FOOD SECURITY RESEARCH PROJECT

POTENTIAL FOR INTRA-REGIONAL MAIZE TRADE IN SOUTHERN AFRICA: AN ANALYSIS FOR ZAMBIA AT THE SUB-NATIONAL LEVEL

By

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The views expressed in this document are exclusively those of the authors.

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EXECUTIVE SUMMARY

This working paper explores the prospects for regional maize trade in helping to stabilize food availability and prices in Zambia. It reviews these general prospects within the maize economy of southern Africa. Given the important regional differences in Zambia's food economy, it explores spatial differences in national food production, consumption and marketed surpluses. It also evaluates the impact of regional maize trade on price stability and food security in different parts of Zambia. The empirical evidence from Zambia, summarized in this paper, suggests that both consumers and farmers stand to benefit from the reduced price volatility that results from opening borders to regional trade in food staples.

In southern Africa, as in the rest of the continent, highly arbitrary political boundaries cut across natural market sheds. As a result, international borders often separate regularly food surplus zones, such as northern Mozambique and northern Zambia, from regularly deficit areas, such as Malawi and Katanga Province of the DRC. Vibrant informal cross-border movements of people and goods recognize these natural economic and cultural linkages. Yet Africa's patchwork of inherited colonial boundaries tends to impede natural trade flows.

Opening up international borders to regional trade in food staples offers many advantages to the region's consumers and farmers. Open borders offer a financially inexpensive means of reducing the domestic price volatility of staple foods. The import parity price sets an upper bound, while export parity sets a floor below which prices will not fall, assuming private traders enjoy the freedom to import and export maize when market conditions permit. The alternative policy of closing borders in small markets such as Zambia invites the prospect of significant price volatility. Under normal production fluctuations, a closed border can easily lead to price volatility in the range of 100% from one year to the next.

Consumers clearly benefit from reduced maize price volatility, particularly during drought years when price spikes can become particularly acute, particularly in thinly markets closed to opportunities for trade. Because poor households spend over half of their income on foods, price spikes in staple food markets risk forcing them into unsustainable short-term coping strategies, forced asset sales or migration, both of which may impair their prospects for building up the human and physical assets required to grow out of poverty over time. By capping price spikes, cross-border trade offers a means of moderating these pressures. Among smallholder farmers, many of whom are net buyers of food (see Table 6), reliable food supplies and reduced price volatility permit them to diversify into higher-value production, thus opening new pathways out of poverty.

Producers of staple foods likewise benefit from open borders. To maintain and sustain producer incentives, surplus farmers in surplus producing zones need access to growing markets, both internal and across national borders. Failure to allow regional trade in food staples risks stalling production growth and private investment in agriculture. In thin national markets, without export outlets, production surges lead easily to price collapses. In turn, these disincentives dampen long-term agricultural income growth. This suggests that both consumers and farmers stand to benefit from the reduced price volatility that results from opening borders to regional trade in food staples.

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ACRONYMS

DRC	Democratic Republic of Congo
CV	coefficient of variation
AEZs	agro-ecological zones
MACO	Ministry of Agriculture and Cooperatives
FRA	Food Reserve Agency
GMO	Genetically modified organism
ARCH	Autoregressive Conditional Heteroskedastic
MSU	Michigan State University
Re-SAKSS-SA	Southern Africa Regional Strategic Analysis and Knowledge Support System for Southern Africa
FSRP	Food Security Research Project
USAID	United States Agency for International Development

1. INTRODUCTION

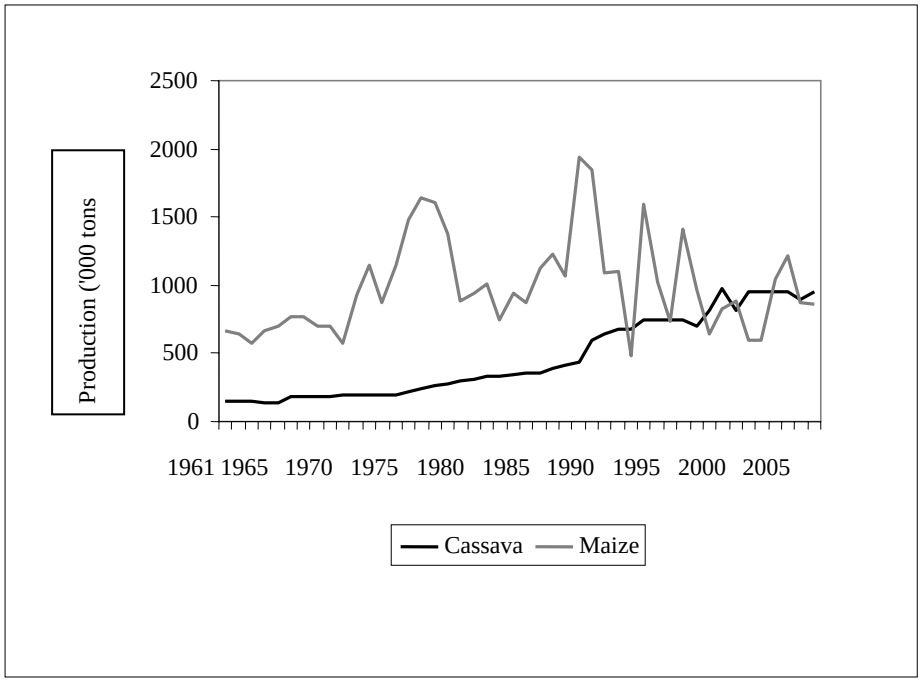
Dependence on rain fed maize production leads to highly volatile output from one year to the next, in Zambia as in many parts of Sub-Saharan Africa (Figure 1). In years of poor harvest, Zambia imports maize. Conversely, in good harvest years, Zambia produces a maize surplus, enabling the country to export maize.

Given this pronounced production volatility, trade becomes a valuable tool for stabilizing national food supplies and prices. Cross-border trade flows can potentially help to reduce price volatility in staple food markets (see, for example, Timmer, Falcon, and Pearson 1983; Dorosh 2001). The import parity price sets an upper bound, while export parity sets a floor below which prices will not fall, provided governments allow grain to flow freely across their borders.

Although maize serves as the country's principal staple food, an array of secondary staples – such as cassava, sorghum, millet and sweet potatoes – has assumed increasing importance in national production and diets since the early 1990's following the withdrawal of large scale input and marketing subsidies for maize and consequent farmer diversification into other crops (Zulu et al. 2000). Differences in agro-ecological conditions and food preferences result in pronounced regional differences in food consumption patterns.

Spatial differences likewise emerged in opportunities for food imports and exports. Maize surplus areas in central and northern Zambia serve deficit markets in Lusaka, in the Copperbelt and in Katanga Province of the Democratic Republic of Congo. Yet deficit areas in the south and east depend on maize imports from South Africa and northern Mozambique. Therefore, opportunities for trade vary significantly within Zambia, requiring a spatial examination of food production and consumption at the subnational level.

Figure 1. Trends in Staple Food Production in Zambia



Source: FAOSTAT

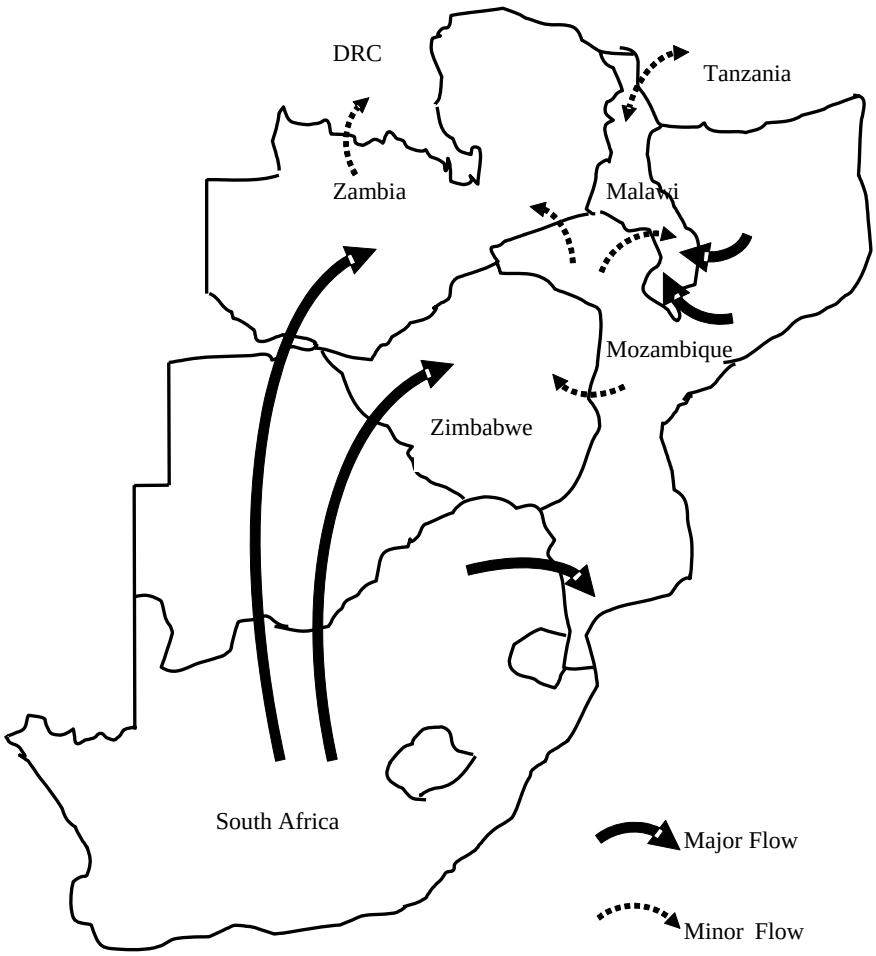
This working paper explores the prospects for regional maize trade in helping to stabilize food availability and prices in Zambia. Section 2 reviews these general prospects within the maize economy of southern Africa. Given the important regional differences in Zambia's food economy, Section 3 explores spatial differences in national food production, consumption and marketed surpluses. Section 4 then evaluates the impact of regional maize trade on price stability and food security in different parts of Zambia. Section 5 distills the paper's principal policy conclusions.

