of Africa		
traditional	8.6	13%
nontraditional	6.1	9%
other	1.9	3%
Intra-Africa trade		
domestic food staples	49.7	73%
other	1.9	3%
Total	68.2	100%

Source: Diao and Hazell (2004).

These surplus food production zones frequently lie across national borders from the markets they serve. Africa's political boundaries, drawn in Berlin in 1885, cut across natural market sheds, impeding the free flow of people and goods. As a result, political borders frequently separate surplus food production zones from the deficit markets they would normally serve. They separate food surplus Northern Mozambique from deficit markets in Malawi and Eastern Zambia. They cut off surplus zones in Eastern Uganda and Northern Tanzania from deficit markets in Kenya. And they separate surplus cassava and maize producing areas of Northern Zambia from the deficit mining towns of Katanga and Kasai provinces in the DRC.

These political borders translate into a welter of tariffs, export restrictions and other man-made impediments to cross-border trade in food staples. In turn, these impediments to trade raise costs and lower incentives to both farmers and traders while at the same time artificially raising consumer food prices in cross-border deficit zones. Without access to regional export markets, production surges in thinly traded national markets lead easily to price collapses, which in turn risk stalling production growth and private investment in agriculture. Therefore, in order to maintain producer incentives in Africa's many surplus food production zones, farmers there need access to growing markets, both internal and across national borders.

This paper aims to identify and define the geographic extent of major staple food market sheds in Eastern and Southern Africa. In order to lay the ground for subsequent empirical analysis of these food markets, the paper evaluates the approximate magnitude of food quantities produced, consumed and traded within key market sheds. A companion paper¹ will draw on this assessment to empirically evaluate the impact of regional trade in food staples on staple food prices, production, consumption and sales in one regional market-shed. As a stand-alone piece, we hope this overview paper will assist trade groups and policy makers interested in helping facilitate the growth and smooth functioning of these regional maize markets.

¹ See Haggblade, Govereh, Nielson and Dorosh. 2008. "Potential Consequences of Intra-Regional Trade in Short-Term Food Security Crises in South Eastern Africa." A report prepared by Michigan State University for the World Bank under contract No. 7144132, *Strengthening Food Security in Sub-Saharan Africa through Trade Liberalization and Regional Integration*.

2. DATA AND METHODS

2.1. Methods

2.1.1. *Qualitative assessment of market flows*

Traders active in staple food markets, particularly those from surplus areas and border zones, know generally where food supplies move geographically. This study, therefore, has relied primarily on the direct observations of trade flows by market participants and officials who monitor cross-border flows.

This study has not attempted any formal econometric price analysis of market integration, of the type described by Fackler and Goodwin (2001) and Moser, Barrett and Minten (2005), due to the spatial sparseness of time series price data and the frequent shifts in country policies that often inhibit market flows and hinder integration of markets across countries. Instead, this study provides qualitative assessment of the direction of flows in normal and drought years as well as approximate quantitative estimates of the extent and size of existing market sheds using available information on production, prices and trade flows, both formal and informal.

In doing so, we have pulled together information from an array of earlier food marketing studies conducted by the Regional Agricultural Trade Enhancement Support (RATES) Project, the Famine Early Warning Network (FEWSNET), Michigan State University (MSU) and allied researchers, the International Food Policy Research Institute (IFPRI), the Food and Agriculture Organization (FAO), the World Bank, the World Food Programme (WFP) and others. Market monitoring by the Regional Agricultural Trade Intelligence Network (RATIN) and FEWSNET permit us to track changes in flows over time. To help fill in gaps in our understanding, we have commissioned a series of specific studies on regional maize trade. These studies are available in Annexes 1-6.

Because both volumes traded and the exact geographic extent of a market shed may vary from one year to the next, depending on weather, production patterns and changing government policies, we have relied on interviews with traders and other knowledgeable key informants in order to put this information in context.

2.1.2. *Quantification*

National food production figures are subject to significant margins of error. Even with the maize harvest, which takes place at a known time and location, available estimates are often subject to a wide margin of error. With cassava, sweet potatoes and bananas, which are harvested over many months, production estimates are far more tenuous. Quantification of trade flows poses similar problems. Given highly porous borders in many parts of the region, estimates of formal and informal trade flows are often subject to substantial undercounting.

Indeed, difficulties in correctly anticipating food availability from local and regional production poses persistent problems to government policy makers, food aid donors and to private traders.

The Malawian experience of 2002 and early 2003 offers a classic example of this, when government misjudged prospects for private sector imports from Mozambique, which led to overshooting on public food imports, difficulties in disposing of surplus stock and triggered a consequent price slump early in the following harvest season (Whiteside, 2003; Tschirley et al., 2006).

To manage this imprecision, we have triangulated and compared quantity estimates using a variety of available sources. National and provincial production estimates, coupled with national farm household and national food consumption surveys permit estimation of net surpluses. And as a check against official border counts, net imports may be estimated as the difference between consumption (as derived from household surveys), regional production and net injections by public sector agencies (through food aid distribution or net sales of government food agencies). Finally, we have cross-checked quantity information with available monthly price series and evidence on transaction costs between pairs of markets within a defined market shed in order to arrive at final best estimate of quantities.

2.2. Data

2.1.1. Qualitative information

Qualitative information provided by market traders is available from a variety of valuable field studies. Key studies of maize marketing have taken place in Zambia (Govereh, Chapoto and Jayne, 2008), Malawi (Chirwa, 2006), Mozambique (Tschirley, Abdula and Weber, 2006; Tschirley and Abdula, 2007), Kenya (Ariga and Jayne, 2007), and Ethiopia (RATES, 2003a; Gabre-Madhin, 1998).

In addition, several recent studies have examined regional food markets in Eastern and Southern Africa. See, for example, Ackello-Ogutu and Eshessah (1997), Arlindo and Tschirley (2003), RATES (2003b), Whiteside (2003), Tschirley et al., (2006), Chapoto and Jayne (2007), and Dradri (2007).

Ongoing monitoring of food markets and cross-border flows, by FEWSNET in Southern Africa (see FEWSNET, 2008a-d) and by the RATES Project in Eastern Africa (see RATIN, 2003), permit a detailed reconstruction of production and trade patterns in many parts of the region. Likewise, WFP's regional procurement officers in Southern Africa have gained considerable experience in evaluating production and available surpluses over time (see Tschirley and del Castillo, 2007).

In an effort to pull together this information, we have benefited from participating in a two-day workshop in Pretoria in November 2007, hosted by FEWSNET and WFP, designed to pool knowledge of key stakeholder groups on the direction and magnitude of food flows in normal years and common emergency situations.

2.1.2. Quantitative information

National production data are available from Ministries of Agriculture, and are compiled by the FAO Statistical Service. Customs officers and border monitors track trade flows, with varying degrees of completeness. To supplement official border data, FEWSNET and WFP have been monitor informal cross-border trade flows in maize, rice, beans.

Price data come from national statistical offices throughout the region as well as from the South African Commodity Exchange (SAFEX) in Johannesburg. Differences in product quality, variations lot sizes and differential product tracking across collection agencies (grain versus flour, for example, or retail versus informal wholesale versus millgate prices) sometimes make price comparisons difficult and require expert consultation with key market participants and observers to resolve.

3. AN OVERVIEW OF MAIZE² MARKETS SHEDS IN EASTERN AND SOUTHERN AFRICA

Although the volumes and even directions of trade flows may differ from year to year production and policy shifts occur, our investigations have identified three broad market sheds moving south to north along the eastern half of the African continent (Figure 1).

3.1. Southern Mozambique Market Shed

The main deficit markets in Mozambique lie in the far south, in the cities of Maputo, Matola and Xai Xai and to a lesser extent in the central coast city of Beira. Domestic surpluses from the central interior areas of Manica Province supply Beira and provide seasonal supplies of white maize to the major urban centers in the south. Regular supplies to the southern cities also come from South Africa, where silos house grain in close proximity to the Mozambican border along rail lines that permit inexpensive transport into the major mills of Maputo.

Despite reliable maize surpluses produced in northern Mozambique, long distances, long wait times at the Zambezi River ferry, and high transport costs make it cheaper for Maputo-based maize mills to source their maize from South Africa. Hence, Mozambique straddles two distinct maize market sheds, with the Zambezi River providing the demarcation line between the two market basins.

Given consistent structural deficits in Southern Mozambique, formal import data indicate consistent net imports for Mozambique as a whole (Figure 2). Because the significant exports out of Northern Mozambique are primarily informal, averaging 136,000 tons annually during the 2000's (Table 2), official net imports data overstate Mozambique's net dependence on imports. Apart from the drought of 1992, right at the end of the Mozambican civil war, official imports into the South have averaged roughly 210,000 tons per year in recent years.

