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COMPETITIVENESS OF MAIZE FROM WESTERN KENYA AND EASTERN UGANDA IN KISUMU TOWN OF KENYA

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Major Professor's Signature

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COMPETITIVENESS OF MAIZE FROM WESTERN KENYA AND EASTERN UGANDA IN KISUMU TOWN OF KENYA

By

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ABSTRACT

COMPETITIVENESS OF MAIZE FROM WESTERN KENYA AND EASTERN UGANDA IN KISUMU TOWN OF KENYA

By

Thomas Maurice Awuor

The system of maize market control in Kenya, like in most parts of sub-Saharan Africa, evolved out of a priority for ensuring national food security and safeguarding producer interests through price support and consumer interests through maize meal subsidy.

Inefficiencies and high operational costs that contributed to national treasury deficits triggered concerns by donors, international lenders and domestic pressures for maize sector reform. The reforms these groups were advocating were maize market privatization which, refers to the withdrawal of state agencies from grain pricing and marketing activities, and maize market liberalization which, refers to the relaxation of regulatory controls on private marketing. Both these reforms have been implemented on and off between 1987 and 2000. The main aim of this thesis is to determine the outcome of these reforms by comparing the profitability of maize production and spatial price spreads before (1989/91) and after (1998/1999) maize market reforms in major maize producing areas of western Kenya; and comparing the competitiveness of maize from western Kenya maize, eastern Ugandan and South African in Kisumu town after maize market reforms.

DEDICATION

Dedicated to my wife Phoebe, daughter Christine and son Sali

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

LIST OF FIGURES

LIST OF TABLES

GLOSSARY

ASAL Agricultural Sector Adjustment Loan

BDAO Bungoma District Agricultural Office

CSRSP Cereal Sector Reform Program

COMESA Common Market for Eastern and Southern Africa

EAC East Africa Community

IDAO Iganga District Agricultural Office

IDEA Innovative Development in Agribusiness Enterprises Project in Uganda

KARI Kenya Agricultural Research Institute

KDAO Kapchorwa District Agricultural Office

Kshs Kenya Shillings, on average Kshs75=$1 in 1998/1999.

LDAO Lugari District Agricultural Office

MDAO Mbale District Agricultural Office

MSU Michigan State University

NCPB National Cereals and Produce Board

SAP Structural adjustment Programme

TDAO Trans-Nzoia District Agricultural Office

WFP World Food Program

CHAPTER 1

INTRODUCTION

1.1 Introduction and Problem Statement

Maize market privatization refers to the withdrawal of state agencies from grain pricing and marketing activities. Liberalization refers to the relaxation of regulatory controls on private marketing (Jayne and Jones, 1997). In Sub-Saharan Africa both privatization and liberalization have been a source of much debate in the past 20 years.

After independence and prior to early 1990s, food marketing consisted of several channels from producers to consumers. The state intervention had a direct influence only on some crops and/or intermediaries, but this still conditioned the terms of operation for most of the other channels. The objective of food policy in the Sub-Saharan region was food self-sufficiency. Food security was the official justification for governments to intervene and set up complex food marketing systems (Seppala, 1997). Fiscal crisis and the framework of policy-based lending by donors since the late 1980s strongly influenced food market privatization and liberalization in this region. External leverage over domestic agricultural policy was expanded through aid conditionality. The major objectives of donors was getting the prices "right" through a competitive marketing structure involving efficient private traders and reducing the fiscal burdens of state-governed marketing.

Now that food marketing reform has spread, albeit only partially, throughout most of Sub-Sahara Africa, it is worth taking stock of the difference between the pre-reform and

post-reform eras. The main objective of this thesis is to determine how farmers and consumers in specific areas have been affected by market reform. To do this, I examine the effect of market reforms (privatization and liberalization) on the production and marketing costs of maize from western Kenya and eastern Uganda in the western town of Kisumu in Kenya. I assess how market reform and other factors have affected the competitiveness of maize production in three comparable pairs of markets in western Kenya and eastern Uganda. Western Kenya and eastern Uganda were selected because they have comparable climate and farm sizes for maize production. These regions have also been trading in maize for quite a long time, both illegally and legally.

It must be pointed out that many aspects of the maize market reform are yet to be implemented. There are still international trade restrictions and National Cereals and Produce Board (NCPB) activity that still influence trade flows and prices in Kenya.

1.2 Specific Objectives

The thesis will address the following issues:

1. Compare the profitability of maize production before (1989/91) and after (1998/1999) maize market reforms in major maize producing areas of western Kenya.

2. Compare the spatial price spreads between selected producer and consumer markets in western Kenya before and after maize market reforms between some major pairs of markets in which there is maize trade.

3. Compare the competitiveness of maize from western Kenya maize, eastern Ugandan and South African in Kisumu town after maize market reforms.

1.3 Hypotheses:

The overall hypothesis of this study is that the partially implemented maize market reform has made maize production and marketing more efficient and has reduced consumer maize prices.

Specifically, the following hypotheses will be tested:

1. Profitability of maize production for medium-scale commercial farmers in western Kenya has increased after maize market reforms.

2. The spatial price spreads from maize surplus regions of western Kenya to Kisumu, which is in a maize deficit region, have been reduced after maize market liberalization.

3. Maize from western Kenya is competitive with maize from eastern Uganda and/or South Africa in Kisumu under free trade.

1.4 Literature Review

The system of maize market control in Kenya, like in most parts of sub-Saharan Africa, evolved out of a priority for ensuring national food security and safeguarding producer interests through price support (Gordon et al. 1992) and consumer interests through maize meal subsidy (Mulinge, 1992). The government and its analysts had long been aware of inefficiencies and high operational costs of the maize marketing parastatal National Cereals and Produce Board (NCPB). However, these were regarded as of secondary importance relative to the direct control over food supplies and producer incomes that were derived from market control. Although the pressure for reforms in the maize marketing system began as early as 1966 with the publication of the recommendations of the 1966 Maize Commission of Inquiry (Gordon et al. 1992), it became a major issue in the late 1980's. This was when NCPB's deficits contributed to national treasury deficits, triggering concerns by donors and international lenders in addition to financially based internal pressures to reform. The main advocates for maize market reforms pointed out that maize marketing activity was operationally more efficient when carried out by the private sector and that this would result in increased producer prices and lower consumer prices
(Argwings-Kodhek 1992 and Gordon et al. 1992). The wave of maize market reforms mounted, and by early 1990's, the pressure for maize market liberalization not only came from the donor community, which saw no sense in subsidization of an economy with limited funds, but also from the farmers, who expected better prices and prompt payment from the private sector.

In terms of agriculture, the aim of marketing reforms (as advocated by donors) on the supply side was twofold: higher producer prices and, subsequently, greater production levels. Later on, pressures emerged for keeping local consumer prices of food low. In order to reach both objectives, a third objective, namely to decrease the cost of marketing, was given a priority (Seppala, 1997).

Maize market reform started in 1988 with the partial relaxation of controls on maize movement across districts. Restrictions on private inter-district maize trade were re-imposed in early 1992. Later in 1992, the domestic maize sub-sector was again partially liberalized; one year after the input sub-sector had been liberalized. The 1992 maize market liberalization marked the end of monopoly trading in maize by the government parastatal National Cereals and Produce Board (NCPB). Farmers were now free to sell maize to NCPB or traders at prices agreed upon between them. Traders were free to get maize from anywhere and sell in or out of Kenya. Since then, there have been studies carried out that determined that a majority of small-scale, net- maize-buying farmers are happy with the liberalized market (Argwings-Kodhek, 1999). But the complaints of a minority of net-selling maize farmers (Argwings-Kodhek, 1998) with strong political connections dictate the maize sub-sector policies, and this has resulted in the imposition of import tariffs on maize.

While it is commonly viewed that most farm households in Kenya are sellers of grain and therefore benefit from "high" grain prices, the fact is that most farm households in Kenya do not produce enough grain to feed themselves and are actually net buyers of grain

(Argwings-Kodhek, 1999). The results of a 1999 Kenya household survey in 22 agricultural districts in Kenya (Jayne et al., 2000) found that on average, 52% of small-scale farm households were net buyers of maize, 16% neither purchased nor sold maize, and the remaining 32% were net sellers of maize. Only in the high potential maize districts which includes Bungoma, Lugari and Trans-Nzoia which account for only 15% of the population of Kenya, did the majority of small-holder households (68%) sell more maize than they consumed. Only 18% of the households in the remaining areas of the country were net sellers of maize. Of the net buyers, about 88% of them only purchased maize (no sales), while 12% of them sold maize but bought more than they sold.
Before the maize market liberalization, it was assumed that most maize farmers were pro-reform, a policy that was geared towards increasing their farm income. At that time, net-sellers saw maize prices in local markets that were higher than NCPB producer prices in most months. Many inferred that liberalization would make it easier for them to benefit from higher selling prices. The private traders also paid promptly.

Many years after liberalization (post-reform), two groups of farmers have emerged. There is a minority of net-maize-selling farmers, who prefer higher maize prices, and majority net-maize-buying farmers, who prefer lower maize prices.

Table 1.4 Relationships Between Grain Prices and Household Preference.

	% of households stating preference for	
Agro-ecological zones	High maize prices*	Low maize prices*
Northern Arid	18.5	81.5
Coastal Lowlands	6.3	93.8
Eastern Lowlands	23.5	76.5
Western Lowlands	6.4	93.6
Western Transitional	18.6	81.4
High Potential Maize Zone	68.9	31.1
Western Highlands	25.6	74.4
Central Highlands	31	69
Marginal Rain Shadow	1.7	98.3

Source: Tegemeo Institute/Egerton University/KARI/MSU Household Survey 1997.
* Relative to 1996/97, a period in which domestic real maize prices were low compared to most years in the 1990s.

The government, on the other hand, has imposed import tariffs to protect all farmers from cheaper maize imports. Studies suggest that actually only 33% of the farmers are being protected (Jayne et. al. 2000). This is thought to be the case because 67% of the small-scale farmers are net maize buying farmers even when they grow maize. It may be argued that if net-maize-buying farmers work in net-maize-selling farms, the former are not hurt by higher maize prices. This may be true in some cases where these two types of farmers are located together. This situation is however not common in Kenya. Consequently, net maize sellers are demanding domestic maize price support through maize purchases by NCPB at higher prices and protection from cheap maize imports through imposition of import tariffs and variable duties.

Kenya is a member of both the Common Market for East and Southern Africa (COMESA) East Africa Community (EAC). With the implementation of zero-tariff

policy by both of these organizations, there is a need to know how western Kenya farm gate maize prices and consumer prices would be affected by the removal of tariff and price support policies. This study attempts to look at how producer and consumer maize prices would react to the absence of these policies through a comparative analysis of both maize production and marketing between western Kenya and eastern Uganda.

Many studies were carried out in Kenya prior to or at the beginning of the privatization and liberalization process to predict the outcome of this process. The results of most of these studies predicted higher producer prices, reduced marketing margins, efficient flow of maize from surplus to deficit areas, and reduced government expenditure in maintaining maize stocks for food security.

In 1992, James Nyoro (1992) did a study on the competitiveness of the maize production systems in Kenya. His study focused on the impact of the 1989-1993 maize market liberalization program on maize competitiveness with other major domestic farm enterprises, and internationally. The maize sector liberalization programs of 1989-1993 had the objective of achieving internal adequacy in maize production and maintenance of strategic reserves (Kenya Development Plan, 1989-1993).

He observed that during most years, maize is potentially a tradable commodity and was imported only when adverse weather conditions lowered its production and raised prices high enough to trigger imports. The country had been mostly self-sufficient in maize since the domestic producer prices of maize typically lay within the import parity price and export parity price.

Under controlled maize prices and liberalized input prices (by 1991), he found that there was a decrease in maize production in major maize producing areas between 1989 and 1992, because of a decrease in the use of fertilizer due to high fertilizer cost.

Nyoro concluded then that maize production costs between 1986 and 1991 had increased in real terms while the gross revenue had stagnated. Hence area under maize decreased because maize farmers switched to alternative crops that were more profitable, notably wheat and dairy. Maize self-sufficiency in 1991 was thus realized at higher costs.
In the same year, Gem Argwings-Kodhek (Argwings-Kodhek, 1992) studied private sector maize marketing in Kenya. His objective was to gain more insight in the private maize marketing sector and find out if this sector would be able to fill the gap brought about by the reduced role of the NCPB in maize marketing, since the liberalization process was being implemented in phases.

His research included identifying major pairs of markets that engaged in maize trading, types of traders, methods of trade, mode of transportation and storage. He concluded that private maize trade was a vibrant part of the national economy but that the potential for the traders to contribute to economic growth was constrained by rules and regulations. These constraints resulted in several inefficiencies such as high marketing margins. He advocated for a government policy that would make the maize marketing system more efficient, competitive and financially sustainable.

Mark Odhiambo et al. (1994) also observed that the informal maize traders operated at high costs and with a lot of operational and pricing inefficiencies under the controlled maize sub-sector. He also noted that maize production in the country reached the peak in 1988/89 when the recorded production reached 30 million (90kg) bags. Since then, production has tended to decline due to poor and unreliable weather, poor husbandry practices, rising input costs and poor seed quality. The country thus resorted to maize imports to meet the increasing demand, yet there was limited foreign exchange.
Other studies by Gabre-Madhin (1999) and Jayne et al.1997), besides reviewing the pre and post liberalization maize markets, they emphasize the need to establish a regulatory environment that facilitates private trade and improve productivity in maize farming.

1.5 Justification

This kind of study is essential because trade was one of the major reasons for reviving the EAC and the creation of COMESA and the existence of these organizations, is already creating pressure to reduce trade barriers. There is therefore a need to accurately understand what the effects will be on trade flows and price levels. There is currently a need for information on the relative costs of maize production in Uganda and Kenya, and costs from points of surplus production to urban markets in Kenya. This is necessary to assess regional implications for trade, farmer income and consumer food security in the absence of trade restrictions.

CHAPTER 2

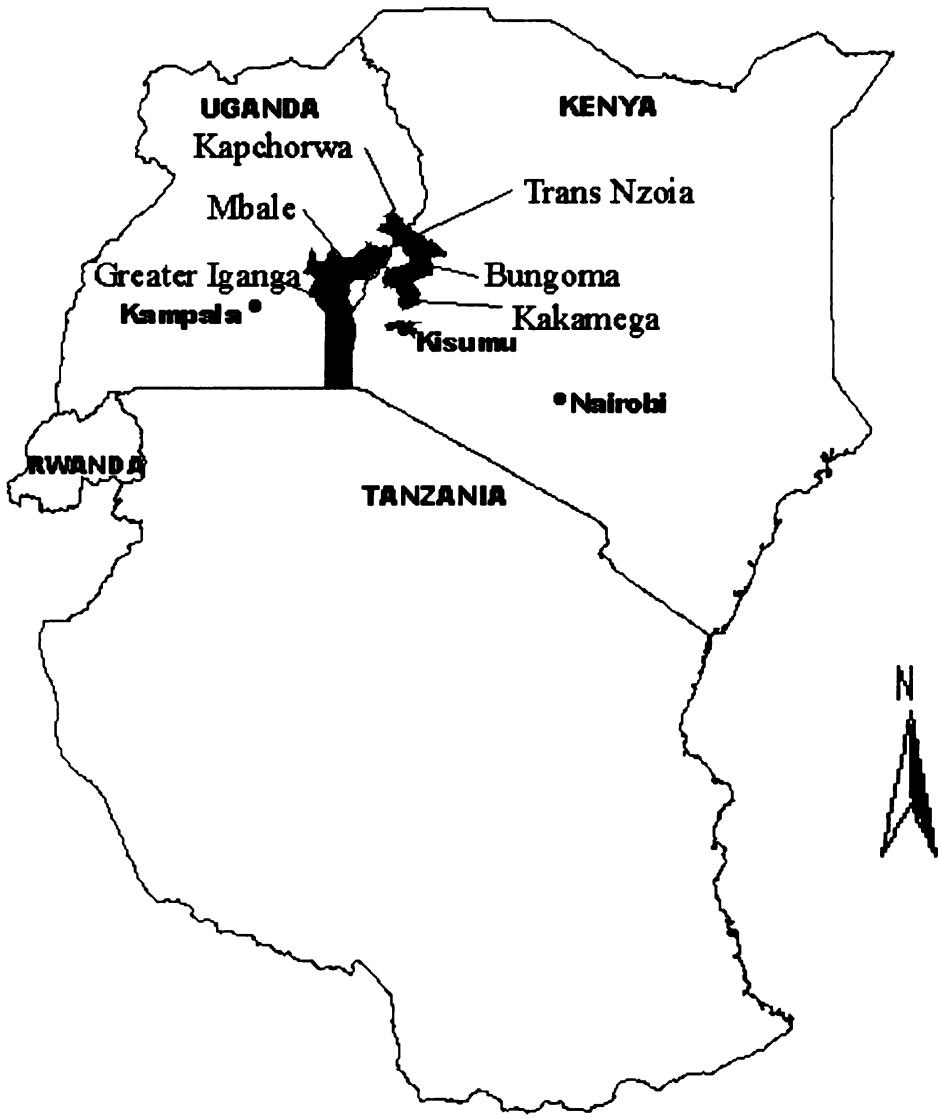
DATA AND METHODOLOGY

2.1 Data

This study was done between April and September 2000. While most of the data are time series, maize production and marketing budgets were available only for 1991/1992. These 1991/1992 farm budgets serve as baseline data to compare to maize production and marketing data that were collected for this study for the 1999/2000 season.