2. PROSPECTS FOR REGIONAL MAIZE TRADE IN SOUTHERN AFRICA

2.1. Patterns of Trade

Maize trades regularly across national borders in southern Africa (Figure 2). Principal surplus areas lie in South Africa, northern Mozambique and to a lesser extent northern Zambia and southern Tanzania. Since the liberalization of maize markets in South Africa in the late 1990s, the emergence of major private trading companies and launching of the SAFEX commodity exchange there, South Africa has served as the principal supplier to maize-deficit countries in the region. The SAFEX price likewise provides the price barometer against which regional millers and grain traders evaluate prospects for regional trade in maize (Traub and Jayne 2004) South African suppliers regularly export white maize to chronically deficit southern Mozambique. Intermittently, they export to Zambia, Malawi and Zimbabwe, in years when domestic production there falters.

Figure 2. Principal Regional Trade Flows of Maize Grain in Southern Africa



* Major flows exceed 100,00 tons per season.

Source: Tschirley et al. (2004)

Table 1. Quantity Flows in Major Southern Africa Maize Market Sheds (Averages 2000 to 2004, '000 tons)*

Market Sheds			Formal Trade		Informal Trade***		Total
	Production	Consumption	Imports	Exports	Imports	Exports	Net Imports
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

*This table omits seeds, losses, feeds and stock changes.
Source: Haggblade et al. (2008).

Northern Mozambique likewise produces regular maize surpluses which it exports, primarily to Malawi during heavy its deficit years, but also to eastern Zambia when production there falters. Southern Tanzania similarly releases maize surpluses to Malawi during deficit years. And northern Zambia frequently exports maize to Katanga and Kasai Provinces in southern Democratic Republic of Congo (DRC), areas to which it is closely linked by geographic proximity, road and rail infrastructure and ethnic ties.

Southern Mozambique, despite its chronic maize deficit (Table 1), imports not from maize surplus northern Mozambique but rather from South Africa, whose maize silos lie close to Maputo along the line of rail and guarantee imports at lower cost than from the more distant northern part of Mozambique. As a result, Mozambique straddles two major market sheds (see Haggblade et al. 2008). The deficit southern part of Mozambique is tied into surplus supplies from South Africa, while the surplus zones of northern Mozambique serve deficit markets in Malawi and sometimes in eastern Zambia.

2.2. Factors Motivating Cross-Border Trade

2.2.1. Political Boundaries Cut Across Natural Market Sheds

Highly arbitrary political boundaries, in southern Africa as elsewhere in the continent, cut across natural markets sheds. Colonial borders, drawn in Berlin in 1885 and inherited by independent African states during the 1960s, remain in force, cutting across ethnic groups and natural movements of people and goods.

As a result, natural market movements frequently cut across national borders. Consider Katanga province of the DRC, which juts far into the middle of Zambia. The rail line running north up through central Zambia continues on to Lubumbashi, in the heart of the Katanga copper belt. Good roads in northern Zambia attract commodity exports from DRC and enable Zambians to export food staples such as maize, cassava, groundnuts and beans into DRC.

Similarly, consider Mozambique, which the Zambezi River cuts in two. Despite regular maize surpluses north of the Zambezi and regular maize deficits in the south, these two parts of Mozambique rarely trade maize. Instead, geographic proximity links the deficit south with the major maize surpluses from South Africa. Meanwhile, the highly productive northern

parts of Mozambique link up with more naturally with markets in Malawi and eastern Zambia. In this northern market shed, northern Mozambique typically supplies to deficit Malawi and sometimes into eastern Zambia.

As these examples suggest, in many instances, political boundaries cut across natural market sheds. To supply deficit areas, the region's surplus maize producing zones must frequently cross national borders. Hence, cross-border trade becomes necessary to ensure regular, low-cost food supplies in these deficit zones.

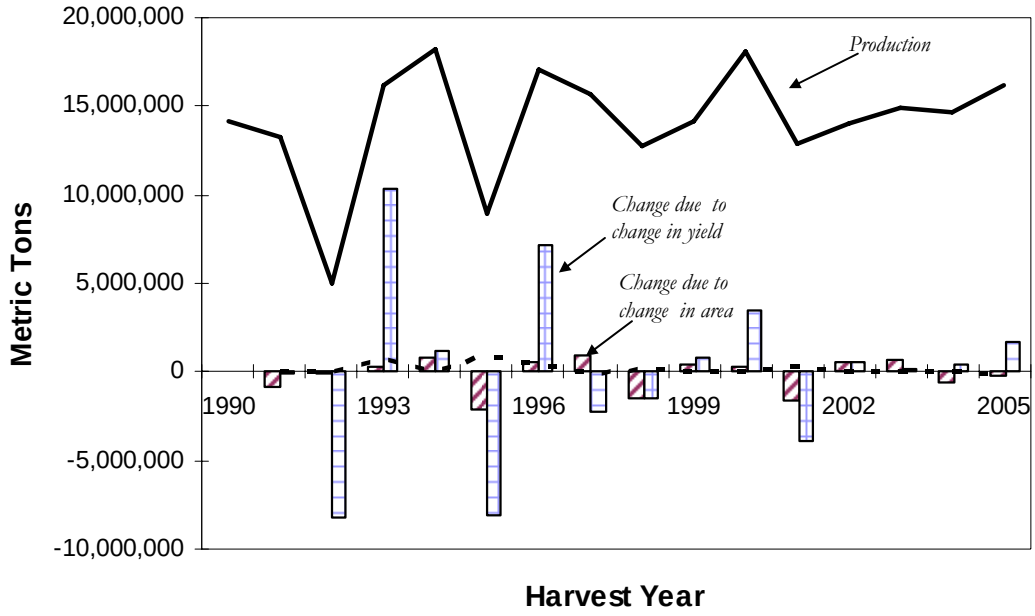
2.2.2. Regional Production Volatility

Maize production in southern Africa is considered highly variable and highly covariant across countries. Official production data suggest that both perceptions are less true now than in the past. From 1990 to 1999, the median year-on-year change in production was nearly 20%, with changes exceeding 50% during four of the ten years (Figure 3). Median year-on-year change from 1996 to 2005 was only 10%, and no single change exceeded 30%. Coefficients of variation in production fell during the second (overlapping) ten-year period in all countries except Zimbabwe; driven by South Africa, the overall coefficient of variation fell from 0.29 to 0.11. During the first period, changes in yield, driven largely by rainfall fluctuations, drove huge changes in production in 1992 (drought), 1993 (recovery), 1995 (drought) and 1996 (recovery). Changes in yield, driven largely by rainfall fluctuations, continued to be the prime cause of change during the second period, but did not have nearly the quantitative impact they did during the first period.

Production in the region was also far more covariant during the first period than the second (Table 2). From 1990 to 1999, correlation coefficients on production between South Africa, Zimbabwe, and Zambia were large, positive, and highly statistically significant. During the second period they were much lower and none were significant. Correlations between those three countries and Mozambique and Malawi were small and insignificant during both periods, with one exception: a large, significant, and negative correlation between Mozambique and Zimbabwe during the second period. Mozambique's lack of correlation with other countries[1] is driven by the predominance of the North in national production, and by the low correlation of weather patterns in this area with those in the rest of the region. For example, during the droughts of 1992 and 1995, production in northern Mozambique was largely unaffected. Since northern Mozambique regularly produces exportable maize surpluses, its lack of correlation with production in the region makes it a potentially important source of supply for both commercial and humanitarian responses to drought.