3.2. South East Market Shed

Maize surpluses from Northern Mozambique serve deficit urban markets in the cities of Nampula and Nacala as well as intermittently significant deficits in Malawi. The highly productive highlands of Southern Tanzania supplement these flows by directing surpluses into Malawi, DRC and sometimes into Zambia. In some years, smaller flows travel from Tete Province in Mozambique into Malawi and Eastern Zambia. During drought years in Malawi, these inflows increase substantially, as they did most notably during the Malawian food crisis of 2002 and early 2003 (Whiteside, 2003; Tschirley, 2006).

² White maize accounts for the overwhelming majority of maize consumed and produced in Eastern and Southern Africa. Consumer taste preferences for white maize in the region date from the 1920's, when the British starch market demanded white maize, leading the Rhodesian Maize Authority to pass resolution in 1923 stating that the introduction of yellow maize varieties into the territory posed "a vital danger to the maize growing industry" (Jayne et al 1995). Although consumers in Southern Mozambique received large quantities of yellow maize in food aid rations following the end of the Mozambican civil war, in the early 1990's, they consider it an inferior food, and currently white maize dominates imports and consumption (Tschirley and Weber, 1996). In the region, only South Africa produces yellow maize in significant quantities, primarily for use in livestock feed. Exports from South Africa are composed primarily of white maize (Traub, 2008).

Figure 1. Market Sheds in Eastern and Southern Africa

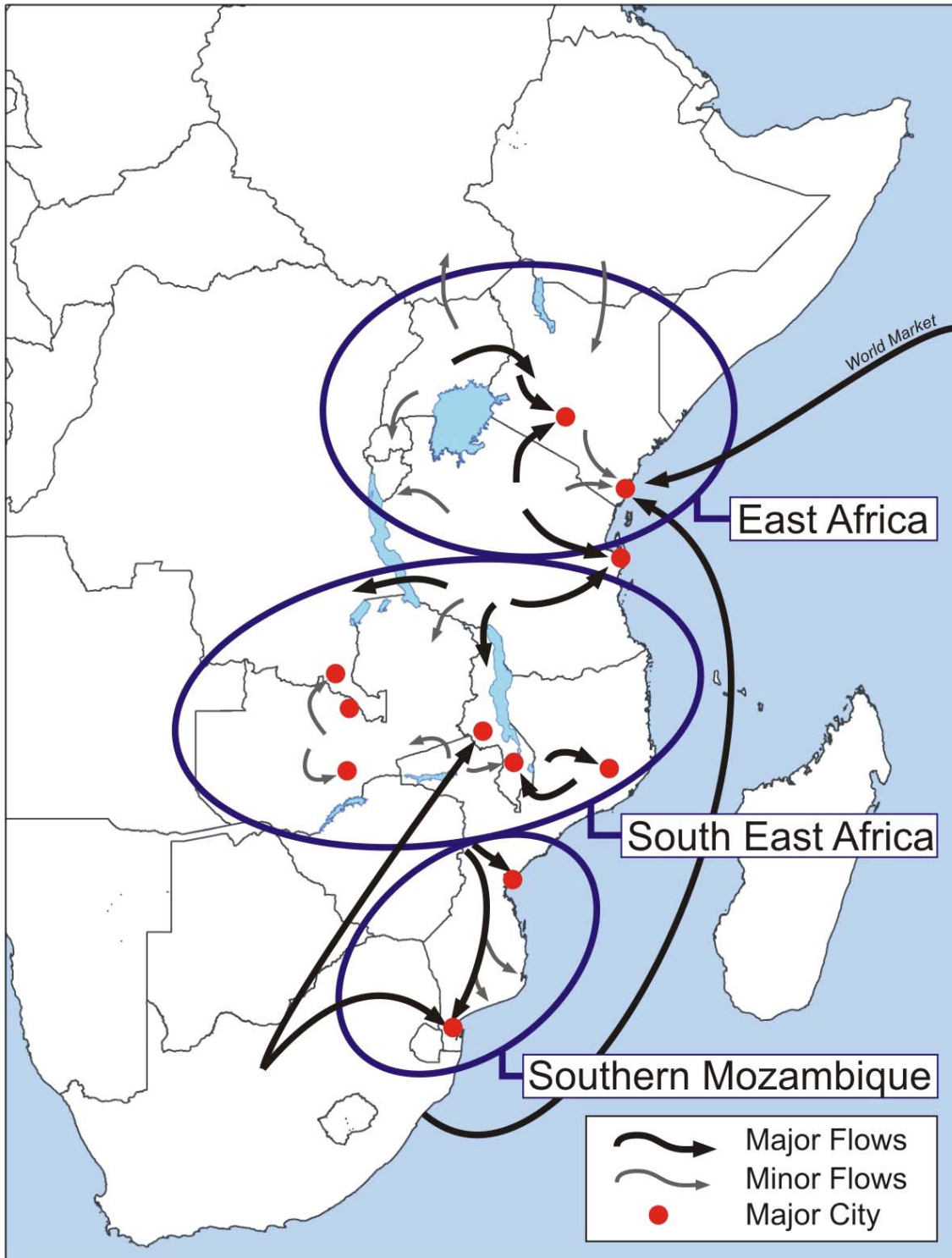


Table 2. Quantity Flows in Major Maize Market Sheds (Averages 2000 to 2004, '000 tons)****

	Production	Consumption	Formal Trade		Informal Trade***		Total
			Imports	Exports	Imports	Exports	Net Imports
East Africa							
Kenya	2,442	2,716	216	11	197	5	398
Uganda	1,209	757	31	31	0	147	-147
Northern Tanzania	916	1,001	73	27	5	85	-35
Total	4,566	4,473	321	69	202	237	216
South East Africa							
Southern Tanzania	1,831	1,001	0	54	2	38	-90
Northern Mozambique*	813	699	0	4	0	136	-140
Malawi	1,873	1,518	95	18	104	0	181
Zambia	868	1,261	59	58	8	13	-4
Total	5,385	4,480	154	134	114	187	-53
Southern Mozambique							
Center**	271	151	0	0	0	0	0
South	148	226	212	0	0	0	212
Total	419	377	212	0	0	0	212

* Includes Tete Province

** Excludes Tete Province

***For Malawi, Northern Mozambique and Southern Tanzania, includes cropping years 2000/01 to 2002/03, or marketing years 2001/02 to 2003/04. All other informal trade flows are averaged from 2004 to 2007.

****This table omits seeds, losses, feeds and stock changes.

Sources: FAOSTAT, FEWSNET, RATIN, Whiteside (2003).

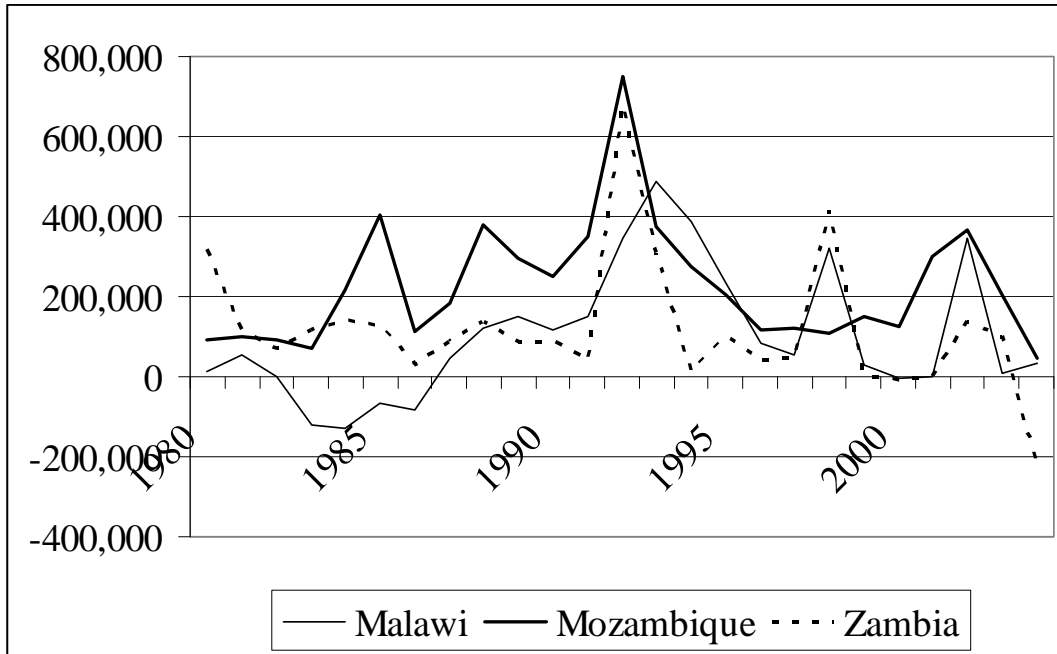
Both northern Zambia and Southern Tanzania supply maize to DRC. Large and small-scale commercial farms in central Zambia likewise supply Lusaka and in the Copperbelt. Similarly, the Southern Tanzanian highlands likewise direct some surplus maize into Dar es Salaam, though most of the southern highlands more easily serve southerly and westerly markets in Malawi, Zambia and DRC.

