THE LIBERALIZATION AND INTEGRATION OF REGIONAL MAIZE MARKETS IN ZAMBIA

BY

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A Thesis
Submitted to the Faculty of Graduate Studies
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DOCTOR OF PHILOSOPHY

Department of Economics
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A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfillment of the requirements of the degree

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Dedicated to my late husband Kapola Sipula, my late father, Boyd Muyatwa, and to my children, Chisulo and Kachinga

ABSTRACT

The liberalization of the agricultural sector in general, and the maize sub-sector in particular, has been a major component of Zambia's structural adjustment program initiated in 1991. However, the government continued to intervene in the maize sub-sector and it was not until June 1995 that the maize market became fully liberalized. For the first time the full participation of private traders in the marketing of maize was allowed. This thesis examines the whether the regional maize markets have become spatially integrated following the liberalization of the maize market. It also examines whether a vibrant private sector has emerged to fill the gap left by the National Marketing Board (NAMBOard) and cooperatives.

Wholesale monthly maize prices at seven regional locations over the period 1993:7 to 1997:12 are used to test the degree of market integration in Zambia using cointegration analysis and a vector error correction model (VECM). The study was also supplemented with data collected from a survey of 188 farmers and 25 traders in 1996.

The main findings of the study are: 1) although real producer prices have risen since liberalization, maize production has declined in the LOR region and increased in the non-LOR, while maize retentions have increased in the LOR and decreased in the non-LOR region; 2) the extent of market integration, as measured by the magnitude of market interdependence and the speed of price transmission between the regional markets, has been very limited; 3) although there has been a rapid emergence of private traders, the emergence of a vibrant trading sector that would fill the gap left by the state has been slow; 4) Many of the private participants in the maize market are constrained by inadequate finance, lack of storage facilities, lack of access to information, and poor transportation infrastructure.

The study concludes that unless the government provides an enabling environment a vibrant trading sector is unlikely to emerge and the maize market will continue to be inefficient, especially at the farm level.

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ABBREVIATIONS AND ACRONYMS

ADF	Augumented Dickey-Fuller
ASIP	Agricultural Sector Investment Program
CSO	Central Statistic Office
CUSA	Credit and Savings Union of Zambia
DF	Dickey Fuller
ECM	Error-correction Model
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GRZ	Government Republic of Zambia
Ha.	Hectare
IAS	Institute for African Studies
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
INESOR	Institute for Economic and Social Research
Kg	kilogram
Km	Kilometer
LOP	Law of one price
LOR	Line- of-Rail
MAFF	Ministry of Agriculture, Food and Fisheries
MMD	Movement for Multi-party Democracy
NAMBoard	National Agricultural Marketing Board (Zambia)
PP	Philips-Perron
SSA	Sub-Saharan Africa
UNZA	University of Zambia
UZ	University of Zimbabwe
VAR	Vector Autoregression
ZCF	Zambia Co-operative Union
ZK	Zambian Kwacha

CHAPTER ONE

INTRODUCTION

The past eighteen years have seen a number of Sub-Saharan (SSA) countries, including Zambia, adopt market-oriented policies which have called for the reduction or total elimination of government intervention in agricultural markets. The general consensus among economists and policy makers has been that these market reforms enhance economic growth as opposed to interventionist policies (World Bank 1981; FAO, 1987). Zambia finally liberalized its agricultural sector in 1991 with the coming to power of the Movement for Multi-party Democracy (MMD) government led by Frederick Chiluba. The need for liberalization of the sector arose out of Zambia's colonial legacy as well as the dismal performance of its copper industry, which has been the lifeline of the country. Major objectives of the liberalization efforts in agriculture have been to induce private sector participation in maize marketing and improve the efficiency of maize marketing.

Implicit in the liberalization of the maize sub-sector are two assumptions. First, the functions that were previously carried out by government parastatal organizations, i.e., the National Marketing Board (NAMBoard) and cooperatives, would be taken up automatically by private sector trading. Second, liberalization would result in the flow of information on local and international prices and supply and demand conditions to traders and farmers across the country, leading to an efficient and integrated system.

The general aim of this study is to determine whether the maize market has become efficient and whether a vibrant private sector had emerged by 1997 to fill the gap left by the government parastatals.

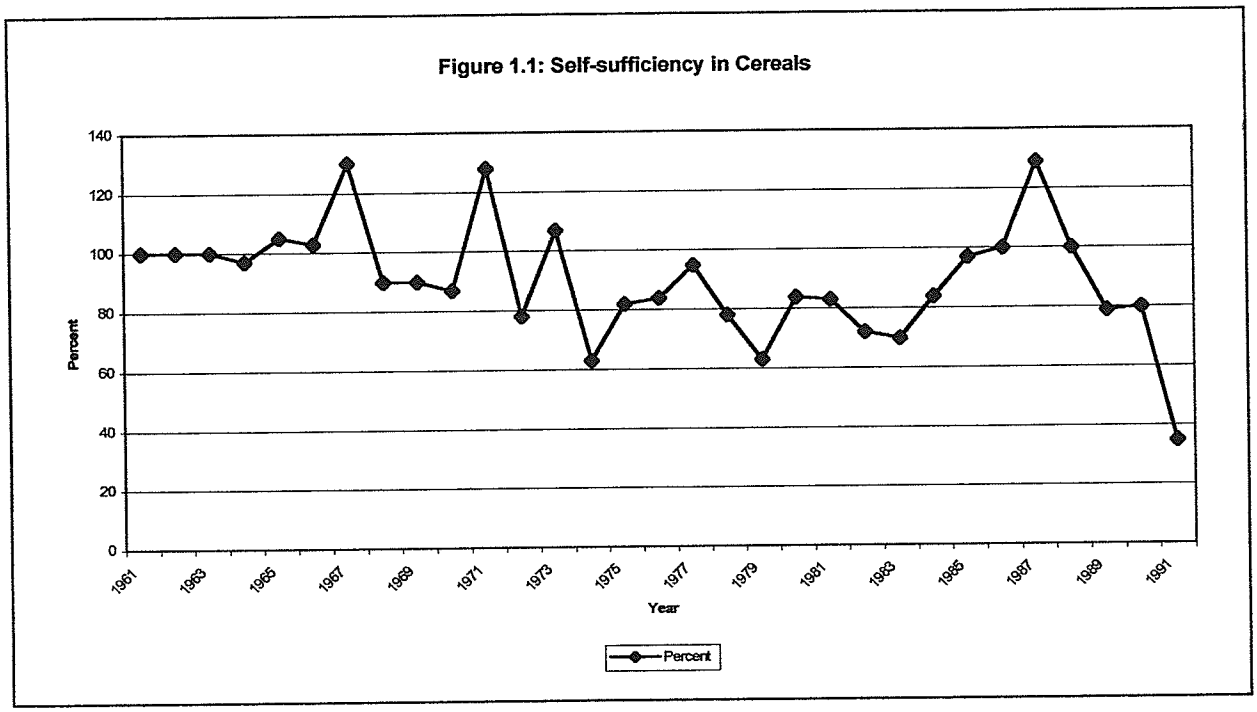
This chapter is divided into five sections. The following section gives a brief background to the problem. The second section provides the problem statement and justification of the study. The objectives and research questions of the study are given in the third and fourth sections, respectively. A brief methodology adopted in the different chapters and an outline of the thesis follows in the fifth section.

1.1 Background to the Problem

In 1964 Zambia boasted of a relatively high standard of living with a per capita GNP of US $500. Annual inflation was then only 5 percent. Daily per capita calorie availability was about 2,100. Malnutrition, persistent hunger and the attendant diseases were infrequent (FAO, 1991). This prosperity was based on copper, the country's major export commodity and source of government revenue. The year 1975, however, ushered in a severe down turn in economic growth as the international market price for copper plunged to its all time low. When Zambia failed to adjust to this and the subsequent external shocks that occurred during the 1980s it compounded its economic crisis by borrowing heavily, thereby leading to an economic stagnation that has since been characterized by declining real GDP per capita, increasing budget deficits and external debt, declining export earnings,[1] declining formal sector employment, and high and growing rates of inflation (Saasa, 1995; Loxely, 1990 and 1995; World Bank, 1992; and Jansen, 1988). For example, between 1980 and 1994 while the population grew at 3.4 percent per annum, average real GDP was virtually stagnant at 0.6 percent per annum, resulting in negative growth in real GDP per capita. During the same period, the external debt grew at about 6 percent per annum (GRZ 1996).

[1] The decrease in export earnings has been compounded by the diminishing access to sources of capital thereby leading to an acute compression of imports.

The attainment of food security has also remained elusive, with more than 3 million people in the country estimated to be food insecure (Sipula, 1988).[2] The government's objective of food self-sufficiency has not been consistently achieved as Figure 1.1 shows.

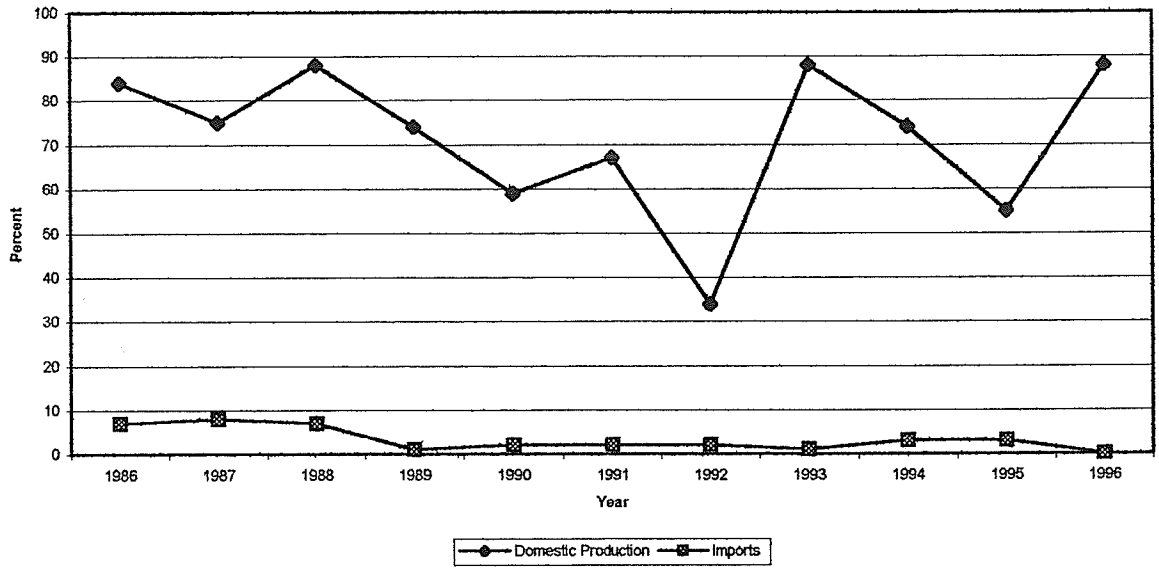


Source: Calculated from FAO (1997): FAOSTAT Data, Rome.

Self-sufficiency in Zambia's cereals (maize, rice, wheat, sorghum and millet) during the period 1971 and 1991 has been achieved in only 5 of the 21 years for which data are available. Consequently, food imports and food aid in cereals have been sought (see Figure 1.2) to satisfy the increased domestic demand resulting from increased total and urban population.

2 Eicher and Staatz (1986, p.216) define food security as, "the ability of a country to assure on a long-term basis that its food system provides the total population access to a timely, reliable and nutritionally adequate food supply."

Figure 1.2: Cereal Supply Situtaion in Zambia, 1986-1996



Source: Calculated from FAO (1997): FAOSTAT Data, Rome.

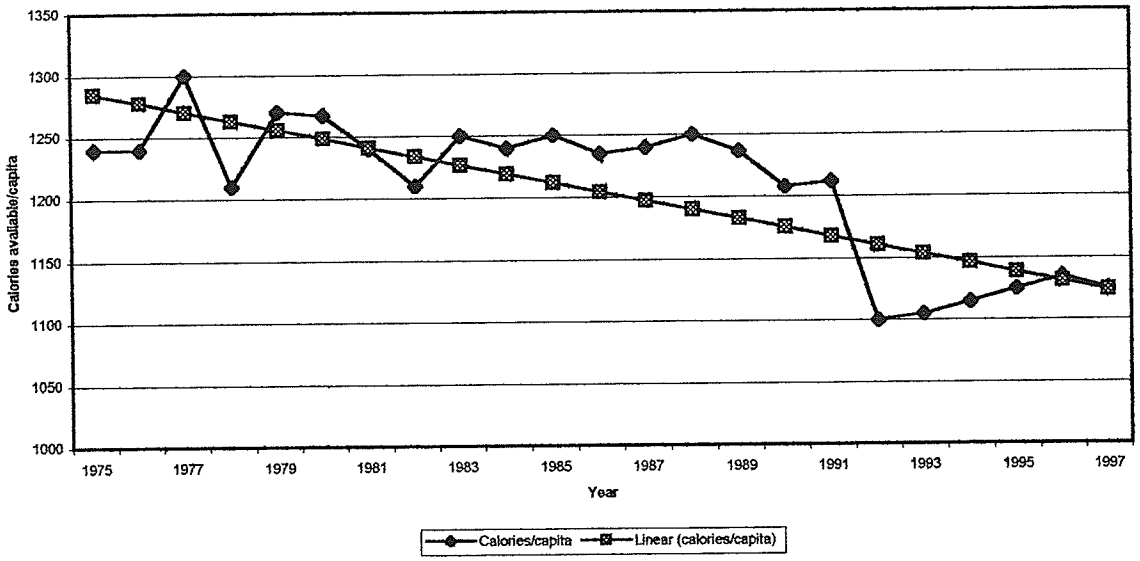
Source: Calculated from FAO (1997): FAOSTAT Data, Rome.

Furthermore, poverty indicators reveal that an estimated 69 percent of the population in 1990 was living in households whose expenditures could not meet their basic needs. The core poor (i.e., those whose expenditures were inadequate to provide enough food) at the national level were estimated at 55 percent of the total population, while in the rural areas the core poor were estimated at 76 percent (World Bank, 1994).

The general consensus on the causes of the economic stagnation and food crisis points to the government's prolonged domestic policy failures (see Loxely, 1995; Saasa 1995; and Seshamani, 1992). For a long time the Zambian government has intervened in virtually all the sectors of the economy; and more so in the agricultural sector, in general, and the maize sub-sector, in particular.

Maize is Zambia's staple food crop, which accounts for over 65 percent of the total consumption per capita every year (see figure 1.4). It is the second most important economic

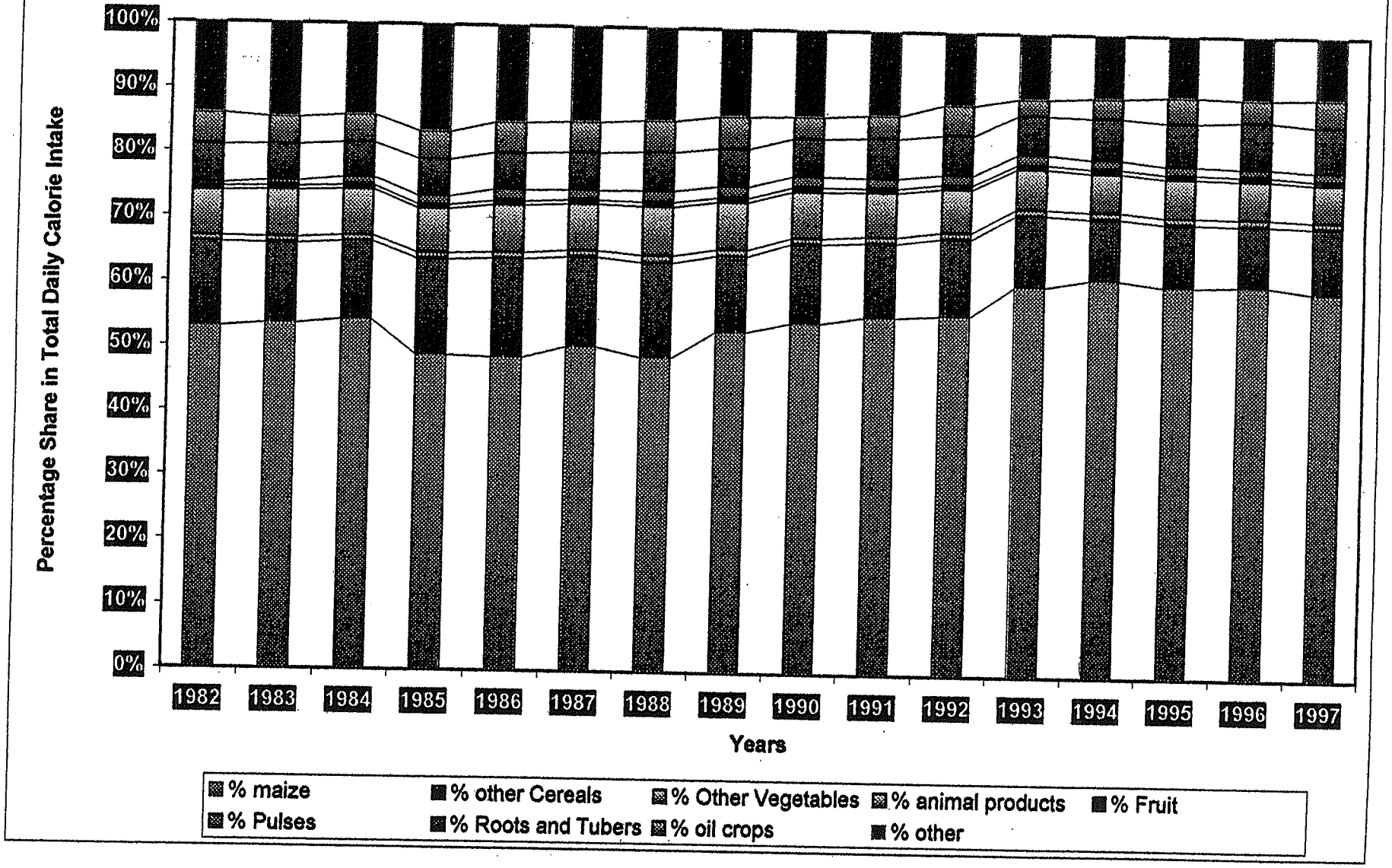
Figure 1.3: Maize Calories Per Capita Availability in Zambia, 1975-1997



Source: Calculated from FAO (1998): FAOSTAT Data, Rome.

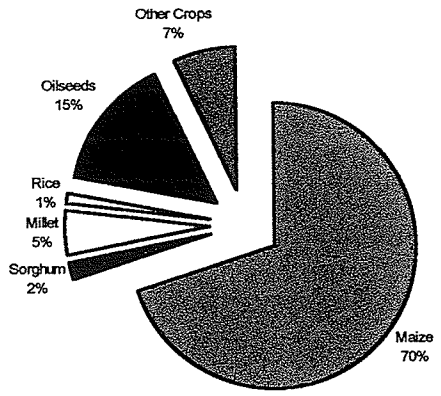
commodity after copper in terms of its contribution to GDP. From a political and social viewpoint it is even more important than copper (McKenzie and Chenoweth, 1991). It is produced by 80 percent of the farmers. Seventy percent of the total crop area is allocated to maize every (see Chart 1.1). Furthermore, maize accounts for 90 percent of the total value of marketed output of major food crops (Mwanaumo, 1994). Ninety percent of the smallholder farmers' cash receipts come from maize. Consequently, due to its importance in economic, social and political terms, maize has in the past received the most attention both in terms of support and policies. The agricultural policy in general, tended to be biased towards the maize sub-sector to the extent that the agricultural policy became almost synonymous to maize policy. Accordingly, changes in maize policies have had and continue to have important implications for the whole of the agricultural sector, other related industries as well as consumer welfare.