The study areas were Trans-Nzoia, Bungoma, Lugari districts and Kisumu town, all in western Kenya. In Uganda, Iganga, Mbale and Kapchorwa districts were covered. These districts were selected because they were not only significant maize producing districts, but also major sources of maize for Kisumu town. These districts are also close to each other despite being in different countries, and this proximity provided a good scenario to study regional competitiveness in maize production and marketing. The sample included 90 farmers and 37 maize traders. The area of study is in figure 2.1

FIGURE 2.1 STUDY AREAS IN EAST AFRICA



Data used in this survey included:

a. 1998/1999 Tegemeo/MSU maize production and marketing costs survey collected in June 2000 for the western Kenya and eastern Uganda districts.

The identification criteria used in selecting farmers and traders in this paper were commodity produced by farmers, region of production, scale and production technology.

This survey looked at medium-scale maize farmers[2] who cultivate maize mainly for the market. The aim was to look at their regional competitiveness in 1999 and compare their domestic competitiveness with that in 1992. The rationale for picking medium-scale, pure commercial maize farmers were as follows: Only a small proportion of smallholder farmers sell maize. By contrast, all medium and large maize farmers sell maize, and farmers in the 5-35 ha farm size category account for the bulk of national maize sales excluding large-scale farms (Jayne et. Al 2000). Moreover, farmers in this group are organized into powerful farm lobby, and they exert a predominant influence on the policy process. Since the study examines the relative profitability of marketed maize produced in various locations, it is appropriate to focus on the type of farms where surplus, marketed maize predominantly comes from. Two, together with large farmers, they are also a powerful lobby that influences maize policy in Kenya (Argwings-Kodhek, 1999), so the effects of market reforms on this set of farmers is likely to have an important influence on the sustainability of the current system.

[2] Medium-scale farmers in this paper refer to farmers with over 5 acres under maize up to 35 acres depending on a region's population density.

A stratified random sampling method was used in selecting a sample of 90 Medium-scale farmers from all the six districts of study. After identifying the farmers and assigning them numbers, 15 identification numbers were randomly selected for each district. These farmers were then interviewed to get input and output maize data of the 1998/1999 season, which typically starts from March/April to November/December. From this data and after careful comparison with secondary data, individual farm budgets for each farmer were constructed. Within each district, the mode (the figure that occurs most frequently) of each cost and income element of the individual farm budgets are used to create a representative farm budget for medium-scale maize farmers in each district. The individual budget items that are in the synthetic budget are those that are prevalent among a group of farmers with similarities in geographic location, commodity produced, technology usage and asset levels.

b. 1991/1992 representative farm budgets for the above western Kenya districts are from 1990/91 maize marketing study of Tegemeo Institute of Egerton University in Nairobi, Kenya. Maize input and output data were collected from 14 medium-scale farmers in each district through purposive survey technique (Nyoro, 1992) from which 14 farm budgets derived. Using the mode for each input and output item from the 14 budgets, one representative farm budgets for each district was made which was a composite of information obtained from several farmers.

c. Monthly wholesale maize prices from 1989 to at least 1998 for the following pairs of towns in which there is maize trade: Mbale/Bungoma, Iganga/Lugari, and

Kapchorwa/Trans-Nzoia. These data were obtained from the Ministry of Agriculture in both Kenya and Uganda.

d. 1992 transportation and marketing costs for maize from Kitale and Eldoret to Kisumu were obtained from maize marketing study by Tegemeo Institute of Egerton University in Nairobi, Kenya. In that study, 326 people involved with private maize trade in Kenya were interviewed. The post-farm maize marketing system of interest to the 1992 study was the Kitale-Kisumu and Eldoret-Kisumu maize trade. Average maize transportation and marketing costs were used to derive a single representative maize trading budget for Kitale-Kisumu and Eldoret-Kisumu routes. Secondary data on road infrastructure between 1992 and 2000 and changes in fuel costs were collected to carry out a "with and without" analysis of maize transportation and marketing.

e. In June/August 2000 data on maize trade between Kitale and Kisumu by traders similar to those of the 1992 study, was collected for this paper. A stratified sampling technique was used in selecting a sample of 12 traders in this route. The same procedure was used in selecting 25 other traders who marketed maize from the other 5 districts to Kisumu in 1999.

f. CIF Mombasa prices of South African maize in Kisumu were constructed from data obtained from South Africa Exchange (SAFEX), the Kenya Ports Authority (KPA) and the Customs Department of Kenya.

g. Exchange rates between Kenya, Uganda, South Africa, and US $ from 1988-1999 were obtained from the Ministry of Finance in Kenya.

h. Consumer price indices from 1988-1999 were obtained from the Ministry of Finance and Kenya Statistical Abstracts for Uganda and Kenya respectively.

i. Time series rainfall data from all the six districts was also collected to cross check 1992 and 2000 data against historical data for a "with and without" analysis purpose.

j. Secondary data on government legislation with respect to maize marketing from 1987 to 2000 was collected and used extensively in explaining the differences in maize production and marketing between 1992 and 2000 within some markets in Kenya, and between western Kenya and eastern Uganda in 2000.

2.2 Analysis

For analytical purposes, this paper used a commodity sub-system framework. The commodity subsystem is defined as the entire set of activities performed in production, assembly, processing, distribution and consumption of a single product (Harrison et al. 1987). In particular the framework used here looks at vertical coordination in maize production and marketing from the farm level to the wholesale level, focusing on profitability at every level, with the aim of identify areas that need improvements.

Net profits, marketing margins and costs were used as measurements of efficiency/competitiveness in the maize commodity subsystem.

The Maize farm-wholesale price spread is defined in this paper as the difference between wholesale and farm-gate prices of whole grain maize in comparable quantity units. Under competitive behavior,

$$P_j - P_i = MM_{ji} = MC_{ji}$$

Where P_j is the wholesale price per 90kg bag of maize in consumption location i,

P_i is the farm gate price of 90kg bag of maize in production location j,

MM_{ji} is the marketing margin of 90kg bag of maize from production location j to consumption location i, and,

MC_{ji} is the marketing costs for 90kg bag of maize from production location j to consumption location i. Efficient maize marketing, would imply that the marketing margins would converge towards marketing costs. Profits for marketing maize would therefore be low but still enough to induce trade in zones where trade occurred. If $P_j - P_i = MM_{ji} > MC_{ji}$ for a sustained period, markets are not behaving competitively.

A great effort was made in this study to obtain comprehensive data on trader marketing costs to ensure that trader profit (price spread minus observed marketing costs) was a good measure of competitiveness and marketing margin when compared to marketing cost. Since marketing costs vary by scale of enterprise, resulting in different net margins for different firm sizes, a lot of effort was also made to interview similar kinds of maize traders in terms of size and technology as alluded to earlier. Again, if a trader was involved with marketing many commodities simultaneously, the size of margin and percent of return to trader may vary by commodity, reflecting degree of value added and marketing costs of a trader. Costs and returns from other commodity businesses were de-

linked from dominant maize trade. The percentage volume of each commodity trade was used to allocate joint costs between different commodities. However, some costs are not observable or are hard to measure. Such costs include search costs, risk premium, asset depreciation, costs from opportunistic behavior and negotiations costs.

Lastly, net margins may reflect differing time periods and degree of value added through storage, transportation, handling, grading, processing, and location of distribution. Due to unavailability of panel data, and/ or consistent data on marketing costs, this study represents a snap-shot comparison between 1991/1992 and 1998/1999. The results of this analysis therefore, would have to be interpreted with caution.

Having explained the rationale of using trader profits, marketing margins and costs to measure competitiveness and efficiency in maize production and marketing, the remaining chapters are a series of comparative matrices of

a. maize production and marketing in western Kenya (1991/92 pre-reform and 1998/99 post reform)
b. competitiveness of maize production and marketing in western Kenya and eastern Uganda (1998/99 post reform)
c. post-reform competitiveness of South African maize in western Kenya (1998/1999).

The effects of free regional trade in maize are then simulated to determine the effects of reduction or elimination of maize trade barriers on the western Kenya maize production and marketing profitability.

The numeraire used in this study is a 90kg bag of maize because it is the most common unit of measurement used in many studies and official government documents in Kenya on issues concerning maize.

CHAPTER 3

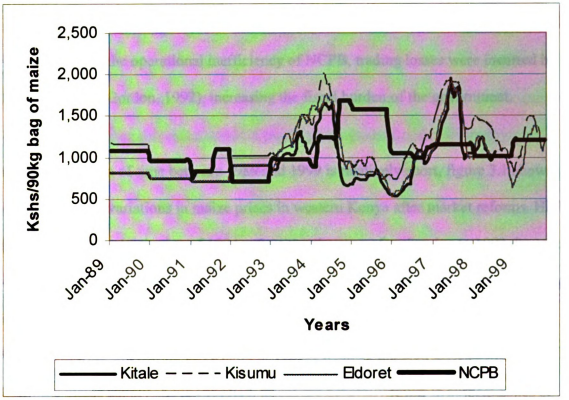
COMPARISON OF MAIZE MARKET COMPETITIVNESS BETWEEN 1992 AND 1999 IN SELECTED WESTERN KENYA AREAS

This chapter compares costs of medium-scale maize production and marketing to Kisumu town from two selected major supply points in Kenya in 1992 and 1999, i.e., just before maize market liberalization and after some market reforms. Our focus will be on price spreads and net profits. This chapter starts by looking at the effect of maize market liberalization on real prices in some western Kenya markets. For trading analysis, the major western Kenya towns in this sample are Kitale in Trans-Nzoia district, Eldoret in Uasin Gishu district and Kisumu in Kisumu district.

3.1. Effect of maize market reform on wholesale prices in some western Kenya markets

Figure 3.1 shows the real monthly wholesale prices for 90kg bag of maize between 1989 and 1999 for Kitale, Kisumu and Eldoret maize markets. 1988 through 1992 is the period of limited maize market reforms in Kenya under Cereal Sector Reform Program (CSRP) (Gordon et al. 1992). The maize market reform during this period mainly focused on making NCPB more efficient and allowing limited inter-district maize trade by private traders. Not much was done in privatizing and liberalizing the maize market. Prior to 1993, official wholesale maize prices were pan-territorial and pan-seasonal. 1993 was the year in which state agencies withdrew from grain pricing, there was relaxation of regulatory controls on private maize, and the NCPB greatly reduced its purchases of maize from farmers.

Figure 3.1 Wholesale Maize prices in Selected Markets in Western Kenya from 1989 to 1999 (Constant 1999 prices)



Source: Prices are from the Market Information Office of the Ministry of Agriculture in Kenya. Note that private prices refer to private maize market prices before 1993.

But since 1999, the NCPB increased its maize purchases again, and the government has maintained a tariff on maize imports greatly raising the maize market price levels. So the period between 1993 and 1998 is the post-market reform period. Note that different prices were used in this figure. Pre 1993 prices are NCPB wholesale market prices. This is because NCPB was the official and dominant maize wholesaler then. Post 1993 maize prices are wholesale maize open market prices reflecting the dominant role of the private sector in maize trade after 1993. Even in years of drought like 1990/91, there were no variations in price to reflect low supply and whatever maize the government imported to meet the shortfall, was sold at the pre-set official wholesale price. This can be seen in figure 3.1 between 1989 and 1992. The gradually decreasing wholesale maize price in

this period was due to a reduction in NCPB price margin as a result of CSRP. It should be noted that 1999/00 year was a low rainfall year.

However, due to the operational inefficiency of NCPB, trading losses were incurred by the government (Gordon, 1992), increasing the fiscal burden of the government.

Although the span of time between 1989 and 1999 is relatively short, figure 3.1 shows weather-induced variations in maize prices in western Kenya after market reforms. High maize prices at the beginning of 1994 reflect the shortage of maize due to 1993 drought and lower prices between end of 1994 and 1996 represent good year harvests. Declining prices towards end of 1997 reflected anticipation of a good harvest in 1998 (Mutunga, 2000). Hence the fluctuating price patterns reflect weather-induced effects, which determine maize supply. As is expected, prices are generally lower in surplus zones of Kitale and Eldoret and higher in the deficit market of Kisumu. The three markets seem to be well integrated since prices in the different markets track each other closely.

1995 and 1996 are the only years in this figure in which real wholesale maize prices were lower than those of pre-reform period. Looking at Table 3.1, the average post-liberalization minimum price is less than the pre-liberalization (before July 1992) minimum, which may imply that depending on the weather and/or season, post-liberalization (after July 1992), prices have in some occasions been lower than pre-liberalization maize wholesale price. Generally, real market prices tend to be higher after liberalization than before liberalization as depicted in table 3.1. This may be attributed to

partial maize market liberalization. This refers to a situation in which the government has withdrawn from monopolizing maize trade but has in place some regulation and intervention mechanisms that reduce domestic and international competitiveness of the maize industry. For example, maize importation is still controlled by the government through import tariffs and variable duties. The government also indirectly sets domestic prices by announcing priori that it would buy big quantities of maize for strategic reserves, at a price that is generally higher than the prevailing market price. It must be noted that macro-economic instability, El-Nino and La-Nina weather effects within the short 7 year period of observation may obscure the effect of market liberalization on real wholesale maize prices in western Kenya.

Table 3.1. Summary Statistics of Wholesale Maize Producer in selected towns and NCPB Producer Prices Before and after Market Reforms (Constant 1999 Kshs prices per 90kg bag of maize)

	Kitale		Kisumu		Eldoret			
	Market Prices						NCPB Prices	
	Before (<July 1992)	After (>July 1992)	Before	After	Before	After	Before	After
Mean	973	1036	1092	1225	1026	1106	927	1218
c.v	0.25	0.32	0.32	0.27	0.36	0.31	0.17	0.23
Minimum	690	538	607	725	599	534	716	878
Maximum	1365	1952	1782	2002	1750	1892	1106	1678

Source: Average Wholesale Prices from the Ministry of Agriculture, Kenya.

Note that there are NCPB depots Kisumu, Kitale and Eldoret, so market prices are being observed for the same specific locations.

Table 3.1 further shows that generally the real price of maize in the deficit town of Kisumu has increased just like the prices in the surplus areas of Kitale and Eldoret. Since prices vary with weather and other factors, the range of prices after liberalization is quite high, reflecting more variable prices than the pre-reform NCPB's pan-seasonal, pan-

territorial prices. Some of this variability is predictable and in fact necessary to induce useful marketing functions by the private sector (Jayne et al. 1998). Overall, both market and NCPB production prices have increased with reform.

3.2. Effect of Maize Market Liberalization Policy on Financial Maize Farm Budgets

The previous section showed market liberalization has had the major effect of increasing variability of wholesale maize prices. However there has also been a general increase in maize wholesale price levels in surplus and deficit areas. Table 3.2. and appendices 3.2.1, 3.2.2 and 4.3.1 show the effects of partial maize market liberalization on farm budgets in Lugari (approximated by Uasin Gishu) and Trans-Nzoia.

The large increase in labor cost for weeding is because most maize farmers in Trans Nzoia reduced their use of chemical weeding due to high cost. Most farmers in Lugari/Uasin Gishu stopped chemical weeding altogether in 1998/99. Shelling labor in Lugari/Uasin Gishu went down because many farmers intensified their use of sheller machines. The cost of gunny bags in Lugari/Uasin Gishu in 1998/99 went down drastically compared to 1992/93 because most farmers in this region sell to private traders unlike in Trans Nzoia. These private maize traders in turn use their own gunny bags. Hence more farmers are using the same gunny bags for 2-3 years. Again selling to private traders on the farm has made farmers in Lugari/Uasin Gishu do away with the cost of transporting maize to the market. In Trans Nzoia, most farmers still sell to NCPB and therefore incur costs for gunny bags and transportation to NCPB silos.