3.3. East Africa Market Shed

Deficit markets in Kenya provide the center of gravity for the East Africa market shed, pulling in surplus maize from Kenya's own central highlands as well as from eastern Uganda and northern Tanzania. Given consistent informal imports from Uganda, in the range of 100,000 tons per year, official trade statistics understate Kenya's import dependence as well as Uganda's status as a consistent net exporter (Figure 3). In some years, maize surpluses from southern Ethiopia flow into northern Kenya, although poor roads limit these flows. The Ugandan surpluses likewise periodically find their way into deficit markets in Rwanda, DRC and Southern Sudan.

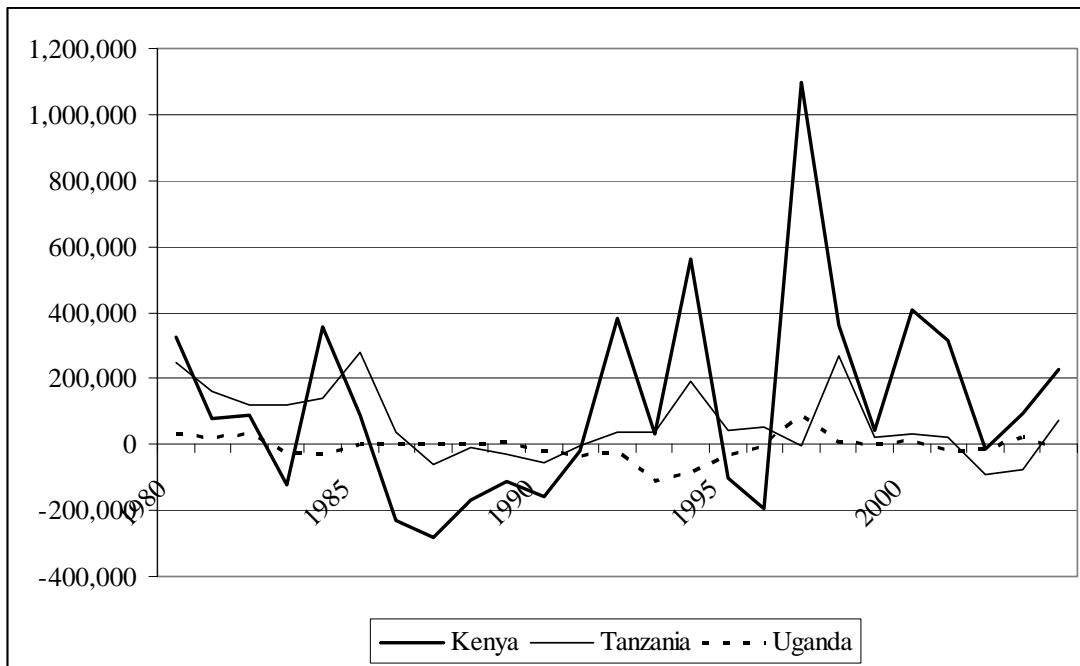
Although quantities change from one year to the next, Table 2 provides a quantitative summary of these maize production, consumption and trade flows using average data from 2000 to 2004. The ensuing discussion describes each of these three market sheds in more detail.

Figure 2. Net Official Maize Imports into South Eastern Africa, 1980 to 2004 (tons)



Source: FAOSTAT.

Figure 3. Official Net Imports into East Africa, 1980 to 2004 (tons)



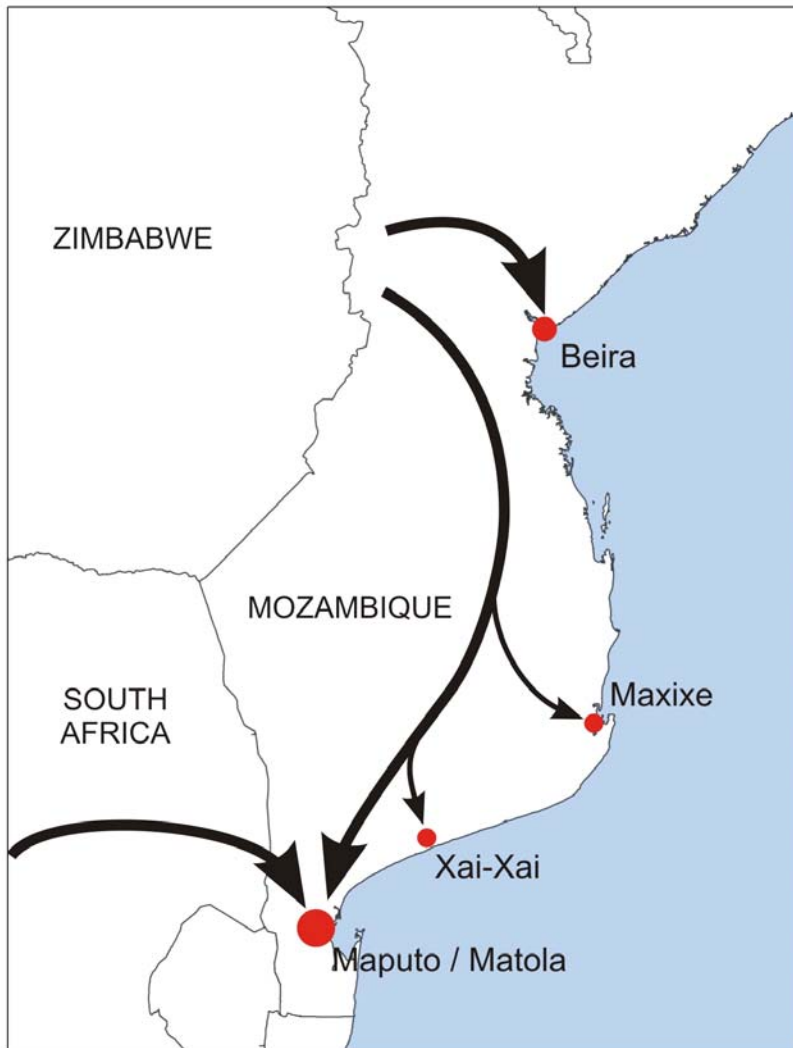
Source: FAOSTAT.

4. SOUTHERN MOZAMBIQUE MAIZE MARKET SHED³

4.1. Major flows

In the southern half of Mozambique, below the Zambezi River, farmers in central interior region of Manica Province produce the most reliable maize surpluses. Production remains concentrated, not only geographically but also among a small group of commercial smallholder farmers. Less than 5% of maize producers account for over 50% of production and over 70% of sales (Tschirley and Abdula, 2007). 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.

Figure 4. Southern Mozambique Market Shed



³ This section summarizes results from two studies by Tschirley, Abdula and Weber (2006) and Tschirley and Abdula (2007).

From Manica, a network of small and large traders transport maize surpluses to markets and mills in coastal cities, particularly in the far south (Figure 4). They also serve deficit households in rural areas. In fact, about 70% of rural households in central and southern Mozambique are net buyers of maize, resulting in total rural market demand for maize roughly equal to that in urban areas.

Urban population, at about 35% of national total, is growing rapidly. At current rates, the urban population share will reach 50% by 2020. As a result, under most likely scenarios, urban demand for maize will likely double over the next decade. 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.

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.

In Maputo, about two-thirds of consumers primarily purchase refined maize meal, with the remainder purchasing grain for service milling. Outside of urban Maputo, those shares are reversed. The low share of consumers in Maputo relying on maize grain likely stems from the low price⁴ and widespread availability of rice and the resulting very low budget share of maize, especially for higher income consumers (Table 3). The buying habits of low-income consumers also contribute to preferences for refined meal. They tend to buy very small quantities at a time, making service milling at hammer mills less desirable.

4.2. Prices

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 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.

⁴ Until this year.

Table 3. Food Expenditure Shares in Southern and Central Mozambique

	Commodity Share of Food Expenditure (%)			
	Maize	Rice	Wheat	Cassava
Urban areas				
Maputo Province*	2.4	7.8	15.5	1.3
Gaza and Inhambane Province	14.5	9.8	6.0	5.2
Manica and Tete Provinces**	39.9	4.4	2.9	0.5
Rural Areas				
Maputo Province	9.1	11.4	7.4	4.7
Gaza and Inhambane Province	12.2	9.5	3.2	8.4
Manica and Tete Provinces	48.0	2.5	1.4	0.5

* Southernmost province.