Figure 1.4: Share of maize in Total Daily Calorie Intake in Zambia, 1982-1997



Source: FAO(1998): FAOSTAT Data, Rome

Chart 1.1: Percentage Share of Crops in Total Area Planted (Mean 1980-96)



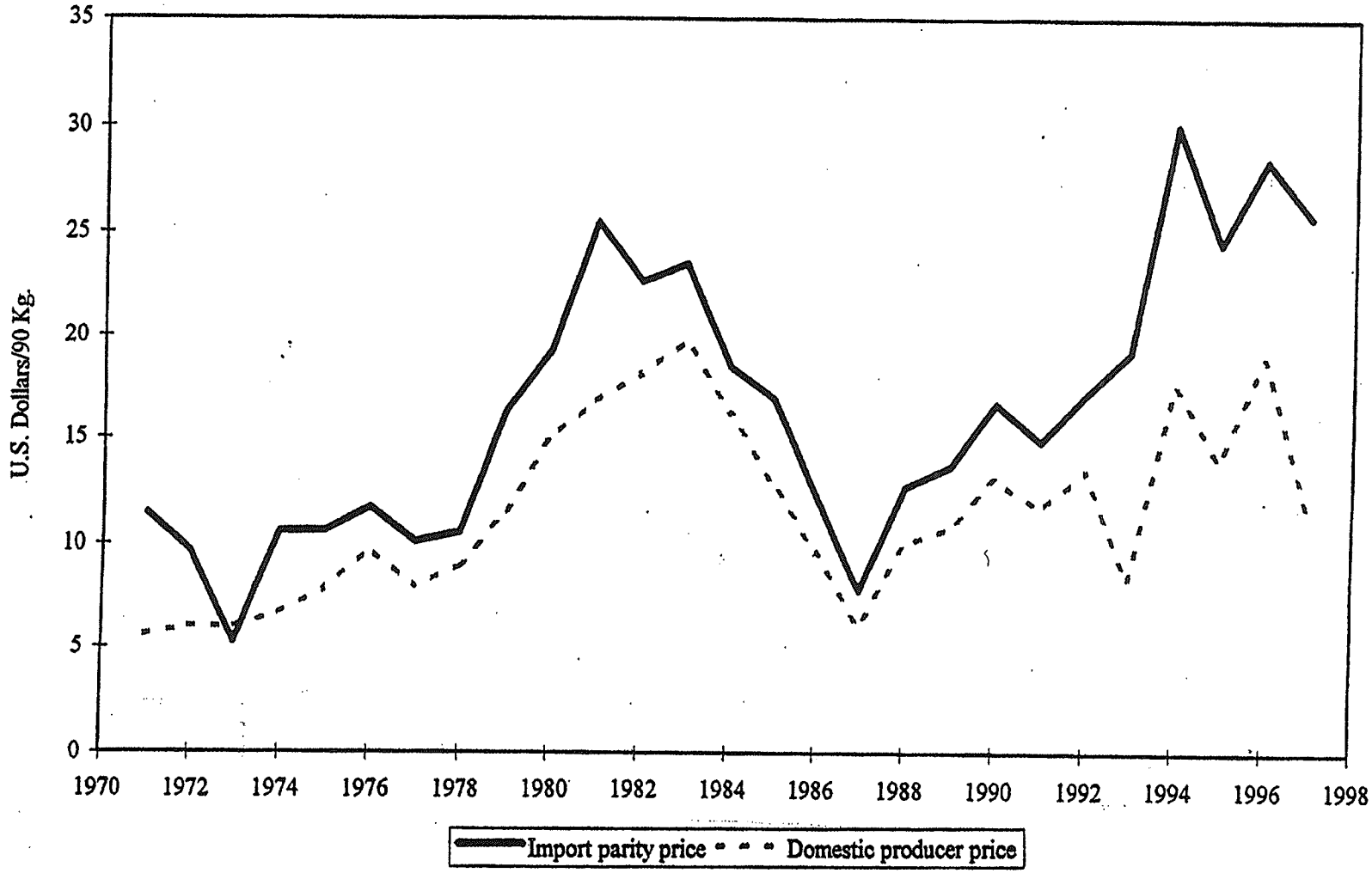
Source: Calculated from FAO (1997): FAOSTAT Data, Rome.

Given the importance of maize in Zambia, the government found it necessary to intervene and it did so under the Agricultural Marketing Acts of 1969 and 1989. Through these Acts government had the power to control maize prices and monopolize maize marketing. Through the policy of uniform pricing, government fixed pan-territorial and pan-seasonal prices,[3] making maize prices invariable spatially and seasonally.

The producer prices for maize were generally fixed at the beginning of the crop season and at levels that were well below the world market (see figure 1.5). The policy of uniform pricing was undertaken to achieve two objectives: ensure equity among farmers through increased income and the provision of cheap food to the urban population. But, as many studies have shown (see for

[3] Pan-territorial pricing refers to the charging of the same price in all areas regardless of the distance while pan-territorial pricing involves charging the same price all year round without consideration of storage costs.

Figure 1.5: Domestic Producer Prices and Import Prices of Maize in Zambia, 1971-1997[4]



Source: IMF (1997): Zambia: Selected Issues and Statistical Appendix, IMF Staff Country Report No. 97/118, IMF Washington.

4 The import parity price is the c.i.f. price at the nearest port plus transportation and other costs, and a profit margin. Both the import parity price and the domestic producer price are computed for Lusaka.

example, Dodge 1991; Kydd 1988; Kalinda 1993; and IMF 1997), these objectives became hard to reconcile, the instruments used were inappropriate and consequently, the policies led to an overall negative effect on agricultural production and maize production in particular. In particular, this policy benefited the urban populace and taxed those farmers close to consumption centers. It also shifted production from the fertile Line-of- Rail (LOR) provinces to the poor and remote non-LOR provinces (see Loxely 1995 and; Kalinda, 1993).

The policy of pan-territorial pricing entailed setting the same producer prices throughout the country irrespective of the significant differences in transport costs between the regions and the availability of agricultural infrastructure. This was done due to the government's need to promote equitable regional development. Using the policy of monopoly marketing, government appointed parastatal organizations, which in the case of maize was the National Agricultural Marketing Board (NAMBoard), and cooperatives to carry out the procurement, distribution and processing of maize. From 1969 to 1989 the maize marketing functions were undertaken entirely by NAMBoard. Then NAMBoard was dissolved under the 1989 Agricultural Marketing Act. For the subsequent two marketing seasons, i.e., 1989/90 and 1990/91, cooperatives were responsible for these functions. During this period government set farm gate prices and into-mill prices and no private traders were allowed to participate in the marketing of maize.

Initial attempts to liberalize the maize market system, which had become costly due to the high marketing subsidies and the inefficiencies of NAMBoard, were made in January 1986. One of the major objectives of the 1986 maize market liberalization was to encourage private trader participation in maize marketing. This involved the decontrol of producer and consumer prices and removal of NAMBoard's monopoly in maize marketing. The 1986 market liberalization was, however, short lived as a result of the food riots that erupted in the main urban centres of Lusaka and

Copperbelt following the increase in the price for white maize. This led to the reintroduction of price controls and marketing restrictions in May 1987.

This kind of intervention, however, proved costly over time as it involved an extensive use of subsidies. The marketing margins between the producer price at which the government institutions purchased the maize from the farmers and the government set into-mill prices at which they sold to industrial millers, were insufficient to cover the total marketing costs of these institutions. Consequently, the maize marketing subsidies and maize related subsidies escalated over time, with the former increasing from about K14 million to over K1 billion between 1975 and 1990 while the latter rose from about K57 million to K3 billion over the same period. The budgetary implications of these substantial subsidies were significant. Maize related subsidies as a percentage of the government budget and budget deficit rose from 6.9 percent and 1.6 percent in 1975 to more than 13 percent and 120 percent in 1990, respectively. Maize marketing subsidies as a percentage of the government budget and budget deficit rose from 1.7 percent and 3.9 percent in 1975 to 5.3 percent and 46.5 percent respectively in 1990 (Kalinda, 1993, p.36).

A number of factors led the Zambian government to abandon the policy pan-territorial and pan-seasonal pricing and that of monopoly maize marketing. First was the economic crisis and the deepening reliance on foreign capital resources coupled with donor pressure for structural adjustment. Second was the negative effect of direct government intervention on agricultural production and on its fiscal budget. Under these circumstances Zambia was compelled to liberalize its agricultural product and input marketing as part of its structural adjustment program starting in 1990. However, the only substantial change that was made was to allow the milling industries to purchase maize directly from farmers and from cooperatives outside their provincial boundaries.

Initial efforts at liberalizing the agricultural sector were in 1989. These involved the removal

of the administrative price controls on all agricultural products except maize meal, maize grain, and fertiliser. In 1990 the trade in maize and fertiliser became liberalised allowing the private sector to export and import fertiliser, which had been hitherto monopolized by NAMBoard and Cooperatives. However, these policies had very little impact since maize, which is the most important crop, remained controlled. Thus, efforts were seriously made in 1991 with the coming to power of the Movement for Multi-party Democracy (MMD) under the leadership of Fredrick Chiluba to make the liberalization of the agricultural policies a major component of the government's structural adjustment program. The price controls on maize and maize meal were removed in late 1991.

In December 1992, a Policy Framework Paper (PFP), which fully amplified the new government's policy for the agriculture sector in general, and the maize market in particular, was published. The state would cease its direct role in the marketing of food crops, including maize and agricultural inputs; and remove all subsidies, privatize parastatal companies in the agricultural sector and decontrol producer prices. The provision of subsidies for rural credit and inputs was abolished in 1992. The same year, the government withdrew from direct intervention in the procurement, transportation, and processing of maize. In order to facilitate the transmission of local and international information on prices and supply and demand conditions to traders and producers in the various parts of the country, the government created the Agricultural Market Information Center (AMIC) within the Ministry of Agriculture, Food and Fisheries (MAFF). The official producer prices for maize were finally abolished in 1994 when government removed all floor and ceiling prices.

Although the government initiated the liberalization of the maize marketing system, in 1991 private traders did not participate fully in maize marketing until 1995 due to government's continued intervention in the marketing of maize. During the period 1991 to 1993 private traders were only

allowed to engage in intra-regional trade while cooperatives became buyers of last resort and were solely responsible for interregional maize trade. This period was, therefore, a period of partial liberalization. The government intervened in the marketing of maize through the appointment of government agents and the maintenance of floor prices for producers and into-mill prices. Cooperatives were buying maize from farmers at government set floor prices and selling to millers at government set into-mill prices, while the private traders could negotiate buying and selling prices with farmers and consumers, respectively.

In the following season, i.e., 1992/93, government eliminated monopoly-buying rights and allowed traders to participate in inter-regional trade. However, government continued to intervene in the maize market. It raised K15 billion to buy maize from farmers, selected the maize marketing financiers, appointed government buying agents (i.e. provincial co-operatives in Central, Southern and Eastern provinces) on behalf of the lending institutions, set prices for grain bags, monitored the use of the funds and set floor producer prices and into-mill ceiling prices (GRZ 1993). This system of government financed, controlled and subsidized operation reinforced the belief that, although the policies had changed, the players remained the same. Consequently, only a few traders participated in the 1993 /94 marketing season.

Although the liberalization of the agricultural sector has resulted in regionally and seasonally differentiated prices and in increased role of the private sector, the government has continued to intervene in the agricultural sector in general and the maize sector in particular. The proposed Food Security Act of 1993, which was approved by parliament in March 1995 as the Food Reserve Bill repealed the 1989 Agricultural Marketing Act. It also enacted a number of actions to create an enabling environment for private sector participation, including, the establishment of a Crop Marketing Agency to manage a national food security reserve; the establishment of a market

information system; leasing and/or selling of government owned storage facilities; registration of traders and; the introduction and promotion of weighing and grading standards. In this case the government was to restrict itself to the managing of strategic reserves of grains and to providing an enabling environment for the effective participation of the private sector.

However, this did not happen. Government continued to intervene in key areas of the agricultural sector. For example, due to the droughts that characterized the first half of the 1990s, especially the severe 1992 drought and the mild droughts of 1994 and 1995, the government banned maize exports to avoid shortages in the country. It was not until 1996 that the maize export ban was removed but the government nevertheless continued to intervene in foreign trade by requiring traders to obtain export permits for maize exports. Thus even if domestic maize prices were completely liberalized in 1994, they remained well below the import parity levels during the 1994-96 period (refer to Figure 1.4 above) due to these restrictions. Second, through the purchases of maize by the Food Reserve Agency the government continues to intervene in the development of domestic prices and trade. In 1997 the government allocation (from the central budget) for maize purchases was estimated at K19 billion. Third, even though fertilizer subsidies were removed in 1993, the government continued to intervene in the marketing of fertilizer by appointing credit coordinators to supply the fertilizer, thereby hindering private sector participation in the provision of fertilizer. These developments will continue to affect the private sector response unless government can create an enabling environment.

1.2 Problem Statement and Justification of the Study

The food crisis in Zambia appears to have been accentuated by its unique characteristics. Zambia is very different from many SSA countries in two aspects: 1) it has been and still remains a

mono-culture economy which depends heavily on copper for its exports; government revenue and employment; and 2) it is the most urbanized country south of the Sahara with more than 50 percent of its population living in the urban areas.

The continued decline in foreign exchange earnings from copper and the huge debt that Zambia accumulated implies that food imports might not be forthcoming. This means agriculture has to play a major role in providing an increased food supply. The growth in urban population also suggests that the remaining rural population have to produce enough food for themselves, for the burgeoning urban population and for the export markets.

In the long-run this requires that on-farm productivity and incomes be increased. But there is a dearth of proven, on-shelf technology suitable to low-rainfall environments and employment opportunities are limited, so substantial growth in rural productivity and hence incomes are, at best, considered long-term possibilities. To ensure national and regional food security requires that the food marketing system be efficient. In the short- and medium-term, an efficient food marketing system generates increased real purchasing power due to reductions in the prices of goods that form large shares of household expenditures.[4]

By liberalizing the maize market, the Zambian government had hoped that this would immediately and fundamentally transform the grain marketing system from largely a state monopoly to one in which the private sector would play an important and legitimate role, that prices would vary over time and space and that production of maize in areas close to the consumption centers would increase. This study argues that an efficient maize market in Zambia has not yet developed. This may consequently lead to gluts in some regions not being translated into adequate access to

[4] In Zimbabwe, Jayne *et. al.* (1990) estimated that a reduction in grain prices in rural areas through the development of intra-rural trade would increase real cash incomes among the poor grain deficit households by as much as 20-30 percent.

food in other regions, as Staatz (1990) observed for Mali.

This raises three major empirical issues that form the central focus of this study. First, has the decontrol of maize prices stimulated maize production? Second, has government decontrol of prices resulted in an efficient maize marketing system? Third, has the removal of the anti-merchant policies, which have prevented traders from playing a major role in maize marketing, induced private traders to move maize from surplus remote rural areas to deficit urban and rural areas?

The performance of the state maize marketing system in Zambia has been heavily studied (see for example, Kalinda 1993) but very little attention has been paid to the performance of the private marketing sector. A few studies (e.g. Lele and Candler, 1981; Malambo 1984) have shown that the "unofficial" system (private trade) accounted for a large portion of the food marketed in rural areas. It has further been established that the official marketing system, as dominated and controlled by NAMBoard, provided a market in which farmers could sell their surplus maize but no back flow for the purchase of processed maize. Thus, farmers had to rely on the private market to buy processed maize often at prices higher than official prices.

The Ministry of Agriculture, Food Security Division, has in conjunction with the Food and Agricultural Organization, carried out some impact studies on various aspects of the liberalized maize market, such as on-farm storage (MAFF 1994), maize milling (MAFF, 1994a), maize prices (MAFF, 1995). Another study looked at the characteristics of the emerging private maize traders during the 1994 marketing season (MAFF, 1994c). These studies have also been mostly descriptive and only give preliminary assessments of the maize market few months after the market was completely liberalized. No study has yet systematically examined the response of the private traders and examined whether the market is indeed integrated, and if not, why.

This study, therefore, comes at an opportune time as little is known about the factors that

might influence the capacity and willingness of private traders to fill the vacuum left by the government parastatals rapidly and efficiently. It is also not clear how private traders relate to each other and other market participants, especially farmers with regard to storage, finance and transport facilities in their efforts to efficiently carry on the different market functions. With the lack of such information, policy makers and planners will tend to base their decisions on the implicit assumptions of how the private sector, for instance, is likely to behave in the face of market liberalization, as research elsewhere in SSA has shown (Weber *et. al.*, 1988; Loveridge, 1988; Wehelie, 1989; Dione, 1989; and Weber and Staazt, 1990).

Thus, provision of answers to some of these issues is an important input in determining whether the emerging private sector has contributed positively to meeting the key economic objectives of food security, income and employment generation and agricultural growth. Since liberalization has advanced much further in Zambia than in most SSA it is expected that this study will also contribute to an understanding of the problems to private sector response in other countries who are yet to completely liberalize their food markets.

1.3 Objectives of the Study

The overall aim of this study is to examine the emergence of a market for maize at the national and regional levels and the response of selected farmers, traders and large millers to the liberalization of the maize market. The specific objectives of the study were:

a) to assess the physical and economic environment prevailing in the country before and after liberalization (1975-1997);

b) to determine the changes in maize production, regional maize deficit/surplus position and on-farm storage;

c) to determine the spatial integration of regional markets over the period 1993:7 to 1997:12;

d) to determine private sector response to maize market liberalization and identify the constraints to an efficient maize marketing system.; and

e) to draw policy implications to facilitate and promote market development for the staple food crop, maize.

1.4 Research Questions

The research questions that will guide this study are as follows:

1) What is the nature of the physical and economic environment that the private traders are operating in?

2) Has liberalization resulted in any significant changes in production and on-farm storage in the line-of-rail (LOR) and non-LOR provinces and are these changes in accordance with emerging market forces?

3) Is the emerging maize marketing system efficient in transmitting price information to market participants, including policy makers?

4) What are the major characteristics and constraints of the emerging private sector?

1.5 Methodology

This study relies on a number of methodologies. The overall study will be achieved through the use of both qualitative and quantitative approaches. The qualitative approach will be useful in describing and understanding the structure of the emerging maize marketing system. The quantitative approach, on the other hand, will be used to analyze the data from the survey of farmers,

traders and large millers. The quantitative approach will also be used to analyze the historical monthly wholesale maize price data.

Objective (a) will be achieved through a descriptive analysis of the prevailing physical and economic environment using available secondary data (Chapter 3). Objective (b) will be realized through the calculation of the changes in maize production, retentions and by estimating the deficit/surplus position in each province (Chapter 4). One of the results of market liberalization is the integration of markets (Hopcraft 1987). Thus, objective (c) will be investigated using the Johansen systems approach and a vector error correction model (VECM) to estimate the long-run and short-run integration, respectively, of regional maize market in Zambia. Price differentials between regions will also be calculated to determine the spatial behavior of prices (Chapter 5). Objective (d) will be achieved through the use of survey data we collected from farmers and traders during in 1996. Descriptive statistics including tabular, cross tabs and chi-square tests will be used for this purpose (Chapter 6).

The study is organized as follows. Chapter two provides the sources of data, the methods used in collecting primary data as well as a brief profile of the research sites. Chapter three describes the physical and economic environment. The changes in maize production, deficit/surplus and on-farm storage are discussed in chapter four. Chapter five provides an evaluation of the integration of regional maize markets. The marketing of maize, or any commodity, involves a number of different actors that help transfer the commodity from lower priced regions to higher-priced regions at the right time and in the desired form. Thus, chapter six attempts to explain the factors that may be constraining the integration of the regional markets in Zambia through a survey of traders and farmers' response to policy changes. Chapter seven provides a synthesis of the findings, draws conclusions and gives policy implications for further market development.

CHAPTER TWO

SOURCES OF DATA AND PROFILE OF THE STUDY SITES

2.1 Introduction

The methods used in the collection of data are important if useful information is to come out of a given problem statement. The standard approaches to collecting data are sufficient where a sample frame of the target group can be drawn from a known population. In the case of traders in Zambia, such a framework cannot be used since there is no known population of traders in Zambia as liberalisation has just been put into effect. Accordingly, this calls for a combination of data sources and methods of data collection.

2.2 Objectives

It is clear that the objectives of this study, as outlined in Chapter 1, cannot be achieved by one source of data and/or one particular method of data collection and analysis. The objectives of this chapter, therefore, are to amplify on the different sources of secondary data; describe the research instruments and methods employed during the collection of primary data; and give a brief description of the study site.

2.3 Sources of Data

Since the database in Zambia, like in many SSA countries, is generally very poor, as Lele (1989) has pointed out, the study had to rely on both secondary and primary data. The secondary data were obtained from different sources including the Central Statistics Office (CSO); the Ministry of Agriculture, Food and Fisheries (MAFF), and Agricultural Marketing Information Center (AMIC); Ministry of Finance; and the Food and Agricultural Organisation (FAO) databank diskettes.

These data sets included macroeconomic indicators (e.g., inflation, GDP), quantities of maize produced and sold, marketed and retained for home consumption, volume of maize exports and imports, and regional wholesale monthly maize prices.[5]

The primary data were from surveys fielded among farmers and traders using qualitative and quantitative approaches. The trader survey sought information from private traders on strategies for sales and acquisition of maize stocks, pricing strategies, storage sizes, seasonality of sales and purchases and investment strategies. The farmer survey sought information on farmers' response to maize market liberalization.

2.4 Survey Design and Research Instruments

2.4.1 Survey Design

In order to meet the goals of observing the response of private market participants to maize liberalization, determine the emerging networks and analyse market efficiency, it was decided to conduct fieldwork in one surplus region of the country. The survey design proceeded from the assumption that any substantial policy value about traders' potential responses to maize market liberalisation will be higher in those regions of Zambia with the highest potential for producing marketable surpluses of maize and lower in those areas with the lowest potential. Therefore, Eastern province was selected as the surplus province and Lusaka province as the deficit province.

Lusaka Province, which mainly consists of the City of Lusaka, is the largest deficit province in the country. It is the main destination of surplus grain from the major maize surplus provinces, especially Eastern. Eastern Province located east of Lusaka has been an important agricultural

[5] The Agricultural Marketing Information Center (AMIC) in the Ministry of Agriculture has since 1993 been collecting weekly price data at designated public markets in the provincial centers, towns in major production centres and border towns around the country (see Appendix 2.1).

surplus region in the country with strong links to Lusaka Province.

The choice of Eastern Province was prompted by a number of factors. First, reports obtained from officials from the MAFF indicated that there had been a more favourable response by private traders to liberalization in Eastern Province than anywhere else in the country despite the provinces distance from the major consumption centres. Second, Eastern Province is the second largest producer of surplus maize in Zambia after Central Province. For example in 1996 it accounted for 28 percent of the total maize production and 17 percent of the total marketed maize output. Third, the province had in the past benefited more from the policy of uniform pricing compared to other provinces. Fourth, Eastern province has strong links with Lusaka than any other major urban deficit region. The destination of the bulk of surplus maize in Eastern Province is Lusaka (Kalinda 1993; and Sipula 1993).