[1] The negative correlation with Zimbabwe is a special case, driven by the economic chaos in Zimbabwe contrasted with recovery from the civil war in Mozambique.

Figure 3. Maize Production Variability in Southern Africa, 1990-2005



Note: Covers Mozambique, South Africa, Swaziland, Zambia, Zimbabwe, and Malawi. Source: FAOSTAT

Source: Tschirley and Jayne (2007).

Table 2. Correlation Coefficients of Maize Production among Selected Southern African Countries, 1990-2005

		South Africa	Zambia	Zimbabwe	Mozambique	Malawi
South Africa	1990 - 1999		**0.66**	**0.93**	0.18	0.12
	1996 - 2005		0.36	0.51	0.04	-0.18
Zambia	1990 - 1999	**0.66**		**0.77**	-0.04	0.36
	1996 - 2005	0.36		0.27	-0.08	0.06
Zimbabwe	1990 - 1999	**0.93**	**0.77**		0.30	0.22
	1996 - 2005	0.05	0.27		**-0.88**	0.21
Mozambique	1990 - 1999	0.18	-0.04	-0.30		**0.65**
	1996 - 2005	0.04	-0.08	**-0.88**		-0.20
Malawi	1990 - 1999	0.12	0.36	0.22	**0.65**	
	1996 - 2005	-0.18	0.06	0.21	-0.20	

Note: coefficients in bold are statistically significant at the 5% level.

Source: Tschirley and Jayne (2007).

Overall, regional production varies less than production in each individual country. While the coefficient of variation of total regional production was 25% from 1990 to 2003, CVs in individual countries ranged from a low of 28% in South Africa to highs of 46% in Zimbabwe and 48% in Mozambique.[2] This suggests that, despite positive and large correlations in production across countries, there will be scope for intra-regional trade to cover some portion of national and sub-regional shortfalls in all but the worst drought years (such as 1992).

2.2.3. Substitution Among Food Staples

Maize serves as the primary food staple in southern Africa. It accounts for up to 60% of caloric intake in Malawi, Swaziland and Zambia, although that share falls to less than 25% in Namibia and South Africa. Yet maize's vulnerability to moisture stress results in wide fluctuations in annual output and price. Hence the importance of a range of drought-tolerant secondary food staples, such as sorghum and millet in the temperate zones and cassava in the tropical zones.

Empirical work in Mozambique shows high levels of cassava consumption as well as substitution between maize and cassava, even in urban areas (Tschirley and Abdula (2007). In Malawi and Zambia, substitution with cassava can also be strong when maize is in short supply. Data from Zambia illustrate how cassava's well-deserved reputation for drought-resistance translates into much lower production volatility for cassava than maize (Figure 1). As a result, increasing cassava production provides a growing buffer against drought-induced volatility in rain fed maize production.

Because households in dual-staple zones of Mozambique, Malawi and Zambia consume both cassava and maize (Figure 4), and because they can harvest cassava over several years, households can choose to consume more cassava and sell more maize during drought years, thus releasing maize for sale to deficit maize-belt households. In bad years, when nearby maize belt households face acute deficits, farmers from neighboring cassava and dual staple zones are able to harvest more of their perennial cassava crop and in turn free up more maize for export to deficit zones. These mixed and dual-staple zones, thus, serve as potentially important food security shock absorbers, enabling the release of maize to deficit areas in times of short supply, thereby moderating regional food shortages. Northern Mozambique provides an example of a maize-exporting dual-staple zone (Figure 4). While maize remains the key staple food in southern Africa, substitution with cassava and other drought-tolerate food staples offer important alternative foods when maize prices spike.

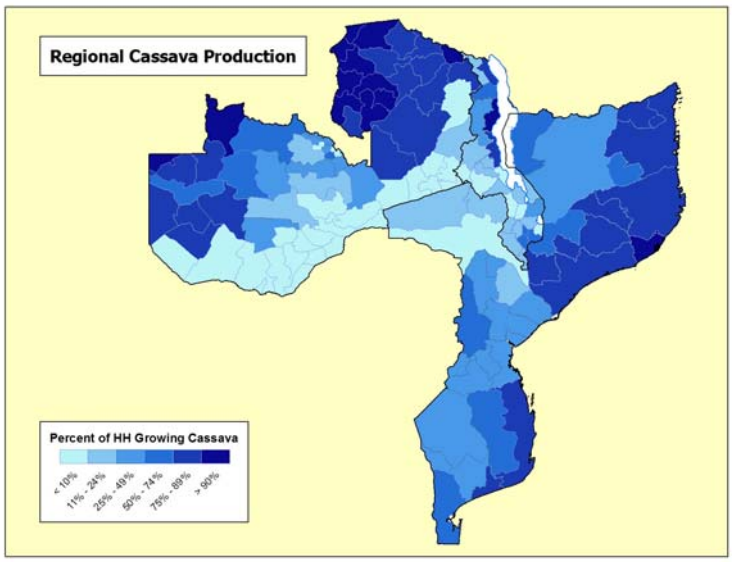
2.3. Benefits of Regional Maize Trade

In drought-prone southern Africa, dependence on rain fed maize production, coupled with the well-recognized moisture sensitivity of maize, translate into highly volatile maize production from one year to the next. In small countries, with closed borders, these production shocks translate into large price fluctuations, easily in the range of 50% to 100%.

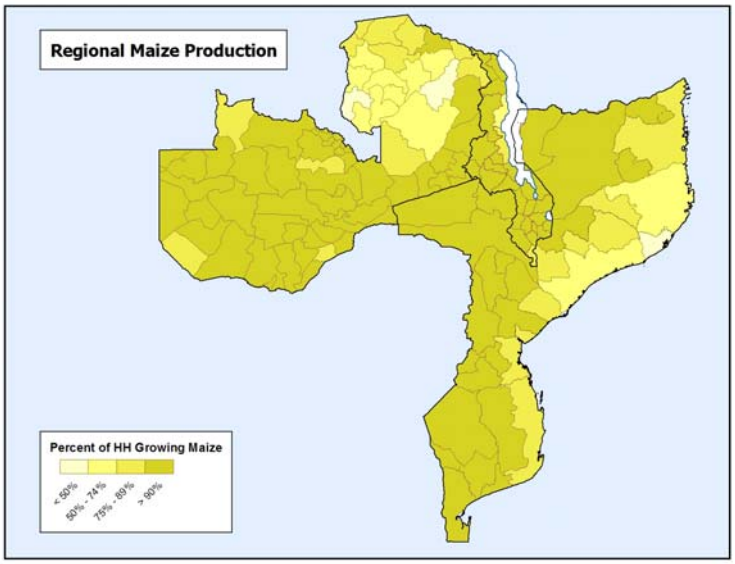
Figure 5 illustrates how trade can moderate price shocks in the maize market. In a normal year, with supply equal to So and demand for maize at D, the normal price Po prevails. In a

[2] Mozambique's high variability is due primarily to steady increases in production since the drought and the ending of the civil war in 1992. The coefficient of variation (CV) of production around a linear trend is only 19% from 1990 to 2003.