** South coast and interior south

*** Upper interior

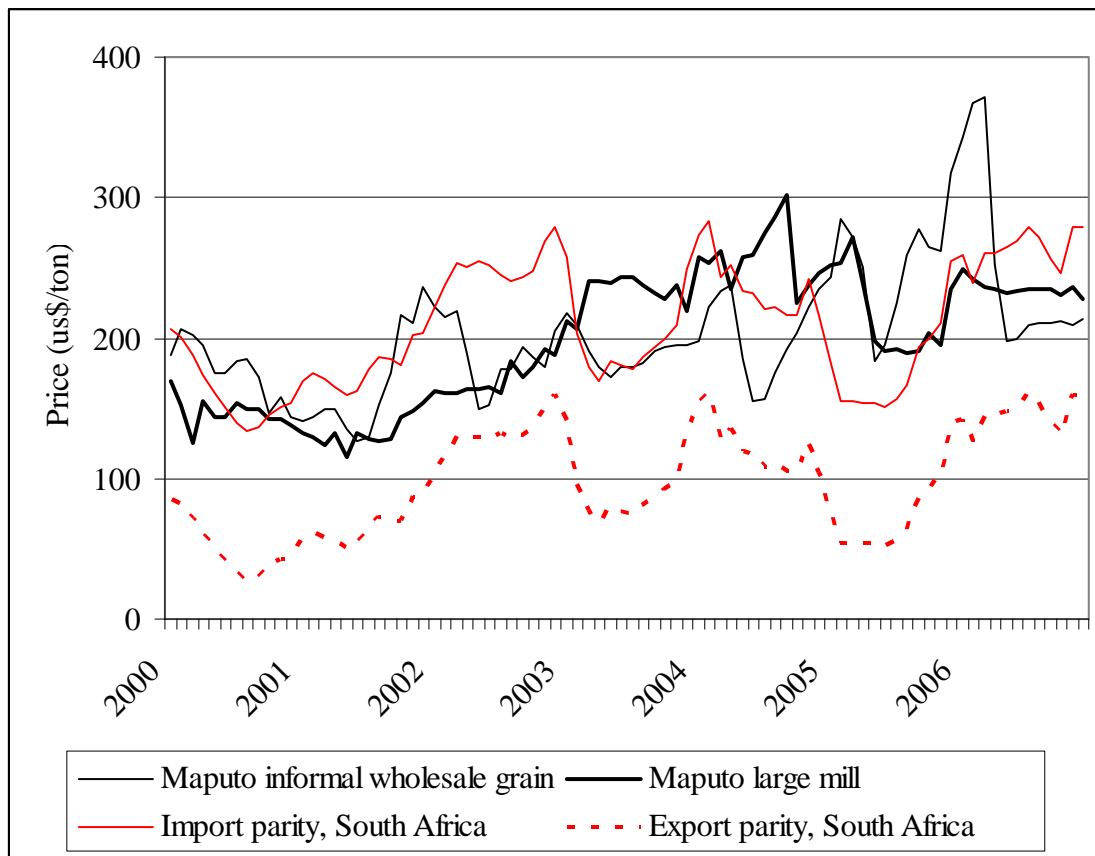
Source: IAF 2002, as reported by Tshirley and Abdula (2007)

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. Medium-scale millers in the Center and South rely primarily on local production, but hold very small market shares.

4.3. Policy Issues

Unlike many other countries in the region, Mozambique has consistently retained an open border policy on maize trade. Since the end of the civil war in 1992, Mozambique has freely allowed maize imports and exports. This enables the large deficits in the southern cities to be met by large millers who import maize grain from South Africa and mill it for sale locally. The open border policy likewise enables farmers in the surplus zones of northern Mozambique to export to Malawi and Eastern Zambia as market conditions permit.

Figure 5. Domestic and Import Parity Prices in Maputo



Source: SIMA and Annex 1.

Although Mozambique does not impose any quotas or bans on cross-border maize trade, they do impose a 17% VAT on imported maize, but not on 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 (Figure 5). 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, until the past year, had 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.

Maize meal price in Maputo broadly track SAFEX grain prices, on which the large millers depend for grain supplies. Over the seven year period, from 2000 to 2006, SAFEX white maize

prices averaged \$136 per ton, while wholesale white maize in the informal Maputo market sold for \$204 per ton. Second grade maize meal, in contrast, retailed for \$420 per ton, roughly double the price of wholesale maize. Converting retail maize meal prices back to implicit wholesale levels⁵, Figure 5 tracks domestic grain-equivalent wholesale prices in relation to import and export parity in South Africa. The large mills that produce maize meal for the Maputo market tend to price their meal in reference to SAFEX, sometimes with a lag. But, on average, over the seven year period depicted below, import parity and implicit large mill retail pricing have equaled each other, at just over \$200 per ton implicit wholesale price for maize grain. During Mozambique's domestic maize shortages of late 2005 and early 2006, the SAFEX price appears to have moderated maize meal prices coming out of the large mills. Meal prices out of the large mills follows SAFEX price downwards, with a several month lag, and remained at SAFEX levels during the worst of the lean season. In contrast, the thinly traded whole grain on the informal wholesale market saw prices spike well above import parity for several months. Given low budget shares for whole grain and service milling, and given the disincentives for small-lot maize imports from South Africa (discussed above), traders evidently felt they could not import profitably in the short window available. Indeed, wholesale maize prices on the informal market fell back below import parity within a couple of months.

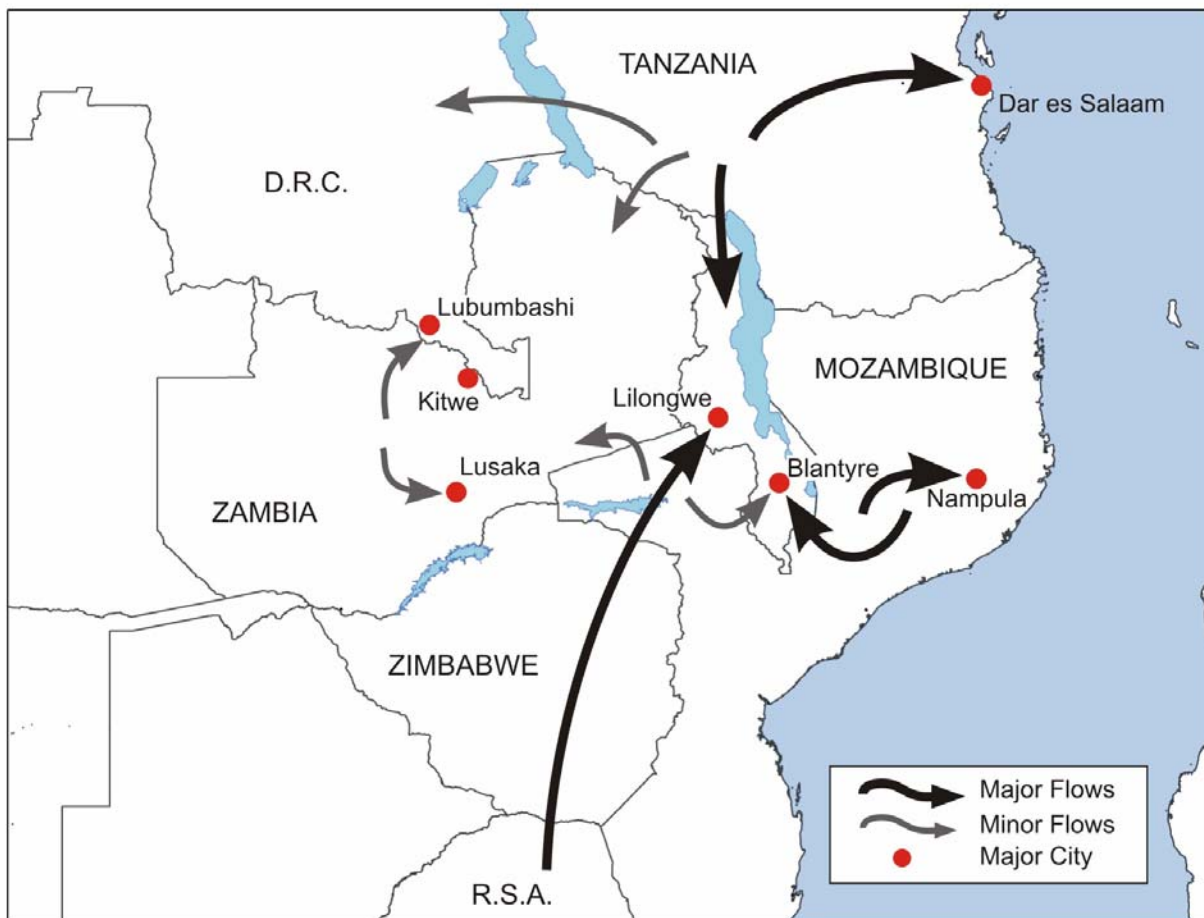
⁵ In this conversion we have used the long-term average retail to wholesale ratio of $420/204 = 2.11$.

5. THE SOUTH EAST MARKET SHED

5.1. Major flows

Northern Mozambique and Southern Tanzania produces the largest maize surpluses inside the South East Africa market shed. In addition, a cohort of large and small commercial farmers in Central Zambia produces marketed volumes that are typically sufficient to supply Zambia's urban markets and in most years exports to the DRC. Land-scarce Malawi, historically dependent on maize imports; has produced large maize surpluses during the past two agricultural seasons, as a result of large-scale distribution of subsidized maize input packages. As a result, production has surged to over 3 million metric tons, from prior norms of 2 million tons, although it is unclear if these subsidies are sustainable over the long run.