The design of the survey and data collection that was used to collect data from the farmers and traders is shown in Figure 2.1.[6] The survey and data design involved selecting first two districts in Eastern Province that represented a surplus and deficit area, i.e., Lundazi and Chipata, respectively. Within each district, three agricultural blocks were chosen, to represent a productive, relatively productive, and least productive block, making a total of 6 blocks (see Table 2.1). A number of criteria were used to arrive at the blocks selected in these two districts. Production of major grains, particularly maize, and accessibility to the area were key factors. Within each block, two agricultural camps were selected, a deficit and surplus, resulting in a total of 12 camps.

[6] This survey design was only used in Eastern province where detailed research was conducted for farmers and traders. Lusaka was included in the study solely for purposes of tracing the movement of maize by traders from a surplus area (in this case Eastern Province) to a deficit area (i.e., Lusaka).

Figure 2.1: Survey and Data Collection Structure

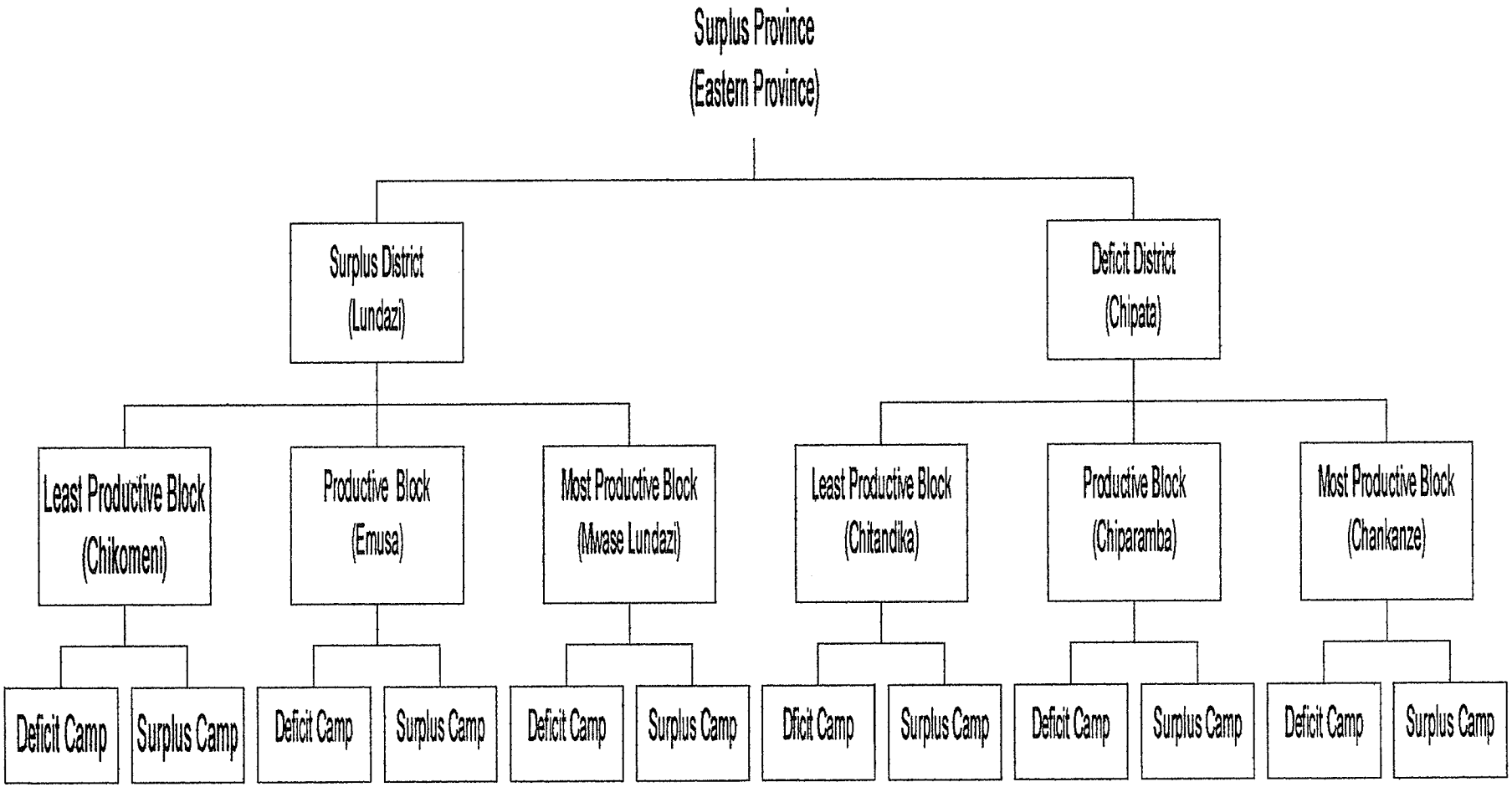


Table 2.1: The Research Sites and the Selection Criterion

District/Block	Productivity of Block			Accessibility of Block		
	Most Productive	Productive	Least Productive	Most Accessible	Accessible	Least Accessible
Lundazi District						
Chikomeni			#	###		
Emusa		##			##	
Mwase Lundazi	###					##
Chipata North						
Chankadze	###				##	
Chiparamba		##		###		
Chitandika			#			#

Source: Based on field notes, August, 1999

2.4.2 Research Instruments

To collect primary data a combination of research instruments was employed (see Appendix 2.2). This involved the use of four research instruments, i.e., semi-structured questionnaires, checklists, focussed group discussions and personal interviews. The semi-structured questionnaires were administered to farmers and traders. There were three checklists that were administered to heads of farm households, traders, and key informants.[7] The checklist for key informants solicited information on the socio-economic characteristics of the community, the agro-economic conditions of the selected areas, credit and marketing institutions operating in the area, types of farming systems and activities, infrastructural development, availability of basic services and the views of key informants on the impact of maize market liberalization. The other two checklists were administered to group discussions held with groups of heads of farm households and small-scale traders. Personal interviews were also conducted with various officials from the provincial agricultural departments, non-governmental organizations (NGOs) and private companies that were involved in the marketing of farm produce in general, and in the marketing of maize, in particular.

2.5 Sample Selection and Data Collection

A pre-testing of the research instruments was done in Mumbwa district, a surplus district located in Central Province, about 100 kilometres north of Lusaka. After pre-testing, the necessary changes were made to the research instruments in readiness for the actual field research in Eastern Province. It would have been better to undertake a reconnaissance survey in the areas selected for

[7] Key informants included, but were not restricted to, extension officers, community leaders, e.g., chiefs, health workers, teachers, NGO personnel and leaders of community based groups (CBGs).

the study. However, due to limited resources this could not be done.

The field trip to Mumbwa was undertaken from 20th December 1995 to 8th January 1996. Interviews with the relevant officials in Lusaka together with the collection of primary data were done between 22nd January and 2nd February 1996. The main fieldwork in Eastern Province had to wait for the start of the agricultural marketing season, which usually starts in May each year. This was conducted from 3rd to 24th August 1996.

The study used largely qualitative methods to obtain the necessary information. Group discussions were a key approach in obtaining information from farmers. One group discussion was held in each camp and each group had an average of about 20 farmers with a total number of 240 farmers having participated in the 12 group discussions.[8] In addition to group discussions, individual interviews were done with farmers that were selected randomly from each discussion group held in the selected agricultural camps. The aim was to get more systematic information about the characteristics of farmers, the factors driving their participation in the market and their experience with the liberalized marketing system. An equal number of farmers were randomly selected from each deficit and surplus camp yielding a total of 188 farmers, 98 in Lundazi and 90 in Chipata.

Getting traders proved more problematic than getting farmers, given the high mobility of traders. Two approaches were used. First, a list of traders was obtained from the MAFF's Food Security Division and traders operating in the survey areas were picked from the list. However, it proved difficult to locate many of these once in the field and it was discovered many of these had either not participated as per their original intention or had stopped trading. A few were unwilling to

[8] Ideally, the group discussions should have been smaller. However, farmer's response was usually overwhelming that turning away some of those that "forced" their way in would have undermined the study.

be interviewed perhaps due to some controversies that surrounded agricultural trading with politicians accusing traders of having been exploiting farmers. Additional information about traders was obtained from key informers while in the field and these were added to the list. The traders on the list tended to be the more established traders operating at fixed locations.

The second approach was to interview all the traders that were found during the survey and were serving the blocks identified, either directly or indirectly. This worked to capture small traders. Where possible, group discussions were also held with traders and these totalled four (3 in Lundazi and 1 in Chipata). Due to the small number of traders that were found, it was decided to interview all the traders that were located. Thus, these two approaches yielded a total of 25 traders (16 in Lundazi and 9 in Chipata).

Overall, a total of 188 farmers, 25 traders and two large-scale millers were interviewed during the survey. The two large-scale millers were based in Lusaka, the capital city.

2.6 Profile of the Study Site

As already mentioned, the second survey was carried out in six blocks (see Table 2.1) in two districts in Eastern province. A striking feature about all the sites visited is the poor accessibility due to the poor state of feeder roads. All the blocks had feeder roads intended for motorized traffic that were passable during the dry season but were difficult to use during the rainy season, particularly at bridges. The situation appeared to get worse as one moved away from the district's centre. Thus, agricultural inputs and products were difficult to deliver after December in many areas.

Development of basic social infrastructural facilities, such as schools and medical centres, differed from block to block. Whereas some blocks such as Chitandika had no health centre and only a few primary schools, others such as Mwase Lundazi boasted of 21 primary schools and three

health centres.

When compared to urban centres, the rural population has lower health status. The most common diseases in all the areas visited are malaria and diarrhoea and these tend to become more acute during the rainy season at the peak of labour demand when fields must be prepared for planting and weeding has to be done. Poor health has been complicated by the advent of AIDS. In one village visited, interviews could not take place on several occasions because four deaths occurred within one week. Another factor complicating the health of the population in the sites visited was the poor supply of water, particularly in the rainy season. Although, some blocks such as Chankanze Agricultural Block in Lundazi had a number of boreholes and water wells, this was not the case in other blocks visited.

The availability of credit, marketing and extension services also differed from block to block. It is interesting to observe that in most of these areas marketing and credit facilities were reported to be insufficient for maize but were adequate for cotton and tobacco.

2.7 Chapter Summary and Conclusions

This chapter has highlighted the different sources of data, both primary and secondary data. It has shown that secondary data are scant in Zambia in as far as the private sector is concerned. These data, therefore, had to be supplemented by the collection of primary data.

A number of problems were encountered during the data collection, the major one being the reluctance of identified traders to participate in the survey. Another major constraint was the availability of funds and time at the disposal of the researcher. Thus, a detailed study of the participants in the maize marketing chain could not be done.

Due to the lack of a known population of the traders, in the country as a whole and in the

study area in particular, normal sampling procedures could not be employed during the collection of the data. While in the field other approaches and methods of collecting data had to be devised. In particular, the study relied heavily on the collection of qualitative data using a combination of different research instruments that were administered to different farmers, traders and other key informants, which included government officials and non-governmental officials.

Despite these problems and the fact that normal sampling procedures were not used in identifying the traders, it is the view of the author that the methodology used to collect the data has yielded data that are relevant to the problem statement under investigation. This methodology is also relevant to future data collection procedures. The combination of both the secondary and primary data has also enriched the data set for the purpose of this study.

CHAPTER THREE

THE PREVAILING PHYSICAL AND MACRO-ECONOMIC POLICY ENVIRONMENT: IMPLICATIONS FOR MARKET INTEGRATION

3.1 Introduction

One of the major objectives of agricultural market liberalisation is to provide an enabling and facilitating environment, both in terms of policy, physical infrastructure and provision of support services like extension, input and output markets, credit facilities and market information, to the emerging market participants. This means that the policies put in place by the government should be credible and stable over a period of time. This also means that the provision of the different services should be improved and made efficient. The aim of this chapter, therefore, is to lay the background for the assessment of the problem under investigation by examining the nature of the physical and economic environment facing the emerging market participants. Whether or not the regional maize markets have remained segmented will be analysed in chapter 5. Here we consider whether an enabling environment was lacking at the time of liberalization and whether such an environment is still elusive for the majority of the market participants.

The chapter is organized as follows. The physical environment is discussed in the next section. This is followed by an examination of the macroeconomic policy environment obtaining in the country in 1996. The last section is a summary of the chapter.

3.2 A General Overview of the Physical Environment

3.2.1 Geographical Location and Demarcation of the Country

Zambia is a landlocked country covering an area of 752,000 square km. It is bounded by eight countries, Botswana, Namibia and Zimbabwe to the south; Malawi and Mozambique to the east; Tanzania and Zaire in the North; and Angola to the West (Figure 3.1). Being landlocked, its major routes to the seaports are through other countries and these are basically two, through Tanzania to the Dar-es-salaam seaport and through Zimbabwe and Botswana to South African seaports. Administratively, the country is divided into nine provinces, Central, Copperbelt, Eastern, Luapula, Lusaka, Northern, North-Western, Southern and Western. The provinces are divided further into 58 districts, of which nine are the main administrative centres (refer to Map 3.1). These nine provincial centres are also the centres where price information is assembled and reported in the weekly bulletin of the MAFF. The nine provinces are normally classified into the line-of-rail (LOR) and the non-line-of-rail (non-LOR).[9] In the LOR region are Central, Copperbelt, Lusaka and Southern while Eastern, Luapula, Northern, Northwestern and Western are in the non-LOR region.

Ecologically, Zambia is divided into four major agricultural zones (see Map 3.2).[10] Zone 1 is in the northernmost high rainfall area of the country and covers the Northern, Luapula, Copperbelt, North-western provinces and some parts of Central province. It has an average rainfall of more than 1,200 millimetres per annum and has weathered and leached soils characterised by

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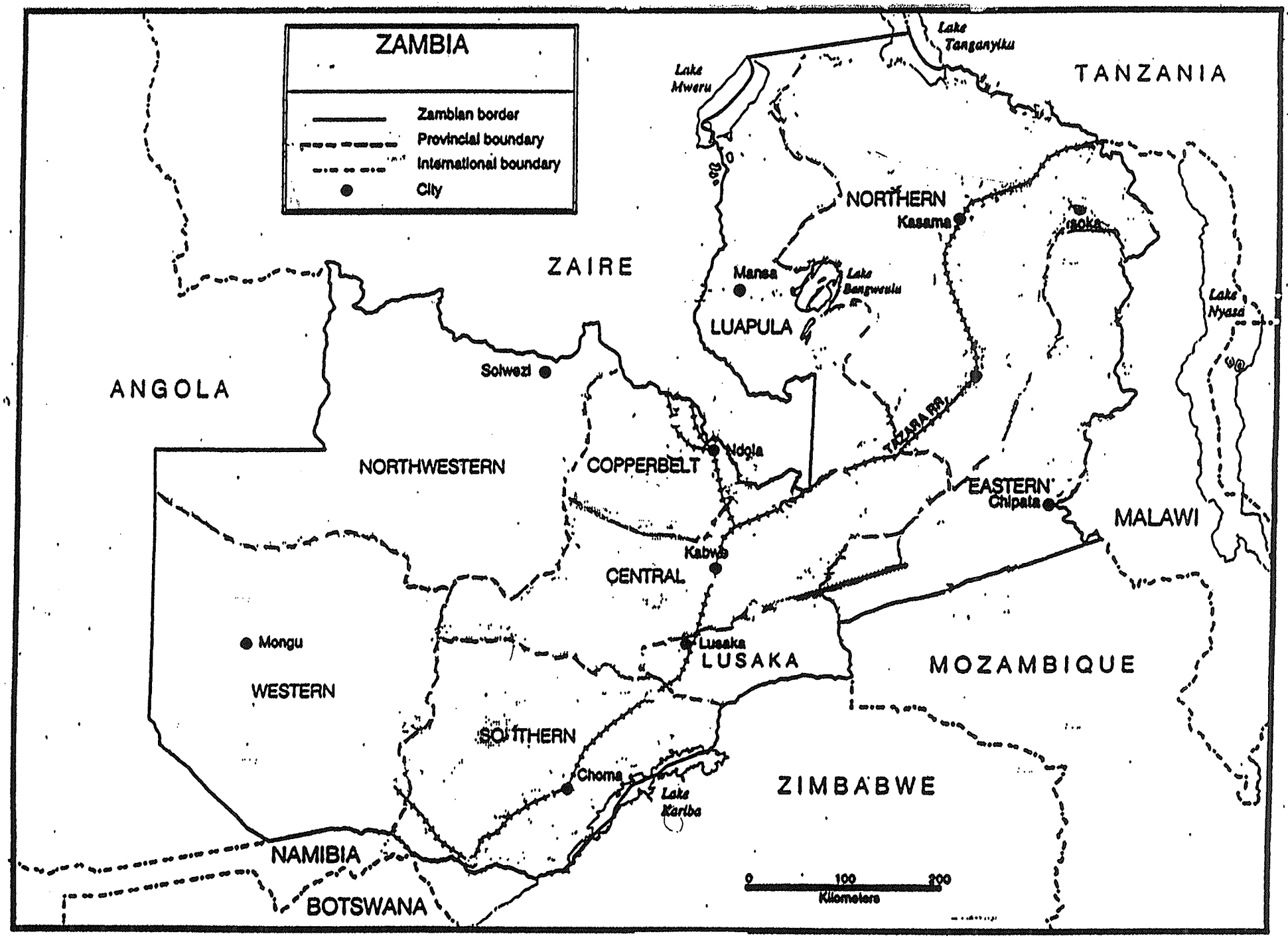
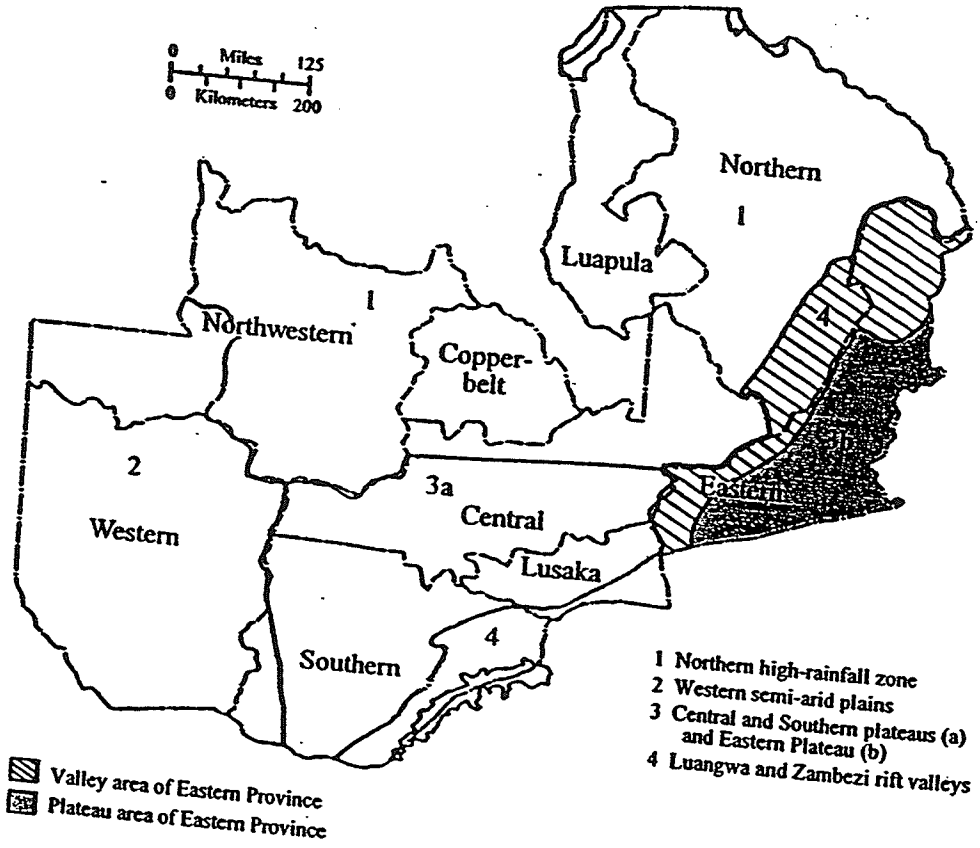
[9] The demarcation of the Line LOR provinces and non-LOR is based on the distance from the old line-of-rail. The former lie along the old line-of-rail while the latter lie away from the old line-of-rail. In general, the LOR provinces are well located in terms of access to the best infrastructural development and road transport networks; are locate in the best ecological zones with the best soils and rainfall pattern. The non-LOR provinces on the other hand have the poorest infrastructural development and road transport networks and are located in the ecological zones that have poor soils.

10 For a more detailed discussion of the zones see Howard, J.A. (1993): "The Impact of Investments in Maize Research and Dissemination in Zambia". Part I: Main Report. ***MSU International Development Working Paper*** No. 39/1, Department of Agricultural Economics, Michigan State University.