Table 3.2 1992 and 1999 Trans-Nzoia and Uasin Gishu Financial Farm budgets(2000 Constant Prices)

Trans Nzoia			Uasin Gishu/Lugari	
	1991/92	1998/99	1991/92	1998/99
Items	**Kshs/acre**	**Kshs/acre**	**Kshs/acre**	**Kshs/acre**
Yields	**22**	**25**	**20**	**17**
Price/90kg	**703**	**1,100**	**703**	**1,000**
Revenue	**15,466**	**27,500**	**14,060**	**17,000**
Fixed costs/acre	**550**	**3,750**	**500**	**1,250**
Labor inputs				
Planting	12		5	
Weeding	14	400	6	600
Pest control	29		70	
Top-dressing	70	60	44	90
Stooking	281	300	352	330
Desuckering	59		47	
Maize dehusking	309	500	469	340
Transport to store	113	100	94	68
Transport to mkt		50		
Shelling labour	111	125	140	34
Watchmen	94	150		200
Total labor inputs	1,092	**1,685**	**1,227**	**1,662**
Non-labor inputs				
1st Plough	937	1,200	937	1,200
1st Harrow	879	800		
2nd Harrow	703	800	1,172	1,000
Planter hire	586	650	586	800
Hybrid seed	403	910	410	910
DAP Fertiliser	1,670	2,025	1,617	1,950
Top-dressing fertilizer	1,213	1,425	797	1,800
CAN spreader	586		586	
Herbicides	937	1,600	937	
Weed spraying	650	500	586	
Depterex	32		69	
Sheller hire	450	500	375	425
Gunny bags	567	250	520	85
Transport to store	309	375	375	485
Trans to mkt	258	1,250	234	
Land Rent per acre	400	**2,000**	400	2,000
Total non-labor inputs	**10,580**	**14,285**	**9,601**	**10,655**
Total costs	**12,222**	**19,720**	**11,328**	**13,567**
Costs/bag	**556**	**789**	**566**	**798**
County council cess	155		141	
Profit/acre	**3,089**	**7,780**	**2,591**	**3,434**
Profit/bag	**147**	**311**	**137**	**202**

Source:Tegemeo/MSU production and marketing costs survey, 2000.

In both Trans-Nzoia and Lugari, the costs of maize production per bag and profits per bag increased after maize market reforms. This paper notes that the best procedure would

have been to trace the costs and profits every year over this period, but data from the same set of farmers and traders over the entire period was not available.
Maize production costs in Lugari/Uasin Gishu increased by 41% in 1999 compared with 1992. These may be attributed to a decrease in maize yields in Lugari/Uasin Gishu from 20 bags of 90kgs per acre in 1992 to 17 bags per acre in 1999 (Table 3.3 below). Also, increasing costs of inputs and mechanized activities may have increased the cost of maize production. In Trans-Nzoia, despite an increase in maize yields from 22 bags to 25 bags per acre, maize production costs per 90kg bag increased by an average of 42% in 1999 compared with 1992.

Table 3.3. Average Maize Yields (90kg bags/acre) in Selected Western Kenya Districts for Medium-scale farms.

Years	Lugari/Uasin Gishu	Trans-Nzoia
1991/92	19	20
1992/93	20	23
1993/94	16	15
1994/95	20	27
1995/96	20	20
1996/97	14	23
1997/98	16	17
1998/99	17	25
1999/00	18	20

Source: District Agricultural Reports, 1991-2000, Kenya Ministry of Agriculture and Livestock Development.

This increase in maize production cost can be attributed to increasing costs of inputs and mechanized activities of inputs and mechanized activities.

Real farm gate prices have increased by 56% in Trans-Nzoia and 42% in Uasin Gishu/Lugari. Consequently, profit per bag increased by an average of 44% in Trans-

Nzoia in 1999. In Lugari profit per bag has increased by an average of 11%. Calculations as to how these averages were derived from table 3.4

Table 3.4 Changes in farm maize prices, costs and profits in 1992 and 1999 in Trans Nzoia and Uasin Gishu

	Trans-Nzoia	1992	1999	% Change in Profit
1	Price per 90kg bag	703	1100	56%
2	Cost, Trans-Nzoia per 90kg bag	556	789	42%
3	Profit at high price (Kshs 703 in 1992 and 1100/90kg bag in 1999)	147	311	112%
4	Profit at low price (Kshs 703 in 1992 and 900/90kg bag in 1999)	147	111	-24%
5	Average Profit	147	211	44%
	Uasin Gishu/Lugari			
1	Price per 90kg bag	703	1000	42%
2	Cost, Uasin Gishu/Lugari	566	798	41%
3	Profit at high price(Kshs 703 in 1992 and 1000/90kg bag in 1999)	137	202	47%
4	Profit at low price(Kshs 703 in 1992 and 900/90kg bag in 1999)	137	102	-26%
5	Average Profit	137	152	11%

Source: 1992 prices from Farm interviews for 1992 by Tegemeo Institute.1999 prices, from 1998/1999 Tegemeo/MSU maize production and marketing costs survey, June 2000.

The farm gate price before 1993 was constant throughout the season due to monopoly purchases by the NCPB at pan territorial and pan-seasonal prices. Prices vary after 1993 depending on the location and season. The high prices (row 3) and low prices (row 4) that lead to high and low profits within a season refer to the highest and lowest farm gate prices received by the farmers in our sample in 1992 and 1999 seasons. Since producer prices were pan-seasonal as set by NCPB in 1992, they do not vary.

The increase in costs per bag in Trans-Nzoia is due to increasing costs of inputs such as fuel, herbicides and fertilizer, most of which are imported and thus susceptible to foreign exchange fluctuations, and the shilling has been depreciating. The increase in profit in Trans-Nzoia is due to government indirect price support through purchases of strategic

food reserves by NCPB at higher prices, and protection of domestic maize market from imports through tariffs and variable duties. In a year like 1998/1999, when there was a shortage in maize production due to delayed rainfall, and in a month like July, which is seasonally a month with decreased maize supplies, medium-scale farmers with stores get high profits. Before market liberalization such high profits were not possible in the formal and legal market because of pan-territorial and pan-seasonal pricing. The small increase in average profits in Lugari/Eldoret is due to a competitive output price since NCPB buying centers were closed in most of these areas. Farmers find it easier to sell maize to traders than get involved with hauling maize to NCPB stores, which is more common in Trans-Nzoia, where land parcels are generally bigger and crop output larger. Generally, it can be deduced from table 3.4 that farm profits are under indirect NCPB price support (high prices) and down under market prices (low prices) because costs gave gown up between 1992 and 1999. The main cost that has gown up is land rental. Land rental price is a function of and positively related to price support.

After partial maize market liberalization, prices have risen more than costs per unit produced, therefore increasing maize production profit for medium-scale farmers. This is because of tariffs (Table 3.5) and NCPB support prices (Table 3.6) that raise domestic prices and farm profits have also increased. It must be noted, however, that weather and season of sale also heavily influence wholesale maize prices and hence farm level profits.

Table 3.5 Maize Tariffs since 1985.

Day	Month	Year	Tariff rate
28	6	1985	37%
29	6	1987	45%
15	1	1988	42%
16	5	1988	30%
21	6	1989	30%
22	9	1989	30%
25	5	1990	25%
9	11	1990	25%
4	6	1992	0
18	9	1992	29%
2	11	1992	0
21	8	1993	0
12	1	1994	0
15	6	1995	15% or 4Ksh/Kg
26	5	1995	0
29	12	1995	15% or 4Ksh/Kg
18	6	1996	25% or 2.5Ksh/Kg
21	6	1996	1.75 Ksh/Kg
14	1	1997	25% or 2.5Ksh/Kg
2	12	1998	25% or 2.5Ksh/Kg
2	11	1998	50%
17	5	1999	2% or 0.25 Ksh/Kg
17	11	1999	50%
13	6	2000	0
21	6	2000	25% or 2.5Ksh/Kg

Source: Kenya Gazette Supplementaries 1985-2000.

Table 3.6 NCPB PROGRESSION OF MAIZE PRICE MARGIN 1984/96 (Kshs/90kg bag)

	(a) Fiscal year	(b) Producer price (Naked)	(c) other Direct costs	(d) Into-Depot price	(e) NCPB Overhead Costs	(f) Selling price	(g) Gross-Margins (f-d)	(h) %total cost (f/d)	(i) GoK Subsidy in brackets (e-f)	(j) Price without subsidy (e+h)
1	1984/85	156.00	32.90	188.90		239.60	50.70	26.84		188.90
2	1985/86	175.00	32.90	207.90		284.65	76.75	36.92		207.90
3	1986/87	188.00	32.90	220.90		284.65	63.75	28.86		220.90
4	1987/88	188.00	32.90	220.90		284.65	63.75	28.86		220.90
5	1988/89	201.00	32.90	233.90		297.15	63.25	27.04		233.90
6	1989/90	221.00	32.90	253.90		320.80	66.90	26.35		253.90
7	1990/91	250.00	38.45	288.45	105.75	320.80	32.35	11.22	32.35	394.20
8	1991/92	300.00	45.95	345.95	101.30	358.57	12.62	3.65	12.62	447.25
9	1991/92	420.00	45.95	465.95	110.50	472.00	6.05	1.30	6.05	576.45
10	1992/93	600.00	45.95	645.95	120.90	670.00	24.05	3.72	24.05	766.85
11	1993/94	600.00	77.00	677.00	204.70	670.00	(7.00)	-1.03	(7.00)	881.70
12	1993/94	950.00	92.50	1,042.50	280.90	670.00	(372.50)	-35.73	(372.50)	1,323.40
13	1993/94	950.00	92.50	1,042.50	280.90	950.00	(92.50)	-8.87	(92.50)	1,323.40
14	1993/94	950.00	104.00	1,054.00	226.00	1,280.00	226.00	21.44	226.00	1,280.00
15	1994/95	920.00	102.50	1,022.50	257.50	1,280.00	257.50	25.18	257.50	1,280.00
16	1995/96[1]	920.00	102.50	1,022.50	257.50	965.00	(57.50)	-5.62	(57.50)	1,280.00
17	1995/96[2]	920.00	102.50	1,022.50	446.11	915.00	(107.50)	-10.51	(107.50)	1,468.61
18	1995/96[3]	920.00	102.50	1,022.50	406.11	865.00	(157.50)	-15.40	(157.50)	1,428.61
19	1995/96[4]	610.00	65.00	675.00	385.87	865.00	190.00	28.15	190.00	1,060.87
20	1995/96[5]	600.00	65.00	665.00	385.87	865.00	200.00	30.08	200.00	1,050.87
21	1995/96[6]	600.00	65.00	665.00	319.56	972.00	307.00	46.17	307.00	984.56
22	1996/97	600.00	65.00	665.00	319.56	972.00	307.00	46.17	307.00	984.56
23	1997/98	800.00								
24	198/99	1,200.00								
	1999/2000	1,200.00								

Notes

1 Price structure under line # 16 is selling price applicable w.e.f 12th July, 1995
2 Price structure under line # 17 is the revised selling price w.e.f 10th August,1995
3 Price structure under line # 18 is the revised selling price w.e.f 22nd August,1995
4 Price structure under line # 19 is the revised purchase price w.e.f 4th September,1995
5 Price structure under line # 20 is the revised purchase price w.e.f 18th December,1995
6 Price structure under line # 21 is the revised selling price w.e.f 4th May,1996

Source: Items a through f, National Cereals and Produce Board. Items g through j, author's compilation.

3.3 Effect of Maize market liberalization policy on traders' financial budgets

This section looks at the effect of maize market reforms on a typical maize trader's budget. Data were available to compare lorry maize traders who move maize from Kitale to Kisumu in both 1992 and 1999. Generally, lorry maize traders are those who own or hire a 10 tons lorry that can be transport 100 bags of maize weighing 90kg each. Since Kitale is a major source of maize for most regions in Kenya, Kitale-Kisumu maize trade budgets would be used as proxies to other regional trading in maize for purposes of comparing 1992 and 1999. Figure 3.7 shows the changes in 1992 and 1999 maize trader's budgets in constant 1989 prices.

Table 3.7 Costs and profits of Maize Trading between Kitale and Kisumu (Constant 1999 Kshs/90kg bag)

Cost/Profit Items	Mode of prices		
	1992	1999	Change
1 Kitale Farm gate price (July)	703	1100	56%
2 Transport to local assembly store	30	25	-17%
3 Storage costs at local store	12	20	67%
4 Mark-up at local assembly store	40	80	100%
5 Bribes	15	0	-100%
6 Transport to Kisumu	116	125	8%
7 Storage costs at Kisumu	10	7	-30%
8 Marketing costs at Kisumu	26	20	-23%
9 Landed cost in Kisumu(sum rows 1 through 8)	952	1377	45%
10 3 Month average wholesale price in Kisumu (May to July	1000	1460	46%
11 Profit/90kg bag (row 10-9)	48	83	73%

Source: Rows 1 through 9, 1998/1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

Row 10 Wholesale prices from Ministry of Agriculture, Kenya

: Row 11 Authors Compilation

The margins fit into the comparison of mean maize margins between Kitale and Kisumu during the years before and after maize market liberalization periods as shown in table 3.8.

Table 3.8 Mean maize trading margins before and after maize market liberalization between Kisumu and Kitale per 90kgs bag and 1999 constant prices).

	Kitale-Kisumu	
	Before Liberalization (Before July 1992)	After Liberalization (After July 1992)
Mean	195.4	206.39
Standard Deviation	0.484	0.6624
Minimum	106.2	-246.5
Maximum	365.6	447.69

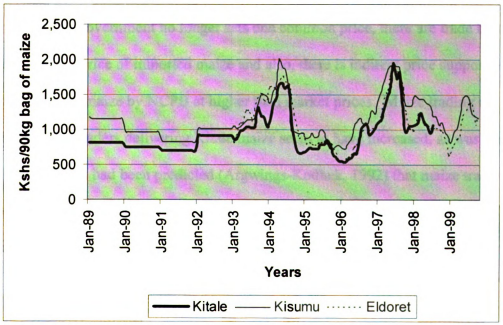
Source of prices: Ministry of Agriculture, Kenya, 2000.

The mean trading margins and standard deviations are derived from the average margins of traders in the sample in both 1992/93 and 1998/99. In the cost items, bribing costs are no longer there since it is now legal to trade in maize domestically and internationally. Marketing costs in Kisumu wholesale market have also gone down because of reduced paperwork to verify legal trading in maize and also because volumes per trader in the market has increased, resulting in cost reduction per bag in marketing costs. Transport to the local assembly store has decreased because there are many more assembly stores and therefore less distance to these stores in 1999 compared to 1992. However, the cost of storage has increased mainly due to cost of chemicals, rent and a slightly longer average period of storage. Profits per bag to traders have increased by 100% at local assembly level and 73% for a typical Kisumu maize wholesaler. This is due to many traders focusing on time and spatial arbitrage as opposed to only the latter, which was their main activity before 1993. It should be noted that official maize prices prior to 1993 were pan-territorial but there were small traders who still engaged in maize trade illegally and who profited from spatial arbitrage. The cost of maize purchase also increased by 56% from 1992. This is because 1999 was a year with a shortage in domestic maize supply due to

bad weather. Transport costs have increased by 8%, reflecting high fuel prices and deteriorating road infrastructure (Argwings Kodhek, 1999).

The high price of maize delivered from Kitale at Kisumu in 1999 was due to poor weather. This is expected because as shown earlier, these two markets seem to be reasonably integrated. Generally, traders' mark-ups have increased slightly suggesting that they have more market power. Table 3.8 shows that there as been an increase in maize marketing margins between Kisumu-Kitale and Kisumu-Eldoret in 1998/99 compared with 1992/93. Figure 3.2 corroborates this by showing an increasing trend in price spreads between Eldoret-Kisumu and Kitale-Kisumu. Except for a few years like 1994/95 and 1996/97, generally the maize price spreads between Kitale, Eldoret and Kisumu have been increasing.

Figure 3.2 Price Spreads between Kisumu, Eldoret and Kitale per 90kg bag (Constant 1999 Prices).



3.4 Conclusion

Maize market liberalization started in the late 1980's, but few meaningful changes in the policy environment were made before 1992. This liberalization process has not been comprehensive and has been implemented piecemeal and marred with reversals. It is referred to as partial market liberalization process in this paper. Major elements of government control that remain are variable import taxes and current price support in selected areas by NCPB. These trade barriers are compatible with WTO provisions up to 2005. However, trade barriers are not allowed under EAC and COMESA requirements of which Kenya is a member.

Although the period of observation between 1993 and 1999 may be short, the piecemeal maize market liberalization process has had the effect of increasing the real price of maize as was shown in table 3.1. Relatively higher farm profits have been achieved because the government no longer sets one common price, there are trade barriers that increase the price of imported maize and also, there is indirect price support through purchases of maize by NCPB at higher than market prices. Maize trading net profits at Kisumu for traders delivering Kitale maize seem to have increased, as was shown in table 3.7 and 3.8. It had been predicted (Argwings-Kodhek, 1992) that maize traders' profits would increase after liberalization to levels that would induce them to engage in trading maize.

Hence, incomplete maize market liberalization has not met the policy objectives of providing lower maize prices for consumers when domestic prices are compared with regional and world maize prices.

Most of the data used to reach these conclusions are from 1998/1999 (which was a poor rainfall year) and 1992/1993. Data for the years in between has been used whenever they were available. Hence these conclusions must be read with caution.

The next 2 chapters will look at the competitiveness of maize production and marketing in western Kenya if there were` free regional trading. The focus would be competitiveness of maize produced in eastern Uganda and western Kenya in Kisumu.