Figure 6. South East Africa Market Shed



These surplus maize production zones serve a range of deficit markets within the market shed. Historically, deficit households in rural and urban Malawi have relied on imports from South Africa, Northern Mozambique and Southern Tanzania (Figure 6). In addition to Malawi, the large maize surpluses produced in Northern Mozambique supply urban Nampula and other cities in the northern zone. Lusaka and the Copperbelt mining towns in Zambia are supplied primarily by large and small commercial farms in Central and North Central Zambia. Typically, these same farms are to supply Lubumbashi and other towns on the DRC side of the Copperbelt. In drought years, government and private traders supplement domestic production with imports from South Africa and Southern Tanzania. Lubumbashi, a city of two million people in the DRC Copperbelt; imports maize from Zambian suppliers; when possible. When low production or export bans are in place, the Lubumbashi imports maize and maize meal by rail from South Africa.

5.2. Prices

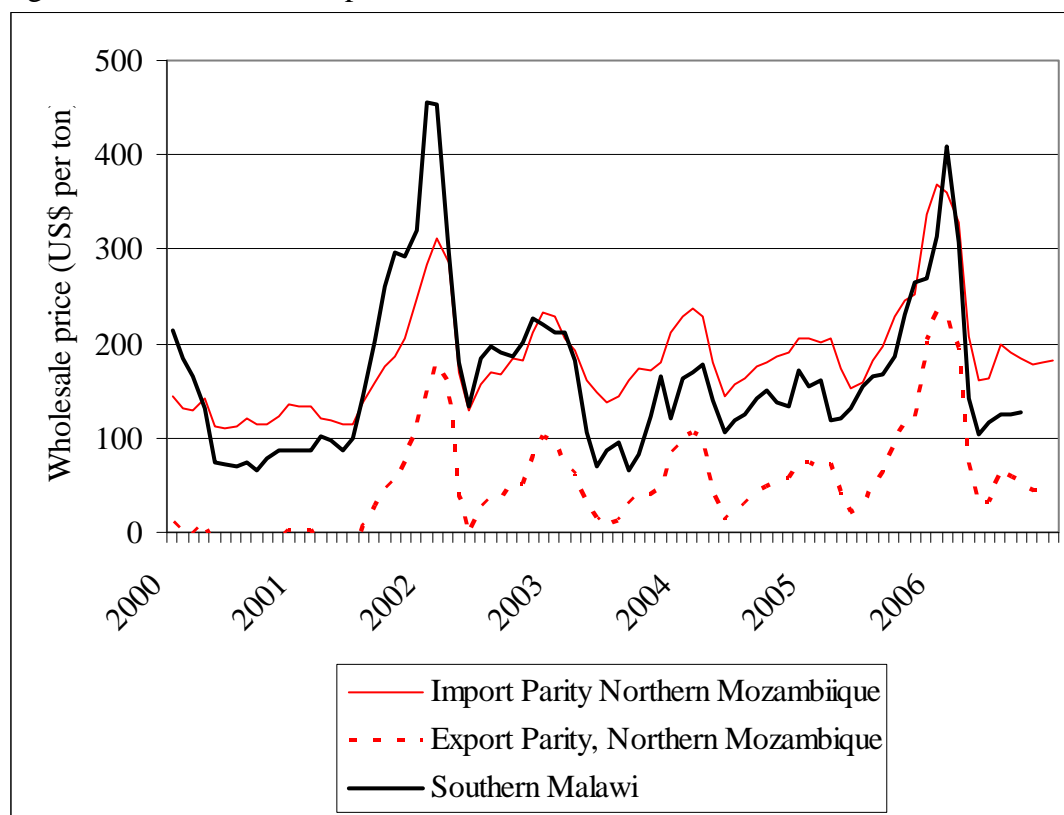
Until very recently, Malawi has formed the core deficit market in the South East African market shed. During the seven year period, from 2000 through 2006, wholesale maize prices in Lunzu Market, near Blantyre in Southern Malawi, averaged \$166 per ton, while those in the interior markets of Northern Mozambique and in the Southern Tanzanian highlands averaged \$120. Because it's proximity, Northern Mozambique has a slight cost advantage in supplying the Malawian market. In 2001, 2002 and 2005, imports from Northern Mozambique were highly profitable and import parity prices from Northern Mozambique served to help cap prices in southern Malawi (Figure 7). Following the Malawian government offloading of excess stocks in early 2003, and the subsequent price fall, exports from Northern Mozambique became unprofitable, as they did again in 2006, following widespread input distribution and a bumper harvest in Malawi. It remains to be seen how continued input subsidies, and continued strong harvest in the past two seasons will affect planting decisions in Northern Mozambique and Southern Tanzania. Alternative cash crops may become more attractive if Malawian harvests continue to be strong (Whitehead, 2003).

5.3. Policy Issues

5.3.1. Import and Export Quotas and Bans

Mozambique and DRC, unlike the other countries in this region, allow the free flow of maize across their borders. Because Northern Mozambique is typically maize surplus, and because Malawian markets offer better prices than Southern Mozambique (because of the longer distance and higher transport cost to Maputo), traders in Northern Mozambique routinely look to Malawi to market their surplus grain. Because the South, then, requires imports, Mozambique has an interest in allowing imports (to serve the South) and exports (to provide price support for surplus farmers in the North). DRC, a net deficit country, similarly benefits from open borders.

Figure 7. Domestic and Import Prices in Southern Malawi



Source: Annexes 1,3.5.

In contrast, Zambia, Tanzania and Malawi carefully control formal cross-border maize trade. They require export and import permits, and periodically they impose bans⁶. Typically, though not always, they ban on imports during good harvest years and exports during poor harvest years. A contrary instance occurred following Zambia's good maize harvest of 2006, when government initially banned exports in order to build up national stocks for the government Food Reserve Agency (FRA) (Dorosh, Dradri and Haggblade, 2007). Traders and farmers complain about the unpredictability of these quotas and considerable evidence suggests that this unpredictability reduces private trader willingness to engage in formal cross-border maize trade (Mwanaumo et al., 2005; Nijhoff et al., 2003; Ashimogo, 2008).

5.3.2. Government Price Subsidies

Farmer price subsidies. The Zambian, Malawian and Tanzanian governments all procure grain for a public food reserve agency. In all three countries, the role of public food agencies has diminished from highly interventionist levels in the late 1980's and early 1990's. The least

⁶ See Phiri (2008) on Malawi, Ashimogo (2008) on Tanzania and Govereh, Chapoto and Jayne (2008) (on Zambia).

interventionist of the three, Tanzania's government purchased an average of 2.6% of total maize production during the 1990's, with the share purchased by their national Strategic Grain Reserve (SGR) falling to 1.6% in the years since 2000 (Ashimogo, 2008). In Zambia, the dissolution of the National Maize Marketing Board (NAMBOARD), in the early 1990's, launched a decade of negligible government procurement. Not until the mid-2000's did the newly reconstituted Food Reserve Agency (FRA) begin purchasing significant quantities of maize, amounting to about 10% of smallholder maize production by 2004 (Govere, Jayne and Chapoto, 2008). The Malawian government's Agricultural Marketing Development Corporation (ADMARC) has remained the most heavily interventionist in the region (Smale and Jayne, 2003).

In Zambia, as in Kenya, the government has typically paid above-market prices for this maize (Govere, Chapoto and Jayne, 2008). This has led, in some years, to unusually large border area purchases by Zambia's Food Reserve Agency (Table 4 and Figure 8). Many market observers believe that high procurement prices in Zambia have attracted informal maize imports from Southern Tanzania and Tete Province in Mozambique (Whiteside, 2003; Times of Zambia, 2006).

Consumer price subsidies. On the consumer side, both Malawi and Zambian food agencies have, at various times, disposed of stock at below-market prices in urban areas. Given the unpredictability of these subsidized sales, many traders decline to enter the import market during drought years, for fear of being undercut by subsidized government grain (Mwanaumo et al., 2005; Whitehead, 2003; Tschirley et al., 2006).

On balance, most available evidence suggest that these government quantity and price controls tend to discourage private cross-border trade, by introducing significant price risk and raising the cost of doing business. Most market traders complain most of all about the unpredictability of government trade controls. A study of Zambian maize markets indicates that several international grain trading companies exited the Zambian market after initial forays because of the heavy risk imposed by unpredictable government interventions in the maize market.

Figure 8. Zones of Heavy Border Area Procurement by the Zambian Food Reserve Agency, 2006



Source: FSRP (2007).

Table 4. High-Side Outliers Among Food Reserve Agency Purchases in 2006

Province District	Marketed Volumes*		FRA Purchases
	1999/2000	2002/03	2006
Eastern			
Chadiza	1,391	1,586	28,257
Nyimba	1,133	486	10,088
Northern			
Mbala	5,962	6,406	20,386
Nakonde	1,545	4,521	11,704
Total	10,031	12,999	70,435

* Farm household estimates of total volumes of maize sold, including all sales to households, traders and to the FRA.