Map 3.1: Location Map of Zambia



Map 3.2 Map of Zambia's Agro-ecological Zones



extreme acidity. It is traditionally a cassava and finger millet producing region even though in recent years its production of maize has increased. Zone 1 accounts for 46 percent of the total land area. Zone 2 comprises the western semi-arid plains and receives less than 800 millimetres of rainfall per annum. The major crops grown are cassava, bulrush millet, sorghum and occasionally maize. It, however, has a large cattle population. Zone 3 (which consists of the central and southern plateau and the eastern plateau) is the most fertile of the four zones. It has moderate rainfall of between 800 and 1,000 millimetres per annum. It comprises most of Central, Eastern, Lusaka and Southern provinces. Although it only accounts for 12 percent of the land, it produces most of the agricultural surplus crops. The major crop grown is maize, although smaller amounts of groundnuts; sunflower, cotton, soybeans and tobacco are also grown. Zone 4 comprises the Luangwa –Zambezi valleys. Although it receives less than 800 millimetres of rainfall annually, it nevertheless has a high irrigation potential and good soil. The zone is, however, situated far from population and infrastructure. It also has had limited agricultural development. This zone is normally considered a food deficit area.

3.2.2 The Country's Resources

Table 3.1 shows that Zambia has a total area of 75million hectares with land area accounting for 74 million hectares. The LOR provinces account for 31 percent (23 million hectares) of the total land area and the non-LOR provinces occupy the remaining 69 percent (52 million hectares). During 1991-94 the total agricultural land was estimated at 35 million hectares out of which 5 million hectares was land available for cultivation and 30 million hectares was grazing land. However, of the 5 million hectares, only about 23 percent was consistently cultivated during this period (IMF 997).

Table 3.1: Estimated Land Distribution by Province (million ha)

Province	Open Water	National Park	Game Management Area	State Land	Traditional Land	Total Land Area
Central	0.02	1.88	1.03	0.55	5.96	9.44
Copperbelt	0.00	0.46	0.00	0.78	1.90	3.13
Lusaka	0.00	1.13	0.41	0.39	0.26	2.19
Southern	0.25	1.69	0.94	1.10	4.56	8.53
LOR	0.27	5.16	2.38	2.82	12.68	23.29
Eastern	0.00	3.24	0.41	0.29	2.98	6.91
Luapula	0.44	0.27	0.15	0.01	4.18	5.06
Northern	0.31	1.44	1.77	0.10	11.16	14.78
N/western	0.00	2.47	0.63	0.49	8.99	12.58
Western	0.03	3.81	0.89	0.00	7.94	12.67
Non-LOR	0.78	11.23	3.85	0.89	35.25	52.00
Total	1.05	16.38	6.23	3.70	47.92	75.29

Source: GRZ, (1994): ASIP Appraisal: Land Use and Administration Sub-programme, Annexes, June/July 1994, Lusaka.

Table 3.2 shows that Zambia's population has more than doubled since 1969, from a mere 4 million people to over 9 million in 1995. The average annual growth rate was estimated at 3.2 percent per annum between 1980 and 1990 and it is projected to grow at 3.6 percent per annum between 1990 and the year 2000. By the year 2025 Zambia's total population is expected to be over 19 million people. Urbanization is the highest in sub-Saharan Africa. Whereas in 1969 only 29 percent of the total population was living in the urban areas, by 1995 the urban population had

almost doubled to about 43 percent. It is estimated that by 2025 over 50 percent of Zambia's total population will be living in the major urban areas (Table 3.2).

Table 3.2: Rural-Urban Distribution of Population, 1969-1990 ('000)

Year	Total Population	Rural	Urban	Percent Urban
1969	4,057	2,865	1,192	29.4%
1990	8150	4727	3423	42.0%
1995	9456	5380	4076	43.1%
2025	19130	7671	11459	59.9%

Source: GRZ (1997); Kalinda (1993); World Bank (1998)

Available estimates at the provincial level indicate that Copperbelt and Lusaka are the most urbanized with 92 percent and 85 percent of the total population living in the urban centers of the respective towns during 1990. On the other hand, Eastern province is the least urbanized with about 86 percent of the total population residing in the rural areas in 1990 (Kumar, 1994). Under market liberalization, this high rate of urbanization has implications for the direction and magnitude of maize flow.

3.2.2 Transport Network and Infrastructural Development

Zambia, like many other Sub-Saharan African countries, suffers from a poorly developed transportation and communication and infrastructure network. An efficient marketing system depends, among other factors, on the availability and state of a road network and transportation system. In particular, the availability of a well-serviced rural road network in the remote surplus

areas not only enhances competition among market participants in their supply of inputs and outputs, but also assures availability of and access to food at the household level. Market integration and, therefore, household food security are unlikely to occur in a situation where the road network structure is poor. In Rwanda it was found that the development of a network of paved primary roads reduced interregional price differentials (Loveridge, 1988).

In Zambia, the existence of a road network, and in particular, rural road network is not the major problem. Most households (81%) in the rural areas are located within a distance of less than 5 km and only 7 percent are at distances more than 10 km from a public road (GRZ, 1996). In general, the road network, especially the inter-provincial network linking the provincial headquarters is well developed, while the inter- and intra-district road networks and the network linking the districts to the provincial headquarters are relatively well developed. What appears to be a major problem is the availability of a good all weather rural road networks of feeder roads connecting villages one to another and to the district centers.

3.2.3 The Structure of the Agricultural Sector

The agriculture sector in Zambia comprises of three major producers, namely small-scale traditional farmers, small-scale commercial farmers[11] and the large-scale commercial farmers. The small-scale traditional farmers are by far the largest group of farmers accounting, in general, for over 80 percent of the total farm households. The small-scale and large-scale commercial farmers, on the other hand, account for less than 10 and 1 percent of the total farm households, respectively (see Table 3.3). Over the period 1980 and 1990, the proportion of small-scale traditional farmers decreased in both the LOR and non-LOR provinces except in Lusaka province while the proportion

[11] In Zambia, the small-scale commercial farmers are often referred to as the emergent or emerging farmers based on the share of the marketed produce and technology used.

of small-scale commercial farmers increased in all provinces except in Central and Lusaka provinces where it decreased. Similarly, the percentage share of the large-scale commercial farmers increased in all provinces except in Lusaka province where it remained the same. This suggests that during this period some transition from small-scale traditional to small-scale commercial had occurred.

Table 3.3: Provincial Composition of Producers, 1980 and 1990 (percent of total)

Province	Large-scale Commercial		Medium-scale Commercial		Small-scale Traditional	
	1980	1990	1980	1990	1980	1990
Central	0.6	1.6	16.0	15.1	83.4	83.3
Copperbelt	0.0	0.6	2.4	3.6	97.6	95.8
Lusaka	0.5	0.5	9.7	5.8	89.8	93.3
Southern	0.5	1.5	12.3	25.3	87.2	73.2
LOR	0.3	0.9	7.7	11.1	92.0	87.9
Eastern	0.0	0.2	2.8	10.2	96.4	89.6
Luapula	0.0	0.0	0.07	0.4	99.9	99.6
Northern	0.0	0.1	0.08	5.1	99.9	94.8
N/western	0.0	0.0	0.14	0.5	99.9	99.4
Western	0.0	0.1	0.0	4.2	100.0	95.7
Non-LOR	0.1	0.2	2.5	5.1	97.2	94.6
Zambia	0.1	0.5	3.5	9.3	96.4	90.2

Source: Calculated from Kalinda, Henrietta (1993) and GRZ (1997): *Agricultural Statistics Bulletin*, 1995/96.

However, a study carried out by the Institute for African studies in 1996[12] indicated that the transition from small-scale traditional farming to small-scale commercial farming was becoming very difficult. Its results seem to suggest this trend might actually be reversing and that many small-scale commercial farmers were likely to revert to small-scale traditional farming. Using different

[12] GRZ (1996): Agricultural Sector Performance Analysis and A Review of Implementation of the Agricultural Sector Investment Program, 1996, Preliminary Report for the Ministry of Agriculture, Food and Fisheries.

performance indicators (e.g., cattle owning, access to credit and use of modern inputs) the study showed that the number of small-scale commercial farmers had declined during the period 1990/91 and 1994/95. For example, the study recorded a decline of cattle-owning farmers among the small-scale commercial farmers, from 65 percent in 1990/91 to 38 percent in 1994/95 while that for small-scale traditional farmers was only from 16 to 14 percent. Similar results were observed using indicators on farmer's access to credit and the use of hybrid seed and fertiliser.

In terms of spatial distribution, Table 3.4 indicates that the majority (74%) of the small-scale traditional farmers in 1990 were located in the non-LOR provinces while the majority (83%) of the large-scale commercial farmers are in the LOR provinces. Over half of the medium-scale farmers in 1990 were located in the LOR provinces.

The categories of farmers identified above differ not only in terms of composition and location, but also in terms of size of land holding, the degree of mechanisation, yields and quantities of produce (especially maize) marketed. Although the large-scale commercial farmers are few in number, they dominate the farming community in terms of the size of land holdings (over 70 hectares on average); yield levels (30 bags per hectare); production and; marketed output (30% of the total value of marketed maize output and 65% of the value of the of the other marketed agricultural products) (McKenzie and Chenoweth, 1992). Compared to the other categories of producers, the large-scale commercial farmers are at a better advantage. They are located in the LOR provinces that have a well-developed infrastructure and road network and the best land suitable for most crops including high value crops. They also have a strong resource base and are highly mechanized and use mostly hired labour. Large-scale farmers also have easy access to credit, marketing, and farm inputs and storage facilities.

Table 3.4: Percentage Share of Farmers by Category and Province, 1980 and 1990

Province	Large-scale Commercial		Medium-scale Commercial		Small-scale Traditional	
	1980	1990	1980	1990	1980	1990
Central	0.0	3.4	2.4	1.1	3.4	3.0
Copperbelt	41.1	34.0	35.7	15.8	6.8	9.1
Lusaka	12.3	3.8	8.9	2.0	3.0	3.4
Southern	43.8	41.8	37.5	36.4	9.6	10.9
LOR	97.2	83.0	84.4	55.3	22.8	26.4
Eastern	2.7	12.4	14.5	33.7	18.4	30.5
Luapula	0.0	0.4	0.2	0.5	12.9	15.3
Northern	0.0	2.4	0.4	6.4	20.4	12.3
N/western	0.0	0.6	0.4	0.3	9.7	6.8
Western	0.0	1.2	0.0	3.7	15.5	8.7
Non-LOR	2.7	17.0	15.5	44.6	76.9	73.6
Zambia	100.0	100.0	100.0	100.0	100.0	100.0

Source: Kalinda, Henrietta (1993)

Small-scale traditional farmers are at the other extreme. Although they constitute over 80 percent of the total farm households in the country and account for 60 percent of the total cultivated land, they are highly disadvantaged in terms of location and accessibility to agricultural services. They are concentrated in the non-LOR where infrastructure and road networks are poorly developed. These farmers also have poor access to agricultural services. Small-scale traditional farmers employ mainly family labour; use hand hoe technology with very little purchased inputs like fertiliser and high yielding varieties of seed. As a result they tend to cultivate small holdings (less than 2 hectares per household), and their productivity is generally low and average yields per hectare are less than half that for commercial farmers (USAID, 1993). Production is largely for home consumption with only a small marketable surplus.

Small-scale commercial farmers, unlike the large-scale commercial farmers, have relatively smaller holdings, an average of 3 hectares, but have larger holdings compared to small-scale traditional farmers. As Table 3.4 above shows, the small-scale commercial farmers are found in both the LOR and non-LOR regions of the country. In 1990 about 55 percent were in the LOR and the remaining 45 percent were in the non-LOR. However, within these two regions they are mostly concentrated in four provinces, Central and Southern province (LOR provinces) and Eastern and Northern (non-LOR provinces). Accessibility to agricultural services like credit, inputs and markets is not as good as that for the large-scale commercial farmers, although it is relatively better than that for small-scale traditional farmers. They rely on both hired and family labour. Their yields and production levels are higher than that for small-scale traditional farmers but lower than that for large-scale commercial farmers. They account for over 30 percent of the total value of marketed maize. However, when their surpluses are added together with the small surpluses of maize from the small-scale traditional farmers, they produce about 70 percent of the value of marketed maize and 35 percent of the other marketed agricultural products (McKenzie and Chenoweth, 1992). Unlike the small-scale traditional farmers, they market about 50 percent of their produce and retain the remaining 50 percent for home consumption. In general however, amounts marketed depend on the balance between supply and own demand.

Thus, the three categories of farmers are of different socio-economic backgrounds and are located in different agro-ecological regions. It is particularly clear that the small-scale traditional and the small-scale commercial farmers are not only disadvantaged in terms of technology, they are also located in areas that are less developed and have poor soils and rainfall patterns (except for Eastern province). Their response to market liberalisation is, therefore, likely to be adversely affected by these constraints compared to the large-scale commercial farmers.

3.3 Macro-economic Policy Environment

One of the pre-conditions for a successful liberalisation is ensuring macro-economic stability. Since 1991 the Zambian government has been aspiring to meet this pre-condition albeit under difficult conditions, such as the limited public sector capacity, the devastating drought in 1992 and a further fall in copper prices in 1992.

When copper prices fell in 1975 the fall in the major macroeconomic variables like the current account, government budget and GDP was immediate and by the beginning of the 1990s the economy had accumulated huge budget deficits, double-digit inflation rates, balance of payments problems and a rapidly depreciating currency. In order to create a stable macro-economic environment characterized by low inflation, real interest rates and a reduced budget deficit, the new government adopted in 1991a comprehensive programme of stabilization and structural reform that included a tight monetary and fiscal policy. A number of the macroeconomic policy measures had been implemented by the end of 1993. For example, nominal interest rates and foreign exchange rates were liberalized in 1992 and 1993, respectively. In an effort to contain the high inflation, the government adopted a cash budget system in January 1993.[13] Then by the end of 1993 food subsidies and direct agricultural market subsidies had been eliminated.

Although the impact of these reforms led to an improvement in the macroeconomic indicators, the macroeconomic environment still remained precarious for the private sector. Inflation as measured by the consumer price index (CPI) fell from a high of 184 percent in 1993 to 43 percent in 1996, and to 24 percent in 1997. Although the 1998 estimate puts inflation at almost 25 percent,

[13] This system entails the meeting of government expenses, both capital and recurrent, by the existing domestic revenue and financing of the external debt servicing through donor external budgetary support (Saasa, 1996, p. 22). In other words, the government can only commit itself to spending only when there is enough revenue to meet its expenses.

it is still high (IMF, 1997). The decline in inflation has largely been due to tight fiscal policies, particularly the cash budget adopted in 1993. The money supply was rising at a declining rate, almost reverting back to the level it had attained in February 1995. The rise in M1 and M2 had fallen from about 56 and 40 percent in December of 1995 to 35 and 36 percent in May 1996, respectively (GRZ, 1996).

Nominal interest rates remained high even though they have fallen tremendously from their peak of 200 percent in mid-1993. However, a tight monetary policy that government has continued to follow pushed up interest rates with the Bank of Zambia weighted lending base rate increasing from 47 percent in November 1995 to 54 percent in June 1996 (GRZ, 1996). The high interest rates have had an adverse effect on the economy as a whole but also on the performance of the private sector and especially the financing of the agricultural sector. The high interest rates have resulted in a credit squeeze among both commercial farmers and the private traders. It has also reduced the access of farmers to credit, consequently dampening their participation in agricultural production and trade (GRZ, 1996).

At the end of the study in 1996, the policy environment within the agricultural sector was also still not conducive for the effective participation of the private sector. Although the government had completely liberalized the marketing of maize, it still continued to indirectly influence the maize market. For instance it has continued to intervene in the marketing and distribution of fertilizer by appointing credit managers. This is a pilot scheme in which fertilizer is made available on credit to stockists/dealers at provincial and district levels for onward lending to the farmers. The program is currently, being carried out by the Cavemont Merchant Bank and SGS Zambia Ltd. These two organizations distribute fertilizer on behalf of the government, through credit coordinators, to farmers in the non-LOR provinces where the private traders are unable to reach. This means that

farmers have to sell to these institutions, an amount equivalent to the fertilizer credit and only the balance if any, can be sold to other traders. The government has also continued to influence maize prices through the National Food Security Reserve.

Initially, the emergence of seasonal and spatial price variations were being dictated by official policy as government continued to announce floor prices and to appoint buying agencies. Farmers interpreted the floor price as the maximum price at which traders would buy maize in remote rural areas. Cooperatives, on the other hand, were made to buy the maize at the floor price and therefore, farmers had an option of getting a higher price from the cooperatives. A number of farmers, however, were uncertain about the ability of the cooperatives to pay them, particularly after government withdrew the subsidy from them. However, the government now intervenes indirectly by providing finance to private agents through private lenders and the management of the maize reserve stocks. These interventions have introduced uncertainties among the different marketing participants, especially the smallholder farmers and private traders. Farmers are still hoping for the resurrection of the old system of appointing buyers. At the same time traders are not yet sure whether government would continue to allow the maize prices to increase enough for them to make profitable marketing margins. These uncertainties are likely to go on in the future unless government can completely stop influencing the maize market. However, given that maize is a staple crop complete withdrawal is unlike to come about in the near future.

3.4 Chapter Summary and Conclusion

Zambia has an abundant supply of resources and a climate that is conducive to growing a number of crops. However, these resources remain under-utilized. In particular, the agricultural sector has not taken full advantage of this fact. For instance, out of an estimated 9 million hectares

of cultivable land only 16 percent is cultivated annually. Based on the agro-ecological zones, except for Eastern province the best land, soils and rainfall is in the LOR provinces. The population and, in particular the urban population, is growing at a faster rate. The chapter has also shown that the rural road network in most of Zambia's rural areas is poor and is, therefore, likely to have serious repercussions on private sector participation in the input and output markets. Thus, improving the rural road networks and other rural infrastructure, like storage facilities, would lead to the reduction in market imperfections.

This chapter has further shown that even though the economy in general had started to stabilize by the end of 1996, the continued high inflation and interest rates continue to make it very difficult for the private sector to participate fully in the agricultural sector. Inflation and real interest rates still remain high even though they have reduced tremendously from their levels before liberalization. High real interests are likely to result in a credit squeeze and consequently discourage private sector participation in agricultural trade, in general, and in maize trading, in particular. Thus, unless the macro-economic environment and the market imperfections are removed the fruits of market liberalization will still remain elusive in Zambia.

Although the maize market was fully liberalized in 1994, allowing anyone to buy and sell maize at negotiated prices, the transition to full maize marketing remains constrained due to a number of problems. One of the problems in the beginning was the devastating drought of 1992, which delayed the liberalization of the market. Given that Zambia's agriculture is rainfed any future droughts will lead to high prices, unless government can effectively stabilize prices and supply through either the effective management of the Food Security Reserve or through the imports/exports. Another problem is government's reluctance to completely withdraw from intervention in the maize market. Although it has directly withdrawn it still continues to intervene

indirectly through the provision of finance to private traders and to the Food Reserve Agency. These continued interventions have consequently sent wrong signals to market participants with farmers still hoping to get back to the system of guaranteed markets and the private traders not yet sure of the credibility of government's pronouncements. In the following chapters it will be shown how the changes in production and on-farm storage have been affected by the natural and macro-policy environment prevailing in Zambia.

CHAPTER FOUR

THE EMERGING PATTERN OF REGIONAL MAIZE PRODUCTION, CONSUMPTION AND ON FARM STORAGE

4.1 Introduction

Chapter two discussed the nature of the physical and macroeconomic environment in which the market participants were operating at the time of the study in 1996. It revealed that although the government attempted to create an enabling environment for the emerging private participants in the maize market, the physical and economic environment still remains unfavorable for effective participation of most actors. This has implications for the integration of the maize markets will be shown in Chapter 5.

This chapter examines the changes in the pattern of maize production and consumption and the amounts retained at the farm level in the nine provincial regions of Zambia as a result of moving from the system of uniform pricing and controlled movements of maize to a liberalized system. In general we would expect, with the decontrol of the prices, an overall increase in maize production in those areas closer to major consumption centres and a decrease in maize production in those areas away from the major consumption centres. On the other hand, consumption requirements are likely to increase in maize deficit areas, especially in the major urban areas, relative to the maize surplus areas. One of the major consequences of market liberalization is the change in storage responsibility. Whereas before liberalization, the government parastatal assumed responsibility for maize storage, with the abolition of the NAMBoard the private sector is expected to take on this responsibility. If markets are well integrated such that maize readily flows from surplus to deficit areas, then the quantities of maize retained will increase in all regions, but more so in surplus regions than in deficit

regions as farmers engage in speculative storage.

The purpose of this chapter is to determine whether the liberalization of the maize market has stimulated production, regulated supplies to consumers and revitalized inter-regional trade as producers engage in speculative storage. The central question being answered is whether there have been any changes in maize production, consumption, and amounts retained by farmers as a result of moving from a fixed price and controlled system to a liberalized one. This chapter provides the essential background for the market integration analysis that will be provided in Chapter 5.

The chapter is organized as follows. Section 4.2 gives a brief description of the methodology employed. Section 4.3 indicates the share of maize in regional production and consumption and 4.4 analyses the trends in maize production and consumption. Sections 4.5 and 4.6 consider the changes in maize deficit and surplus position at the provincial level and changes in on-farm storage. The summary and conclusions are given in section 4.7.