CHAPTER 4
COMPARATIVE ANALYSIS OF MAIZE PRODUCTION IN EASTERN UGANDA AND WESTERN KENYA

4.1 Comparative analysis of maize production in Mbale (Uganda) and Bungoma (Kenya) districts

This section compares 1999 farm-level maize production budgets in Mbale district of Uganda with those of Bungoma district of Kenya. These two districts, like Iganga district of Uganda and Lugari district of Kenya, and Kapchorwa district of Uganda and Trans-Nzoia district of Kenya, were selected not only because they are (or are nearly) adjacent to each other but also because they have similar agro-climatic conditions and household land parcels. Mbale, like Bungoma, is a major maize-producing district, ranked third overall in Uganda for maize production (Mbale DAO, 2000). Its maize production system is characterized by small to medium producers using predominantly labor-intensive methods. Average household land size in Mbale is 2.5 acres. However, most commercial maize farmers have on average 4 acres under maize. The main crops in the district are coffee, bananas, horticulture, and maize. Maize is second to bananas in terms of national consumption, although this is changing, especially in eastern Uganda (Iganga DAO,2000). Many farmers do not use fertilizer (95%), citing lack of financing as a constraint; however with government and NGO projects, fertilizer use is increasing steadily. Yields average 18 bags (of 90kg) per acre[1] using Longe 1 seed and 20-25 bags with hybrid seed. Use of Longe 1 seed[2] with some fertilizer, is the production system being encouraged by the government and NGO organizations (IDEA, 2000). This system

[1] This corresponds to .66tons per ha

[2] Longe 1 seed is an improved open pollinated variety of maize produced by the Uganda agricultural Research Institute.

of production in Mbale is the one used for comparison with the Bungoma maize system in Kenya.

Bungoma District is a major maize producing area in Kenya. Its large to medium-scale farmers in the northern end of the district bordering Trans-Nzoia are surplus maize producers (BDAO, 2000). However, farmers who will be compared with those in Mbale are medium- scale maize producers in agro-ecological zones similar to that in Mbale. Their land parcels are similar to those in Mbale, although their production system is more capital intensive. This study looked at medium-scale farmers with 4 acres under maize. The average yield per acre of these types of farmers in Bungoma was 13 bags (of 90kgs).

Table 4.1 shows medium-scale farm-level production budgets per acre for Bungoma district of Kenya and Mbale district of Uganda respectively. Appendices 4.1b and 4.2 present the more detailed farm budgets from which table 4.1 is derived. Appendix 4.1a shows wholesale maize prices in different towns of eastern Uganda and western Kenya over time in constant 1999 prices. Yields in Mbale are 18 bags of 90kg on average compared with 13.5 bags of 90kg in Bungoma. This is so despite the use of improved open pollinated variety in Mbale as opposed to Hybrid seed in Bungoma, which are known to be better than open pollinated varieties. Also the rate of fertilizer usage in Mbale is lower than in Bungoma. Hence higher maize yields even when open pollinated maize seed is used with less fertilizer in Mbale suggest that land in Mbale is more fertile than in Bungoma, where maize yields are low despite use of hybrid seed and higher amounts of fertilizer.

Table 4.1 Bungoma and Mbale Medium-scale Maize Production Budgets per acre in 1999.

	Bungoma	Mbale
Items	**Kshs/acre**	**Kshs/acre**
Yields	**14**	**18**
Price (Kshs/90kg bag)	**1000**	**765**
Revenue	**13500**	**13770**
Fixed costs/acre	**1125**	**1000**
Labor inputs		
Planting	250	450
Weeding	1400	1500
Top-dressing	50	300
Stooking	200	
Maize dehusking	203	500
Transport to store	27	200
Shelling labor	203	450
Total labor inputs	**2332**	**3400**
Non-labor inputs		
1st Plough(Tractor Hire)	1500	1500
Furrowing(Tractor Hire)	250	
Seed	910	600
DAP Fertilizer	2025	1050
Top-dressing fertilizer	1425	900
Gunny bags	135	176
Transport to store	405	270
Land Rent per acre	1500	1200
Total non-labor inputs	**8150**	**5696**
Total costs	**11607**	**10096**
Costs/bag	**860**	**561**
Profit/acre	**1893**	**3675**
Profit/bag	**140**	**204**

Source: Mode of Bungoma and Mbale farmers 1999 budgets with maize sale in June-August, 1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

Table 4.1 shows that maize production in Bungoma (Kenya) uses more non-labor cost inputs than in Mbale (Uganda), with Kshs 9,335 of the total costs of producing maize in one case being non-labor costs items compared with Mbale's Kshs 6696.

Table 4.2 Cost elements of producing 90kg bag of maize in Bungoma and Mbale districts

Activity	Bungoma Kshs/bag	%	Mbale Kshs/bag	%
Planting labor	19	2	25	4
Weeding labor	104	12	83	15
Fertilizer Application	4	0	17	3
Harvesting labor	47	5	64	11
Mechanized Land Preparation	130	15	83	15
Planter	0	0	0	0
Seed	67	8	33	6
Fertilizer	256	30	108	19
Chemical Weeding	0	0	0	0
Harvesting(Capital Items)	40	5	25	4
Land Rental	111	13	67	12
Fixed costs	83	11	56	10
Total Costs	**860**	**87**	**561**	**83**
Farm gate price	**1000**		**765**	
Farm profit	**140**	**13**	**204**	**17**

Source: Mode of farmers of cost and revenue items of farmers 1999 budgets. Farm gate prices are actual prices received by farmers between June and August 1999. 1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

Table 4.2 shows the cost elements of producing 90kg bag of maize in Bungoma and Mbale districts. The five major cost items of medium-scale maize production in Bungoma district of Kenya are Fertilizer (30%), mechanized land preparation (15%), land rental (13%), weeding labor (12%) and fixed costs (11%). Harvesting expenditure in Kenya is only 5%. The six major cost elements of medium-scale maize production in Mbale district of Uganda are fertilizer (19%), mechanized land preparation (15%), weeding (15%), land rental (11%), harvesting (11%) and fixed costs (10%).

Using tables 4.1 and 4.2, appendices 4.1b and 4.2, in Mbale, the average rate of fertilizer application in Mbale is 30kgs of DAP and 30 kg of top dressing Urea fertilizer per acre, compared with Bungoma, which uses 75kg of DAP and 75 kg of top dressing CAN fertilizer. With the cost of DAP being Kshs 35/kg in Uganda compared with 27Kshs/kg

in Kenya and Urea in Uganda costing Kshs 30/kg compared with CAN at 19Kshs/kg in Kenya, the cost of fertilizer is more expensive in Uganda than Kenya. Hence, the high cost of fertilizer use per bag of maize produced in Kenya is due to high intensity of fertilizer use. The other major difference is seed cost. In both Districts, the amount of seed used is 10kgs per acre. However, the Longe1 variety of seed used in Mbale is a composite variety akin to Katumani composite in Kenya. It is cheaper, at Kshs 60 per kg, than Hybrid 627 used in Bungoma, which costs Kshs 92 per kg. Seed in Kenya is a major cost element due to price but not quantity.

Of the 6 major cost elements in maize production in Mbale, four are non-labor cost items; fertilizer and mechanized land preparation, fixed costs and land rent. Weeding and harvesting are the two types of major labor inputs. In Bungoma, the four major non-labor cost items are fertilizer, mechanized land preparation, fixed costs and land rent. Weeding is the only major labor input.

The relatively high cost of weeding in Uganda is mainly due to a high number of people engaged in weeding in Uganda. Land preparation accounts for 15% of the total cost of producing 90kg bag of maize in both districts, despite an extra land preparation activity of furrowing in Bungoma.

Poor land fertility in Bungoma compared with Mbale resulted in more fertilizer being used and consequently higher fertilizer cost per 90kg bag of maize produced. A high percentage (IDAO, 2000) of Mbale farmers does not use fertilizer.

The farm gate price of maize in Mbale is Kshs 765 per 90kg bag. It is Kshs 1000 in Bungoma (1999 Tegemeo/MSU maize production and marketing cost survey, June 2000). However, as table 4.1.2 shows, profit make up 13% of the total price of a 90kg bag in Bungoma and 17% in Uganda. This shows that farmers in Mbale get higher profits than in Bungoma despite a farm gate price difference of Kshs 235 per 90kg bag. This corroborates the relative advantage of maize production in Mbale compared with the adjacent Bungoma district for similar farmers in similar zones. This further suggests that Mbale can sell maize to Bungoma and other parts of Kenya if the costs of transactions do not surpass Kshs 235 per bag between June and August, which was the observed period of maize sale. The next section will look at competitiveness of Iganga maize production.

4.2 Comparative analysis of maize production in Iganga (Uganda) and Lugari (Kenya) districts 1999

This section, compares 1999 financial budgets of farm-level maize production in Iganga district of Uganda and Lugari district of Kenya. Iganga district is one of the biggest maize producing districts in Uganda (IDAO, 2000). It had total of 45,000 hectares under maize for two seasons. Composite (Longe 1), local varieties, Zimbabwe Hybrid and Uganda Hybrid B are the major varieties preferred because their seeds can be used for three seasons before loosing vigor. Currently, the use of hybrid seed is gaining a lot of popularity, although the average cost of 100Kshs per kilogram is a constraint for most farmers. It is estimated that about 60% of all maize farmers in Iganga use hybrid or Longe. In 1999, a total of 100 metric tons of hybrid seed were sold to farmers. On average, household land parcels are 2.5 acres. But this study looked at small to medium-scale commercial maize farmers with average land size of 8 acres under maize. These

farmers, most of whom use hybrid seed, are the ones compared with Lugari farmers in Kenya.

Lugari district in Kenya is also a major maize producing area in Kenya. Its medium to large- scale farmers are surplus maize producers (LDAO, 2000). However the farmers who will be compared with those in Iganga are those with land sizes of 8-10 acres under maize, in agro-ecological zone similar to that in Iganga. Table 4.3 is the financial farm-level maize production budgets of Bungoma and Iganga districts. More details on inputs used in the derivation of table 4.3 are in appendices 4.3 and 4.4

In Table 4.3, planting in Lugari is predominantly done by hired machinery, while it is done by labor in Iganga. Hence the big cost difference in the cost of planting labor. Maize shelling is mostly done by machinery with less labor requirements as opposed to manual shelling in Iganga. Again this explains the huge differences the cost of shelling labor and sheller machine hire. In Iganga, shelled maize is transported to the farm store by manual labor as opposed to using tractor trailer which, is the common practice in Lugari. Hence the cost differences in labor costs and non-labor costs in transporting maize to the farm store.

Table 4.3 Lugari and Iganga Medium-scale Maize Production Budgets per acre in 1999.

	Lugari	Iganga
Items	**Kshs/acre**	**Kshs/acre**
Yield (90kg bags/acre)	**17**	**21**
Price received from traders (Kshs/90kg bag)	**1000**	**675**
Revenue	**17000**	**14,175**
Fixed costs/acre	**1250**	**1,000**
Labor inputs		
Planting	0	500
Weeding	600	1,800
Top-dressing	90	400
Stooking	330	
Maize dehusking	340	500
Transport to store	68	250
Shelling labor	34	525
Watchmen	200	
Total labor inputs	**1662**	**3,975**
Non-labor inputs		
1st Plough (Tractor Hire)	1200	1,500
Harrowing(Tractor Hire)	1800	
Hybrid seed	910	1,100
DAP Fertilizer	1950	1,200
Top-dressing fertilizer	1800	1,050
Shelling	425	0
Gunny bags	85	210
Trans to store	485	0
Land Rent per acre	2000	**1200**
Total non-labor inputs	**10655**	**6260**
Total costs	13567	11235
Costs/bag	**798**	**535**
Profit/acre	**3434**	**2940**
Profit/bag	**202**	**140**

Source: Mode of Lugari and Iganga 1999 farmers budgets with maize sale in June-August.
1999 Tegemeo/MSU maize production and marketing costs survey, June 2000.

Table 4.3 shows that maize production in Lugari (Kenya) uses more non-labor cost inputs than in Iganga (Uganda), with Kshs 10,655 of the total costs of producing maize in one

acre being non-labor costs items compared with Mbale's Kshs 6,260. Reasons as to why maize production in the three districts of Bungoma, Lugari and Trans-Nzoia in western Kenya use less labor compared with the three districts of Mbale, Iganga and Kapchorwa in eastern Uganda, are explained later in section 4.4. The above tables also show that maize yield per acre in Iganga is 21 bags of 90kgs compared with 17 bags in Lugari. 10kgs of hybrid maize is used in both districts, but the rate of fertilizer application is 30kg of DAP and 30kg of Urea top-dressing fertilizer in Iganga. In contrast, 75kg of DAP and 100kg of CAN top-dressing fertilizer is applied per acre in Lugari. The high yield in Iganga even when less fertilizer is applied, suggests that either Uganda Hybrid B or Zimbabwe hybrid 625 seed varieties used in Iganga, are higher yielding than Hybrid 627 0r 614 used in Lugari and/or there is greater land fertility in Iganga.

Table 4.4 presents the cost elements of producing 90kg bag of maize in Lugari and Iganga districts. In Lugari, the three major cost elements are fertilizer (29%), mechanized land preparation (16%) and land rent (15%). The six major cost elements of maize production in Iganga district are Fertilizer (20%), weeding labor (16%), mechanized land preparation (13%), land rent (11%), harvesting labor (11%) and seed (10%).

Using tables, 4.3 and 4.4 and appendices 4.3 and 4.4, in Iganga, the average rate of fertilizer application is 30kgs of DAP and 30 kg of top dressing Urea fertilizer per acre. In contrast, in Lugari farmers use 75kg of DAP and 100 kg of top dressing CAN fertilizer. The cost of DAP is 40Kshs/kg in Iganga compared with 27.5Kshs/kg in Kenya, and urea in Uganda costs 35Kshs/kg compared with CAN at 19.5Kshs/kg in Lugari.

Table 4.4 Cost Elements of producing 90kg bag of maize in Lugari and Iganga Districts

	Lugari		Iganga	
Activity	**Kshs/bag**	**%**	**Kshs/bag**	**%**
Planting labor	0	0	24	4
Weeding labor	35	4	86	16
Fertilizer Application	5	1	19	4
Harvesting labor	57	6	61	11
Mechanized Land Preparation	129	16	71	13
Planter	47	6	0	0
Seed	54	7	52	10
Fertilizer	221	29	107	20
Chemical Weeding	0	0	0	0
Harvesting(Capital Items)	59	7	10	2
Land Rental	118	15	57	11
Fixed costs	74	9	48	9
Total Costs	797	72	535	79
Farm profit	202	28	140	21
Farm gate price	1000		675	

Source: Mode of cost and revenue items from1999 farmers' budgets. Farm gate prices are actual prices received by farmers between June and August 1999.
1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

Hence, the high cost of fertilizer use per bag in Kenya is due to greater intensity of fertilizer use in Lugari. Weeding is a major cost element in Iganga. This can be attributed to relatively more rainfall and slightly higher temperatures in Iganga, which provide an environment for a more prolific weed growth. Mechanized planting in Lugari also provides more uniform soil coverage by maize, hence reducing the need for second weeding. This is not very common in Iganga. Hence weeding is not a major expense in Lugari like in Iganga. Iganga being labor intensive in maize production. The price of weeding labor in Iganga district is higher than in Lugari district because it is done at the time of peak demand for labor. Land preparation is mechanized in both districts, but it is the second important cost element in maize production in Kenya and only the third in Iganga. Tractor hire in Lugari is 1200Kshs per acre compared with 1500Kshs per acre in

Iganga because there are fewer tractors for hire in the latter area. However since in Lugari, furrowing is undertaken and it costs 1000Kshs/acre, land preparation costs in Lugari are higher than in Iganga. Harvesting and seed costs are the last two major cost elements in both areas. Harvesting is relatively cheap in Lugari because of use of a sheller machine. It gets out more grain from the ear than beating sacks with sticks, which is the slow labor practice in Iganga district. The Uganda maize hybrid B seed costs 110Kshs compared with the Kenya hybrid seed 627, which costs 91Kshs per kg.

In conclusion, the higher yield in Iganga is achieved even when less fertilizer is applied, suggesting that either Uganda Hybrid B or Zimbabwe hybrid 625 seed varieties used in Iganga, are higher yielding than Hybrid 627 or 614 used in Lugari and/or there is greater land fertility in Iganga. Consequently, the major source of higher production costs in Lugari is the cost of non-labor inputs, especially fertilizer, land preparation and planting costs. With the high amounts of fertilizer currently being used in maize production by farmers in Lugari, improving seed productivity and/or other husbandry practices seem to be the major source for potentially increasing maize yields per acre to be competitive with Iganga district.

Hence Iganga has a cost advantage in maize production. Area under maize production is increasing because it has now become a major cash crop, which takes a short time to mature and costs less to produce relative to other crops. It is also easier to store and has a ready market in Uganda and other neighboring countries including Kenya (IDAO, 2000). Iganga's comparative advantage in maize production is corroborated in table 4.2.3. While Lugari farmers receive a higher price of 1000Kshs per 90kg bag of maize and make a

28% profit margin, Iganga farmers receive Kshs 675/90 kg bag and still make a 21% profit margin.