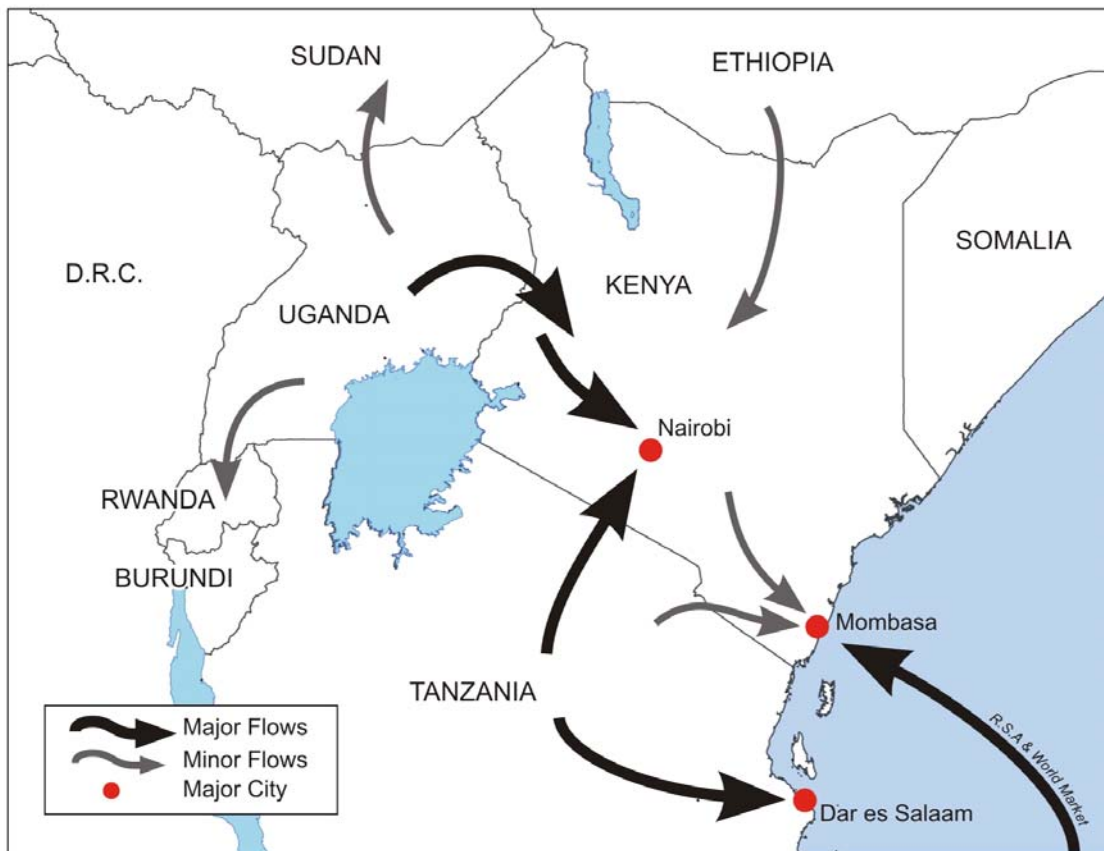
Source: FSRP (2007).

6. THE EAST AFRICA MARKET SHED

6.1. Major flows

Surplus maize-producing areas in East Africa include Eastern Uganda, Northern Tanzania, and the western highlands of Kenya. Major deficit areas emerge in the large urban areas of Nairobi and Mombassa as well as in coastal Dar es Salaam. Though maize movements vary seasonally and involve movement in both directions at given times of year, the most prevalent flows are depicted in Figure 9.

Figure 9. East Africa Market Shed



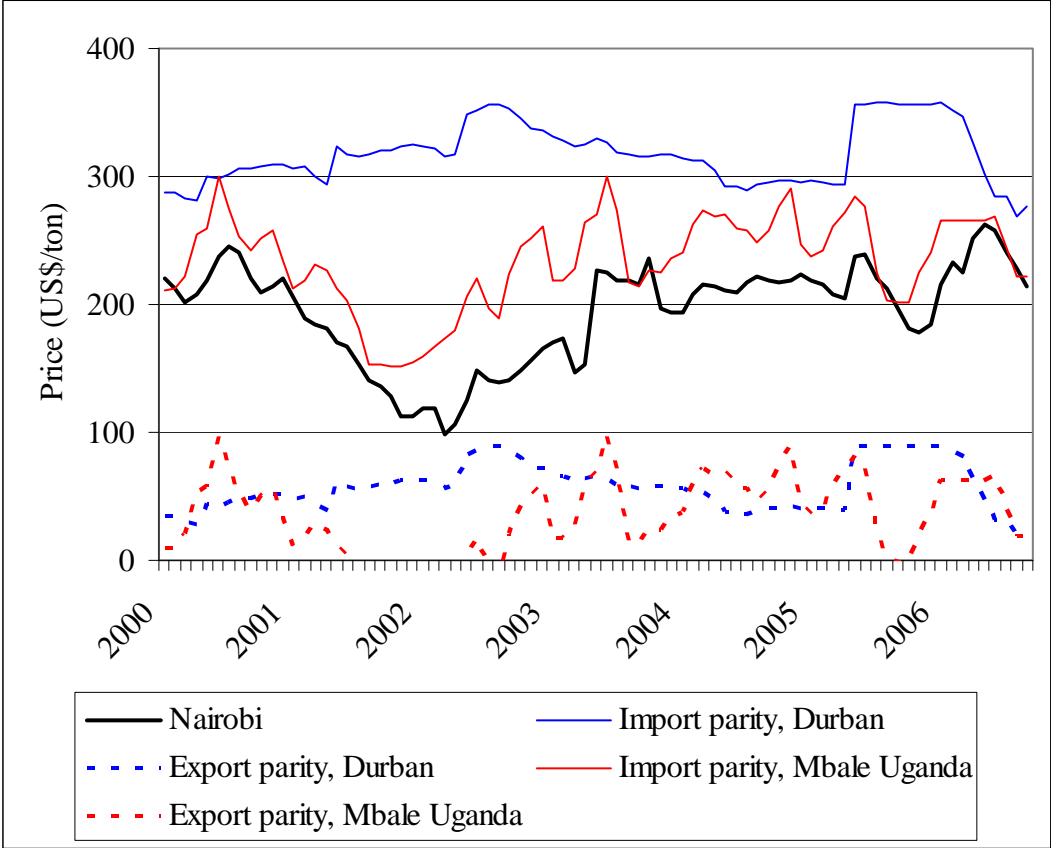
6.2. Prices

Kenya remains a deficit, high-cost maize market. Over the period between 2000 and 2006, the monthly Nairobi wholesale price for white maize has averaged \$194 per ton, compared to \$127 in Uganda at the Mbale market near the Busia border post, and \$165 in Durban. Kenya's policy of maintaining high maize prices, through high procurement prices and tariff protection, has favored farm groups as well as informal traders from Uganda. Even from 2005 onwards, when

Kenya lowered its maize import tariff from 25% to 2.75% for EAC countries, they retained the 25% levy on sea shipments coming in via Mombassa. As a result, shipments from South Africa and the rest of the world continue to face a 25% entry fee, and these duties amount to roughly half of total landed costs in Nairobi (Nyoro, 2008, Table 5). These duties on official imports have spurred the rise of substantial informal maize imports from Uganda and Tanzania. At roughly 200,000 tons per year, these informal imports roughly match the magnitude of official imports (Table 2).

Import parity calculations suggest that informal imports from Uganda have helped to cap Nairobi price increases intermittently over the past six years (Figure 10). Imports from Durban remain more competitive in Mombasa, where they avoid the Mombassa to Nairobi transit and handling costs of roughly \$50 per ton. Given the high cost of maize in Kenya, they remain generally uncompetitive in export markets.

Figure 10. Domestic and World Prices for White Maize Grain, Wholesale in Nairobi



Source: Annexes 1-4.

6.3. Policy Issues

Chronic maize deficits in Kenya, since the early 1990's, have provided the central gravitational force drawing in maize from surrounding surplus areas in Uganda and Tanzania (Magnay, 2004). For this reason, Kenya's trade policies become the most important governor of regional maize flows.

Kenyan maize policy in recent decades has involved supporting high prices for farmers through high government procurement prices. Kenya remains the most highly interventionist government in the region, with National Cereal Produce Board (NCPB) purchases accounting for 11% of national maize production during the 1990s, though falling to 7% since 2000 (Nyoro, 2008). In contrast, Tanzania's Strategic Grain Reserve purchased only 1.6% of national production since 2000, and Uganda does not operate a government maize procurement agency (Adamuga, 2008).

Because Ugandan farmers can produce maize at lower cost than Kenyan farmers, Kenya has historically protected its farmers by imposing high import tariffs on maize (Nyoro, Kiriimi and Jayne, 2004). This import tariff has fluctuated widely, and unexpectedly, over time, from a high of 50% in 1999 to a low of zero in 2000. But during the second half of the 1990's and the first half of the 2000's, the import tariff averaged 25% (Ariga and Jayne, 2007). Recent simulation results suggest that the Kenyan tariffs raised maize prices in Kenya between 4% and 17%, depending on the market and year (Jayne, Myers and Nyoro, 2005).