4.2 Methodology

The trend analysis is based on annual data for the period 1980 to 1997 for maize production and retained quantities. The supplies in each province refer to field run production (GRZ/MAFF, 1997), thus they exclude amounts imported or carryover stocks due to lack of such data at the provincial level. Consumption is estimated for only six selected years due to lack of data at the provincial levels. The estimates are based provincial population and the national per capita consumption figures. Both total and per capita maize consumption data in Zambia is only available at the national level. To estimate the consumption requirements in each province we assumed that the average per capita consumption at the national level applies in each province. If this is a reasonable assumption given the limited data then maize consumption in each province is calculated

as follows:

$$c_{it} = pc * pop_{it} \qquad (4.1)$$

where:

c_i = consumption in province i at time t; i = 1..9 and t = time period

pc = per capita consumption at the national level at time t; and

pop_{it}= population in province I at time t.

Then the maize deficit or surplus situation in each province can be defined as the difference between provincial maize production and provincial consumption requirements. The formula used to calculate the deficit/surplus position in each province is given as follows:

$$ds_{it} = p_i - c_i \qquad (4.2)$$

where:

ds_{it} = deficit or surplus position in maize in province i at time t; i = 1..9,

p_{it} = production of maize in province i at time t; and

c_{it} = maize consumption requirements in province i.

A negative result indicates that a given province is deficit in maize and, therefore, imports from other provinces or from other countries will have to be sourced. A positive result, on the other hand, suggests that a given province has surplus maize that it can export to other deficit provinces or to neighbouring deficit countries. When the result is zero, this suggests that a given province is self-sufficient in maize. Note however, that this is a narrow definition of self-sufficiency since we have not taken into consideration the stock changes, the incomes and price effects on consumption. If in a given province, incomes were less and/or prices lower, then consumption might be artificially

greater than would in fact be the case. Thus we might observe an apparent deficit when in fact there is a 'surplus' being generated. Therefore, caution should be taken when interpreting the results.

The amounts retained are estimated as the difference between production and the marketed production, the latter being measured as the sales to industrial millers and large-scale traders. Thus marketed production excludes sales to small–scale private traders and other large-scale traders not reporting their sales (GRZ/MAFF, 1997).

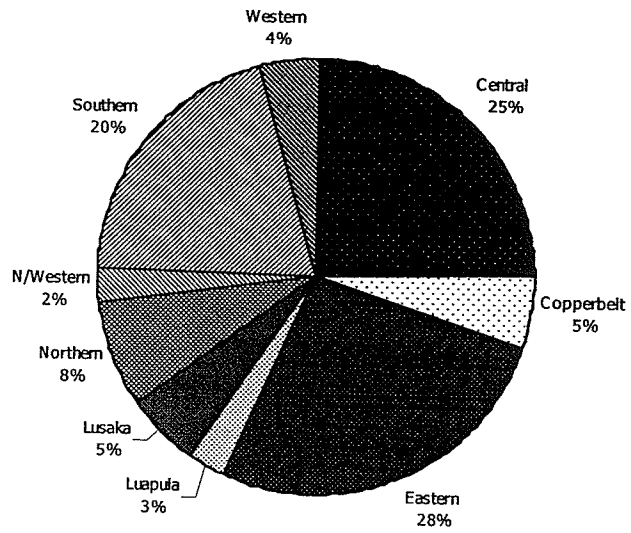
In order to capture the effects of liberalization under different rainfall conditions we selected six years, i.e., 1983, 1988, 1989, 1992, 1993 and 1996. The first three years, i.e., 1983, 1988 and 1989 represent the pre-liberalization period and are used as the base years. The second set of three years, i.e., 1992, 1993 and 1996 depict the post-liberalization period with 1992 and 1993 representing the period of partial liberalization and 1996 representing full liberalization of the market. The 1992 partial liberalised system entailed the liberalization of intra-regional maize trade and controlled inter-regional maize trade, while during 1993 inter-regional marketing was liberalised but the government still continued to intervene by appointing buying agents, and financing the maize purchases. In terms of rainfall, the years 1983 and 1992 are drought years, 1988 and 1993 are above normal rainfall years while 1989 and 1996 are normal rainfall years. Thus changes in production, consumption, and amounts retained were estimated by subtracting the post-liberalization figures from the pre-liberalization figures for similar rainfall conditions.

4.3 Share of Maize in Regional Production and Consumption

The production of maize is generally concentrated in two provinces in the LOR region (Central and Southern) and in two provinces in the non-LOR region (i.e., Eastern and Northern). The bulk of the surplus maize, however, comes from Central, Southern and Eastern provinces, which

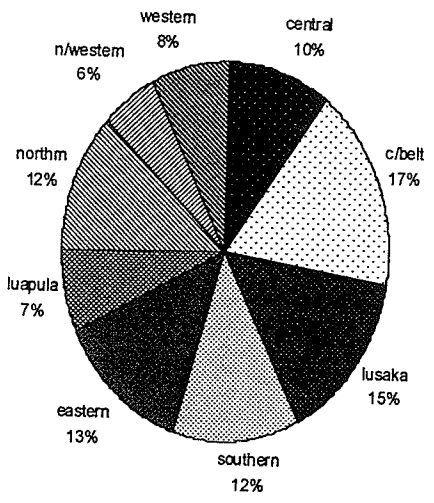
together accounted for over 70 percent of total production at the time of the study in 1996 (see figure 4.1). On the other hand, the bulk of the maize produced is consumed by the two major urban deficit provinces in the LOR (Lusaka and Copperbelt), which together accounted for over one quarter of the total estimated maize consumption in 1996. The other deficit provinces (Luapula, Northwestern and Western) located in the non-LOR region, accounted for 21 percent of the estimated consumption in 1996 (see figure 4.2)

Figure 4.1 Provincial Share in Total Maize Production in 1996



Source: GRZ (1997): *Agriculture Statistics Bulletin.*

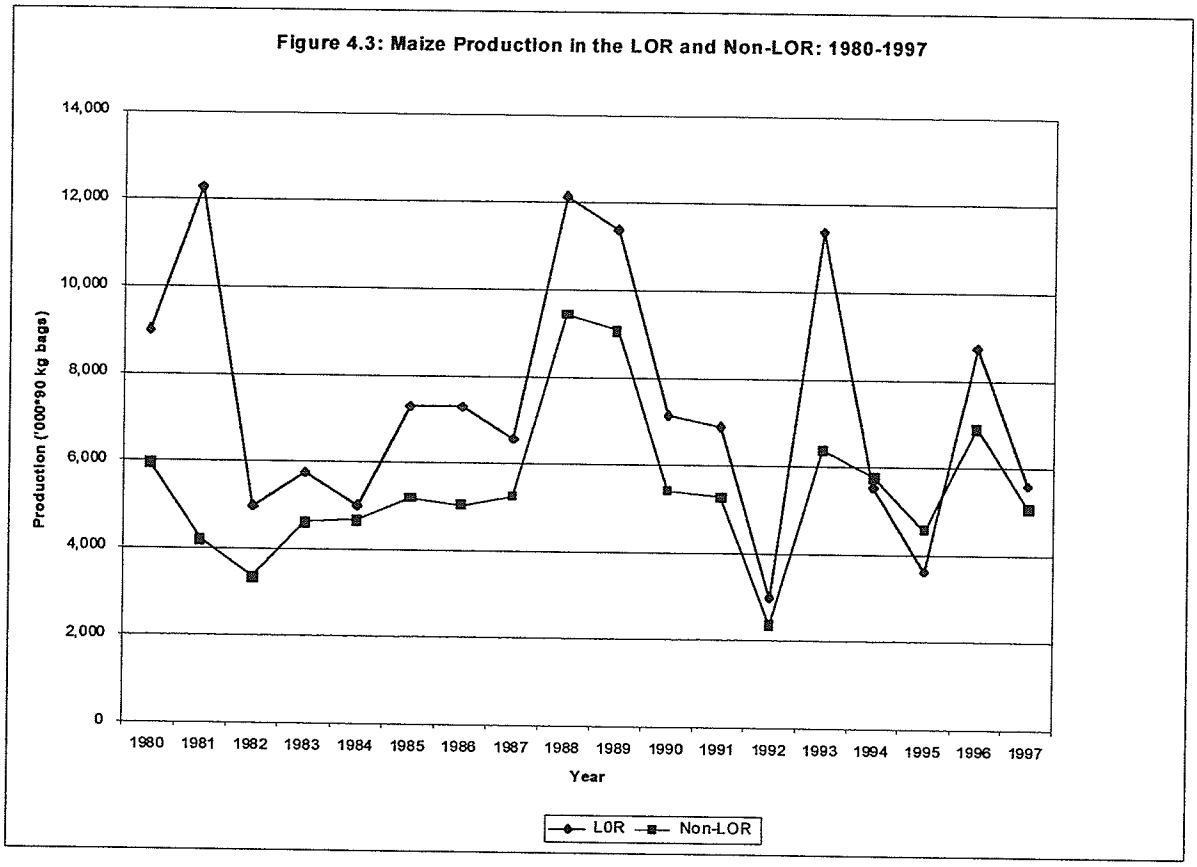
Figure 4.2: Provincial Share in Total Consumption in 1996 (%)



Source: FAO (1998): FAOSTAT Data, Rome

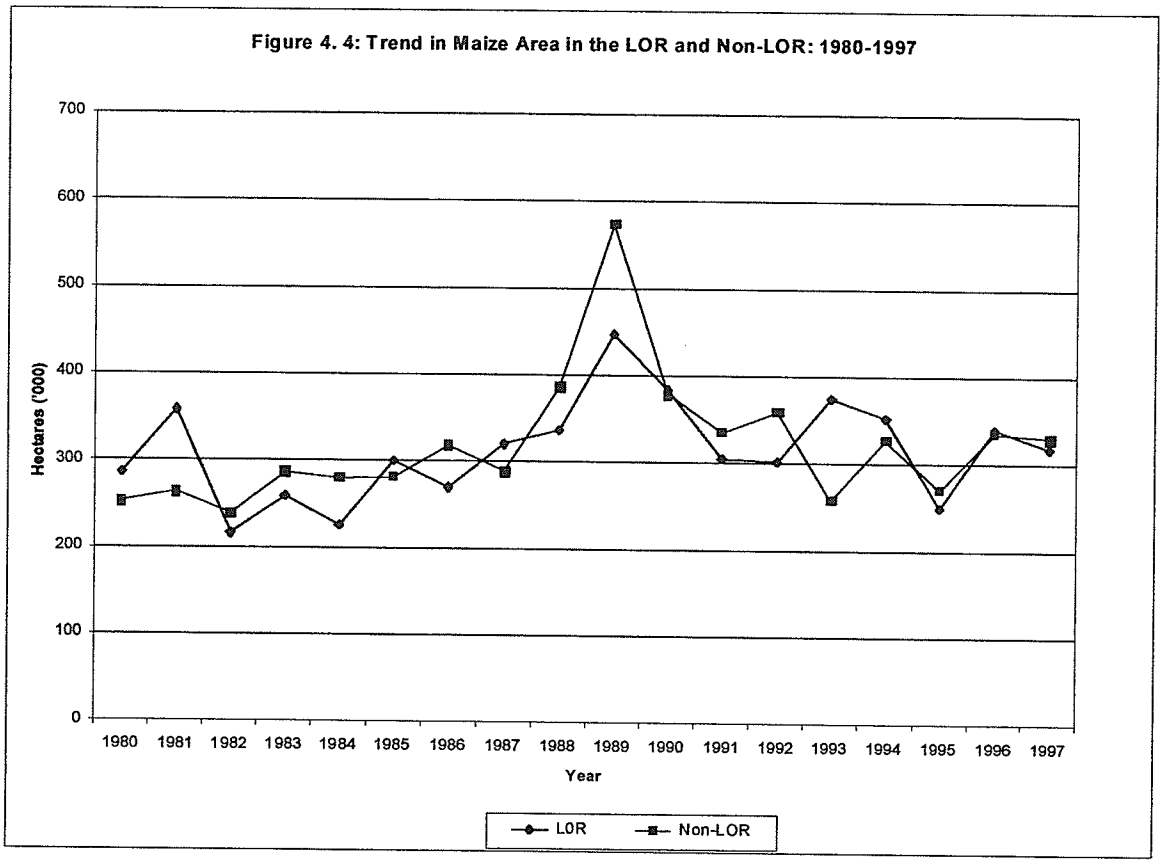
4.4 Trends in Production and Estimated Consumption

Although real producer prices of maize have shown an upward trend (see figure 1.5, p.8), production of maize at the national level reveals a downward trend between 1980 and 1997 (See Figure 4.3). Production fluctuated from a high of 20 million 90-kg bags during the 1988/89 season to a low of 5 million 90-kg bags during 1991/992. By 1992/93 it increased to almost 18 million bags, the highest it ever reached during the entire post-reform period. In 1995/96 it fell to 16 million bags and finally by 1996/97 it had fallen to just below 11 million bags. With liberalization of the maize market, the production of maize was expected to increase in regions close to consumption areas located along the LOR (i.e., Lusaka, Central, Southern and Copperbelt) and decrease in regions far from consumption areas and located in the non-LOR (i.e., Eastern, Luapula,



Source: GRZ (1997): *Agriculture Statistics Bulletin.*

Mongu, Northern and Northwestern). However, the statistics suggest that the LOR has experienced a downward trend in maize production while the non-LOR provinces indicate an upward trend in maize production during the period 1980 to 1997 period. The decline in production was largely due to a decline in area planted (see figure 4.4), which in turn was a result of drought, especially during the 1991/92 season. Although the area planted to maize showed an upward trend, it declined from a high of one million hectares during the 1988/1989 season to 520 thousand hectares in 1994/95 before increasing to 676 thousand hectares in the following season. However, by 1996/97 season it had fallen to 648 thousand hectares.



Source: GRZ (1997): *Agriculture Statistics Bulletin.*

To exclude the effect of drought on the surplus/deficit position of Zambia, the LOR and non-LOR provinces we picked two years that had normal rainfall conditions, a pre-liberalization year (1989) and a post-liberalization year (1996). The study also revealed that even under normal rainfall conditions, full liberalization of the maize marketing did not bring about any significant changes in maize supply and amounts retained at the farm level. If anything, the analysis revealed that even under normal rainfall conditions Zambia experienced a decline of 70 percent in its surplus position after the maize market was completely liberalized. This decline was, however, less than what was recorded during the drought years of 1982/1983 and 1991/199 (1065%). The deficit position in Lusaka increased by 27 percent while that in Copperbelt declined by 37 percent between 1989 and 1996. In the non-LOR the three deficit provinces still maintained their deficit position, even if the

magnitude of their maize deficits had declined: Western by 36%, Luapula 25% and Northwestern 18%. The analysis also revealed that the three surplus provinces (i.e., Central, Southern and Eastern provinces), that account for over 70 percent of the total maize produced in the country in most years, experienced a decline in their surplus position after liberalization. The surplus position for the surplus regions should have been greater than that before liberalization. But this does not seem to be the case. These results suggest a limited response to price liberalization by the farmers in Zambia as well as the presence of structural rigidities in the maize market.

Table 4.1 indicates, in general, that the average annual contribution of the three major surplus areas (i.e., Central, Southern and Eastern provinces) to production has declined since liberalization. Prior to liberalization the three provinces accounted for an average of 78 and 75 percent in total maize production and hectarage, respectively. But this has fallen to 68 and 72 percent per annum over the respective periods. The contribution to total production has particularly been as a result of the fall in Southern and Eastern provinces whose contributions have declined from an average of 30 and 23 percent prior to liberalization to 22 and 18 percent respectively after liberalization. The contribution to total area planted increased for Southern province (from 20 % to 24%) but declined for Eastern province (from 36% to 30%) after liberalization. On the other hand, Central province increased it share to total production only marginally from 25 percent prior to liberalization to 28 percent per annum after liberalization although the area planted to maize declined slightly from 19 percent per annum to 18 percent per annum. Note, in relative terms, the area planted has not fallen as much as the production. This could suggest an improvement in productivity. However, studies have found that in general the variations in maize production in Zambia is largely due to variations in hectarage rather than variations in productivity (i.e., yields per hectare) (see Kalinda, 1993 and Maleka *et. al.*, 1991).

Table 4.1: Provincial Share in Maize Area, Production, and Marketed Output

	AREA (%)		PRODUCTION (%)		MARKETED (%)	
	1980-1989	1990-1997	1980-1989	1990-1997	1980-1989	1990-1997
Central	20	18	26	24	32	30
Copperbelt	3	4	3	6	3	6
Lusaka	5	5	4	5	4	6
Southern	21	24	26	21	25	21
LOR	49	51	59	56	64	63
Eastern	35	31	29	24	23	15
Luapula	1	2	1	3	1	4
Northern	9	7	8	11	10	13
N/western	2	3	1	3	1	3
Western	4	6	2	3	1	2
Non-LOR	51	49	41	44	36	37
Zambia	100	100	100	100	100	100

Source: Own calculations based on Appendix Table 4.1A-4.3A.

Overall, however, the three surplus provinces still dominate the production of maize and still account for the largest area allocated to maize. The reduction in Eastern province's share (a province in the non-LOR area far from consumption areas and prone to drought) in total production and area planted has not been as dramatic. At the same time the increase in the share of Central province (a province in LOR area close to major consumption areas and less prone to drought) to total production has only been marginal. This would suggest the effect of drought that has characterized the post -liberalization period, particularly, the 1992 drought. This may also be due to problems with access to inputs and credit due to the credit squeeze experienced by many farmers

during the post-liberalization as government withdrew subsidies for maize production and marketing and liberalized the financial sector resulting in high interest rates. An alternative explanation could be the non-emergence of a vibrant private sector.

4.5 Changes in Production and Consumption

Economic theory stipulates that an increase in price leads to an increase in production whereas a decrease in price results in a decrease in quantities produced. Everything else being equal, full liberalization should lead to higher prices in the deficit provinces and lower prices in the surplus provinces. Therefore, production should increase in all the deficit provinces and the two LOR surplus provinces (Central and Southern) and decline in production in the two non-LOR surplus provinces. In the surplus non-LOR provinces it is expected that production will decline as prices decline forcing farmers to shift to other high value crops like cotton, soybean and groundnuts, especially in Eastern province.

Table 4.2 shows that production at the national level decreased by 48 percent from 10 million bags in 1983 to 5 million bags in 1992 after partial liberalization. The potential benefits of the partial liberalization were however thwarted by the drought condition that prevailed in 1992. The huge decline in maize production recorded at the national was as a result of the huge drop in production in the three major producing provinces, Southern and Central in the LOR and Eastern in the non-LOR provinces that were adversely affected by this drought. Production fell by 85 percent, 42 percent and 70 percent in the respective provinces. Consequently, both the LOR and non-LOR regions recorded a decline in maize production during this period. Although production increased in the remaining deficit provinces, except for Lusaka, which recorded a decline of 11 percent, this was not sufficient

Table 4.2: Provincial and Regional Maize Production Changes [a]

Region	Under Partial Liberalization and Drought Conditions			Under Partial Liberalization and Above normal Rainfall Conditions			Under Full Liberalization and Normal Rainfall Conditions		
	1983	1992	% Change	1988	1993	% Change	1989	1996	% Change
Central	3,301	1,920	(41.84)	4,391	4,406	0.33	4,870	3,866	(20.62)
Copperbelt	159	359	126.05	793	882	11.30	667	847	27.00
Lusaka	495	439	(11.40)	988	952	(3.57)	789	849	7.65
Southern	1,808	280	(84.50)	5,987	5,140	(14.14)	5,068	3,184	(37.18)
LOR	5,763	2,998	(47.98)	12,159	11,381	(6.39)	11,394	8,746	(23.24)
Eastern	3,095	915	(70.45)	6,481	3,771	(41.82)	6,004	4,177	(30.42)
Luapula	73	323	341.82	288	419	45.49	475	419	(11.88)
Northern	1,217	800	(34.28)	1,830	1,336	(26.97)	1,675	1,256	(25.05)
N/western	95	184	94.18	306	326	6.42	377	385	2.13
Western	148	153	3.10	527	520	(1.41)	555	678	22.22
Non-LOR	4,628	2,374	(48.70)	9,433	6,372	(32.45)	9,086	6,915	(23.90)
Zambia	10,391	5,372	(48.30)	21,591	17,753	(17.78)	20,480	15,661	(23.53)

Source: GRZ (1997): Agricultural Statistics Bulletin, Central Statistics Office, Lusaka.

[a] all the production figures given for the respective years are in '000 * 90 kg bags.

to offset the decline at the regional and national levels. Thus, the decline in production at the national level was largely due to the huge decreases in Southern and Eastern provinces. Both of these provinces are major surplus areas but are also more prone to drought compared to Central and Northern provinces, which are in the high rainfall zone.

When the market was fully liberalized we notice that production fell by about 24 percent at the national level from 20 million bags in 1989 to 16 million bags in 1996 in spite of the good weather conditions. Maize production in both the LOR and non-LOR provinces declines after liberalization by almost the same percentage points, 23 and 24 percent, respectively. At the provincial level, we see a reduction in maize production in all four major surplus provinces, however the decline is much more in Southern (37%), followed by Eastern (30%) and Northern (25%) and then Central (21%). Production however increases in the deficit provinces, Copperbelt (27%) Western (22%), Lusaka (8%) and Northwestern (2%).