4.3 Comparative analysis of Trans-Nzoia (Kenya) and Kapchorwa (Uganda) maize production systems in 1999

This section compares the 1999 financial budgets of maize production in Kapchorwa district in Uganda and Trans-Nzoia district in Kenya. Kapchorwa district borders Kenya to the west. It is the biggest maize-producing district in Uganda. The farm sizes are small in the western and southern part of the district around 5 acres. The eastern side has relatively big land parcels, and for this study the average farm sizes looked at is 20 acres under maize. Maize planting is between March and May and harvesting is between October and January. Maize and dairy are the major farm enterprises in Kapchorwa. Trans-Nzoia neighbors eastern Uganda. It is the major maize-producing district in Kenya (TDAO, 2000). It is also home to relatively large-scale farms compared with most parts of Kenya. While farm sizes vary between the 7 divisions in the district, this study looked at farms with 28 acres under maize on average. The district's elevation ranges between 1400-2600 meters above sea level and the rainfall pattern is unimodal. All crop output comes from the normally highly reliable long rain season. Maize is planted between March and May and harvested between December and January. Maize, maize seed, sunflower and dairy are the principal agricultural enterprises. Table 4.5 and appendices 4.5 and 4.6 represents medium-scale farms maize production budgets per acre for the year 1999, in Trans-Nzoia and Kapchorwa districts.

Again for the same reasons cited for Lugari, land preparation is done by machinery in Trans-Nzoia as opposed to labor as in Kapchorwa. Hence the big cost difference in labor for planting and planter hire. Tables 4.5 and appendices 4.5 and 4.6 show that maize yield per acre, are 25 bags of 90kg in both districts when 10kgs of Kenya hybrid 627 are used.

Table 4.5 Kitale and Kapchorwa Medium-scale Maize Production Budgets per acre in 1999.

	Trans-Nzoia	Kapchorwa
Items	**Kshs/acre**	**Kshs/acre**
Yield (90kg bag/acre)	**25**	**25**
Price received from traders (Kshs/90kg bag)	**1100**	**675**
Revenue	**27500**	**16875**
Fixed costs/acre	**3750**	**1250**
Labor inputs		
Planting	0	250
Weeding	400	2000
Top-dressing	60	200
Stooking	300	300
Maize dehusking	500	600
Transport to store	100	200
Transport to market	50	0
Shelling labor	125	1250
Watchmen	150	0
Total labor inputs	**1685**	**4800**
Non-labor inputs		
1st Plough	1200	1500
1st Harrow	800	1500
2nd Harrow	800	0
Planter hire	650	0
Hybrid seed	910	1150
DAP Fertilizer	2025	1500
Top-dressing fertilizer	1425	1250
Chemical weeding	1600	0
Weed spraying	500	0
Sheller hire	500	0
Gunny bags	250	188
Transport to store	375	750
Trans to market	1250	0
Land Rent per acre	**2000**	**1000**
Total non-labor inputs	**14285**	**8838**
Total costs	19720	14888
Costs/bag	**789**	**565**
Profit/acre	7780	1988
Profit/bag	**311**	**80**

Source: 1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

T However, the rate of fertilizer application is only 50kg of DAP and 50kg of top-dressing fertilizer urea. In contrast, the rate of fertilizer application per acre in Trans-Nzoia is 75kg of DAP and 100kgs of CAN. This suggests that either the use of top-dressing fertilizer urea and/or greater soil fertility in Kapchorwa results in higher maize yields than in Trans-Nzoia. Table 4.3.2 represents the cost elements producing 90kg bag of maize in Trans-Nzoia and Kapchorwa districts.

The four major cost elements in Kapchorwa are fixed costs (19%), fertilizer (18%), mechanized land preparation (14%) mechanized shelling (12%) and chemical weeding (11%). The first three major cost elements in Kapchorwa are land preparation (20%) fertilizer (18%), harvesting labor (16%) and weeding labor (13%).

Table 4.6 Cost elements of producing 90kg bag of maize in Trans-Nzoia and Kapchorwa districts

	Trans-Nzoia		Kapchorwa	
Activity	**Kshs**	**%**	**Kshs**	**%**
Planting labor	0	0	10	2
Weeding labor	16	2	80	13
Fertilizer Application	2.4	0	8	1
Harvesting labor	49	6	94	16
Mechanized Land Preparation	112	14	120	20
Planter	26	3	0	0
Seed	36.4	5	46	8
Fertilizer	138	18	110	18
Chemical Weeding	84	11	0	0
Harvesting(Capital Items)	95	12	37.5	6
Land Rental	80	10	40	7
Fixed costs	150	19	50	8
Total Costs	789	72	565	88
Farm profit	311	28	80	12
Farm gate price	1100		675	

Source: 1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

Fixed costs expense is high in Trans-Nzoia due to depreciation of large maize stores. Storing maize for sale in off-season months is a phenomenon that is increasing, especially among medium to large-scale farmers in Trans-Nzoia. In contrast, storage of maize for sale later on is not widely practiced in Kapchorwa and stores are generally smaller, resulting in lower depreciation costs. The high cost of fertilizer in Trans-Nzoia is not because of cost but quantity applied per acre. While fertilizer costs 27 Kshs per acre for DAP and 19 Kshs for CAN in Trans-Nzoia, they are 30Kshs and 25Kshs respectively in Kapchorwa. However only 50kgs of both are applied in Kapchorwa per acre of maize, as opposed to 75kgs of each on average in Trans-Nzoia. Mechanized land preparation is more expensive in Kapchorwa due to high cost of hiring tractors because there are fewer tractor services compared with Trans-Nzoia. Labor-intensive maize harvesting costs more in Kapchorwa, mostly because of the many people involved in shelling activity and this applies to weeding too. It is also a significant cost element in Kenya, where shelling is done by machinery. Use of herbicides is a common practice in the medium-scale maize farming in Trans-Nzoia because of scarce labor resources during this critical time. At this time, even most small-scale farmers who supply labor to large farms are busy weeding their small maize crops.

The major difference in costs of producing one bag of maize between Trans-Nzoia and Kapchorwa is due to the low costs of production and especially in non-labor cost items. Land rental in Kapchorwa is half that in Trans Nzoia probably because there is no price support in Kapchorwa that bids up land rental rates in Trans Nzoia. Other non-labor cost items such as chemical weeding and harvesting are also lower in Kapchorwa because

more labor is used in maize production in Kapchorwa than in Trans Nzoia. The lower costs of intermediate and fixed inputs more than compensates for the high labor cost of labor-intensive maize production in Kapchorwa in producing the same quantity of maize per acre as in Trans Nzoia.

While the cost of producing maize in Trans-Nzoia is higher than in Kapchorwa, the farm profit from 90kg bag of maize is 28% in Trans-Nzoia compared with 12% in Kapchorwa because of the higher farm gate prices in the latter. The high farm gate price in Trans-Nzoia may due to various factors. One major factor is that the government still determines maize prices through NCPB and NCPB buys mainly from Trans Nzoia district. The higher rates of farm profit in Trans-Nzoia may be one reason why the land rent per acre is higher than in Kapchorwa.

4.4.1 Evolution of capital-intensive maize production systems in western Kenya and parts of eastern Uganda

One of the major findings of this study is the high level of capital intensity of maize production in Kenya generally and in Kapchorwa in Uganda. The relatively high capital intensity in Kapchorwa may be due to cheaper capital costs as opposed to Iganga and Mbale in eastern Uganda. Before further analysis, the evolution of this biochemical and mechanization of maize production is briefly explained.

Kenya's agriculture has since colonial times been characterized by a dual size structure. On one hand are the large commercial farms, which during colonial times were exclusively owned by European settlers, producing high-value cash crops such as coffee,

tea, pyrethrum, wheat, and dairy products for the export and the internal urban market. These were and have remained highly mechanized enterprises and are quite important to the Kenyan economy.

At independence, the area covered by these large farms was 3 million ha. Since then about 1 million hectares have been taken over under the various government schemes and subdivided for settlement by African farmers as small (less 5 ha.) and medium-scale (5-25 ha.) farms. Most of these farms are in the high potential areas, where both the rainfall is adequate and soils are highly fertile. In contrast are the small-scale farmers found all over the country. A significant proportion of these farmers lived in the African reserve lands during the colonial period and owned fragmented parcels of land, on which they practiced subsistence agriculture. As a consequence of the *Maumau* wars in the early 1950s, the Swynnerton Plan was adopted in 1954. That plan led to a land consolidation program on these African farms, and the small farmers were encouraged to grow high-valued cash crops such as coffee, tea, and pyrethrum. At independence, some of the landless people from these African reserves, as well as the small-scale farmers, were settled in some of the land acquired by the Government from the European settlers. A number of mechanization schemes were started in 1960s to help these settlers in opening up their new lands as well as construct soil conservation structures (Muchiri et al. 1990). These schemes were both owned and operated by government as well as privately.

Initially, these tractor hire schemes (both Government and private) were quite successful, as there was a high demand for their services as most farmers grew annual crops - wheat, maize, beans, etc. This also coincided with the time when hybrid maize was being introduced in Kenya, with the resulting higher yields (Gerhardt, 1975). Due to the high

yields, and hence increased production, many farmers in the newly settled lands used intensified their use of machinery, especially in extensive cereal production. With the fragmentation of the land due to population pressure, hand tool technology has become the predominant type of technology in the smallholder sector in the high potential areas. Agriculture, however, is quite intensive in land use due to the favorable climate and the range of cash and food crops that can be produced. Draught/animal technology is unlikely to be adopted in these areas, as grazing is not available and the opportunity cost of land is too high to make draught animals economical. In the main cereal producing areas, tractors cultivate the farms and some of the medium and small-scale farmers hire tractors for cultivation. It is estimated that in addition to the 300 public owned tractors available for hire, there are over 3400 tractors owned by small and medium-scale farmers that are engaged wholly or principally in contracting work.

4.4.2 Cost of maize production in western Kenya and eastern Uganda

Table 4.7 shows the cost of maize production per acre, while table 4.8 shows the same costs per 90kg bag.

Table 4.7 Cost of Maize production per acre in 1999

	Bungoma	Mbale	Lugari	Iganga	Trans-Nzoia	Kapchorwa
Activity						
Planting labor	250	450	0	500	0	250
Weeding labor	1,400	1,500	600	1,800	400	2,000
Fertilizer Application	50	300	90	400	60	200
Harvesting labor	632	1,150	972	1,275	1,225	2,350
Mechanized Land Preparation	1,750	1,500	2,200	1,500	2,800	3,000
Planter	0	0	800	0	650	0
Seed	910	600	910	1,100	910	1,150
Fertilizer	3,449	1,950	3,750	2,250	3,450	2,750
Chemical Weeding	0	0	0	0	2,100	0
Harvesting(Capital Items)	540	446	995	210	2,375	938
Land Rental	1,500	1,200	2,000	1,200	2,000	1,000
Fixed costs	1,125	1,000	1,250	1,000	3,750	1,250
Total Costs	**11,606**	**10,096**	**13,567**	**11,235**	**19,720**	**14,888**

Source: Mode of farmers of cost and revenue items of farmers 1999 budgets. Farm gate prices are actual prices received by farmers between June and August 1999.

Table 4.8.Cost of maize production per 90kg bag in 1999

	Bungoma	Mbale	Lugari	Iganga	Trans-Nzoia	Kapchorwa
Planting labor	19	25	0	24	0	10
Weeding labor	104	83	35	86	16	80
Fertilizer Application	4	17	5	19	2	8
Harvesting labor	47	64	57	61	49	94
Mechanized Land Preparation	130	83	129	71	112	120
Planter	0	0	47	0	26	0
Seed	67	33	54	52	36	46
Fertilizer	256	108	221	107	138	110
Chemical Weeding	0	0	0	0	84	0
Harvesting(Capital Items)	40	25	59	10	95	38
Land Rental	111	67	118	57	80	40
Fixed costs	83	56	74	48	150	50
Total Costs	**860**	**561**	**797**	**535**	**789**	**565**

Source: Mode of farmers of cost and revenue items of farmers 1999 budgets. Farm gate prices are actual prices received by farmers between June and August 1999

When the costs of production are compared across the three regions in Kenya, Trans-Nzoia has the highest cost per acre. The difference in costs of production between Trans-

Nzoia and Lugari is land preparation, chemical weeding and harvesting costs. The former incurs around Kshs 7275 per acre or Kshs 250 per bag on these activities alone. The difference between the high costs of production in Bungoma compared with the low cost of production in Lugari is due to high cost of land preparation, planter hire and the sheller machine. As observed earlier, the high cost is due to costly non-labor inputs. However, relatively higher output yields in Trans-Nzoia make the cost of production per 90 kg bag of maize the lowest at Kshs 789 among these three regions of Kenya. Lugari's cost of production is Kshs 798 per 90kg bag; it is Kshs 860 in Bungoma, which has the lowest cost per acre at Kshs 11,606. But the low cost per acre translates into a high cost per bag because the average yield per acre in Bungoma is only 13.5 bags. While there are differences in the cost items of producing maize in Trans-Nzoia, Lugari and Bungoma as depicted by costs per acre, maize productivity per acre is the major determinant of costs per bag. Although the cost of maize production per acre in Trans-Nzoia is 70% higher than in Bungoma and 45% higher than in Lugari, maize yields are 90% higher than in Bungoma and 50% higher than in Lugari. This translates into lower costs of maize production per bag. The high maize productivity in Trans-Nzoia can be attributed to high soil fertility and/or better agronomic practices.

As noted in earlier studies (Kodhek, 1999), yields in the prime production areas of the lower highlands which include Upper Bungoma, Lugari and Trans-Nzoia districts (the grain basket of the north rift that produces the bulk of marketed maize) range from 12 to 30 bags per acre in normal years. Yields reflect soil fertility and/or production practices, the quality and timeliness of land preparation and weed control, the use of

certified seed and the quantity of fertilizer used. Higher yields in Kenya are associated with higher costs of production per acre, but with lower costs per bag produced. Cash flow constraints and the almost complete lack of production credit mean that those who can invest in optimal production practices are those with adequate working capital, usually implying large land holdings and/or off-farm sources of income. Reforms in maize marketing mean that prices are quite low immediately after harvest, and rise significantly towards the middle of the following year. Those who can hold out get a much higher return from their maize production than the typical small-holder who must sell immediately to meet such pressing cash needs as December ceremonies and January school fees.

Since Bungoma uses the same type of seed as in Trans-Nzoia and Lugari and relatively high quantities of fertilizer, the relatively low yields may be due to lower rainfall, lower soil fertility and/or poor crop husbandry practices. Maize production involves implementing the right agronomic practices at the right time.

The data suggest in part that in Trans-Nzoia and Kapchorwa mechanization has increased yields. Mechanization in these districts has improved the quality of farming operations. Reasons for relatively higher maize yields in Trans-Nzoia and Kapchorwa include deeper ploughing and thorough incorporation of weeds and crop residues, row planting, correct placement of fertilizers through use of machinery; superior and thorough crop protection against weeds, and better harvesting operations due to use of machinery. Timely execution of agricultural tasks is crucial in predominantly rain fed maize production, and as has been observed in the last few years, rainfall tends to be unreliable and erratic in

most cases (Mrema 1990). The untimely completion of such tasks as planting can mean complete loss of the crop, whereas untimely completion of subsequent operations such as weeding and harvesting can lead to substantial reduction in the harvest. Machinery in these districts has also helped in reduction of drudgery in performing agricultural tasks (Makanjuola, 1990). Reliance on human muscle as maize area is expanded is difficult, arduous and expensive in the hot climate of eastern Uganda and Western Kenya. With competition between school and off farm income, labor costs are increasingly becoming expensive. The high number of tractors and other farm machinery in Trans-Nzoia compared with other regions depresses the price of farm services, resulting in lower costs to farmers. While per acre costs of machinery is very high, proper and timely application of maize agronomic activities yield higher outputs for Trans-Nzoia farmers, resulting in lower costs per bag. Bungoma district has fewer medium-large scale farms (Nyoro, 1992) than Lugari and Trans-Nzoia. The cost of machinery is higher in Bungoma due to lower availability of machinery as a result of fewer and relatively smaller medium to large farms. Oxen furrowing is still common (Nyoro, 1992).

Kapchorwa district in Uganda, the district that produces more maize than any other district in Uganda, has the highest cost of production per acre and per 90kg bag at Kshs 14,888 and Kshs 596 respectively. Most commercial maize farmers have relatively larger farms compared with the other two districts and, as mentioned earlier, maize production is more capital intensive than on smallholder farms. From the budgets, it is apparent that machinery services are expensive in eastern Uganda relative to western Kenya. There are not yet as many tractors and other farm machinery in Kapchorwa as in Trans-Nzoia in Kenya, which is the adjacent district. And there was not any observation of cross-border

farm services from Kenya to Uganda. The rate of fertilizer use in Kapchorwa seem to be low compared with Trans-Nzoia, which has similar agro-ecological zone (soil type, elevation and temperature and rainfall). On average maize yield is the same as in Trans-Nzoia yet less fertilizer is used per acre. This suggests that soil fertility is higher in Kapchorwa leading to the need for less fertilizer. In Mbale and Iganga, yields are high with even little fertilizer use. But the farms are relatively small compared with Kapchorwa. Maize production in Iganga and Mbale is labor intensive and fertilizer application is also lower at 30kgs of DAP and 30kgs of Urea per acre. Maize yields are lower at 18 and 21 bags per acre respectively, compared with 25 bags per acre in Kapchorwa. However, the costs per 90kg bag are lower in Iganga and Mbale compared with Kapchorwa. This may be attributed to fertile soils that have been used for production of bananas and other crops and are increasingly being used for maize production. The costs may rise, though, with increasing use of fertilizer to replenish the soils, which is being encouraged by the government and non-governmental organizations (IDAO and IDEA, 2000).