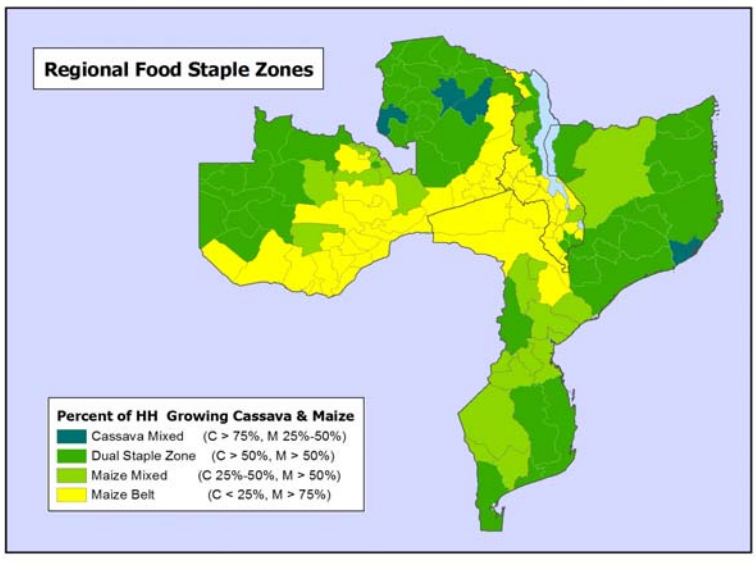
Figure 4. Food Staple Zones in Zambia, Malawi and Mozambique



a. Regional Cassava Production



b. Regional Maize Production

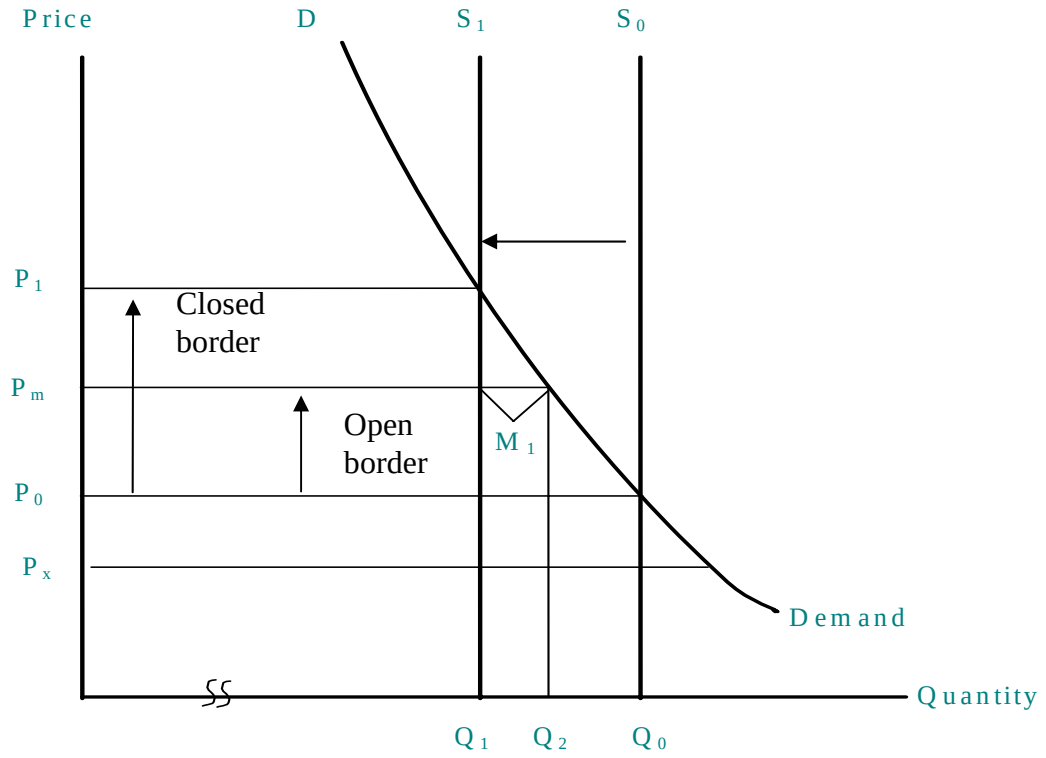


c. Regional Food Staple Zones Source: Haggblade and Nielson

drought year, however, production falls and the domestic supply curve shifts to the left (to S_1). Without trade, the domestic maize price will increase to P_1. But where open borders allow trade, import parity price (Pm) sets a cap on the price increase, limiting it to Pm. Under open borders, traders will import $M_1 = Q_2-Q_1$ tons of maize in order to meet consumer demand level prevailing at the import parity price (Pm).

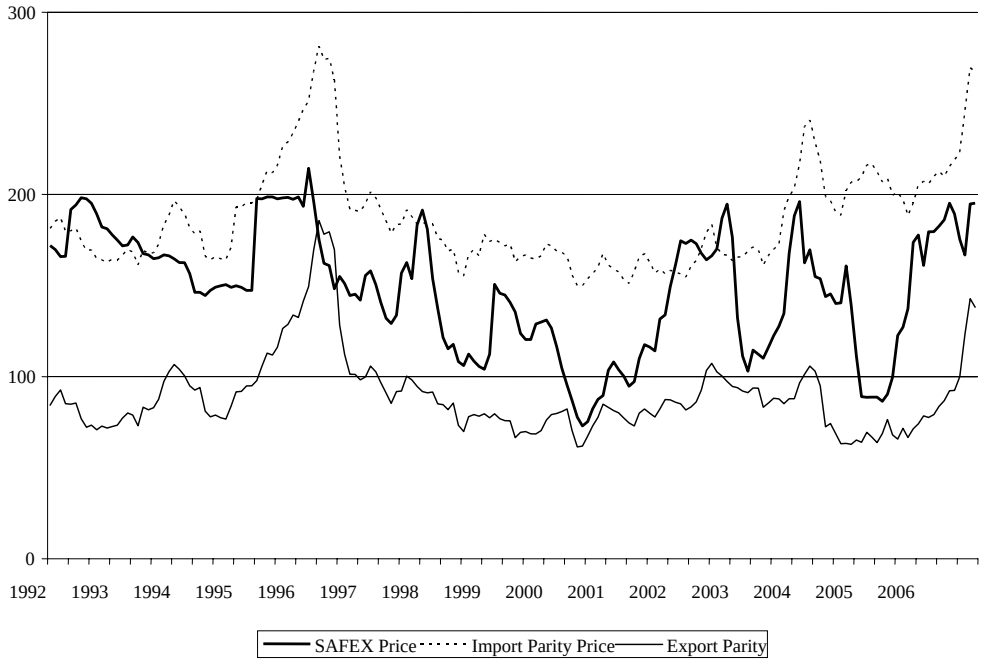
Open borders, therefore, offer a means of reducing domestic price volatility of staple foods. The import parity price sets an upper bound, while export parity sets a floor below which prices will not fall, provided governments allow grain to flow freely across their borders (Figure 6). Section 4 of this paper returns to this theme by measuring the impact of open borders in moderating price spikes and increasing food availability during shortfall production years. But first, Section 3 examines explores the spatial differences in food production and consumption, that lead to differing regional impact of cross-border flows.

Figure 5. Imports Moderate Price Shocks during a Drought



Source: Dorosh, Dradri, and Haggblade (2007).

Figure 6. Trends in Domestic, Import and Export Prices for White Maize Grain in South Africa



Source: Traub (2008).

3. SPATIAL DISTRIBUTION OF STAPLE FOOD PRODUCTION, CONSUMPTION AND MARKETING IN ZAMBIA

3.1. Spatial Distribution of Food Production

Production of staple foods, like all of crop agriculture, differs across agro-ecological zones (AEZs). In Zambia, the zones become wetter moving from AEZ 1 in the south, where rainfall averages about 800 mm per year, to AEZ3 in the north where precipitation averages closer to 1200 mm per year (Figure 7).

These agro-climatic differences, together with differences in transport infrastructure and market access, particularly along the line of rail, influence farmers' cropping choices and give rise to differing food production patterns (Figure 8). While cassava production dominates in northern and northwestern Zambia, maize predominates elsewhere. Despite the prevalence of cassava production in the north, given higher rainfall and a longer growing season, maize yields are often higher in the cassava belt than in the southern maize belt (Table 3)