Under a well functioning market and everything else being the same, production should have increased in the two LOR provinces after liberalization. This did not happen. Instead maize production declined in Southern and Central Provinces. In the non-LOR region production is decreased in the two surplus provinces (Eastern and Northern) as expected. Overall therefore, production does not increase as expected in the LOR region and at the national level. Instead production at the national level falls basically because production in the LOR falls after full liberalization, suggesting the limited response by the private sector to maize market liberalization. These results suggest that the private sector, especially the farmers in the LOR region were not responding to the increased prices as expected. In this case the weather may not be responsible for the reduction in maize production. Other factors, therefore, must be at play and it is our argument that the maize market may not be working as envisioned or that the maize market is being

constrained by non-price factors (see chapter 6).

The fall in production as revealed above suggests that consumption could not be met by domestic production. Instead the government had to resort to imports. During 1992, consumption increased by 27 percent when the market after partial liberalization of the maize market (see Table 4.3). Thus a total of 720,000 metric tons of maize had to be imported in 1992 to fill the domestic production gap. The drought also led to a 25 percent decline in agricultural real GDP (GRZ 1992, as quoted in Mwanaumo, 1994). However, the increase in the estimated consumption under normal rainfall was only 10 percent at the national level after full liberalization of the maize market.

4.6 Changes in Maize Deficits and Surpluses after Liberalization

This section examines the changes in regional maize production and consumption by comparing the maize deficit or surplus position of the provinces before and after liberalization under similar rainfall conditions. Under normal conditions (i.e., everything being equal), liberalization should increase maize surplus in the two surplus LOR provinces (Central and Southern) and reduce maize surplus in the two non-LOR provinces (Eastern and Northern). For the deficit provinces, the effects of liberalization on the maize deficit position will depend on whether the resulting increase in production after liberalization is greater than or less than the deficit before liberalization. If the increase in maize production resulting from liberalizing the market is greater than that before liberalization, then a deficit province is likely to become self-sufficient after liberalization. On the other hand, if the increased maize output resulting from liberalization is less than the deficit before liberalization, then a deficit province is likely to maintain its deficit position even after liberalization.

Table 4.3: Provincial and Regional Maize Consumption Changes [a]

Region	Under Partial Liberalization and Drought Conditions			Under Partial Liberalization and Above normal Rainfall Conditions			Under Full Liberalization and Normal Rainfall Conditions		
	1983	1992	% Change	1988	1993	% Change	1989	1996	% Change
Central	886	1,212	36.79	1,075	1,293	20.30	1,095	1,307	19.00
Copperbelt	2,346	2,939	25.31	2,860	3,094	8.17	2,944	2,282	(22.00)
Lusaka	1,268	1,576	24.24	1,491	1,678	12.54	1,643	1,930	17.00
Southern	956	1,258	31.60	1,161	1,308	12.65	1,044	1,616	55.00
LOR	5,456	6,985	28.03	6,587	7,373	11.93	6,726	7,135	6.00
Eastern	1,251	1,591	27.17	1,577	1,709	8.31	1,506	1,728	15.00
Luapula	799	879	9.95	1,005	939	(6.61)	112	898	(19.00)
Northern	938	1,439	53.41	1,092	1,508	38.13	719	1,560	117.00
N/western	573	697	21.56	693	723	4.33	804	733	(9.00)
Western	903	1,000	10.68	1,040	1,047	0.63	1,061	1,003	(5.00)
Non-LOR	4,465	5,606	25.55	5,408	5,926	9.57	5,203	5,923	14.00
Zambia	9,920	12,591	26.91	11,631	13,299	14.34	11,929	1,3082	10.00

Source: Own calculations based on equation 4.1. The national per capita consumption used in the calculation was obtained from FAO FAOSTAT 1998

Note: [a] all the consumption figures given for the respective years are in '000 * 90 kg bags.

The changes in surplus/deficit position at the national, regional and provincial levels are shown in Tables 4.4 and 4.5 below. When the changes in deficit/surplus prior to and after liberalization under drought conditions are examined, we notice that the surplus in Central province reduces by 71 percent after liberalization. In the other three surplus provinces the surplus decreases in all of them with Northern province having the largest decline (329%) followed by Southern (215%) and Eastern (137%). Note however that in the LOR region, both Central and Southern provinces' surplus is reduced instead of increased after the partial liberalization. Eastern and Northern, non-LOR provinces, however, turn out as predicted, i.e., the surplus reduces in both.

Table 4.4: Maize Surplus/Deficit Situation at the Provincial and Regional Levels Before and After Liberalization ('000 * 90 kg bags)

Region	Pre- Liberalization			Post Liberalization		
	1983	1988	1989	1992	1993	1996
Central	2415	3317	3775	708	3113	2560
Copperbelt	(21870	(2067)	(2277)	(2580)	(2211)	(1435)
Lusaka	(773)	(503)	(854)	(1137)	(725)	(10810
Southern	852	4826	4024	(977)	3832	1568
LOR	307	5572	4668	(3987)	4008	1611
Eastern	1844	4904	4498	(676)	2062	2449
Luapula	(726)	(718)	(637)	(556)	(520)	(479)
Northern	279	738	956	(640)	(172)	(304)
N/western	(478)	(387)	(427)	(512)	(398)	(348)
Western	(755)	513)	(506)	(847)	(527)	(325)
Non-LOR	163	4024	3883	(3232)	446	992
Zambia	748	9960	8551	(7218)	4454	2579

Source: Own Calculations based on equation 4.2.

Table 4.5: Provincial Changes in Maize Deficit and Surplus Position (%)

	Change in Deficit/ Surplus under Partial liberalization[1]		Change in Deficit/ Surplus under Partial liberalization[2]		Change in Deficit/ surplus with full liberalization	
	'000 * 90 kg bags	Percent	'000 * 90 kg bags	Percent	'000 * 90 kg bags	Percent
Central	(1707)	(71%)	(204)	(6%)	(1216)	(32%)
Copperbelt	393+	18%	144+	7%	841*	(37%)
Lusaka	364+	47%	222+	44%	227+	27%
Southern	(1830)	(215%)	(993)	(21%)	(2456)	(61%)
LOR						
Eastern	(2520)	(137%)	(2841)	(58%)	(2049)	(46%)
Luapula	170*	(23%)	197*	(27%)	158*	(25%)
Northern	(918)	(329%)	(910)	(123%)	(1261)	(132%)
Northwestern	34+	7%	10+	3%	79*	(18%)
Western	92+	12%	14+	3%	181*	(36%)
Non-LOR						
Zambia	(7967)	(1065%)	(5506)	(55%)	(5971)	(70%)

Source: calculated from Table 4.4.

Notes: 1 only intra-region trade is liberalized;
2 regional trade of maize is liberalised.

Key: () implies a decrease in surplus, * implies a decrease in deficit and + implies increase in deficit

With regard to the deficit provinces in the LOR region we note that in the Copperbelt and Lusaka provinces the results came out as predicated, i.e., an increase in deficit. In the non-LOR deficit provinces, however, it was only in Luapula where the deficit decreased when the market was partially liberalized. In Northwestern and Western the deficit increased. In the latter two provinces therefore, maize shipments were required.

These results, however, are misleading because for one, 1992 entailed only partial liberalization, and for the other, 1992 was a terrible drought year, the worst of its kind that the country had ever experienced in its entire history. Thus, the mixed picture after partial liberalization in the deficit/surplus position could actually be due to the severe drought. Take Eastern province for example. The surplus could have reduced after liberalization not so much because of partially liberalizing the maize market but because Eastern province, although surplus, is a drought prone province. Similarly, Southern province is a major drought province and, hence, the reason why its

surplus position reduced instead of increasing after partial liberalization. In both cases, the partial liberalization could have had little or no major effect on production. In any case the market had just been liberalized and the private sector could have been still unsure of government's commitment to liberalizing the maize market.

However, even after accounting for drought, the deficit/surplus position at the national, regional levels does not change, only the magnitude changes. For example, the surplus at the national level decreases after liberalization by 70 percent in 1996 compared to 1065 percent in 1992. Similarly, the surplus in the LOR region decreases by 61 percent in 1996 compared to 215 percent in 1992. The deficit in the non-LOR provinces on the other hand decreases by 36 percent after 1996 as expected.

4.7 Regional Changes in On-farm Storage

In this section we try to infer the lack of market integration by examining the changes in on-farm storage before and after liberalization. Unlike production changes we cannot predict what will happen to maize retentions at the regional and provincial levels. We can only predict that due to the removal of pan-seasonal pricing maize prices will likely be higher after harvest and lower at and just after harvest inducing farmers and traders to engage in speculative storage. To the extent that this happens, then retentions for those farmers and traders with storage facilities and the financial capacity to rent the government storage facilities will likely increase. However, it is possible that farmers in the non-LOR provinces may increase their retention of maize because the low producer prices resulting from removal of pan-territorial prices will result in less production and therefore increase the need for home consumption. If these farmers are more concerned with meeting own consumption then we can expect on-farm storage to increase in the no-LOR provinces.

4.7.1 Amounts Retained as a Percent of Total Production

Table 4.6 how much of the total production each province has retained during each of the six years chosen for analysis. The Table indicates that on average, forty-one percent of the total production was retained at the farm level during the entire period under review for the country as a whole. Amounts retained as a percentage of total production, however increased after liberalization from an average of 36 per cent before liberalization to an average of 47 percent per annum. At the regional level the LOR provinces retained average of 36 percent of their total production during the entire period compared to 49 percent for the non-LOR provinces. At the provincial level, all the provinces recorded increased retentions after liberalization. Southern province in particular increased its maize retentions by 30 percentage points from 41 percent before liberalization to 70 percent after liberalization. Central province, on the other hand, increased its retentions by only 15 percentage points after liberalization.

Due to the effects of the drought in both periods it is not easy to conclude that the increased quantities retained after liberalization were in fact due to lack of access to markets, thereby indicating the lack of integration after liberalization. Also bearing in mind that the post-liberalization period is characterized by different stages of liberalization, i.e., partial and full liberalization coupled with the severe drought, such a conclusion may be misleading as the increases may in fact be due to the drought. Thus, in the following section we isolate the pre-and post-liberalization periods based on three scenarios, deficit, above normal and normal rainfall conditions.

Table 4.6: Percent of Maize Retained By Farmers, Pre-and Post-Liberalization Periods

Region	Pre-Liberalization			Post-Liberalization			Average		
	1983	1988	1989	1992	1993	1996	Total	Pre-Liberalization	Post-Liberalization
Central	32.24	4.88	7.72	28.70	22.69	34.37	21.77	14.95	28.59
Copperbelt	43.26	24.38	27.44	48.55	27.43	40.10	35.19	31.69	38.69
Lusaka	56.08	23.25	40.97	84.88	32.96	41.40	46.59	40.10	53.08
Southern	46.75	42.83	33.73	99.49	45.27	65.53	55.60	41.10	70.10
LOR	39.14	26.33	22.74	45.91	34.12	46.95	35.87	29.40	42.33
Eastern	48.32	43.64	58.85	58.13	67.79	69.30	57.67	50.27	65.07
Luapula	44.99	15.35	18.63	25.49	28.34	48.27	30.18	26.32	34.03
Northern	46.33	13.30	13.65	37.15	32.28	41.43	30.69	24.43	36.95
N/western	46.04	23.34	57.68	49.06	44.48	49.99	45.10	42.35	47.84
Western	65.80	40.22	48.61	76.44	55.21	47.39	55.61	51.54	59.68
Non-LOR	48.26	36.04	47.74	47.10	55.53	59.74	49.07	44.01	54.12
Zambia	43.20	30.57	33.83	46.44	41.80	52.60	41.41	35.87	46.95

Source: GRZ (1997): Agricultural Statistics Bulletin, Central Statistics Office, Lusaka.

4.7.2 Changes in On-farm Storage

During the drought years, 1983 and 1992 when the maize market was only partially liberalized, the amounts retained at the farm level for Zambia as a whole declined by 44 percent. During the above normal and normal rainfall conditions, the surplus maize retained increased, with retentions increasing much more once the maize market became fully liberalized (Table 4.7). This suggests a lack of markets and the limited trader and farmer participation in speculative storage.

Table 4.7: Changes in Retained Maize at the Provincial Level

Region	Under Partial Liberalization and Deficit Condition			Under Partial Liberalization and Above Normal Rainfall Condition			Under Full Liberalization and Normal Rainfall Condition		
	1983	1992	% Change	1988	1993	% Change	1989	1996	% Change
Central	1,064	551	(48.22)	214	1,000	366.59	376	1,329	253.62
Copperbelt	69	174	153.69	193	242	25.25	183	340	85.61
Lusaka	278	372	34.11	230	314	36.73	323	352	8.79
Southern	845	279	(67.02)	2,565	2,327	(9.25)	1,709	2,086	22.07
LOR	2,256	1,377	(38.98)	3,202	3,883	21.28	2,591	4,106	58.48
Eastern	1,495	532	(64.45)	2,829	2,556	(9.62)	3,533	2,895	(18.07)
Luapula	33	82	150.27	44	119	168.63	88	202	128.36
Northern	564	297	(47.30)	243	431	77.22	229	520	127.49
N/western	44	91	106.93	71	145	102.83	217	192	(11.49)
Western	97	117	19.77	212	287	35.34	270	321	19.15
Non-LOR	2,233	1,118	(49.93)	3,400	3,539	4.08	4,337	4,131	(4.76)
Zambia	4,489	2,495	(44.43)	6,601	7,421	12.42	6,928	8,237	18.89

Source: GRZ (1997): Agricultural Statistics Bulletin, Central Statistics Office, Lusaka.

Studies have found that with the withdrawal of the public marketing institution a larger amount of surplus maize is remaining on the farm as the emerging traders engage in immediate turnover of their purchases with less speculative storage (see for example, GRZ 1994 and FAO 1995).

At the regional level the quantities of surplus maize retained at the farm level declined by 39 percent and 50 percent in the LOR provinces and non-LOR provinces, respectively, during the drought years of 1983 and 1992. In all the cases this is because the 1992 drought was much more severe than the 1983 drought. At provincial level Southern and Central provinces in the LOR region reduced their amounts retained by 67 and 48 percent, respectively. In the non-LOR, the two surplus

provinces Eastern and Northern also reduced the amounts retained after liberalization, 64 and 47 percent, respectively. Thus, Southern reduces its amounts retained much more than the other surplus provinces. Among the deficit provinces, all increase amounts retained except Copperbelt, which decreased its amounts retained after liberalization.

4.7.3 Changes in Retained Maize Quantities Under Normal Rainfall Conditions and Full Liberalization

Table 4.7 shows that under normal conditions, when the maize market was fully liberalized, 19 percent of production is retained at the national level compared to 12 percent during the surplus years 1988 and 1989 with partial liberalization. At the provincial level both the two surplus provinces in LOR region increase their maize retentions, while the two deficit two provinces in the LOR region increase their maize retentions, with Copperbelt's quantities increasing by 86 percent while those for Lusaka increase by 9 percent after liberalization.

In the non-LOR provinces, Eastern reduces its amounts by 18 percent while Northern province increases its amounts by 127% after liberalization. The tremendous increase in quantities retained by farmers in Northern province could imply that traders are not accessing this region due to high transportation costs and so farmers should begin to diversify into other high value crops. For Eastern province the reduced quantities after liberalization does suggest that the amounts sold have increased after liberalization. One possible explanation could be that traders may still be accessing the surplus in spite of the high transportation costs associated with transporting maize from Eastern to Lusaka, the major destination for the bulk of the maize surplus. This would suggest in turn that maize markets in Eastern province have become inefficient after liberalization. Another plausible explanation for the decrease in amounts retained, however, could be because Eastern province is a main export area of maize to Malawi. Although no figures are available it has been reported that

substantial amounts of the maize surplus in Eastern province are exported to Malawi.

In terms of the deficit provinces in the non-LOR provinces, Luapula and Western increased their retained amounts after liberalization (by 128% and 19%, respectively), while Northwestern province amounts retained were reduced (by 11%).

4.8 Summary and Conclusion

The above discussion has shown that the changes in maize production and on-farm storage have in general been affected by the drought and the stages of liberalization. When the rainfall conditions were bad any liberalization efforts were obviously overshadowed by the effects of the drought. Under normal conditions, however, the results also depended on the extent of the liberalization.

The picture that emerged under normal rainfall conditions suggests that full liberalization did not bring about any significant changes in maize supply and on-farm storage. If anything, the analysis revealed that even under normal rainfall conditions Zambia experienced a decline of 70 percent in its surplus position after the maize market was completely liberalized. This decline was, however, less than what was recorded during the drought years of 1982/1983 and 1991/199 (1065%). The deficit position in Lusaka increased by 27 percent while that in Copperbelt declined by 37 percent between 1989 and 1996. In the non-LOR the three deficit provinces still maintained their deficit position, even if the magnitude of their maize deficits had declined: Western by36%, Luapula 25% and Northwestern 18%. The analysis also revealed that the three surplus provinces (i.e., Central, Southern and Eastern provinces), that account for over 70 percent of the total maize produced in the country in most years, experienced a decline in their surplus position after liberalization. The surplus position for the surplus regions should have been greater than that before

liberalization. But this does not seem to be the case. These results suggest a limited response to price liberalization by the farmers in Zambia as well as the presence of structural rigidities.

These changes in production and amounts retained suggest that in general the maize market appears to be still segmented in spite of the full liberalization. The effect of partial liberalization (i.e., liberalization of intra-region trade) coupled with drought is on average to reduce maize supply at the national level and in both the LOR and non-LOR regions. At the national level production fell by 48 percent while consumption by 27 percent thereby resulting in a decreased surplus that was attained in 1983. That is, the production in 1992 was much lower than that in 1983 before the market was liberalized. At the regional level, there was not much difference in the changes in maize production and consumption when the market became liberalized. However, the decrease in surplus was much more in the LOR than in the non-LOR provinces. Amounts retained were also much more in the LOR than in the non-LOR provinces. These changes can largely be attributed to the effects of the 1992 drought rather than to the partial liberalization. This is confirmed by the low maize production in the LOR surplus provinces that are prone to drought and even in the non-LOR Eastern Province recorded a decrease in production because it is also a drought prone province. In other words, the effects of drought are much more felt in the drought prone areas of Central, Southern and Eastern and since these also happen to be the major surplus areas, reduction in production in these areas pulls down the production at the national level.

The lesson from all this is that liberalization under drought conditions will not have any effect and in fact does disrupt the liberalization efforts, as what happened in 1992. Because of the severe drought, government was forced to import maize since by then a private sector had not yet emerged. In addition, the government was forced to appoint a limited number of private organizations and/or traders to purchase maize directly from farmers at the government set price for

supplying the industrial mills. Also the fact that government only liberalized the intra-province trade, leaving the cooperatives to deal with inter-provincial trade, meant in effect that cooperatives provided a producer floor price and into-mill ceiling price. Thus, the pan-seasonal and pan-territorial prices still remained in effect to the discouragement of any private sector participation. Even when markets are liberalized if the environment in which the market participants operate is not conducive, liberalization will have very limited results, if any.

In the next chapter we formally test the integration of markets and in Chapter 6 we seek to identify the constraints that have prevented the emergence of a vibrant private sector.

CHAPTER FIVE

EVALUATION OF THE EFFICIENCY OF THE MAIZE MARKET

5.1 Introduction

The general consensus among economists and policy makers has been that market reforms enhance economic growth as opposed to interventionist policies (FAO, 1987; and Onafowora and Owoye, 1998). Thus, the past eighteen years have seen a number of Sub- Saharan African countries adopt market-oriented policies which have called for the reduction and/or complete elimination of the main market distortions. Within agriculture, particularly the food sub-sector, these have include the removal of restrictions on inter-regional movement of food crops by traders; elimination of pan-territorial and pan-season pricing; and reform or complete abolition of government parastatal marketing organizations, thereby, allowing greater private sector participation.

Market integration is a central issue in many contemporary debates concerning these issues of market liberalization. Market integration is perceived as a precondition for effective market reform in SSA and indeed in other developing countries. "Without spatial integration of markets, price signals will not be transmitted from urban food deficit to rural food surplus areas, prices will be more volatile, agricultural producers will fail to specialize according to long-term comparative advantage, and the gains from trade will not be realized" (Baulch, 1997: p.477).

For spatially dispersed regional food markets, as exist in many Sub-Saharan African countries, the nature and extent of market integration in the context of food market liberalization is of vital importance since many of the regional food markets are characterized by periodic food

shortages which have the potential to generate transient food security, and sometimes, even chronic food security problems. Merely knowing that markets are integrated is not enough. One needs to also know the extent of spatial market integration within the context of market integration.

This chapter formally tests whether regional maize markets in Zambia have become integrated. Cointegration analysis, which is used for this purpose also allows us to examine the extent of the integration of the regional maize markets in Zambia. The rest of the chapter is organized as follows: the section that follows provides the main objectives of the chapter. Third section gives a theoretical and empirical review of market liberalization and market integration. The fourth section develops the model to be utilized as well as the data used. The fifth section provides an analysis of the results. The last section is a summary of the chapter.

5.2 Objectives of the Chapter

This chapter will argue that even though the regional trade barriers were fully eliminated in 1995, the markets were still not integrated by the end of 1997 indicating the presence of obstacles to private sector participation in the markets. In chapter six an attempt will be made to identify these obstacles and to examine how the emerging market participants have organized themselves in response to the challenges that the liberalization of the maize market has brought about.