Also, NCPB price support in Kenya and intensive buying in Trans Nzoia seem to have bid up the land rental rates in Trans Nzoia district increasing the cost of maize production per bag in Trans Nzoia compared with Kapchorwa.

4.4.3 Simulation Analysis: Effect of increased fertilizer use on maize production costs

This section simulates the effect of increasing the intensity of fertilizer use on farm profitability and relative production costs. Increasing fertilizer usage to get optimum

yields has been the objective of the department of agriculture in Mbale, Iganga and Kapchorwa, and many non-governmental organizations (IDEA and IDAO, 2000). Specifically, promotion of fertilizer usage has focused on showing farmers how yields increase with more fertilizer usage under prevailing agronomic practices. The district agricultural offices recommend 50kgs per acre of both basal and top dressing fertilizer per acre for maize production in Mbale and Iganga, as this is affordable and appropriate with current agronomic practices. In parts of Kapchorwa, increasing fertilizer application to 75kgs per acre is recommended (KDAO, 2000). Other labor and non-labor costs will also change especially those that are dependent on intensity of inputs and yields harvested. Usage of more fertilizer does not significantly affect such labor costs as fertilizer application as it has been observed that the same labor force can apply another 50kg of fertilizer per acre at the same cost (IDEA and IDAO, 2000).

Increasing both basal and top dressing fertilizer usage to 50kg per acre, increases yields about three bags in Mbale and Iganga, and four bags in Kapchorwa. These yield increases are those projected by the Iganga, Mbale and Kapchorwa districts department of agriculture (Iganga, Mbale and Kapchorwa District Agricultural Offices, 2000). Fertilizer field trials by the department of agriculture and non-governmental organizations have shown yield increases of 3-6 bags with increased fertilizer application rates of both basal and top dressing up to 50kgs per acre in Mbale and Iganga and 75kgs/acre in Kapchorwa with the current agronomic practices. Yields are higher if agronomic practices are also improved (IDAO and IDEA 2000). Specifically, the maize output/fertilizer input ratios

for a normal production season are 38kgs/kg of fertilizer for Mbale, 16kgs/kg of fertilizer for Iganga and 13kgs/kg of fertilizer in Kapchorwa in eastern Uganda.

Table 4.9 shows the effect of increasing fertilizer application rate in Mbale, Iganga and Kapchorwa to 50kgs per acre of both basal and top dressing fertilizer.If the Ministry of Agriculture in Uganda intensifies its campaign of increasing use of fertilizer to replenish soil fertility in Mbale, Iganga and Kapchorwa, the change in costs of maize production would actually be a marginal reduction in cost (table 4.9).

Table 4.9 Simulation of the effects on maize production costs per 90kg bag resulting from increased fertilizer use in selected areas of eastern Uganda.

	Mbale		**Iganga**		**Kapchorwa**	
Cost of maize production per 90kg bag in 1999	Increasing DAP by 20kg/acre and Urea by 15kgs/acre. Output increases by 6 bags of 90kg/acre	Existing situation based on farm surveys	Increasing both DAP and Urea by 20kg/acre each. Output increases by 3 bags of 90kg/acre	Existing situation based on farm surveys	Increasing both DAP and Urea by 25kg/acre each. Output increases by 3 bags of 90kg/acre	Existing situation based on farm surveys
	Cost of maize production per 90kg bag in 1999					
Planting labor	20	25	20	24	9	10
Weeding labor	68	83	72	86	71	80
Fertilizer Application	14	17	16	19	7	8
Harvesting labor	52	64	51	61	84	94
Mechanized land Preparation	68	83	60	71	107	120
Planter	0	0	0	0	0	0
Seed	27	33	44	52	41	46
Fertilizer	157	108	150	107	125	110
Chemical Weeding	0	0	0	0	0	0
Harvesting(Capital Items)	20	25	8	10	33	38
Land Rental	70	67	59	57	42	40
Fixed costs	57	56	49	48	52	50
Total Costs	553	561	529	535	572	596

While there is no incentive for farmers to increase their fertilizer use under current agronomic practices, it is important to note there is a potential for further cost reduction in maize production in Mbale, Iganga and Kapchorwa districts. Hence they have a comparative advantage in maize production compared with Bungoma, Lugari and Trans-Nzoia with the potential of even cheaper production costs with better agronomic practices.

4.4.4. Profit margins of maize production in western Kenya and Eastern Uganda

Table 4.10 shows farm gate profits as a percentage of farm gate prices of a 90kg bag of maize. Farm gate profits are higher in Mbale and Iganga districts compared to Bungoma and Lugari respectively.

Table 4.10 Production costs and profits in Eastern Uganda and Western Kenya (Kshs/90 kg bag)

	Mbale	Bungoma	Iganga	Lugari	Kapchorwa	Trans-Nzoia
Cost (Kshs/90kg bag)	561	860	535	798	596	789
Profit (Kshs/90kg bag)	204	140	230	202	79	311
Farm gate price of 90kg bag	765	1,000	765	1,000	675	1,100
% profit/90kg bag	**27%**	**14%**	**30%**	**20%**	**12%**	**28%**
Average area under maize (acres)	6	6	10	10	20	20
Average yields (90kg bags/acre)	18	14	21	17	25	25
Average income from maize (Kshs/year)	**22,032**	**11,340**	**48,300**	**34,340**	**39,500**	**155,500**

Source:1999 Tegemeo/MSU maize production and marketing costs survey, June 2000

However, Trans-Nzoia's maize production profit (28%) is higher than Kapchorwa's (12%) This is due to the policy of domestic price support through NCPB, as the board buys strategic maize reserves at higher prices while cheap imports are discouraged through higher import tariffs. This also shows how powerful, the medium to large-scale maize farm lobby is, as they are the ones who benefit from higher maize prices (Argwings-Kodhek, 1999). The high profits in Mbale and Iganga compared with Bungoma and Lugari may be due to high demand for maize in both Mbale and Iganga which are the main maize market towns in Eastern Uganda, for consumption and wholesale to WFP, and Kenya.

4.4.5. Conclusion

At farm level, complete market liberalization would eat into the high profit margins of farmers in western Kenya. Figure 3.1 showed higher NCPB prices in some years and months when the market prices are low. Given the powerful lobby of maize farmers and the extent to which net buying farmers and urban consumers, most of whom have farming backgrounds, are sympathetic to maize farmers plight irrespective of scale, it has not been smooth to fully implement structural changes in the maize sub-sector in Kenya. The above tables show that external maize trade liberalization and elimination of NCPB price supports would bring competitiveness and lower consumer prices if farm gate price reduction is passed on to consumers. The best approach would be simultaneously focusing on ways of reducing cost of per unit maize production (Yangeen et al. 1990) that would improve farm incomes and soften farmer's opposition to reforms and the opening up the maize market to allow for maize imports. Policy makers should not take costs as

given, but rather seek to help farmers reduce their production costs through cost-effective public sector investments in seed research and market infrastructure.

CHAPTER 5

MAIZE MARKETING FROM EASTERN UGANDA AND WESTERN KENYA TO KISUMU

This chapter looks at post-farm marketing of maize from eastern Uganda and western Kenya to Kisumu town in western Kenya. The major objective is to determine whether Ugandan maize would be competitive in Kisumu in the absence of tariffs and other external trade barriers, and how this would affect price levels in Kisumu and the price levels in surplus western producing districts of western Kenya. It starts by describing the characteristics of cross-border maize traders first. It is important to note that this study is static and does not attempt to estimate how maize prices or volume of trade would change when costs change.

5.1. Characteristics of cross-border maize traders

This section borrows heavily on previous trade studies by Ackello-Ogutu, Gabre-Mahdin and James Nyoro. In her 1999 study, Gabre-Mahdin found that maize trading businesses are generally very small, with between 1 and 4 salaried employees on average in both countries. Firms appear to rely more on temporary or day laborers, who were responsible for weighing, sacking, and loading or off-loading maize. In terms of their business assets, most traders in both countries did not have significant business assets, with only one-fifth of traders possessing their own storage facilities or a grain transport vehicle. This may be due to the lack of financing for small enterprises that are often unable to obtain formal credit. She also found that two-thirds of Ugandan traders own and use telephones, in contrast to only 35% a figure corroborated by Nyoro et al. for Kenyan maize wholesalers.

Gabre-Mahdin also found that in both Uganda and Kenya, the majority of traders indicated that it was difficult to rent trucks during the harvest season as well as during the period in which there was high demand for transport of-cash crops (coffee and tea). In both countries, transport rates appear to increase up to roughly 40% in these periods. In most studies, transport bottlenecks have been associated with poor roads. It may also be due to limited number of trucks in a period due to competing interests especially in the post harvest period.

Both Ugandan and Kenyan traders on average store maize for a period of two weeks. This indicates that traders may not be taking advantage of temporal arbitrage opportunities (Gabre-Madhin, 1999). This may be attributed to lack of sufficient capital or it could mean that the NCPB pricing policies eliminate private incentives to store by reducing intra-year price variation.

In Kenya, around 10% of maize traders use credit (Nyoro et al. 1999), and of these, only 6% of the traders obtained bank loans. Most Kenyan traders appear to rely to a far greater extent on informal credit from family and friends. In contrast, 38% of Ugandan traders obtained bank loans and 37% of traders used informal loans. Selected characteristics of Kenyan traders and the marketing chain are shown in appendices 5.1 and 5.2 respectively.

Our study corroborated Madhin's and Nyoro et al. in that traders in both Uganda and Kenya exhibit a similar pattern, in which purchases are conducted in distant markets while sales are conducted in the trader's own market. Due to heavy concentration of traders in Eastern and Western Kenyan towns and the fact that only traders (wholesalers) located in these large regional markets were interviewed, they exhibited a pattern in which they were only concerned with one long-distance transport activity (from purchase market to own warehouse) per transaction.

5.2 Analysis of cross-border maize transfer costs

The price spread between supplier and destination markets can be compared to the cost of transferring maize from Uganda to Kenya to determine whether margins are competitive in the years where trade occurs and whether price spreads were within the parity price band.

In years where Ugandan exports to Kenya are substantial, efficient market flows would be characterized by the following relationship.

$$P_K - P_U \geq t$$

Where P_K represents the price of maize in consumption areas of Kenya

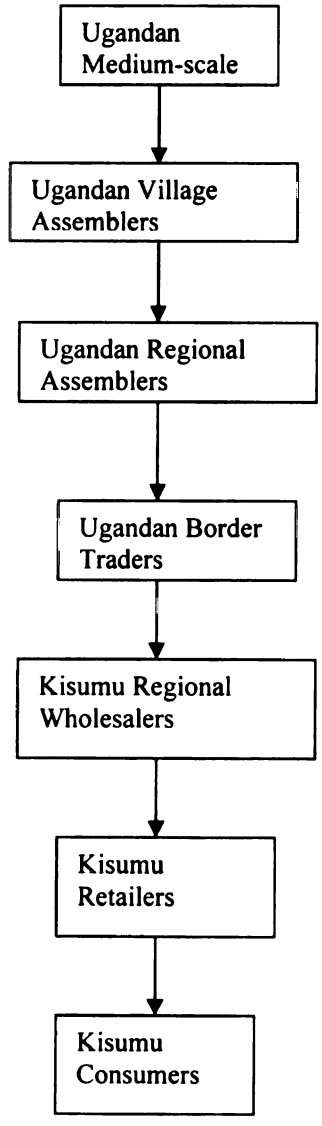
P_U represents the Ugandan maize price in surplus production areas

t represents the cost of transferring grain from Uganda to Kenya

Perfect spatial arbitrage occurs, when the price difference equals the transfer cost. When the price spread P_K-P_U falls lower than t, trade cannot take place without traders incurring a loss. Indeed, this is a situation of autarky. If the price differential remains above t for a sustained period, markets are not behaving competitively.

Figure 5.1 is a flow diagram depicting the most common observed maize flow channel from eastern Uganda to Kisumu town in Kenya and . Table 5.1 shows the cost build-up for the informal maize trade from Eastern Uganda and Western Kenya to the maize deficit town of Kisumu in Kenya.

Figure 5.1 Regional Maize Marketing Chain from Western Uganda to Kisumu (Kenya)



Source: Author's compilation

Table 5.1 Cost Build-Up from Eastern Uganda and Western Kenya to Kisumu July-October 1999 per 90kg bag

Cost Items	Bungoma	Mbale	Lugari	Iganga	Trans-Nzoia	Kapchorwa	Durban, South Africa[1]
1 Farm gate price	1000	765	1000	675	1100	675	878[2]
2 Transport to local assembly store	25	23	25	23	25	23	0
3 Storage costs at local store	30	10	25	15	20	8	0
4 Mark-up at local assembly store	70	55	80	75	80	100	0
5 Transport to border	0	90	0	45	0	113	111[3]
6 Storage costs at Border store	0	5	0	5	0	5	0
7 Mark-up at Border store	0	53	0	75	0	91	0
8 Transport across border	0	25	0	25	0	25	0
9 Border costs[4]	0	54	0	54	0	54	192[5]
10 Bribes	0	90	0	90	0	90	0
11 Transport to Kisumu	75	150	95	100	125	200	425
12 Storage costs at Kisumu	7	7	7	7	7	7	7
13 Marketing costs at Kisumu	20	20	20	20	20	20	20
14 Landed price in Kisumu (sum of rows 1 through 13)	1227	1346	1252	1209	1377	1410	1633
15 Three Month average price in Kisumu(May to July)	1460	1460	1460	1460	1460	1460	1460

Source: 1999 Tegemeo/MSU maize production and marketing costs survey, June 2000
South African prices are from SAFEX.

1. Details on costs of importation are in appendix 5.2.1
2. South African farm gate price is actually F.O.B price Durban.
3. Transport to border is shipment costs with insurance to Mombasa
4. Border costs are costs of covertly moving small quantities over the border to avoid detection by customs authority
5. Border costs for South African maize refers to costs of importation at Mombasa, Kenya. Taxes are Excluded because we are analyzing maize importation into Kenya with no taxes/avoided taxes.

This table only provides cost build-up for informal maize trade, the most common type of maize cross-border trade between Kenya and Uganda. Informal cross-border trade activities between Kenya and Uganda are significant and involve movement of large amounts of both agricultural and industrial goods. This informal trade in maize, constituted about 3% of Kenya's national production figures for maize in 1995 (Ackello-Agutu, 1997). This translates to roughly 15% of marketed supply. Even during maize movement control in Kenya, which was supposed to prevent Kenyan maize from crossing to neighboring countries, movement across Kenya's borders was occurring. But there was a net flow of maize from Uganda and Tanzania into Kenya (Argwings-Kodhek, 1992). Due to lack of adequate personnel and financial resources, it is extremely difficult for government officials to apprehend traders who do not use the official channels. Indeed, in most cases, no effort is made to do so since customs and security personnel benefited in one way or another from informal trade (Ackello-Ogutu, 1997). Maize from East Africa was charged an import duty of Kshs 2.50 per kg and a fee of 2.75% of the value of a 90kg bag of maize for import declaration form, at the border in 1999. With these taxes eastern Ugandan maize is no longer competitive in Kisumu. Yet our observation was maize still flowed to Kenya with the import tax in place. This lends credence to earlier studies and the omission of official taxes in the cost build-up as shown in table 5.1. It, however, includes other "taxes" in the form of bribes and border transfer costs, which are done clandestinely and are relatively low, compared to the official tax.

From table 5.1, maize from Mbale reaches Kisumu more expensively than maize from Bungoma by about Kshs119 per bag during the period of study. This is due to four main reasons:

1. A high transport cost because Mbale is further from Kisumu than Bungoma.
2. A higher cost of getting maize across the border in small consignments to avoid taxation

3. Extra cost of bribing customs personnel to evade tax
4. Extra cost of bribing the police in case a trader is apprehended for evading tax.

The last three cost items make up 29% of the total costs of transfer of maize from Mbale to Kisumu. The major cost elements of transferring maize from Bungoma to Kisumu is transport (44%) and storage, which also makes up 44% of all the total costs of maize transfer. The latter cost includes mark-ups for storage function. Marketing cost is mainly made up of licenses for wholesaling maize in Kisumu wholesale market. It is a fixed sum paid by all traders. It also includes the cost of loading and unloading, which again is the same for all traders since they contract the same people. The high costs of transferring maize from Mbale to Kisumu, reduces the net profits accruing to traders to 8%, as opposed to Bungoma's 19% as seen in table 5.2. The 19% net profit of traders transferring maize from Bungoma to Kisumu only accrues to those few traders who can store maize for at least 4 months.