Not surprisingly, these high import tariffs discouraged formal trade and instead diverted trade flows into informal channels. A series of cross-border monitoring studies has documented the widespread practice of trucking grain to the Uganda-Kenya border, then offloading and carrying bags on bicycles across the border to circumvent customs agents. The bicycle traders then bulk bags at assembly points across the border where Kenyan traders with trucks reload the bags and deliver them to deficit markets throughout Kenya (Ackello-Ogutu and Echesseh, 1997; RATES, 2003b). These added transaction costs clearly dampen incentives to trade. In spite of these impediments, informal flows from Uganda range from 40,000 to 80,000 tons per year between 2001 and 2004 (Magnay, 2004).

Since January of 2005, with the institution of the new East African Community (EAC) trade agreement, Kenya has lowered its maize import tariff from 25% to 2.75% on maize imports from the other member countries of Uganda, Tanzania, Rwanda and Burundi. This, together with COMESA efforts to harmonize food safety, phytosanitary standards and customs procedures, are expected to facilitate cross border trade in coming years.

7. CONCLUSIONS

Surplus food production zones often lie across national borders from the deficit markets they serve. Maize farmers in eastern Uganda and northern Tanzania serve deficit markets in Kenya. Farmers in northern Zambia serve deficit markets in the mining centers of Katanga and Kasai Province in the Democratic Republic of Congo (DRC). Small producers in northern Mozambique supply maize to Malawi and intermittently to eastern Zambia. And surplus maize from the southern Tanzanian highlands flows regularly into Malawi and intermittently into northern and eastern Zambia.

As a result, natural markets sheds cut across national boundaries. Tanzania and Mozambique offer the clearest example of this. While surplus producers in northern Tanzania serve deficit markets in Kenya, those in the southern highlands serve coastal markets and deficit areas to the south, primarily in Malawi. Mozambique is likewise partitioned into two major market sheds. Despite regular maize surpluses in the north and in Tete Province in northern central Mozambique, the major deficit markets in the south rely primarily on imports from South Africa and to a lesser extent on seasonal surpluses from central Mozambique.

To maintain and sustain producer incentives, farmers in food surplus zones will need access to growing markets, both internal and across national borders. In thin national markets, without export outlets, production surges lead easily to price collapses. In turn, these disincentives dampen long-term agricultural income growth. Therefore, failure to facilitate the expansion of intra-regional trade in food staples risks stalling production growth and private investment in agriculture in these critically important high potential food production zones. Indeed, the policy-abetted Malawian price collapse of 2003 left many Mozambican maize farmers without their normal export outlets, inducing them to consider alternative cash crops such as tobacco instead. This suggests that *national* maize production and marketing policy will be most productive when formulated in a *regional perspective* that recognizes and facilitates the development of these external food markets.

Successful expansion of regional trade in food staples holds the potential to accelerate agricultural income growth in favorable areas while simultaneously diminishing price volatility and hunger in deficit zones. Thus, regional trade food in staples constitutes one key plank in an effective agricultural development and food security strategy for the region.

REFERENCES

- Ackello-Ogut, Chris and Echessah, Protase. 1997. "Unrecorded Cross Border Trade between Kenya and Uganda: Implications for Food Security." Nairobi: USAID.
- Abdula, Danilo (2005). "Improving Maize Marketing and Trade Policies To Promote Household Food Security In Southern Mozambique". M.S. Thesis. Department of Agricultural Economics, Michigan State University. East Lansing.
- Alimuga, Lucy. 2008. "Uganda Country Maize Trade Profile." Appendix 4 to this report.
- Ariga, Joshua and Jayne, T.S. 2007. "Maize Trade and Marketing Policy Interventions in Kenya." Background paper prepared for the FAO Conference on Food Marketing and Trade Policy Options in Eastern and Southern Africa," March 1-2, 2007, Rome.
- Ashimogo, Gaspr. 2008. "Tanzania Maize Trade Country Profile." Annex 3 to this report.
- Babu, Suresh and Sanyal, Prabuddha. 2007. "Persistent Food Insecurity from Policy Failures in Malawi." Case Study #7-2 of the program *Food Policy for Developing Countries: The Role of Government in the Global Food System*. Ithaca, New York: Cornell University.
- Byerlee, Derek, T.S. Jayne, and Robert J. Myers. 2006. Managing food price risks and instability in a liberalizing market environment: overview and policy options. *Food Policy*, 31(4):275-287, August.
- Chapoto, Antony and Jayne, T.S. 2007. "Price Unpredictability, Trade Policy and the Demand for food Staples in Eastern and Southern Africa: An Application of the ARCH Model." Paper presented to the Workshop on Appropriate Trade Policies for Agricultural Development in a Globalizing World, 10-11 December, 2007. Rome: Food and Agricultural Organization.
- Chirwa, Ephraim. 2006. "Commercialisation of Food Crops in Rural Malawi: Insights from the Household Survey." Working Paper no. 2006/04. University of Malawi, Chancellor College.
- del Ninno, Carlo, Paul Dorosh and Kalanidhi Subbarao. 2005. "Food Aid and Food Security in the Short- and Long Run: Country Experience from Asia and sub-Saharan Africa", Social Protection Discussion Paper No. 0538. Washington, D.C.: World Bank.
- Devereux, Stephen. 2002. The Malawi Famine of 2002. Institute of Development Studies Bulletin 30(4):70-78.
- Diao, Xinshen and Hazell, Peter. 2004. "Exploring Market Opportunities for African Smallholder Farmers." *2020 Africa Conference Brief No.6*. Washington, DC: International Food Policy Research Institute.

- Dorosh, Paul. 2001. Trade liberalization and national food security: Rice trade between Bangladesh and India. *World Development* 29(4): 673-689.
- Dorosh, Paul; Dradri, Simon and Haggblade, Steven. "Alternative Instruments for Ensuring Food Security and Price Stability in Zambia." Working Paper 29. Lusaka: Food Security Research Project.
- Dradri, Simon. 2007. "A Market Analysis of the Food Security Situation in Southern Africa in 2007/08." Paper prepared for the Strengthening Emergency Needs Assessment Capacity (SENAC) and Regional Bureau for Southern Africa. Lusaka: World Food Programme.
- Gabre-Madhin, E. 1998. "*Transaction Costs, Contractual Choices, and Institutions in the Ethiopian Grain Market.*" Ph.D. Dissertation. Stanford, CA: Stanford University.
- Govere, Jones; Jayne, T.S.; and Chapoto, A. 2008. "Assessment of Alternative Maize Trade and Market Policy Interventions in Zambia." *Working Paper No.32*. Lusaka, Zambia: Michigan State University Food Security Research Project.
- FEWSNET (Famine Early Warning System Network). April 2008a. "Informal Cross Border Food Trade in Southern Africa." Issue 41. Published monthly since July 2000 by FEWSNET and the World Food Programme: www.fews.net.
- FEWSNET (Famine Early Warning System Network). April 2008b. "Zambia: Informal Cross Border Trade Report." Published since October 2005 by FEWSNET and the World Food Programme: www.fews.net.
- FEWSNET (Famine Early Warning System Network). March 2008c. "Malawi: Informal Cross Border Trade Report." Published since October 2005 by FEWSNET and the World Food Programme: www.fews.net.
- FEWSNET (Famine Early Warning System Network). April 2008d. "Mozambique: Informal Cross Border Trade Report." Published since October 2005 by FEWSNET and the World Food Programme: www.fews.net.
- FSRP (Food Security Research Project). 2007. "Testimony to the Parliamentary Committee on Agriculture and Lands on Agricultural Marketing and Finance Systems in Zambia." Lusaka: National Assembly, Parliament Building, May 2, 2007.
- Govere, Jones; Chapoto, A.; and Jayne, T.S. 2008. "Assessment of Alternative Maize Trade and Market Policy Interventions in Zambia." Forthcoming as a Food Security Research Project Working Paper. Lusaka: Michigan State University.
- Howard, Julie A. and Mungoma, Caroline. 1996. *Zambia's Stop and Go Revolution: The Impact of Policies and Organizations on the Development and Spread of Maize Technology*. MSU International Development Working Paper No. 61. East Lansing, Michigan: Department of Agricultural Economics, Michigan State University.