The major aim of this chapter, therefore, is to evaluate the integration of the regional maize markets. The specific objectives are: 1) to test whether short-run and long-run integration has occurred in the regional maize markets; and 2) determine the extent of the impact of market liberalization on the integration of regional maize markets.

5.3 Background on Market Liberalization and Market Integration

5.3.1 Market Liberalization Experience in Sub-Saharan Africa

The liberalization of agricultural markets has been a major component of the structural adjustment programmes that have been embarked upon by a number of developing countries, particularly Sub-Saharan African countries, including Zambia. Structural adjustment programmes, especially as they relate to food markets, have focussed largely on agricultural pricing and on redefining the role of marketing boards. It was assumed that liberalization of the pricing policy would result in higher prices to producers and reduced prices for consumers, thereby stimulating production and regulating supplies to consumers. On the other hand, it was assumed that by liberalizing the marketing of food crops private traders would respond and fill up the gap that would be left by the government parastatals and that this would result in improved efficiency of the food markets.

Observers on agricultural reforms in SSA countries conclude that the success of these reforms depends on the capacity of the private trading sector to respond rapidly and take up the functions previously performed by state monopolies (Santorium and Tibaijuka, 1992). A number of studies indicate that liberalization has led to a significant entry of private traders in the SSA food markets in the last decade, leading to fairly competitive and efficient food markets (see for example, Lele and Christiansen, 1988; Dione, 1989; Coulter and Golob, 1992; Chisvo, Jayne, Teft, Weber and Shaffer 1991, Kaluwa and Chilowa, 1991; and Mendoza and Randrianarisoa 1998). However, the results indicate that the grain markets are dominated by numerous small-scale traders and only a limited number of large scale traders. The participation of traders, particularly the small-scale traders, appears to be limited both in terms of geographical and volume expansion thus leading to less efficient food markets (see for example, Jones 1994).

Although inter-regional trade barriers have been removed in most African countries, allowing private traders to move food crops from one region to another, food restriction movements are still in force in some countries, e.g., South Africa, and have been removed only recently in Kenya, Sudan, Zimbabwe and Mozambique (Jayne *et.al.*, 1995).

5.3.2 Market Liberalization Experience in Zambia

Until 1995 the Zambian government intervened in the pricing and marketing of maize. The pricing policies involved pan-territorial and pan-seasonal pricing whereby the government set and announced the prices at which NAMBoard procured maize from the farmers and the into-mill prices at which NAMBoard sold maize to millers. The marketing policies involved the monopoly in maize marketing by government parastatals, to the elimination of private sector trading, especially in the urban areas. Any private sector participation that existed in maize marketing was mainly restricted to the rural areas (Lele and Chandler 1984; Malambo 1987). While in most SSA countries (e.g., Malawi and Zimbabwe) private trader participation in grain markets was prohibited legally prior to the liberalization, in Zambia the restitution (rather than the legal prohibition to inter-regional trade) favouring the cooperative NAMBoard marketing system for conducting inter-regional trade explains the absence of a significant private trading sector that would compete with these government sponsored institutions (Kydd,1988).

This system entailed the transport of maize from long distances from remote surplus areas to a parastatal mill located mainly in the major urban cities. Once the maize was milled it was hauled back to the rural areas over the same distance. A number of studies and reviews on the maize pricing and marketing policies indicate that this system was too costly and inefficient (Muntanga 1984; Mwanaumo 1987; Sipula 1993; and Kalinda 1993). Thus, in 1995 the

monopoly of cooperatives in maize marketing was abolished through the Food Reserve Act and maize trade became completely liberalized, allowing for the first time the participation of private traders in maize marketing. The pan-seasonal and pan-territorial pricing system was also abolished allowing the forces of demand and supply to determine the producer and into-mill prices.

The impact of these market reforms on the efficiency of the maize market as well as the extent of market integration has not been well documented in Zambia. The Ministry of Agriculture, Food and Fisheries under the FAO project has carried out a number of market liberalization impact studies on various aspects of the agricultural market liberalization in general, and maize market liberalization in particular, in the three surplus provinces of Central, Eastern and Southern. For example, an impact study on the characteristics of the emerging private traders carried out in the Central, Eastern and Southern provinces of Zambia in November 1994 (see GRZ, 1994b) revealed that private traders had responded quickly to the economic opportunities presented by the liberalization of the maize market, but the marketing chains established were longer and costly. This was attributed to the lack of a developed intermediate link between the producers and the consumers. The study also found that the two maize market trading sectors that had emerged (i.e., small scale trading sector and large scale trading sector) were vertically and spatially segmented as they operated in relatively separated circuits with the small-scale trading sector supplying largely the open public markets and the large scale trading sector supplying the major industrial mills based mostly in the urban deficit centres of Lusaka and Copperbelt.

With market liberalization, we expect prices to be lower at and shortly after harvest time and higher just before harvest, reflecting the increasing and decreasing quantities of maize marketed respectively. The marketing season in Zambia runs from May to April. A study of the

development of wholesale maize prices at public markets (GRZ 1995) found that during the 1994/95 marketing season, maize prices were consistently low from May to November but sharply rose between December and February. This uneven development of wholesale maize prices was attributed to a number of factors, such as distress selling by farmers at the beginning of the marketing season as farmers try to meet their cash needs; increasing marketing costs; insufficient maize production due to the partial drought during the 1993/94 season; and leakages of maize into neighboring countries, especially Zaire and Malawi (GRZ, 1995). Imports have particularly had an adverse effect on the development of maize prices in Zambia. Available data, although limited, show that when yellow maize was imported during the 1992 drought and injected onto local markets, yellow maize was priced at about 10 percent to 35 percent lower than the price for white maize produced in Zambia for comparable refined meals (Jayne *et.al.*, 1995, p.15).

In a liberalized setting, we expect marketing margins to be low where production and consumption are relatively close together, haulage distances are shorter and storage periods are shorter. On the other hand, if production and consumption are geographically separated, and distances are longer, marketing margins tend to be higher. Zambia is characterized by one crop production season with maize being harvested once a year and long haulage distances with sparsely scattered production regions away from the main consumption areas. A number of studies in Zambia have found that liberalization has resulted in a reduction in marketing margins at the retail and processing levels (GRZ, 1995; Jayne et.al., 1996; and Kähkönen and Leathers, 1999) but an increase in marketing margins at the farm level (Kähkönen and Leathers, 1999). The GRZ (1995) study found that marketing margins were between 15 and 30 percent for those large-scale traders supplying maize to nearby industrial millers and between 32 and 45 percent or

even up to 54 percent for those traders transporting maize over longer distances. For the traders supplying the public markets the retail marketing margins were between 15 and 30 percent (GRZ 1995a). These results indicate that wholesale marketing margins at industrial mills are lower than the wholesale marketing margins at public markets, suggesting that the latter is less efficient than the former. Jayne et.al., (1996) found that as a result of increased competion from the informal millers and traders, the processing and retail distribution costs in the official marketing system reduced by more than 20 percent after market reform. Kähkönen and Leathers (1999) found that the efficiency of mill-to-retail marketing of maize had increased since liberalization, while the efficiency of farm-to-wholesaler marketing of maize had decreased. They furthe established that transaction costs of the mill-to-retail marketing had decreased while that of the farm-to-wholesaler had increased during the same period. These two phenomenon suggest limited competition of traders at the farm level, especially in the remote areas and, therefore, lack of integration of the surplus rural markets with the major urban deficit cities such as Lusaka and Ndola.

Overall the results from these studies suggest that although the response of private traders in Zambia has been overwhelming with the marketing of maize being carried out almost entirely by the private traders, the maize markets are still not well integrated. These studies are however, limited in that they are mostly descriptive and they do not formally test for market integration. They are also limited to marketing of maize within the three surplus areas with no attempt being made to examine the linkages between these areas and the deficit areas in the rest of the country.

5.3.3 Market Integration

An indirect means of analyzing market efficiency or private trader behavior is to test for market integration (Hopcraft, 1987). Three types of market integration are identified in the literature, inter-temporal, spatial and vertical. Vertical market integration is concerned with stages in marketing and processing channels. Inter-temporal market integration relates to the arbitrage process across periods. Spatial integration is concerned with the integration of spatially distinct markets. The concept of market integration has normally been applied in studies involving spatial market inter-relatedness.

A fundamental issue preoccupying many researchers is whether market liberalization enhances the integration of spatial markets (Silumbu, 1992; Goletti and Babu, 1994; Goletti *et.al.*, 1995; Barrett 1996; and Dercon, 1995). Silumbu (1992), utilizing monthly wholesale prices, tested for spatial and inter-temporal market integration of maize markets in Malawi. He found that the integration of urban markets had increased slightly even under partial liberalization of the maize markets. Goletti and Babu (1994), using different measures of integration and monthly retail maize prices for eight regional markets in Malawi, concluded that liberalization of the maize market had increased market integration. Dercon (1995) also showed that market liberalization had improved short-run integration of the teff markets in Ethiopia. The International Food Policy Research Institute (IFPRI) has also carried out a number of studies on the effects of liberalization on market integration in five African countries focussing on maize markets (Ghana, Benin, and Malawi) and rice markets (Senegal and Madagascar) (see Badiane et.al., 1997). The results are mixed with market integration being higher in Benin and limited in the other four countries, especially Malawi and Madagascar.

5.4 Methodological Considerations in Market Integration

As the number of studies on market liberalization have proliferated, so have the studies testing for food market integration (see for example, Gupta and Mueller, 1982; Hytens, 1986; Ravallion, 1986; Silumbu, 1992; Alexander and Wyeth, 1994; Goletti and Babu, 1994; Dercon, 1995). The initial empirical studies on market integration utilized static price correlation to test for spatial market integration in agriculture (see for example, Jones 1968, 1972; Farruk, 1970 and Lele, 1972). This involves the estimation of bivariate correlation or regression coefficients between the time series of spot prices for an identical good or bundle of goods at different market places. A statistically significant coefficient implies that the two markets are integrated. This kind of modelling of spatial market integration has, however, been criticized for masking other synchronous factors like inflation, seasonality, etc. Among the main critics of bivariate correlation are Blyn (1973); Timmer (1974); Harriss (1979).

Time series methods have been introduced in the study of market integration to counteract the problems of common trends and non-stationarity of food prices inherent in bivariate price correlation models. These studies also formerly model the issues pertaining to short-run and long-run integration, seasonality and degree of market integration (see Boyd and Brosern, 1986; Delgado 1986; and Ravallion 1986; Heyten 1986; and Timmer 1986).

Over the years a number of empirical studies utilizing time series data have been carried out to study the integration of markets. Four approaches have been utilized (see Baulch 1997), namely, the "Law of One Price" (LOP) (Richardson, 1978), Ravallion model (Ravallion 1986), Granger causality (Granger 1969; Alexander and Wyeth 1994; Goletti and Babu 1994) and cointegration ((Engle and Granger 1987; Ardeni 1989; Goodwin 1992; Palaska and Harriss-White 1993; Alexander and Wyeth 1994; Silvapulle and Jayasuriya 1994; Mendoza and Rosegrant 1995;

Park 1997).

The LOP tests for perfect co-movement of prices within a single data period. The LOP assumes that as long as markets are cointegrated, price changes will be conveyed from one market to another on a one-to-one basis. That is, the current price changes in one spatial market is influenced by the current price changes in another market. There are, however, problems to this approach that the literature identifies (Ismet, Barkley and Llewelyn 1998). First, it is pointed out that the approach presumes that trade must occur in each and every period. Second, occurrence of transfer cost changes that are non-random may lead one to reject market integration even when arbitrage holds. Third prices are assumed to be exogenously determined in one market. Fourth, the approach takes marketing margins to be either constant or proportional as a maintained hypothesis. The LOP has been used to test for short and long-run relationships by Protopapadakis and Stoll (1986) and has been found to hold. Ardeni (1989), however, using cointegration, found the LOP not to hold when tested as a long-run relationship largely because it did not take into account the stationarity of price series.

Unlike the LOP, the Ravallion model assumes that price adjustments between two spatial markets take time. In this way both the long-run and the short-run market integration can be tested. The Ravallion model also assumes a uni-directional movement of price changes from the central market to the reference (rural) market. Thus, for non-stationary prices, an error correction mechanism is incorporated, relating the contemporaneous change in price in market i to the contemporaneous and past spatial price differentials and lagged price in market j. The Ravallion approach to testing market integration has been modified in recent years. Faminow and Benson (1990) revisited it by introducing base point pricing. Alexander and Wyeth (1994) revise the Ravallion model by employing econometric integration and cointegration techniques.

Granger causality method (Granger 19969; Alexander and Wyeth 1994) employs an error correction mechanism to determine the extent to which current and past price changes in one market explain price changes in another. The error correction mechanism helps to alleviate the problems of auto-correlation and multicollinearity of most food price series (Baulch 1997).

While the above methods have utilized econometric techniques to analyze market integration, they base their conclusions for market integration on non-stationary price data. That is they ignore the properties of time series data such as stationarity and cointegration. The cointegration approach takes these issues into consideration. The approach tests whether two markets are integrated in the long-run by assessing whether prices wander within a fixed band (Baulch 1997, p.518). An integrated market is one in which a long-run relationship exists between pairs of price series (Engle and Granger, 1987). If two price series are cointegrated, this suggests interdependence while absence of cointegration indicates segmentation. Goletti *et al.* (1995) point out that if cointegration is rejected in both directions then the two markets are segmented while the presence of cointegration in both directions indicates that markets are integrated. Markets may not be integrated because they are not linked by arbitrage, i.e., they represent autarkic markets or because there are impediments to efficient arbitrage like trade barriers, imperfect market information or risk aversion (Ravallion, 1986 and Buccola, 1983) or because of the presence of imperfect competition (Faminow and Benson, 1990).

Another issue that has arisen in the literature is whether, the use of a bivariate approach that assumes a radial configuration of markets is realistic. Given the nature of food markets in many SSA countries, the assumption of a single central market does not hold since there are many regional markets which have linkages that bypass the central market (Silvapulle and Jayasuriya 1994 p.370). Silvapulle and Jayasuriya argue further that the existence of a central market is

arbitrarily assumed rather than discovered from the data. In cases where a number of regional markets have direct linkages with each other, important long-run price relationships may exist among these markets and these could be missed out if the radial type of market is assumed.

Due to these problems a number of studies in recent years employ the multivariate approach to infer market integration (e.g. Silvapulle and Jayasuriya, 1994, Chang and Griffith, 1998). The use of multivariate analysis is the best approach to use if prices are endogenously determined, which is usually the case for food markets in which prices are simultaneously determined. The multivariate approach was used by Silvapulle and Jayasuriya (1994) in their study of the Philippines rice markets to study the cointegration of markets and and it was found thtat the rice markets are cointegrated. Chang and Griffith (1998) applied the multivariate approach to Australian monthly beef prices at the farm, wholesale and retail levels and found all three prices to be cointegrated.

Due to the appealing nature of the multivariate model and given the nature of the regional maize markets in Zambia, this study adopts the multivariate approach based on the Johansen cointegration procedure to test for market integration. This is discussed in the next section.

5.5 Empirical Model

The success of market liberalization is dependent on how well price signals are transmitted (to the market participants) from one region to another. Analysis of agricultural production, like inter-temporal demand analysis, is usually based on lagged response to price information. Moreover, if supply is taken in the broader context of stock build-up and draw-downs as well as production, one can also consider the speed at which traders and other suppliers to the markets

react to price information (including overreaction to such information in the short run as indicated by Ravallion (1987)).

The theoretical model of spatial market integration predicts that under competitive conditions price differences between two regions in the same economic market for a homogenous commodity will differ by exactly the inter-regional transportation costs. Market integration, thus, involves a test of price efficiency by examining how food markets in different regions respond jointly to supply and demand forces. If price movements in different parts of the country tend to behave similarly, reflecting costs of transferring the product between two regions, then markets are said to be integrated.

5.5.1 Cointegration of Regional Maize Markets: Bivariate Approach

Market integration is concerned with linkages among markets, i.e., the interdependence of prices between pairs of markets. The idea is to determine whether any long-run relation exists between markets. To simplify matters we will start by assuming two markets, a local or peripheral market (e.g., Chipata) and a central or reference market (e.g., Lusaka). The two markets are said to be segmented if the price changes in the reference market do not influence the price changes in the perioheral market. That is, the two markets have no long-run relationship with each other. But is the two markets posses a stable long-run relation with each other, then the two markets are said to be cointegrated (Granger and Weiss, 1983).

Denoting the peripheral and reference market prices by P and R, respectively, then the following relationship between the two price series can be written as follows:

$$P_t = \delta + \alpha R_t + \varepsilon_t \qquad (5.1)$$

where P_t and R_t are wholesale prices for maize at time t in the peripheral (or local) market and the reference (or central) market, respectively, δ and α are parameters to be estimated, and ε_t is the error term. If prices are measured in levels then the intercept denotes fixed marketing margins and the coefficient for the reference market measures the cost of arbitrage between the peripheral and reference market. That is the marketing margins in the peripheral market are stricly proportional to the prices in the reference market. Thus, long-run integration in this case requires that $a = 1$ and the intercept is a constant that can take on any value. Following Palaskas and Harris-White (1993) and Alexander and Wyeth (1994) equation (5.1) is transformed into logs in order to avoid the biased standard errors of the cointegrating regression.

To test if the two price series are cointegrated Engle and Granger (1987) proposed a two stage procedure. In the first stage, the individual price series are tested for the order of integration (i.e., the number of times that each price series has to be differenced before it becomes stationary) in order to determine whether they are stationary or not. A variable is integrated of order, *d,* i.e., *I(d)*, if it is differenced *d* times to become stationary. A variable is stationary in levels if it is integrated of order zero, *I(0)* and is integrated of order one if it has to be differenced once, I(1) to become stationary. If the series is not found stationary when differenced once, then the series is differenced a second time, in which case it becomes integrated of order two, *I(2)* and so on. Most economic variables, especially price series, are not stationary in levels and, therefore, have to be differenced once or more before they become stationary. However, most price series are rarely integrated of order higher than two, and are usually I(1) if non-stationary (Kennedy,

1998).

To test whether a univariate variable is stationary a number of tests are available in the literature and these include the Dickey-Fuller test (DF) (Dickey and Fuller, 1979), the augmented Dickey-Fuller test (ADF) (Dickey and Fuller, 1981 and the Philips-Perron (PP) test (Perron 1988).

In the second stage P is regressed on R and the residuals from the cointgrating equation (5.1) are tested for stationarity using the same test statistics mentioned above. If any of these test statistics indicate that two prices, P_t and R_t, are integrated and cointegrated, then the existence of long-run market integration is implied (Alexander and Wyeth, 1994).

5.5.1.2 Error Correction Model

The error correction model asserts that if P_t and R_t are cointegrated, then the error term from the cointegrating equation should be included, otherwise a first differencing regression between the two prices will be misspecified and cannot, therefore, be employed to test for market integration (Palaskas and Harris-White 1993, Dercon 1995). Engle and Granger, (1987) showed that a series of market prices with a long-run relationship but with significant short-run divergences can be given an error-correction representation as follows:

$$\Delta P_t = \sum_{j=1}^{n} \theta_{1j} \Delta P_{t-j} + \sum_{j=1}^{n} \theta_{2j} \Delta R_{t-j} - \gamma_1 (P_{t-1} - \alpha R_{t-1} - \delta) + \varepsilon_{1t} \tag{5.2}$$

and

$$\Delta R_t = \sum_{j=1}^{n} \theta_{3j} \Delta R_{t-j} + \sum_{j=1}^{n} \theta_{4j} \Delta P_{t-j} - \gamma_2 (P_{t-1} - \alpha R_{t-1} - \delta) + \varepsilon_{2t} \tag{5.3}$$

where: Δ represents the difference operator (e.g., $\Delta P_t = P_t - P_{t-1}$),

ε_{1t} and ε_{2t} are uncorrelated white noise processes,

θs, γs, are parameters to be estimated, and

$(P_{t-1} - \beta R_{t-1} - \alpha)$ is the lagged error term from the cointegrating equation (i.e., 5.1).

The advantage of the error correction model is that not only can the short-run and long-run information be conveyed between markets but also the relevant direction of flow of price information can be determined. Therefore, Granger causality from R to P can be inferred from the rejection of the following joint hypothesis:

$$\theta_{21} = \ldots = \theta_{2n} = \gamma_1 = 0 \qquad (5.4)$$

Similarly, Granger causality from P to R can be inferred from the rejection of the joint hypothesis,

$$\theta_{41} = \ldots = \theta_{4n} = \gamma_2 = 0 \qquad (5.5)$$

The implication of equation (5.4) is that the null hypothesis that R does not Granger cause P is rejected if the lagged values of ΔR are jointly significant and the coefficient on the error term is significant. That is, the past price changes in the reference market (R) and the lagged price differential explain the current price changes in the peripheral (P) market. Similarly the hypothesis in (5.5), (i.e., P does not Granger cause R) is rejected if the lagged values of P are jointly significant and the lagged value of the error term is significant, implying that the current price change in the reference market (R) can be explained by the past price changes in the peripheral (P) market and the lagged price differential.