Figure 7. Zambia's Agro-ecological Zones

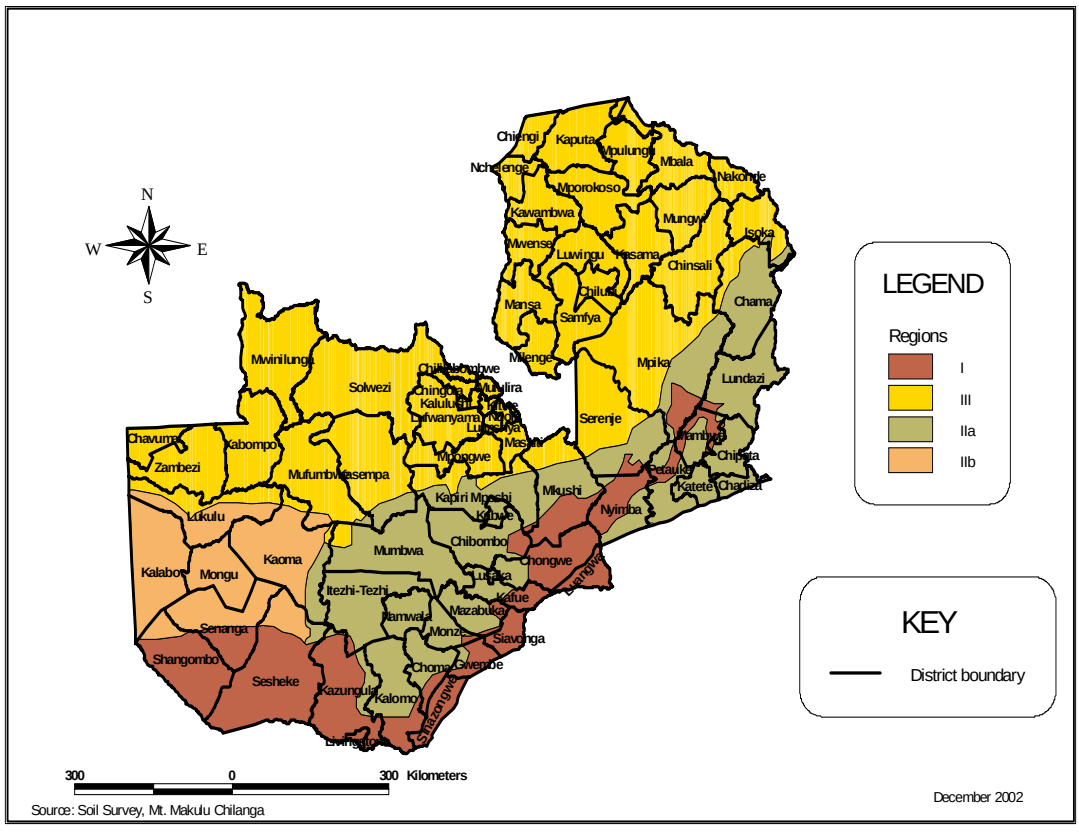
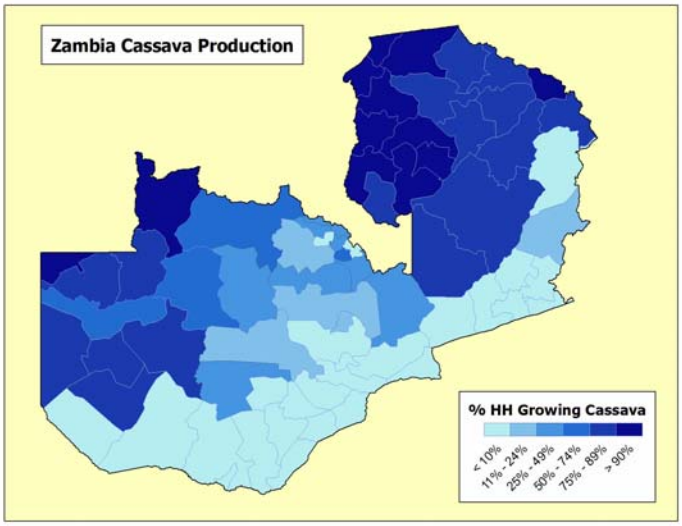
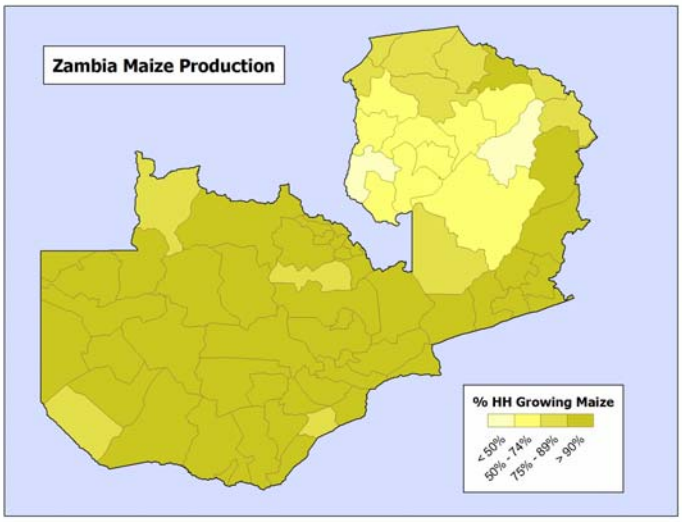


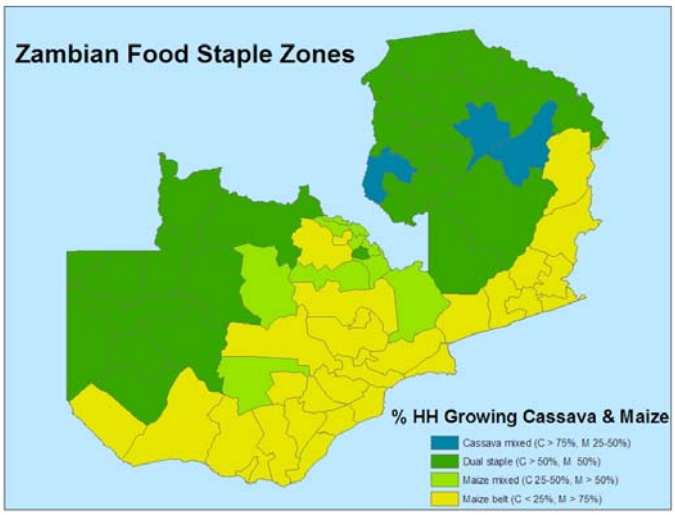
Figure 8. Food Staple Zones in Zambia



a. Cassava Production Zones



b. Maize Production Zones



c. Food Staple Zones

Source: Haggblade and Nielson (2007)

Table 3. A Profile of Zambian Farm Households by Food Production Zone***

	Agro-Ecological Zone					All
	1	2a	2b	3a*	3b*	Zambia
Households growing principal food staples						
cassava	2%	5%	65%	45%	92%	42%
maize	91%	79%	85%	85%	54%	81%
Area planted by households who grow these staple crops (ha/hh)						
cassava	0.53	0.38	0.66	0.56	0.86	0.76
maize	0.91	1.09	0.62	0.72	0.42	0.85
Production per producing household (kg/hh)						
cassava	222	363	374	856	1,434	1,142
maize	715	1,455	415	1,078	648	1,098
Yield (kg/ha)**						
cassava	922	1,126	756	1,700	2,488	2,122
maize	944	1,393	768	1,500	1,593	1,359
Commercialization (% of producing households who sell some of their production)						
cassava	24%	21%	21%	18%	25%	23%
maize	13%	22%	20%	41%	43%	28%
Quantity sold (kg per producing household)						
cassava	17	92	54	78	131	109
maize	100	310	54	333	207	258
Sales as share of total production						
cassava	7%	12%	9%	7%	7%	8%
maize	5%	7%	7%	15%	20%	10%

* Note that this demarcation splits AEZ3 into two zones. 3b is the core of the cassava belt, defined as all districts where over 90% of households grow cassava, while 3a covers the remaining districts in AEZ3.

** Cassava "yields", defined as production divided by total area in production, are understated because farmers harvest only about one-third of their total cassava area each season.

*** Averages of the five seasons from 2000/2001 through 2004/05.

Source: Haggblade and Nyembe (2007).

3.2. Spatial Differences in Staple Food Consumption

Food prices and food consumption habits closely mirror production patterns. In northern and northwest Zambia, where a majority of households both produce and consume cassava (see Figure 8), cassava prices range between 50% and 60% of the price of maize. Yet in Zambia's maize belt, in the central, southern and eastern parts of the country, the cassava price exceeds that of maize because of scarcity of local supply, much of it shipped down from the north (Table 4).

Table 4. Relative Cassava and Maize Prices by Food Staple Zone*, November 2006

	Product	Prices (Kw/kg)		Relative prices
		cassava	maize	cassava/maize
Cassava-based dual staple zone				
Mansa	flour/mugaiwa	444	889	0.50
Kawambwa	flour/mugaiwa	444	778	0.57
Dual staple zone				
Kasama	chips/grain	469	778	0.60
Serenje	chips/grain	444	667	0.67
Maize belt				
Lusaka	chips/grain	800	700	1.14

* Food staple zones are defined in Figure 8c.

Source: Haggblade and Nyembe (2007)

Consumption patterns closely mirror production availability and prices. Maize consumption dominates in the south, while cassava is more common in the north. In northern Zambia, where cassava is plentiful and prices are low, households consume roughly 66 kg (by dry weight) of cassava per person per year[3]. Yet in the south, where households prefer maize and where cassava is both scarce and expensive, households consume only 2 kg of cassava per person per year.

Maize consumption averages roughly 97 kg per person per year, slightly over 100 kg in the southern maize belt and 90 kg in the cassava belt and dual staple zones of northern and northwest Zambia. In the aggregate, Zambia's cassava belt and dual staple zones account for about one-third of national maize consumption while the southern maize belt accounts for the remaining two-thirds (Table 5). In the cassava-consuming zones, urban and better off households typically consume more maize, while poorer and rural households consume more cassava (Table 6).