Table 5.2 Price spreads and their relationship with transfer costs

		Eastern Uganda			Western Kenya		
		Mbale	Iganga	Kapchorwa	Bungoma	Lugari	Trans-Nzoia
1	Buying Price	765	675	675	1,000	1,000	1,100
2	Prevailing Market price in Kisumu	1,460	1,460	1,460	1,460	1,460	1,460
3	Price Spread (2-1)	695	785	785	460	460	360
4	Transfer costs	581	534	735	227	252	277
5	Price Spread-Transfer costs (3-4)	114	251	50	233	208	83
6	Traders profit as % of retail price (5/2)	8%	21%	4%	19%	17%	6%

Source: 1999 Tegemeo/MSU maize production and marketing costs survey, June 2000. Kisumu wholesale prices are from the Ministry of Agriculture in Kenya.

Iganga's maize, like Mbale's, reaches Kisumu via the Busia border crossing, but cheaper than Lugari's by Kshs 43 per 90kg bag. The transport cost from Iganga to Kisumu is slightly higher than from Lugari to Kisumu by about Kshs 7, and costs of bribing is Kshs 144 (sum rows 9 and 10 in table 5.1) or 27% of the total transfer costs. Yet Iganga's maize is still cheaper than Lugari's maize in Kisumu. The lower cost of Iganga's maize in

Kisumu is due to the lower costs of production of maize in Iganga, which results in lower farm gate price of maize in Iganga. Table 5.3 corroborates this. The profit of traders moving maize from Iganga to Kisumu is 21% as opposed to 19% from Lugari.

The Kapchorwa maize reaches Kisumu mixed with Mbale maize and also comes through the Suam border crossing, which is along the two districts' border. The latter route is the one used in this study. Maize from Kapchorwa reaches Kisumu at a slightly higher price than Kitale's by Kshs 33 per 90kg bag. Although farm gate price of maize is lower in Kapchorwa than in Kitale, the landed price of Kapchorwa maize in Kisumu is higher than Kitale's. This is because maize from Kapchorwa incurs border crossing costs and bribes along the way to sustain tax evasion, higher transport costs due to being further away from Kisumu, and poor sections of road network between Kapchorwa and Kitale town in Trans-Nzoia. The net profit to traders involved in moving maize from Kapchorwa to Kisumu is 4% compared with moving maize from Kitale to Kisumu which results in 6% net profit (Table 5.3), making the latter more competitive.

While maize from South Africa may not be competitive in Kisumu due to a high transport cost, it is competitive in coastal and eastern areas of Kenya without import taxes. It would still have to compete with maize from Narok and parts of Central and Eastern province, which were not covered in this paper. This suggests that if prices of maize were reduced for net-buying small-scale farmers, different areas of Kenya would have to be supplied from different sources depending on competitiveness.

In absolute terms, price spreads are generally higher for maize from eastern Uganda to Kisumu compared with maize from western Kenya. Table 5.3 is a general indication of the price levels in the towns we have analyzed and neighboring regions over three years (1997-1999).

Table 5.3 Maize Mean Prices over three years (1997-1999) in Western Uganda and eastern Kenya (in constant 1999 prices)

Place	Mbale	Iganga	Kapchorwa	Kitale	Kisumu	Eldoret
Kshs/ 90kg bag	1150	1114	1064	1265	1550	1318

Source: Kenya wholesale prices are from the Ministry of Agriculture in Kenya.
Uganda wholesale prices are from the Ministry of Agriculture and Ministry of Finance and IDEA.

Distances from eastern Uganda to Kisumu are far compared with western Kenya, with exception of Iganga. Hence, transfer costs which mainly consists of transport, border crossing and bribing costs, are generally higher by on average of 42% from eastern Uganda to Kisumu compared with transferring maize from western Kenya to Kisumu. Also while western Kenya maize traders only incur two major cost elements of storage and transport, eastern Uganda traders incur extra costs in terms of border crossing and bribes as mentioned earlier. These comprise 27 to 43% of the total transfer costs from eastern Uganda to Kisumu (table 5.1) depending on where the maize is coming from. Still eastern Uganda maize traders get lower but positive and competitive net profit mark-ups compared with their counterparts in western Kenya with exception of Iganga because they purchase maize at lower prices. This implies that with an eminent reduction/removal of the tariff by 2005 as stipulated in the EAC charter, maize from eastern Uganda would be more rewarding to traders and would be cheaper to Kisumu consumers.

Therefore, despite the distance, high transport costs and costs related to Kenya maize market protection, Uganda maize reaches Kenya at competitive prices. High farm gate prices and a marketing system that is slightly less competitive than eastern Uganda's makes western Kenya maize generally less competitive than Uganda's in Kisumu even with the informal costs incurred on circumventing import tariff. However since Uganda is currently a small exporter of maize to Kenya, the price of eastern Uganda maize does not significantly affect the Kisumu wholesale maize price. However without tariff, cheap maize supply from Uganda could increase to levels in which it may decrease the price of maize in Kisumu town. Further, since eastern Uganda harvests maize one month earlier

than western Kenya, eastern Uganda farmers may especially be able to exploit a specific market window early in the season.

5.3 Simulations of effect of costs of maize transfer on Kisumu wholesale maize prices

This section combines chapters 4 and the preceding sections of this chapter. It was expected with the on set of external trade liberalization, that the border crossing costs and bribes would be eliminated from the traders' costs of moving maize from eastern Uganda to Kisumu. If this happens, then the landed price of maize in Kisumu from Mbale, Iganga and Kapchorwa would decrease by about 10%, 14% and 8% respectively. If we assume that the proportion of maize from eastern Uganda is big enough to affect the wholesale price in Kisumu, and further that the cost reduction is passed on to consumers, then wholesale price of maize in Kisumu would decrease by about 12% between June and July (Table 5.4).

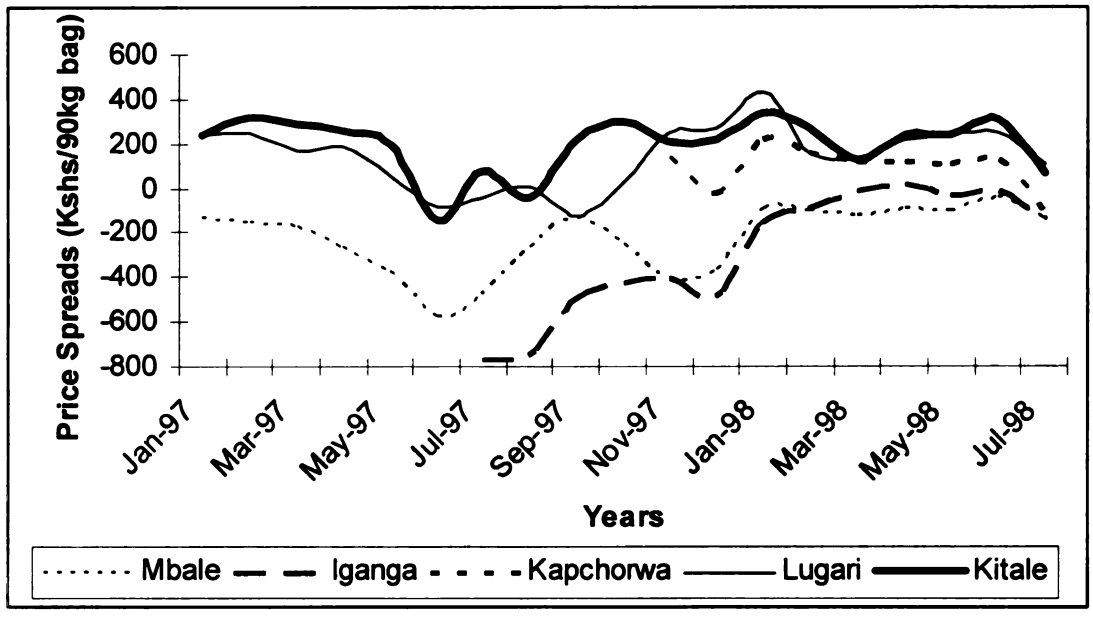
Table 5.4 Simulation of how marketing costs affect Kisumu wholesale maize prices

	Three Month average price in Kisumu (May to July 1999)	Landed cost in Kisumu July 1999	New landed price in Kisumu with no border costs and bribes, all passed to consumers*	% Reduction in Landed price at Kisumu
Eastern Uganda				
Rows	1	2	3	(2-3)/2
Mbale	1460	1346	1206	10%
Iganga	1460	1209	1040	14%
Kapchorwa	1460	1410	1291	8%
Western Kenya				
Bungoma	1460	1227	1227	0
Lugari	1460	1252	1252	0
Trans-Nzoia	1460	1377	1377	0

*This is calculated by subtracting columns 6 through 10 of table 5.1 from the average price spreads between Mbale, Iganga and Kapchorwa to Kisumu.

Figure 5.2 shows the price spreads between selected eastern Uganda, western Kenya and Kisumu between 1997 and 1998.

Figure 5.2 Maize Price Spread between selected eastern Uganda regions and Kisumu town in Kenya



Source: Maize wholesale prices are from the Ministries of Agriculture of both Kenya and Uganda

For most months, the price spreads between Lugari and Kitale in Trans Nzoia in western Kenya are higher than from eastern Uganda. The reduction and/or elimination of import tariffs makes the price of maize from all these three eastern Uganda districts lower than from Lugari and Trans-Nzoia districts in western Kenya. This would make maize from eastern Uganda more competitive in Kisumu.

5.4 CONCLUSION

Chapter 4 showed that western Kenya medium-scale farmers, on average, have higher profit margins than their counterparts in eastern Uganda. This was attributed to government protection through NCPB maize purchases at higher prices and imposition of tariffs.

Doing away with domestic maize market protection may induce further production of maize in eastern Uganda for the maize-deficit market in Kisumu and its surroundings with the increased imported volumes forcing a reduction in prices of maize in western Kenya in the long run. We saw in chapter 4 that this is possible because eastern Uganda, even under the current scenario of using a mixture of open pollinated and hybrid seed, limited biochemical and machinery use, has a comparative advantage in maize production.

If competitiveness is measured in terms of costs and net profits accruing to maize producers and marketing agents, then clearly, eastern Uganda maize production is competitive. Maize marketing from eastern Uganda is however less competitive due to tariffs that increase other cost such as bribery costs, of transferring maize to Kisumu.

Kenya's political-economic policy has resulted in the protection of medium to large- scale farmers, all of who are net-maize seller at the expense of the 67% small-scale farmers who are net maize buyers and urban consumers.

In the USDA FAS World Grain Circular, one author wrote: "the competitive ability of the United States in world grain markets is more a function of policies than it is of production costs. The ability of the U.S to penetrate new markets depends more upon its ability in international trade negotiations than in its ability to lower costs. This is not to say that the U.S should ignore neither its satisfied customers nor the opportunity to increase our productivity and lower costs (FAS USDA, World Grain Circulars, 1990).

In this regard, eastern Uganda's maize market penetration of Kenya and the subsequent more efficient and competitive maize production in western Kenya may need a bigger push from Uganda or within the realms of East African Community than from the Kenya government itself. As it is, the government values protecting farmers irrespective of whether they are net maize buyers or consumers and as long as there is sympathy from urban consumers and other small scale farmers.

CHAPTER 6

CONCLUSION

The main objectives of this study were to:

1. Compare the profitability of maize production before (1989/91) and after (1998/1999) maize market reforms in major maize producing areas of western Kenya.

2. Compare the spatial price spreads between selected producer and consumer markets in western Kenya before and after maize market reforms, between some major pairs of markets in which there is maize trade.

3. Compare the competitiveness of western Kenya maize with eastern Ugandan and South African maize after maize market reforms.

Farm level data and secondary data were collected for 1998/99 season in 2000. 1992 data from Tegemeo Institute maize marketing study was used has the basis of comparison between pre-maize market reform period before 1993 and post maize market reform period after 1993. The analysis method was mainly static comparative matrices of:

1. maize production and marketing costs in western Kenya (1991/92 pre-reform and 1998/99 post reform)

2. competitiveness of maize production and marketing in western Kenya and eastern Uganda (1998/99 post reform)
3. post-reform competitiveness of South African maize in western Kenya (1998/1999).

The effects of removing external trade barriers between western Kenya and eastern Uganda are:

1. Kisumu wholesale maize prices would be lower in most years, as cheaper imports from eastern Uganda would increase due to relatively low maize production costs in eastern Uganda, offsetting a higher transfer cost to Kisumu.
2. If the government maintains price support policy through NCPB, and effectively barred maize imports from Uganda, the costs of maize to consumers in Kisumu would rise as Kenyan maize displaced by Ugandan maize in filling a high demand would be sold to NCPB at the support price.
3. If EAC charter is to be upheld by 2005, this means that Kenya/Uganda trade barriers will need to be reduced. Hence there is an urgent need from the standpoint of Kenyan maize producers to work on reducing costs of maize production in western Kenya, so that western Kenyan maize can be more competitive against eastern Uganda maize when the time comes to conform to EAC rules. Or western Kenya farmers should explore alternative crops.

This study has identified two major leverage points of achieving higher farm income and efficient maize marketing of maize in western Kenya. First the maize market liberalization process, as was shown chapter 4, needs to facilitate productivity increases

at farm level. While lower maize prices would weed out inefficient marginal farmers, who are mostly small-scale, medium to large-scale western maize farmers would have to supply maize to the former at lower prices, which is possible through increased productivity. Eastern Uganda's more fertile soils result in higher yields per acre and lower farm gate prices, making eastern Uganda maize competitive in Kisumu. Also, the government's price support policy through NCPB has probably been capitalized into land rental rates, raising the costs of maize production in western Kenya.

Two, other institutional reforms and public infrastructural investments, which accompany price reform and make it more effective, need much more emphasis. These include investment in rural road infrastructure, access to credit by small traders and farmers, a more efficient price dissemination mechanism, standards and quality control. Apparently, conditionality linked to Agricultural Sector Adjustment Loan (ASALS) and Structural adjustment Program (SAPs) by the World Bank, included investment in these market-supporting areas, but they are not emphasized in the implementation of ASAL or SAP (Seppala et al. 1997). Improvements in these areas would further reduce the cost of maize transfer from western Kenya to Kisumu, making it more globally competitive.

APPENDICES

APPENDIX 3.1 A MAIZE BUDGET FOR UASIN GISHU PER ACRE, MEDIUM-SCALE 1992 (Constant 1999 Prices)

Labor inputs	
Planting(.1 mandays*/acre per acre @ Kshs 47/manday)	5
Top-dressing(.75 mandays per acre @ Kshs 59/manday)	44
Weeding(.1 mandays/acre at Kshs 59/manday)	6
Pest control(.25 mandays/acre @ Kshs 28159/manday)	70
Desuckering(1 manday/acre @ Kshs 47/manday)	47
Stooking(5 mandays/acre @ Kshs70/manday)	352
Maize dehusking(5 mandays/acre @ Kshs94/manday)	469
Transport to store(2 mandays/acre @ Kshs 47/manday)	94
Shelling labor(1 mandays/acre @ Kshs 70/manday)	70
Weighing, sewing & loading(1 mandays/acre @ Kshs 70/manday)	70
Sub Total	1,226
Non-labor inputs	
Ploughing(Kshs 937/acre)	937
2nd Ploughing	0
Harrowing(Kshs 586/acre)	1,172
Planter hire(Kshs 586/acre)	586
Maize seed(10kgs/acre @ Kshs 41/kg)	410
DAP fertilizer (75kgs/acre @ Kshs 22/kg)	1,617
CAN fertilizer(@Kshs 16 per 50kg)	797
CAN spreader (Kshs 586/acre)	586
Depterex(1kgs/acre @ Kshs 157/kg)	69
Transport to store (17 bags/acre @ Kshs 19)	375
Sheller hire(17 bags @ Kshs 19/bag)	375
Gunny bags (20 bags for two years @ Kshs 52/bag)	520
Transport to NCPB (20 bags/acre @ Kshs 12/bag)	234
Weed spraying(Kshs 586/acre)	586
Herbicides(2litres/acre @ Kshs 469)	937
Sub Total	9,197
Output	
Maize (20 bags of 90kg @ Kshs 703 per bag)	14,061
Total Revenue	14,061
Total Costs	10,423
Cost/bag	521
Pre Tax Profit	3,638
Taxes	141
County council cess	141
PROFIT (AFTER TAX)	3,497
Profit/bag after tax	175