- Jayne, T. S., L. Rubey, D. Tschirley, M. Mukumbu, M. Chisvo, A.P. Santos, M. T. Weber, and P. Diskin. 1995. Effects of Market Reform on Access to Food by Low-Income Households: Evidence from Four Countries in Eastern and Southern Africa. International Development Paper No. 19. Michigan State University, Department of Agricultural Economics, East Lansing.
- Jayne, T. and S. Jones. 1997. Food Marketing and Pricing Policy in Eastern and Southern Africa: A Survey. *World Development* 25(9):1505-1527.
- Jayne, T.S.; Zulu, B.; Mather, D.; Mghenyi, E.; Chirwa, E. and Tschirley, D. 2005. "Maize Marketing and Trade Policy in a pro-Poor Agricultural Growth Strategy: Insights from Household Surveys in Eastern and Southern Africa." Paper prepared for the conference on *Toward Improved Maize Marketing and Trade Policies in the Southern Africa Region* sponsored by the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), June 21-22, Centurion Park Hotel, South Africa.
- Jayne, T.S., Tembo, G., Nijhoff, J., 2005. Experiences of food market reform and price stabilization in eastern and Southern Africa. *Food Policy*. 31(4): 328-342.
- Jayne, T.S.; Mukumbu, Mulinge; Chisvo, Munhamo; Tschirley, David; Weber, Michael T.; Zulu, Ballard; Johansson, Robert; Santos, Paula and Soroko, David. 1999. Successes and Challenges of Food Market Reform: Experiences from Kenya, Mozambique, Zambia and Zimbabwe. MSU International Development Working Paper No.71. East Lansing, Michigan: Department of Agricultural Economics, Michigan State University.
- Jayne, T.S.; Myers, Robert J.; and Nyoro, James. 2005. "Effects of Government Maize Marketing and Trade Policies on Maize Market Prices in Kenya." Tegemeo Working Paper 15/2005. Nairobi: Egerton University.
- Jayne, T.S.; Myers, Robert J.; and Nyoro, James. 2008. "Effects of NCPB Marketing Policies on Maize Market Prices in Kenya." *Agricultural Economics* 38(2008):313-325.
- Jayne, T. and S. Jones. 1997. Food Marketing and Pricing Policy in Eastern and Southern Africa: A Survey. *World Development* 25(9):1505-1527.
- Kalinda, T., F. Maimbo, and M. Mushimba, 2003. *Zambia Food Security Issues Paper*. Forum for Food Security in Southern Africa. www.odi.org.uk/food-security-forum.
- Magnay, John. 2004. "The Ugandan Maize Industrey." Conference Paper No. 7 presented to the New Partnership for Africa's Development (NEPAD) conferences on *Successes in African Agriculture for the IGAD Region*. Nairobi, November 22-25, 2004.
- Minten, Bart and Paul Dorosh (eds). 2006. Rice Markets in Madagascar in Disarray: Policy Options for Increased Efficiency and Price Stabilization. Africa Region Working Paper Series. Number 101. Washington: World Bank.

- MOA/MSU Research Team (1994). “Who Eats Yellow Maize? Some Preliminary Results of a Survey of Consumer Maize Meal Preferences in Maputo”. Research Report 18E. Ministry of Agriculture, Maputo.
- Mwanaumo, Anthony, T.S Jayne, Ballard Zulu, Julius Shawa, Green Mbozi, Steven Haggblade, and Misheck Nyembe (2005). “Zambia’s 2005 Maize Import and Marketing Experiences: Lessons and Implications”. Policy Synthesis No. 11. Food Security Research Project - Zambia. Michigan State University. <http://www.aec.msu.edu/agecon/fs2/zambia/PS11.pdf>
- Muyanga, Milu; Jayne, T.S.; Argwings-Kodhek, G.; and Ariga, Joshua. 2006. Staple Food Consumption Patterns in Urban Kenya: Trends and Policy Implications. Tegemeo Institute of Agricultural Policy and Development, Working Paper No.19, Nairobi: Egerton University.
- Nijhoff, J.J.; Jayne, T.S.; Mwinga, Billy; and Shaffer, Jim. 2002. Markets Need Predictable Government Actions to Function Effectively: The Case of Importing Maize in Times of Deficit. Policy Synthesis No.6. Lusaka: Food Security Research Project.
- Nijhoff, J.J.; Tembo, Gelson; Shaffer, Jim; Jayne, T.S.; and Shawa, Julius. 2003. How Will the Proposed Crop Marketing Authority Affect Food Market Performance in Zambia: An Ex Ante Assessment to Guide Government Deliberation. Working Paper No.7. Lusaka: Food Security Research Project.
- Nyoro, James. 2008. “Kenya Country Maize Trade Profile.” Appendix 2 to this report.
- Philipose, Anandita. 2007. “Policy Implications of Droughts and Food Insecurity in Malawi and Zambia.” Case Study #7-3 of the program *Food Policy for Developing Countries: The Role of Government in the Global Food System*. Ithaca, New York: Cornell University.
- RATES. 2003a. “Maize Market Assessment and Baseline Study for Ethiopia.” Nairobi: The RATES Center.
- RATES (Regional Agricultural Trade Expansion Support Program). 2003b. “Regional Maize Trade Policy Paper.” Nairobi: COMESA.
- RATIN (Regional Agricultural Trade Intelligence Network). 2003. “Regional Trade Overview” RATIN Monthly Bulletin, June 13, 2003. Nairobi: RATES Center.
- Smale, Melinda and Jayne, Thomas. 2003. “Maize in Eastern and Southern Africa: ‘Seeds’ of Success in Retrospect.” *Environment and Production Technology Division Working Paper No. 97*. Washington, DC: International Food Policy Research Institute.
- Tiffen, Mary (2003). “Transition in Sub-Saharan Africa: Agriculture, Urbanization and Income Growth”. *World Development*, Vol. 31, No. 8, pp. 1343–1366

- Traub, Lulama Ndibongo and Jayne, T.S. 2004. "The Effect of Market Reform on Maize Marketing Margins in South Africa." *MSU International Development Working Paper No.83*. East Lansing, MI: Department of Agricultural Economics, Michigan State University.
- Traub, Lulama Ndibongo. 2008. "South Africa Maize Trade Country Profile." Maize Market Sheds in Eastern and Southern Africa. Annex 1 to this report.
- Tschirley, David and del Castillo, Anne Marie. 2007. "Local and Regional Food Aid Procurement: An Assessment of Experience in Africa and Elements of Good Donor Practice." *International Development Working Paper No.91*. East Lansing, Michigan: Michigan State University.
- Tschirley, David; Donovan, Cynthia and Weber, Michael. 1996. "Food Aid and Food Markets: Lessons from Mozambique". *Food Policy*, vol. 21, no. 10.
- Tschirley, David and Jayne, T.S. 2007. "Food Crises and Food Markets: What has been Learned in Southern Africa over the Past Decade?" Presented at Vulnerability to and Early Warning for Food Emergencies: Conceptual Issues and Practical Implementation. FAO Global Information and Early Warning System (GIEWS) on Food and Agriculture. FAO, Rome. December 6-7, 2007.
- Tschirley, D., Nijhoff, J. Arlindo, P., Mwinga, B., Weber, M. and Jayne, T. 2006. Anticipating and Responding to Drought Emergencies in Southern Africa: Lessons from the 2002-2003 Experience. *MSU International Development Working Paper No.90*. East Lansing, MI: Michigan State University.
- Tschirley, David, Jan J. Nijhoff, Pedro Arlindo, Billy Mwinga, Michael T. Weber, and T.S. Jayne (2005). "Anticipating and Responding to Drought Emergencies in Southern Africa: Lessons from the 2002-2003 Experience". International Development Working Paper No. 89. Michigan State University.
<http://www.aec.msu.edu/agecon/fs2/papers/idpw89.pdf>
- Tschirley, David, Danilo Abdula, and Michael T. Weber (2006). "Toward Improved Maize Marketing and Trade Policies to Promote Household Food Security in Central and Southern Mozambique". Research Paper No. 60E. MA/MSU Food Security Project. Maputo. <http://www.aec.msu.edu/agecon/fs2/mozambique/wps60e.pdf>
- Tschirley, David and Abdula, Danilo. 2007. "Toward Improved Maize Marketing and Trade Policies to Promote Household Food Security in Central and Southern Mozambique: 2007 Update." Paper Prepared for the Conference on *Trade Policy for Food Products Conducive to Development in Eastern and Southern Africa*. Food and Agriculture Organization of the U.N. Rome, Italy. March 2007
- Whiteside, Martin. 2003. "Enhancing the Role of Informal Maize Imports in Malawi Food Security." Lilongwe: DFID.

Wood, Adrian Paul; Kean, Stuart A.; Milimo, John T.; and Warren, Dennis. 1990. *The Dynamics of Agricultural Policy and Reform in Zambia*. Ames, Iowa: Iowa State University Press.

Zinyama, Fridah. 2007. WFP awards NMC Zim maize export contract. *The Post Tuesday*, February 27, 2007, p.11.

Zulu Ballard., J.J. Nijhoff, T.S. Jayne and A. Negassa. 2000. *Is the glass half-empty or half full? An analysis of agricultural Production trends in Zambia*. Working paper no. 3. Food Security Research Project. Lusaka.

Zulu, Ballard; Jayne, T.S.; and Beaver, Margaret. 2007. "Smallholder Household Maize Production and Marketing Behavior in Zambia and Its Implications for Policy." *Working Paper No.22*. Lusaka, Zambia: Michigan State University Food Security Research Project.