Table 5. Staple Food Consumption in Zambia ('000 tons of maize equivalents)

	Food Staple Zone		
Food Consumed	Cassava mixed and dual staple zones	Maize Belt	All Zambia
Maize	303	642	945
Cassava*	281	4	285
Total	585	645	1,230

* Cassava consumption given in dry weight equivalent, that is, fresh weight times 0.3.

Source: Dorosh, Dradri and Haggblade (2007)

[3] This amounts to 200 kg of fresh cassava.

Table 6. Regional Differences in Staple Food Consumption in Zambia

	Population		Food Consumption (kg/capita)	
Household group*	people	share	maize	cassava*
Northern Zambia				
commercial farms	899,213	9.7%	135	105
poor farms	2,323,917	25.1%	43	62
rural nonfarm	352	0.0%	43	62
middle and rich urban	893,125	9.6%	114	8
urban poor	452	0.0%	64	8
total north	4,117,060	44.5%	91	66
Southern Zambia				
commercial farms	1,245,304	13.4%	136	4
poor farms	3,218,350	34.8%	68	2
rural nonfarm	488	0.0%	68	2
middle and rich urban	678,672	7.3%	115	2
urban poor	452	0.0%	56	2
total south	5,143,266	55.5%	102	2
National total	9,260,327	100.0%	97	26

* Cassava consumption given in dry weight equivalent, that is, fresh weight times 0.3.

Source: Dorosh, Dradri and Haggblade (2007).

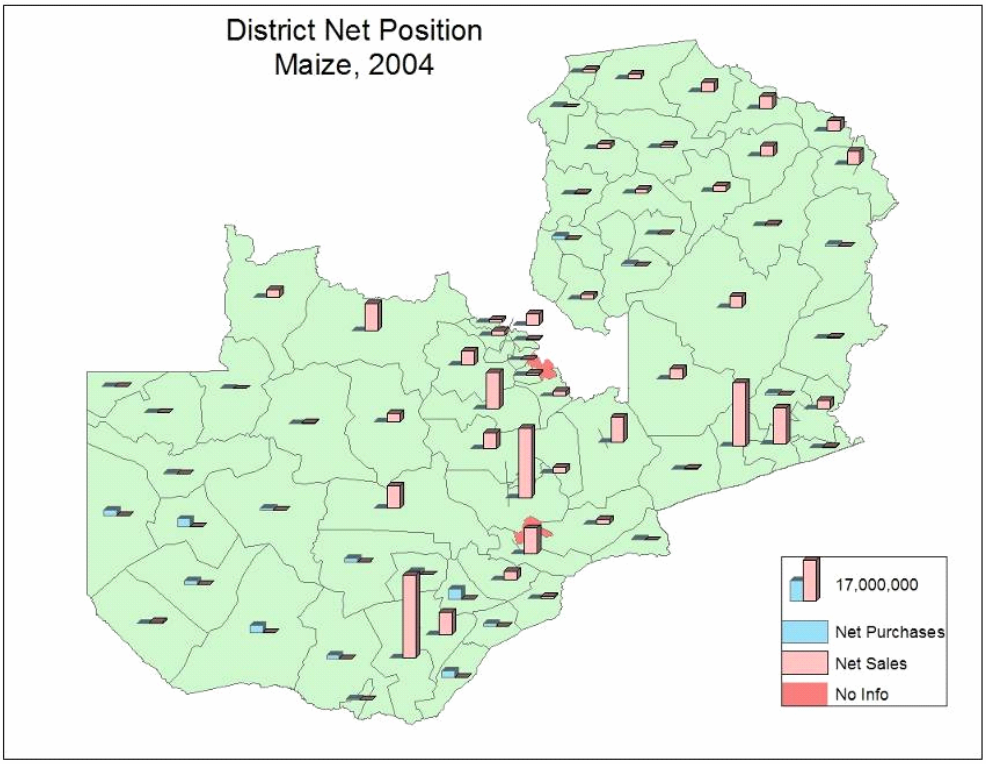
3.3. Spatial Distribution of Marketed Surpluses

Maize surpluses available for sale lie primarily along the line of rail running up the middle of Zambia from south to north (Figure 9). Significant surpluses likewise emerge in the Copperbelt near the DRC border and the towns of the Zambian copperbelt as well as in the heavily populated south-eastern corner of Zambia, near Malawi and the Mozambique border. Among smallholder households, maize sales remain highly concentrated. Only 2% of smallholder households account for 50% of maize sales, while 75% do not sell any maize at all. As a result, low-income, low-asset households are typically net buyers of maize (Table 7).

Cassava surpluses, in contrast, remain concentrated in northern and northwest Zambia (Figure 10). About 10% of the national cassava crop is traded, roughly half of this in fresh form in nearby urban and rural markets and half in dried form (Haggblade and Nyembe, 2007).

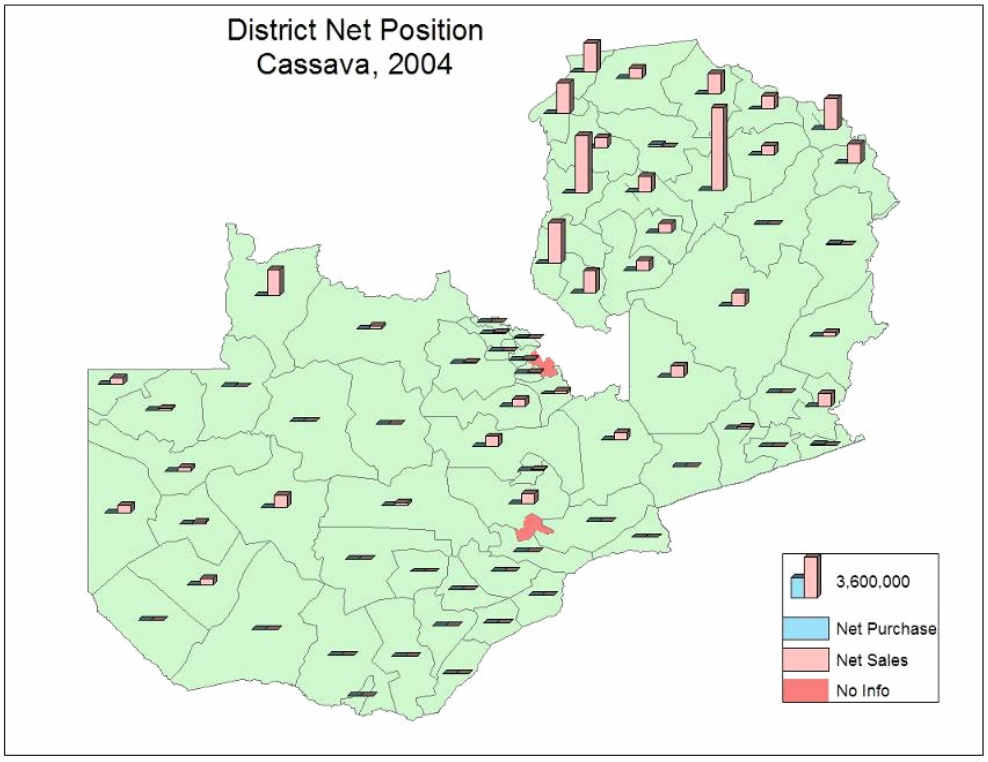
Dried cassava often transits long distances. Supply chains all emanate from the surplus cassava-producing regions in the north. Primary flows head into the DRC and the Zambian copperbelt towns. Lesser quantities travel as far south as Lusaka and Livingstone. Some cassava gets exported to Angola where prices are very high, triple those along the border and six to ten times as high as in the northern cassava-producing provinces (Figure 11).