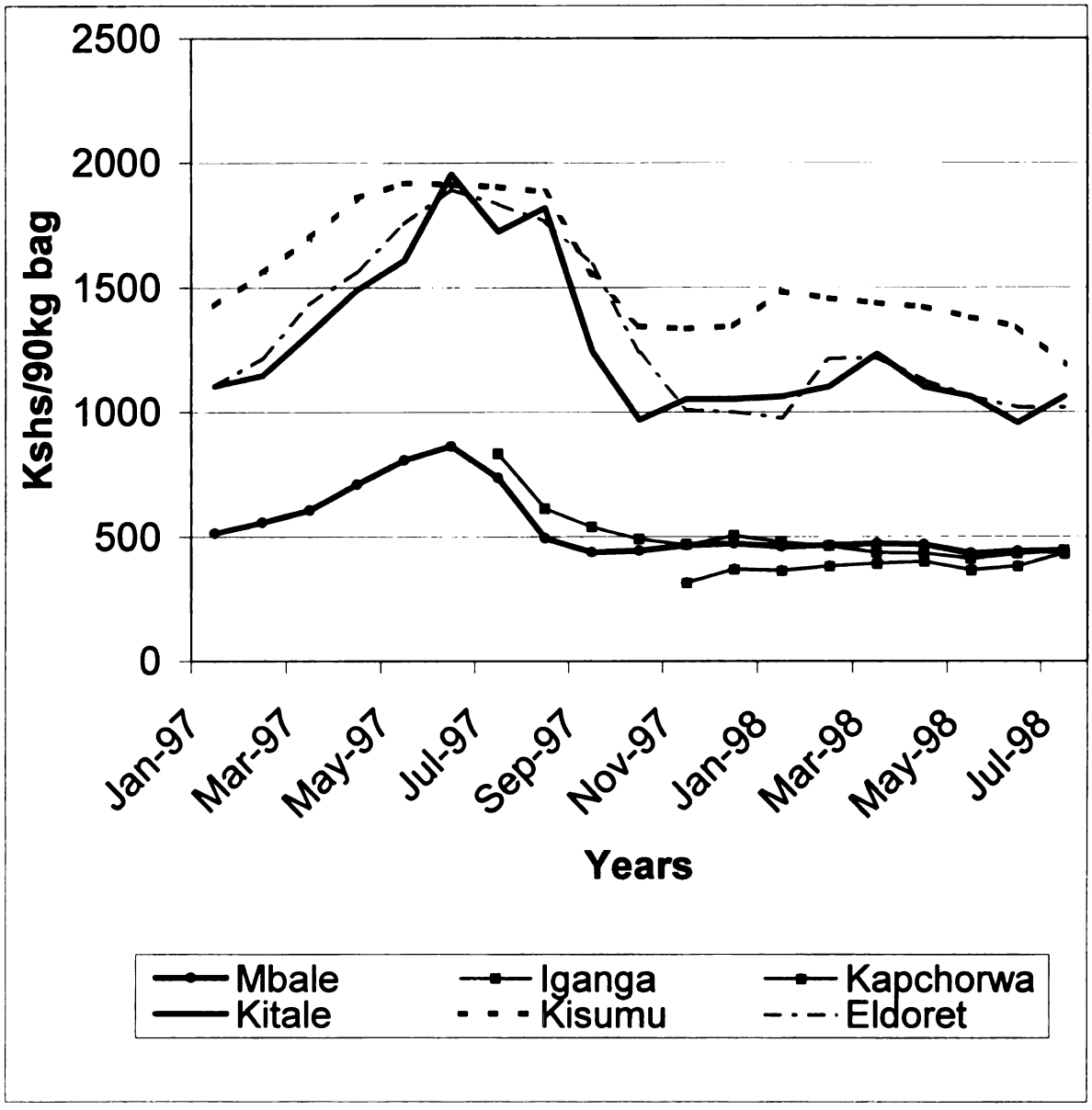
Note: A manday is equivalent to 6 hours of work by a man or a woman
Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 3.2 SYNTHETIC MAIZE BUDGET FOR TRANS-NZOIA PER ACRE, MEDIUM-SCALE 1992 (Constant 1999 Prices)

Labor inputs	**Value**
Planting(.25 mandays/acre per acre @ Kshs 47/manday)	12
Pest control(.5 mandays/acre @ Kshs 59/manday)	29
Weeding(.12 mandays/acre at Kshs 59/manday)	14
Top-dressing(1.5 mandays per acre @ Kshs 47/manday)	70
Desuckering(1 manday/acre @ Kshs 59/manday)	59
Watchmen(2 mandays per acre @Kshs 47/manday)	94
Stooking(4 mandays/acre @ Kshs70/manday)	281
Maize dehusking(5.5 mandays/acre @ Kshs 56/manday)	309
Transport to store(2.2 mandays/acre @ Kshs 52/manday)	113
Shelling labor(1.25 mandays/acre @ Kshs 47/manday)	59
Weighing, sewing & loading(1.1 mandays/acre @ Kshs 47/manday)	52
Sub Total	1,092
Non-labor inputs	
1st Plough(Kshs 937/acre)	937
1st Harrow(Kshs 879/acre)	879
2nd Harrow(Kshs 703/acre)	703
Planter hire(Kshs 586/acre)	586
Hybrid seed(10kgs/acre @ Kshs 40/kg)	403
DAP Fertilizer(75kg/acre @ Kshs 22/kg)	1,670
Herbicides(2.5litres/acre @ Kshs 375)	937
Weed spraying(Kshs 703/acre)	703
Top-dressing fertilizer(75kg/acre @ Kshs 16/kg)	1,213
CAN spreader (Kshs 586/acre)	586
Depterex(0.25kgs/acre @ Kshs 129/kg)	32
Transport to store (22 bags/acre @ Kshs 14)	309
Sheller hire(22 bags @ Kshs 23/bag)	516
Gunny bags (22 bags for two years @ Kshs 52/bag)	567
Transport to NCPB (22 bags/acre @ Kshs 12/bag)	258
Sub Total	10,299
Output	
Maize yield (22 bags/acre)	15468
Total Revenue(22 bags @ Kshs 703)	15468
Total Costs	11391
Cost/bag	518
Pre Tax Profit	4076
Taxes	
County council cess	155
PROFIT (AFTER TAX)	3922
Profit/bag after tax	178

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 4.1a WHOLESALE MAIZE PRICES FOR SELECTED EASTERN UGANDA AND WESTERN KENYA (CONSTANT 1999 PRICES).



APPENDIX 4.1b SYNTHETIC MAIZE BUDGET FOR BUNGOMA PER ACRE, MEDIUM-SCALE IN 1999

Revenue (14 bags/acre @ Kshs 1000/bag)	**13500**
Fixed costs/acre	**1125**
Labor inputs	
Planting(5 mandays/acre per acre @ Kshs50)	250
Weeding(Twice,10 mandays/acre at Kshs 70,each time)	1400
Top-dressing(1 mandays per acre @ Kshs 50)	50
Stooking (1 manday/acre @ Kshs 200)	200
Maize dehusking(13.5 bags/acre @ Kshs15/bag)	203
Transport to store(13.5 bags/acre @ Kshs 2/bag)	27
Shelling labor(13.5 bags/acre @ Kshs 15 per bag)	203
Total labor inputs	**2332**
Non-labor inputs	
1st Plough(Kshs 1500 per acre)	1500
Oxen furrowing (Kshs 250/acre)	250
Hybrid seed(10kgs/acre @ Kshs 92/kg)	910
DAP Fertilizer(75kg/acre @ Kshs 28.5/kg)	2025
Top-dressing fertilizer(100kg/acre @ Kshs 20.5/kg)	1425
Gunny bags (13.5 bags @ Kshs 5/bag)	135
Transport to store(17 bags/acre @ Kshs 30/bag)	405
Land Rent per acre	1500
Total non-labor inputs	**8150**
Total costs	**11607**
Costs/bag	**860**
Profit/acre	**1833**
Profit/bag	**140**

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 4.2 SYNTHETIC MAIZE BUDGET FOR MBALE PER ACRE, MEDIUM-SCALE IN 1999

Revenue (18 bags/acre @Kshs 765)	**13770**
Fixed costs/acre	**1000**
Labor inputs	
Planting(9 mandays/acre per acre @ Kshs50)	450
Weeding(twice with 10 mandays/acre each time @ Kshs 75)	1500
Top-dressing(6 mandays per acre @ Kshs 50)	300
Maize dehusking(10 mandays per acre @ Kshs 50 per acre)	500
Transport to store(4 mandays @ Kshs 50)	200
Shelling labor(18 bags @ Kshs 25 per bag)	450
Total labor inputs	**3400**
Non-labor inputs	
1st Plough(Kshs 1500 per acre)	1500
Hybrid seed(10kgs/acre @ Kshs 60/kg)	600
DAP Fertilizer(30kg/acre @ Kshs 35/kg)	1050
Top-dressing fertilizer(30kg/acre @ Kshs 30/kg)	900
Gunny bags (21 bags @ Kshs 9.75/bag)	176
Transport to store(18 bags/acre @ Kshs 15/bag)	270
Land Rent per acre	1200
Total non-labor inputs	**5696**
Total costs	**10096**
Costs/bag	**561**
Profit/acre	**3675**
Profit/bag	**204**

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 4.3 SYNTHETIC MAIZE BUDGET FOR LUGARI PER ACRE, MEDIUM-SCALE IN 1999

Revenue (17 bags/acre @Kshs 1000)	**17000**
Fixed costs/acre	**1250**
Labor inputs	
Weeding(10 mandays/acre at Kshs 60)	600
Top-dressing(1.5 mandays per acre @ Kshs 60)	90
Stooking(1 manday/acre @ Kshs 330)	330
Maize dehusking(17 bags/acre @ Kshs 20/bag)	340
Transport to store(17 bags/acre @ Kshs 4/bag)	68
Shelling labor(17 bags/acre @ Kshs 2 per bag)	34
Watchmen(1 manday per acre @Kshs 200/acre)	200
Total labor inputs	**1662**
Non-labor inputs	
1st Plough(Kshs 1200 per acre)	1200
Furrowing (Kshs 1000/acre)	1000
Planter hire(Kshs 800/acre)	800
Hybrid seed(10kgs/acre @ Kshs 92/kg)	910
DAP Fertilizer(75kg/acre @ Kshs 27.5/kg)	1950
Top-dressing fertilizer(100kg/acre @ Kshs 19.5/kg of CAN)	1800
Sheller hire(17 bags @ Kshs 25/bag)	425
Gunny bags (17 bags @ Kshs 5/bag)	85
Transport to store(17 bags/acre @ Kshs 28.5/bag)	484.5
Land Rent per acre	2000
Total non-labor inputs	**10655**
Total costs	**13567**
Costs/bag	**798**
Profit/acre	**3434**
Profit/bag	**202**

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 4.4 SYNTHETIC MAIZE BUDGET FOR IGANGA PER ACRE, MEDIUM-SCALE IN 1999

Revenue (21 bags/acre @Kshs 675)	**14,175**
Fixed costs/acre	**1,000**
Labor inputs	
Planting(10 mandays/acre per acre @ Kshs50)	500
Weeding(twice with 12 mandays/acre each time @ Kshs 75)	1,800
Top-dressing(8 mandays per acre @ Kshs 50)	400
Maize dehusking(10 mandays per acre @ Kshs 50 per acre)	500
Transport to store(5 mandays @ Kshs 50)	250
Shelling labor(21 bags @ Kshs 25 per bag)	525
Total labor inputs	**3,975**
Non-labor inputs	
1st Plough(Kshs 1500 per acre)	1,500
Hybrid seed(10kgs/acre @ Kshs 110/kg)	1,100
DAP Fertilizer(30kg/acre @ Kshs 40/kg)	1,200
Top-dressing fertilizer(30kg/acre @ Kshs 35/kg of Urea)	1,050
Gunny bags (21 bags @ Kshs 10/bag for 2 years)	210
Land Rent per acre	1200
Total non-labor inputs	**6260**
Total costs	**11235**
Costs/bag	**535**
Profit/acre	**2940**
Profit/bag	**140**

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 4.5 SYNTHETIC MAIZE BUDGET FOR TRANS-NZOIA PER ACRE, MEDIUM-SCALE IN 1999

Revenue (25 bags/acre @Kshs 1100)	**27500**
Fixed costs/acre	**3750**
Labor inputs	
Weeding(10 mandays/acre at Kshs 40)	400
Top-dressing(1.5 mandays per acre @ Kshs 50)	60
Stooking(1 manday/acre @ Kshs 300)	300
Maize dehusking(25 bags/acre @ Kshs 20/bag)	500
Transport to store(25 bags/acre @ Kshs 4/bag)	100
Transport to market(25 bags/acre @ Kshs 2/bag)	50
Shelling labor(25 bags/acre @ Kshs 5 per bag)	125
Watchmen(1 manday per acre @Kshs 150/acre)	150
Total labor inputs	**1685**
Non-labor inputs	
1st Plough(Kshs 1200/acre)	1200
1st Harrow(Kshs 800/acre)	800
2nd Harrow(Kshs 800/acre)	800
Planter hire(Kshs 650/acre)	650
Hybrid seed(10kgs/acre @ Kshs 91.8/kg)	910
DAP Fertilizer(75kg/acre @ Kshs 28.5/kg)	2025
Top-dressing fertilizer(100kg/acre @ Kshs 20.5/kg)	1425
Chemical weeding(2 litres/acre @ 800/litre)	1600
Weed spraying(Kshs 500/acre)	500
Sheller hire(25 bags @ Kshs 20/bag)	500
Gunny bags (25 bags @ Kshs 20/bag)	250
Transport to store(25 bags/acre @ Kshs 15/bag)	375
Trans to market(25 bags/acre @ Kshs 50/bag)	1250
Land Rent per acre	2000
Total non-labor inputs	**14435**
Total costs	**19720**
Costs/bag	**789**
Profit/acre	**7630**
Profit/bag	**311**

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 4.6 SYNTHETIC MAIZE BUDGET FOR KAPCHORWA PER ACRE, MEDIUM-SCALE IN 1999

Revenue (25 bags/acre @Kshs 675)	**16875**
Fixed costs/acre	**1250**
Labor inputs	
Planting(5 mandays/acre per acre @ Kshs50)	250
Weeding(10 mandays/acre at Kshs 100)	2000
Top-dressing(2 mandays per acre @ Kshs 100)	200
Stooking(1 manday/acre @ Kshs 300)	300
Maize dehusking(25 bags/acre @ Kshs 24/bag)	600
Transport to store(25 bags/acre @ Kshs 8/bag)	200
Shelling labor(25 bags/acre @ Kshs 50 per bag)	1250
Total labor inputs	**4800**
Non-labor inputs	
1st Plough(Kshs 1500/acre)	1500
1st Harrow(Kshs 800/acre)	1500
Hybrid seed(10kgs/acre @ Kshs 115/kg)	1150
DAP Fertilizer(50kg/acre @ Kshs 30/kg)	1500
Top-dressing fertilizer(50kg/acre @ Kshs 25/kg of urea)	1250
Gunny bags (25 bags @ Kshs 15/bag)	188
Transport to store(25 bags/acre @ Kshs 30/bag)	750
Land Rent per acre	1000
Total non-labor inputs	**8838**
Total costs	**14888**
Costs/bag	**565**
Profit/acre	**1988**
Profit/bag	**80**

Source: Tegemeo/MSU production and marketing costs survey, 2000.

APPENDIX 5.1

CHARACTERISTICS OF MAIZE TRADERS IN KENYA

	Characteristics	Assemblers	Wholesalers	Dis-assemblers	Retailers	All average
1	Number in Survey	29	43	50	79	50
2	Type of Business:					
	with retail shop	38	28	72	66	51
	In maize meal trade	21	18	18	33	23
	in fertilizer trade	8				8
	in wholesaling grain	17		3		10
	in transport business	16				16
	in processing trade			23		23
	using agents for selling	19	16	4	5	11
3	borrowed credit	4	16	14	5	10
	Source of credit:					
	Banks	100	43			72
	NGO	0	6	100	50	39
	traders	0			50	25
4	Giving out loans:					
	farmers	60	20	6	6	23
	Traders	40	60	87	94	70
5	With telephone	18	35	28	9	23
6	Difficulties accessing credit	96	65	51	84	74
7	Own store	36	25	18	30	27
8	Hire store	80	70	92	83	81
9	Use brokers	43	77	53	53	57
10	License required	96	35	71	33	59
11	Do visual inspection	100	93	95	100	97
12	Use commodity exchange	0	0	0	0	0
13	Use futures contract	0	4	2	0	2
14	Determine quality visually	98	100	100		99
15	Satisfied with grading	57	58	74	81	68
16	Cost/km good road	2 7	1 3	2.6	2 1	2.6
17	Cost/km bad road	5 6	2.2	5.6	3.7	3.8

Source: Maize Traders Survey (Nyoro et.al). Tegemeo Institute 1999.

APPENDIX 5.2 IMPORT PARITY PRICE OF SOUTH AFRICAN MAIZE IN KISUMU

	Costs and Revenue			
	Per Ton	Per 90kg Bag	Per Bag 90kg no taxes	
Tons/bags/shipment	25000	1	1	
FOB Per ton/bag	130	878	878	
Shipping /Ton/bag	15	101	101	
C&F Mombasa ($)	145	979	979	
Insurance	1	10	10	
Exchange rate	75	75	75	
CIF Mombasa (US$)	146	989	989	
CIF Mombasa (Kshs)	10984	989	989	
Import Duty (25 %)	2746	247	0	
Suspended Duty (50 %)	5492	494	0	
Total Taxes	8239	741	0	
Importation Charges	2137	192	192	
Pre-Shipment Inspection (2.75%)	302	27	27	
Port Charges ($5/Ton+VAT)	431	39	39	
Stevedoring etc. ($15/ton+VAT)	1294	116	116	
Clearing and Forwarding (1%)	110	10	10	
Free On Shore Mombasa	15867	1697	1373	
Transport to Nairobi	2500	225	225	
Transport to Kisumu		200	200	
FOB Kisumu (Aug 1999)		2122	1798	

Source: Customs Department of Kenya. 2000.

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