Figure 9. District-Level Maize Marketed in Zambia, 2004



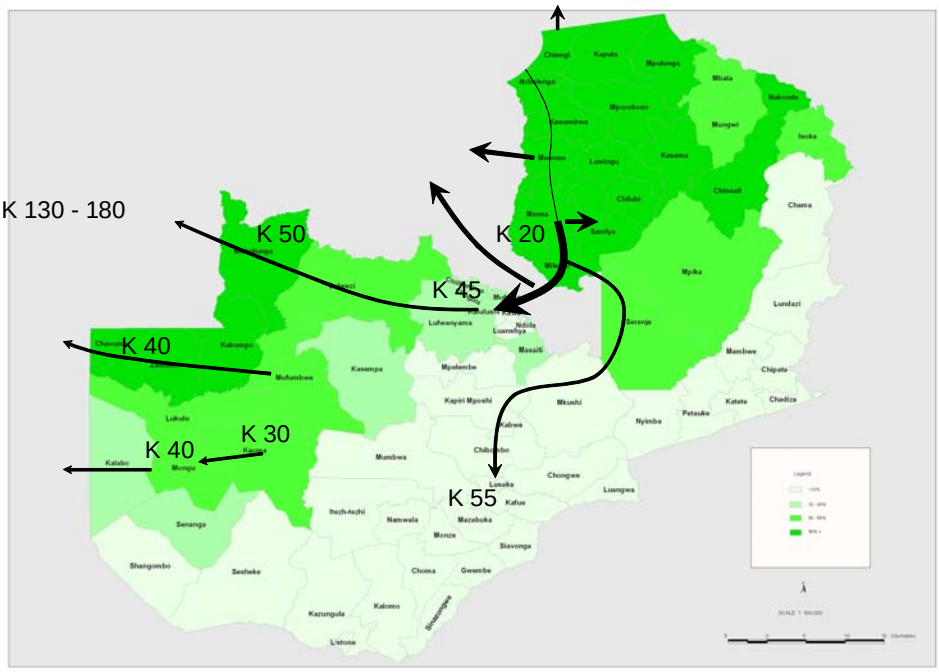
Source: Tschirley and Longabaugh (forthcoming).

Figure 10. District-Level Cassava Sales in Zambia, 2004



Source: Tschirley and Longabaugh (forthcoming)

Figure 11. Dried Cassava Trade Flows and Wholesale Market Prices*



* Wholesale market prices listed in '000 Kwacha per 50kg bag.

Source: Haggblade and Nyembe (2007)

Table 7. Characteristics of Smallholder Farmers in Zambia, 2000/01

	Maize sellers		Households not selling maize
	top 50% of total maize sales	bottom 50% of maize sales	
Percent of households	2%	23%	75%
Land holding size (ha/hh)	6	4	3
Farm assets (US$/hh)	1,558	541	373
Income (US$/hh)	1,350	354	291

Source: Zulu et al. (2007).

4. IMPLICATIONS OF REGIONAL CROSS BORDER MAIZE TRADE FOR ZAMBIAN FOOD SECURITY

4.1. Opportunities for Regional Maize Trade

Given the high volatility of national maize production (Figure 3), Zambia vacillates between surplus and deficit status. In some years Zambia produces a maize surplus, enabling it to export maize. In drought years, however, domestic production does not suffice and the country requires maize imports. In many years, it makes economic sense to export maize surpluses from the north into DRC while at the same time importing into the big cities in southern Zambia. For that reason, both official and unofficial trade data frequently document maize imports and exports during the same year (Tables 8 and 9).

4.2. Policy Barriers to Cross-border Trade

Until 1991, the Zambian government maintained monopoly control over maize import and exports through the parastatal National Marketing Board (NAMBOARD). As part of sweeping economic reforms, the Chiluba government dismantled NAMBOARD in 1991 and began issuing licenses to private maize traders.

Table 8. Measured Informal Cross Border Maize Trade from (Exports) and to (Imports) Zambia and Net Exports in Metric Tons[a]

	----------Total [July 2004-March 2006]---------				
Source	Exports	% of total exports	Imports	% of total imports	Net exports[b]
Tanzania	93	0.3	17,255	99.1	-17,162
Mozambique	55	0.3	49	0.3	6
Malawi	2,462	8.5	115	0.7	2,347
Zimbabwe	13,288	46	0	0	13,288
DRC	13,000	45	0	0	13,000
Total	28,898	100	17,419	100	11,479

Notes: [a]These are estimates based on key information from seven major borders crossings. Trade from other minor border crossing and illegal trade are not captured. [b]Net exports are computed as the difference between exports and imports.

Source: WFP/FEWSNET Downloadable at: http://www.fews.net cited in Govereh, Jayne and Chapoto (2008).

Table 9. Formal Cross Border Maize Trade Flows in Zambia: Imports and Exports

	1999	2000	2001	2002	2003	2004	Total	% of total
	---------- Exports (metric tons) ----------							
Zimbabwe	7,801	2,824	730	223	20,792	171,327	203,699	53.0
DRC	16,590	14,785	16,589	482	2,407	16,451	67,306	17.5
Malawi	0	146	290	3,563	7,917	43,420	55,336	14.4
South Africa	25	5,530	7,801	2,827	4,682	8,865	29,731	7.7
Tanzania	290	94	550	78	150	9,539	10,701	2.8
Other	0	628	1,221	990	2,686	8,455	17,319	4.6
Total	24,706	24,007	27,181	8,163	38,634	258,057	384,092	100.0
	---------- Imports (metric tons) ----------							
South Africa	17,770	2,976	19,501	126,080	101,148	7,664	275,142	67.7
Tanzania	2,329	3,792	813	13,062	15,661	86	35,744	8.8
Zimbabwe	8,456	4,984	5,932	9,703	2,455	1,882	33,415	8.2
Kenya	8	116	499	1,612	1,711	12,769	16,715	4.1
Mozambique	163	412	6	1	8,646	0	9,229	2.3
Other	433	1,043	440	14,578	875	95	36,163	8.9
Total	29,159	13,323	27,191	165,036	130,496	22,496	406,408	100.0

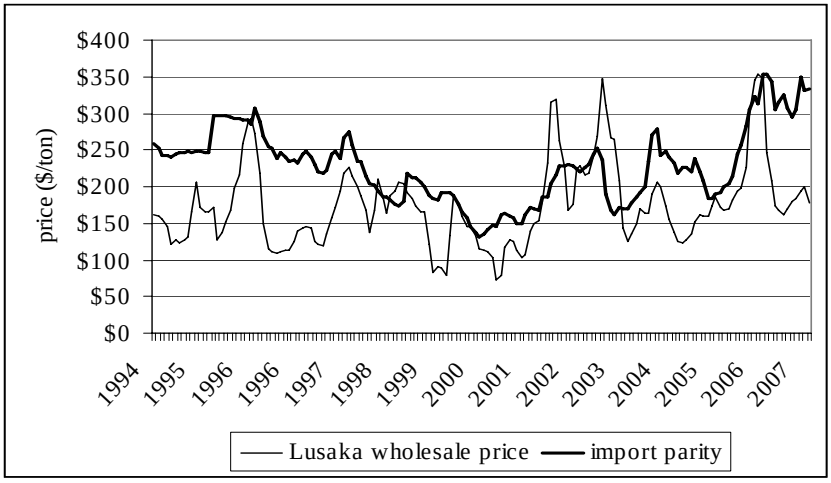
Source: FAO Stat. Downloadable at: http://faostat.fao.org/site/601/default.aspx, accessed August 2006. Cited in Govereh, Jayne and Chapoto (2008).

This active government involvement, coupled with unpredictable policy positions, has tended to discourage commercial cross-border maize trade. In response to the 2001/02 drought, for example, the Zambian government announced its intention to tender for the import of 200 thousand tons of maize and to sell that grain at subsidized prices through selected large millers. Due to delayed financing for these government-sponsored imports, however, actual shipments did not begin until December, and by May 2002 only 130 thousand tons had arrived. Under the government subsidy, sixteen designated millers sold the imported grain at $70 to $100 below market price. As a result, private traders declined to import maize at commercial prices for fear of losing money (Nijhoff et al. 2002 and 2003).

In recent years, Zambia's policies have similarly restricted external trade flows. In calendar year 2005, a year of below-normal maize harvest, government initially banned maize imports under the Control of Goods Act. Following heavy lobbying by millers and traders, the Ministry of Agriculture and Cooperatives (MACO) issued import permits for 200 thousand tons of maize, 150 thousand to the private sector and 50 thousand through the government Food Reserve Agency (FRA). Government suspension of early shipments, under new Genetically modified organism (GMO) certification procedures, and confusion over maize import duties (which government initially increased and subsequently suspended temporarily), produced considerable uncertainty among potential private importers. Subsidized sales of FRA maize stocks to millers, late in the year at $60 to $80 below import parity, introduced considerable risks for private traders as well as disincentives for millers looking to import maize. The resulting confusion and disincentives limited actual imports to less than half the allocated quota and delayed them until very late in the marketing season when import prices had risen by over $90 per ton (Mwanaumo et al. 2005).

During critical domestic maize shortages in 2005, government waived the 15% duty for maize imports in order to cushion maize consumers from high maize meal prices. This policy environment, in which the import tariff can change suddenly, stymies private traders from

Figure 12. Trends in Import Parity and Domestic Prices for White Maize



Source: Dorosh, Dradri and Haggblade (2007).

importing maize when the situation would otherwise warrant doing so. If traders suspect that the import tariff will be waived later in the year, this means that if they mobilize imports early (while the tariff is in place), they are likely to lose their market later when competing against other firms that can import more cheaply once the tariff is waived. The result of this policy uncertainty is commonly a temporary under-provision of imports during periods when traders wait for the anticipated waiver of the import tariff before importing. Such policy uncertainty in the market can produce a situation in which local prices exceed import parity levels for periods of time, as it did in Zambia's case in both 2001/02 and 2005/06 (Figure 12).

The following season, in 2006, Zambian farmers produced a bumper maize crop. Even so, the government order restricting cross-border maize flows remained in effect, preventing maize exports. As domestic maize prices fell, traders and farmers lobbied for permission to export while, in the midst of a presidential election campaign, the government's Food Reserve Agency (FRA) purchased over 400 thousand tons of maize (Fynn 2007). Ultimately, the government authorized export of 100 thousand tons through the FRA, although actual exports amounted to under 50 thousand tons.

In the 2007 harvest season, early flooding led to concerns about potential crop shortages. But as the season unfolded, the damage proved highly localized, and Zambia produced a bumper harvest of 1.4 million metric tons of maize. Early government statements suggesting they would allow maize and maize meal exports (Zinyama 2007) gave way to a series of abrupt changes – reimposition of an export ban in mid-March (Times 2007), a temporary lifting of the ban in late March, along with a statement reiterating government's commitment to maintain the export ban (Malan 2007), and finally, in June of 2007, the issuance of export permits for 200 thousand tons of maize, 50 thousand through the FRA and 50 thousand each through farmers, millers and traders (ZNFU 2007).

Given the unpredictability of government behavior and the constant risk of subsidized public maize sales, many private traders and millers have proven reluctant to engage in commercial cross-border maize trade. In fact, several large players have exited the industry. During the 1990's, after maize market liberalization began, five international grain trading companies

opened offices in Zambia. But four of the five subsequently closed their Zambian operations because of the unpredictability of government actions and the consequently high risk of commercial losses (Nijhoff 2003; Govereh, Jayne, and Chapoto 2008).

4.3. Impact of Open Borders Food Security and Price Volatility

4.3.1. Impact on Prices

Using 15 years of historical data on Zambian maize production, trade, domestic and border prices, a recent study has used an economic simulation model to estimate the impact of production surpluses and shortfalls on domestic maize prices (Dorosh, Dradri, and Haggblade 2007). Using a simple two-commodity model with five household groups in each of two geographic regions (northern and southern Zambia), the study projects the price impact of both drought and a bumper harvest under closed borders and under free trade (Table 10).

Consider first a drought year in which maize production falls 30% below its fifteen year normal average level. Under closed borders, a 30% fall in maize availability causes the maize price to skyrocket, increasing by over 150% (Table 10). Under free trade, however, the import parity price from South Africa places a cap on the price increase (see Figure 5). Given normal historical price spreads, import parity would cap the Lusaka maize price increase at 36%.

Conversely, in a year of bumper harvest, export parity prices will set a floor on the price fall. Assuming a 30% increase over normal production levels, closed borders would trigger a 50% fall in domestic maize prices. But when exports are allowed, the export parity price (to DRC) limits the domestic price fall to 26%, roughly half of the decline registered in a closed economy. Thus, in both good years and bad, open borders place bounds on the magnitude of domestic price movements, both upwards and down.

4.3.2. Impact on Vulnerable Households

Given known consumption parameters, the same simulation model is able to project the effect of these prices changes on vulnerable household food consumption. In the drought-year case, with closed borders, when a 30% production shortfall triggers a 163% rise in domestic maize price, poor households reduce their maize consumption by approximately 100 thousand tons. But they increase consumption of alternative food staples, such as cassava, by 43 thousand tons, leaving a net staple food reduction of 57 thousand tons (Table 11).

Table 10. Trade Policy Impact on Maize Prices in Zambia

Production scenario	Maize Price Under Alternate Trade Regimes	
	Closed border	Open border
Bumper maize harvest (30% above normal)	-50%	-26%
Dought (maize harvest 30% below normal)	163%	36%

Source: Dorosh, Dradri, and Haggblade (2007)

Under open borders, the pressure on vulnerable households diminishes considerably. With the price increase capped at 36% by the import parity price, reductions in poor household food consumption drops to 33 thousand tons. Thus, the open borders cut food pressure on vulnerable households approximately in half.

4.3.3. Impact of Price Variability

As the recent case history of Zambia's on-again, off-again maize import and export controls (reviewed in section 3.2 above) suggests, unpredictable government intervention in regulating international grain trade may risk confusing the private sector. A recent time-series econometric study has tested this impact empirically using 12 years of monthly time series data (Chapoto and Jayne 2007). Estimating an Autoregressive Conditional Heteroskedastic (ARCH) model, the study finds that import restrictions (both tariffs and quantitative controls) tend to raise average Lusaka maize prices, particularly during drought years (Table 12, column 1).

In addition, import tariffs and delayed execution of public-authorized imports tend to raise price variability (Table 12, column 2). These findings will not surprise Zambia's trading community. Both millers and traders struggle each year to anticipate (and to influence) government maize trade policy. Because of government's unpredictable behavior, private traders may undershoot or overshoot in planning their import requirements. As a result of unpredictable government trade controls, domestic maize price volatility can easily increase.

Table 11. Impact of Regional Maize Trade on Staple Food Consumption of Poor Households During a Drought Year in Zambia

	Closed border	Open border
Maize price (% change from normal)	163%	36%
Poor household food consumption ('000 tons of maize-equivalents)		
maize	-101	-44
cassava	43	11
total	-57	-33

Source: Dorosh, Dradri, and Haggblade (2007)

Table 12. Impact of Various Public Interventions on Maize Price Volatility (Lusaka into-mill Price for White Maize Grain)

	Mean Price	Price Variance
WFP Purchases	-0.0254	-0.215**
	(-1.22)	(-2.38)
Government sales	0.381***	0.275
	-3.93	-1
Government purchases	-0.346***	0.486*
	(-4.79)	-1.72
Import Tariff	0.0796**	0.666***
	-2.16	-4.56
Import restrictions	3.105***	-0.1
	-6.48	(-0.062)
Delayed implementation	2.142	1.893**
of intention to import	-0.16	-2.1
Export ban	-0.484	1.693
	(-1.37)	-1.51
Drought *Export ban	1.090*	-1.969
	-1.91	(-1.41)
Drought *Import tariff	0.0625*	0.496***
	-1.84	-4.55

Note: t-ratios listed in smaller font underneath parameter estimates
*** indicates 99% confidence level; ** 95% and * 90%.

Source: Chapoto and Jayne (2007).

5. CONCLUSIONS

In southern Africa, as in the rest of the continent, highly arbitrary political boundaries cut across natural market sheds. As a result, international borders often separate regularly food surplus zones, such as northern Mozambique and northern Zambia, from regularly deficit areas, such as Malawi and Katanga Province of the DRC. Vibrant informal cross-border movements of people and goods recognize these natural economic and cultural linkages. Yet Africa's patchwork of inherited colonial boundaries tends to impede natural trade flows.

Opening up international borders to regional trade in food staples offers many advantages to the region's consumers and farmers. Open borders offer a financially inexpensive means of reducing the domestic price volatility of staple foods. The import parity price sets an upper bound, while export parity sets a floor below which prices will not fall, assuming private traders enjoy the freedom to import and export maize when market conditions permit. The alternative policy of closing borders in small markets such as Zambia invites the prospect of significant price volatility. Under normal production fluctuations, a closed border can easily lead to price volatility in the range of 100% from one year to the next.

Consumers clearly benefit from reduced maize price volatility, particularly during drought years when price spikes can become particularly acute, particularly in thinly markets closed to opportunities for trade. Because poor households spend over half of their income on foods, price spikes in staple food markets risk forcing them into unsustainable short-term coping strategies, forced asset sales or migration, both of which may impair their prospects for building up the human and physical assets required to grow out of poverty over time. By capping price spikes, cross-border trade offers a means of moderating these pressures. Among smallholder farmers, many of whom are net buyers of food (see Table 6), reliable food supplies and reduced price volatility permit them to diversify into higher-value production, thus opening new pathways out of poverty.

Producers of staple foods likewise benefit from open borders. To maintain and sustain producer incentives, surplus farmers in surplus producing zones need access to growing markets, both internal and across national borders. Failure to allow regional trade in food staples risks stalling production growth and private investment in agriculture. In thin national markets, without export outlets, production surges lead easily to price collapses. In turn, these disincentives dampen long-term agricultural income growth. The empirical evidence from Zambia, summarized in this paper, suggests that both consumers and farmers stand to benefit from the reduced price volatility that results from opening borders to regional trade in food staples.

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