5.5.1.3 Dynamic Adjustments

Just knowing that markets are integrated is not enough. One also needs to know the extent of market integration. Since markets do not instantaneously adjust, we need to know how

markets adjust in the short-run. To do this we have to estimate a structural equation in which the current value of the independent variable is included on the right hand side of the equation. In this case, the following structural version of equation 5.2 is represented as follows (Dercon 1995):

$$\Delta P_t = \sum_{j=1}^{n} \mu_{1j} \Delta P_{t-j} + \sum_{j=0}^{n} \mu_{2j} \Delta R_{t-j} - \lambda_1 (P_{t-1} - \beta R_{t-1} - \delta) + \varepsilon_{1t} \tag{5.6}$$

and

$$\Delta R_t = \sum_{j=1}^{n} \mu_{3j} \Delta R_{t-j} + \sum_{j=0}^{n} \mu_{4j} \Delta P_{t-j} - \lambda_2 (P_{t-1} - \beta R_{t-1} - \delta) + \varepsilon_{2t} \tag{5.7}$$

The hypothesis of short-run market integration implies that price changes in the reference market will be transmitted instantaneously to the peripheral market. This involves the testing of the following joint hypothesis:

$$\mu_{11} = \ldots = \mu_{1n} = \mu_{21} = \ldots = \mu_{2n} = 0; \lambda = 1; \mu_{20} = \alpha \tag{5.8}$$

and

$$\mu_{31} = \ldots = \mu_{3n} = \mu_{41} = \ldots = \mu_{4n} = 0; \lambda_2 = 1; \mu_{40} = \alpha \tag{5.9}$$

The null is rejected if none of the lagged variables are significant in the respective equations and any change in the current variable (R and P, respectively) is conveyed according to the long-run relationship and any departures from the long-run relationship is corrected immediately. Since all the variables are stationary, standard F-tables can be used to determine if the null hypothesis is rejected or not.[15] If the null of no short-run integration is rejected, then this may indicate that the two markets are efficient in transmitting information from one market to another, since

[15] Testing for short-run in this case includes testing for $\mu=\alpha$ where α is the coefficient for the cointegrating equation which is specified using non-stationary variables and is biased in small samples. Dercon (1995) suggests that in a large enough sample the estimated α obtained from a two step procedure can be used even though this involves loss of power of the test statistic.

transmission is faster.

Studying the dynamics involved in the transmission of prices among markets can also help us determine the speed of adjustment, i.e. the length of time (e.g., days, weeks, or months) it takes for price information to be transmitted from one market to another. The speed of adjustment to errors is reflected in the coefficients of the relevant error term. The value of the coefficient λ measures the speed with which the sytem moves to its long-run equilibrium. The closer to one λ, is *"the faster errors relative to the long-run solution will be corrected, suggesting an improvement in arbitrage relative to periods of slower adjustment"* (Dercon 1995, p. 124). But as Goletti and Babu (1995) point out, the speed at which prices respond to the errors is not necessarily an indication that markets are efficient but an indication of how flexible the markets are.

Dercon further suggests testing whether the long-run solutions implied in the cointegrating equation (i.e., equation 5.1) are consistent with those from the short-run equation. This involves testing the following restrictions:

$$\alpha \sum_{i=1}^{n} \mu_{1i} + \sum_{i=0}^{n} \mu_{2i} = \alpha \qquad (5.10)$$

and

$$\alpha \sum_{i=0}^{n} \mu_{3i} + \sum_{i=0}^{n} \mu_{4i} = \alpha \qquad (5.11)$$

According to Dercon (1995), if the markets under consideration are cointegrated then the above restrictions should not be rejected because the long-run solution to equation 5.6 and 5.7 respectively , is:

$$\Delta P = \frac{\sum_{i=0}^{n} \mu_{2i}}{1 - \sum_{i=1}^{n} \mu_{1i}} \cdot \Delta R \qquad (5.12)$$

and

$$\Delta R = \frac{\sum_{i=0}^{n} \mu_{4i}}{1 - \sum_{i=1}^{n} \mu_{3i}} \cdot \Delta P \qquad (5.13)$$

such that 5.12 and 5.13 are just alternative ways of testing whether the coefficient on the current variable (i.e., P and R) is consistent with the long-run value from the cointegrating equation (i.e., α). If the variables are cointegrated, then long-run market integration implied in equation 5.1 should be consistent with the long-run market integration inferred in equation 5.6 and 5.7.

5.5.2 Cointegration of Regional Maize Markets: Multivariate Approach

To avoid any estimation problems that a bivariate model may pose e.g. simultaneity bias and non-normality, three factors have to be taken into consideration when estimating any cointegrated system: the existence of unit roots, the multivariate nature of the system, and the dynamics involved (Gonzalo, 1994). Gonzalo (1994) points out that even though a number of methods exist for testing cointgration of markets maximum-likelihood (ML) system estimation is better than the single equation bivariate model discussed above or other multivariate approaches. It is important to estimate a system of equations since using a bivariate approach may miss out some of the linkages between markets. Also, price series tend to move together rather than independently since they are linked by common stochastic trends (Stock and Watson, 1988). Also

the bivariate approach discussed above is based on the assumption that only one linear combination of variables is stationary. However, given the nature of food markets, more than two stable linear combinations are likely to exist. Thus, a multivariate approach is suitable in the case of Zambia.

Having established that the variables are non- stationary, a maximum likelihood approach based on a finite Vector Autoregression (VAR) model, as developed by Johansen (1991), can be specified to determine whether the system of equations are cointegrated, i.e., have a long-run relationship. A standard VAR model with lag length p, VAR(p) is specified as follows:

$$X_t = A_0 + A_1 X_{t-1} + \ldots + A_p X_{t-p} + V_t \qquad t=1,\ldots,T, \qquad (5.14)$$

where:

p = lag length;

X_t = an (n x 1) vector of endogenous variables;

X_{t-j} = an (n x 1) vector of the jth lagged value of x_t;

A's = (n x n) matrices of unknown parameters;

V_t = is an independently and identically distributed n-dimensional vector with zero mean and variance matrix Σ_ε.

The next step involves specifying a VAR model in an error correction form, i.e., a vector error correction model (VECM) with p lag length using the VAR above. Following Johansen (1988) and Johansen and Juselius (1990) a general system of regression equations is stipulated as follows:

$$\Delta X_t = \Gamma_0 + \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{p-1} \Delta X_{t-(P-1)} + \Pi X_{t-p} + \upsilon_t$$

or

$$\Delta X_t = \Gamma_0 + \sum_{j=1}^{p-1} \Gamma_j \Delta X_{t-j} + \Pi X_{t-p} + \nu_t \qquad (5.15)$$

where

$$\Gamma_0 = A_0$$

$$\Gamma_j = -\left(I - \sum_{j=1}^{p-1} A_j \right), j = 1,2,\ldots, p-1$$

$$\boxed{\Pi = -\left(I - \sum_{i=1}^{p} A_i \right);}$$

and ΔX_{t-j} is a (n x 1) vector of X_t-j in first differences, j=1, 2,...., 1. Π and Γ_j (j = 1,...,k) are n by n matrices of parameters and υ_t is an n-vector of residuals which are assumed to be normally distributed with mean 0 and have a contemporaneous covariance matrix Σ_ε. The long-run information in Xt is summarised by the long-run impact matrix, Π.. The Π is the rank of the matrix of the VECM that determines the number of independent cointegrating vectors. If the matrix Π has a rank, r, greater than zero, then cointegration is present. If on the other hand, the rank of Π is zero, then the variables are segmented or do not have a long-run relationship and the model translates into a standard VAR model in differences.

Johansen and Juselius,1990 propose two liklihood-ratio tests statistics to based on different assumptions about the the alternative hypothesis. These are the trace statistic tests, λ_{Trace}, and the maximum eigenvalue statistic test, λ_{max} and are specified as follows:

$$\boxed{\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1-\lambda_i)} \qquad (5.16)$$

$$\lambda_{max}(r, r+1) = -T \ln(1 - \lambda_{r+1}) \qquad (5.17)$$

Where λ_i = the estimated values of the eigenvalues from the estimated Π matrix

T = the number of observations used

Equation 5.16 tests the null hypothesis that there are r or less cointegrating vectors, i.e., $r \leq 1$, while equation 5.17 tests the null hypothesis that there are exactly r integrating vectors, i.e., $r = 1$. The test statistics are then compared to the critical values. If the calculated test statistics are greater than the critical values, then the null hypothesis is rejected in each case.

Just like with the bivariate approach, the VECM in a multivariate system conveys information on rates of adjustments and feedback effects. That is, the Π matrix can be decomposed into the product of α and β where $\Pi = \alpha \beta$. The short-run dynamics among the variables can be evaluated by examining the significance of and signs on the estimated lagged coefficients. The dynamic of the system can be inferred from the parameter α which is interpreted as the matrix of speed of adjustment coefficients. If the value of α is low then the system is said to adjust slowly to the deviations from the long-run equilibrium. Higher values of α suggest the high response of the system to these deviations. If on the other hand, the value of α is zero then the system is not responding to the disequilibrium error. This implies that the variables may be weakly exogenous (Chang and Griffith,1998). The parameter β represents the cointegration relationships in which the disequilibrium error is stationary (Johansen and Juselius 1990).

The discussion in the next section will only apply to the results from the multivariate approach, preliminary estimation using the bivariate approach indicated that the multivaraite approach represented the situation prvailing in Zambia better. Also most current empirical reseach employs this approach.

5.6 Results

5.6.1 Study Area and Data Used for Analysis of Regional Market Integration

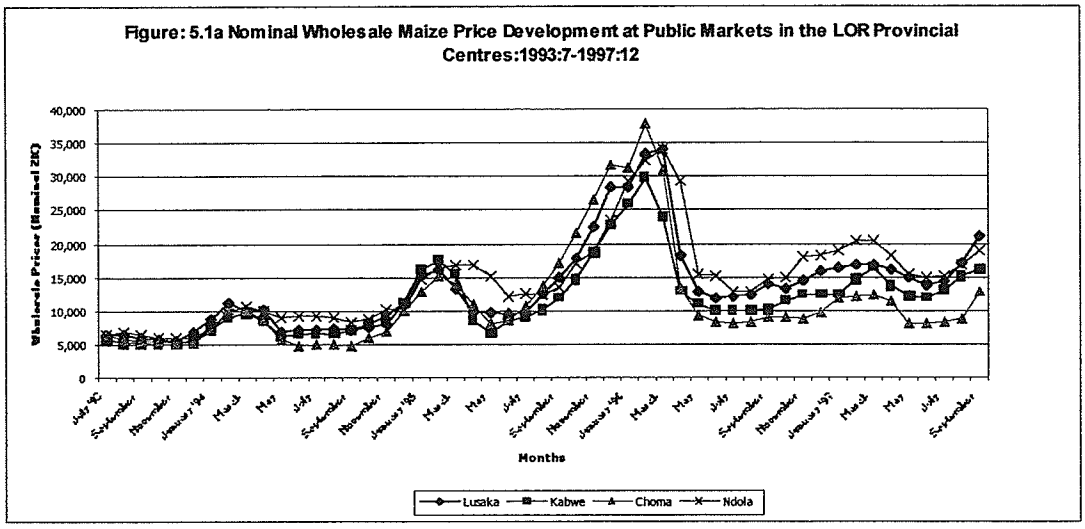
Maize is the staple food crop which is grown all over Zambia. Some inter-regional trade in maize occurs between some regions that are deficit and surplus in maize production. Seven regional maize markets: Lusaka, Ndola, Mongu, Kasama, Choma, Kabwe and Chipata, for which data were available on a longer time period were selected to test for the integration of the maize markets. Although price data is collected from various markets around the country (see Appendix 2.1) consistent data was only availble for these seven regional centers.

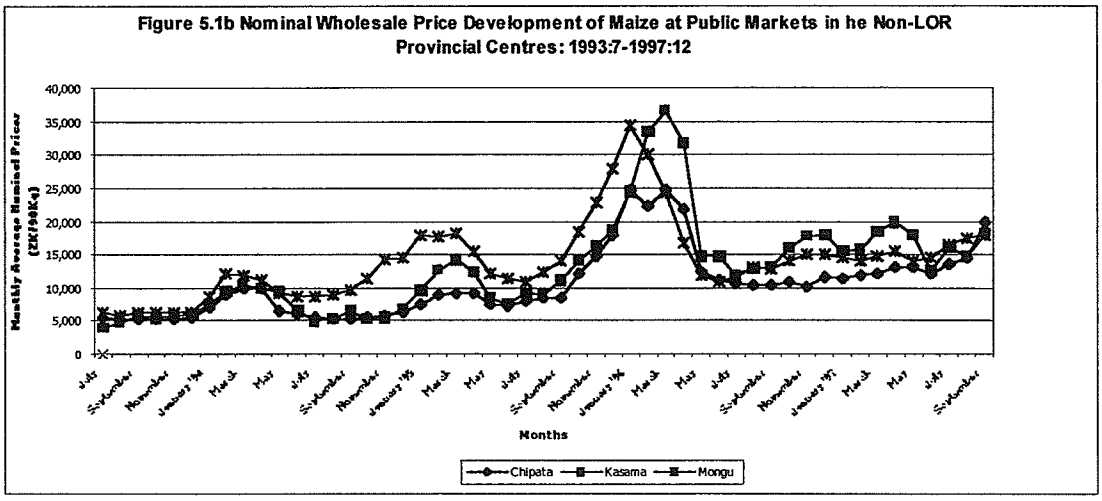
Lusaka located in Lusaka Province in the LOR region is the capital city as well as the major centre of business and trade. It possesses the best infrastructure and is also the most populous. Ndola located in the Copperbelt Province in the LOR region ranks second in terms of infrastructure and population. Both Lusaka and Ndola are the major urban maize deficit regions in the country. Mongu is a rural maize deficit region located in the Western Province in the non-LOR region. Chipata, located in the Eastern Province in the non-LOR region is a rural maize surplus region in addition to being the exporting region for maize exports to Malawi. Kabwe is a surplus region in Central province in the LOR region and is located between two major consuming regions (i.e., Lusaka and Ndola). It is also endowed with good infrastructure. Choma is a surplus district in Southern Province in the LOR. It is located some 284 km from the major urban deficit region (i.e., Lusaka). Kasama, in the Northern province, is relatively surplus. Imports into the country are delivered through Choma, Lusaka, Kabwe and Kasama. On the other hand, Kabwe is a maize exporting region for exports to Zaire while Chipata is an exporting region for exports to Malawi (Mwanaumo, 1994).

The price data used in the analysis are nominal wholesale monthly average prices

measured in Zambian Kwacha for white maize for the period 1993:7 to 1997:12. This gives us a total of 54 montly observations. This period was chosen because it represents the period for whih data was available on a monthly basis and for which monthly variations were observed.

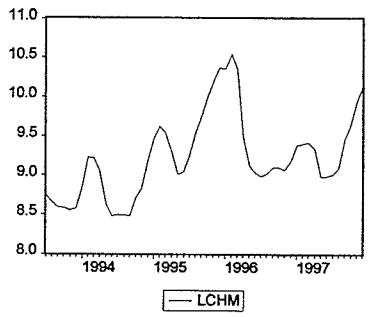
The original data for the seven selected regional markets are shown in figure 5.1a and 5.1b while the logarithm of the seven regional market price series and their first-difference series are presented in figure 5.2. As can be seen from Figures 5.1a and 5.1b the the price data for maize shows that there is some spatial variations between the regional markets as well as some seasonal variations.

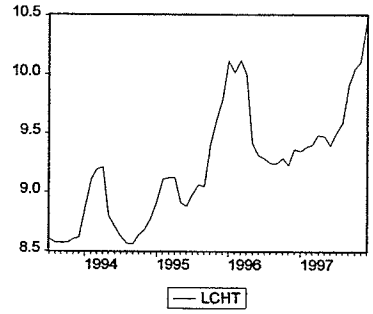


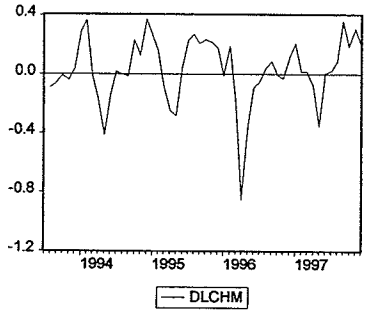


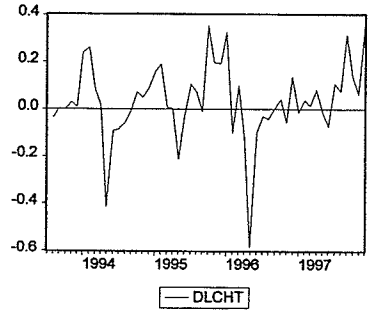
Source: GRZ(1997): *Agricultural Statistics Bulletin.*

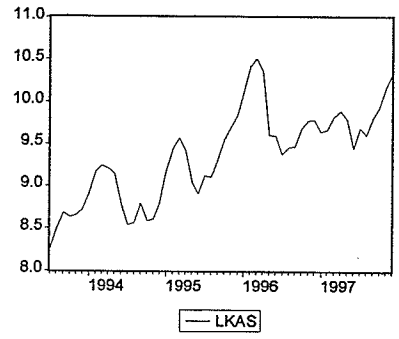
Figure 5.2: Monthly Log Wholesale Regional Maize Prices in Levels and Differences: 1993:7 - 1997:12

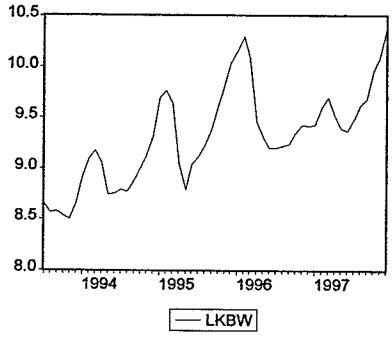


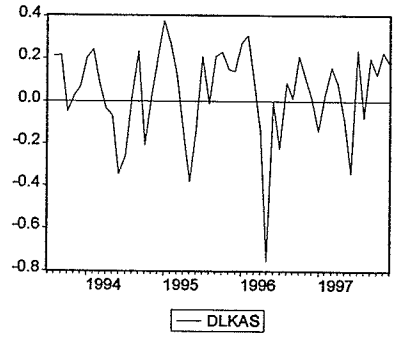


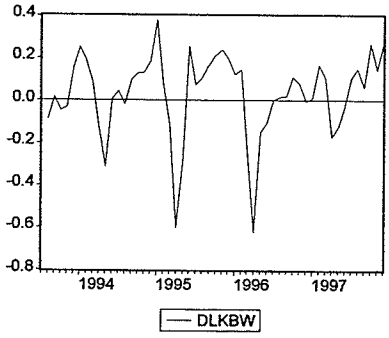


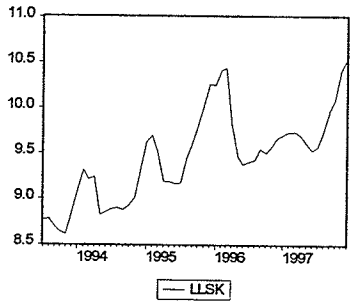


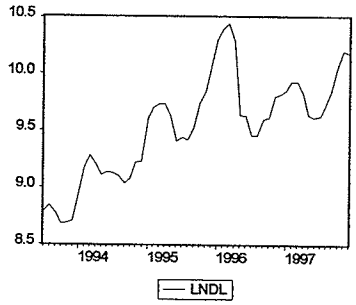


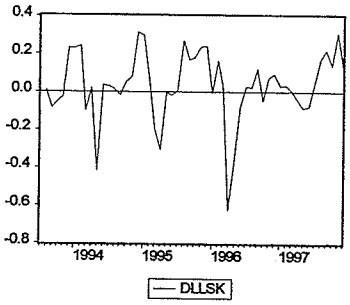


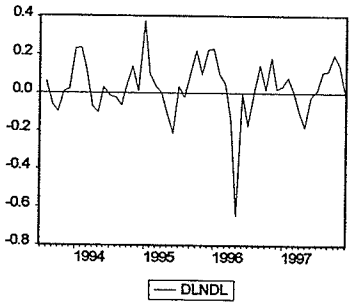


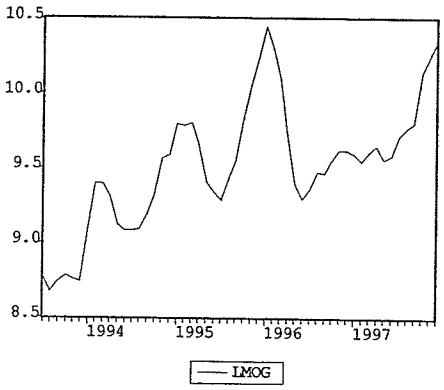


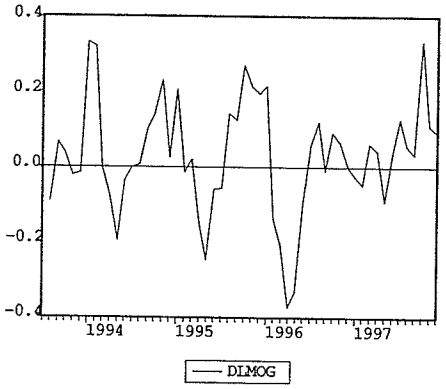












Source: GRZ(1997): *Agricultural Statistics Bulletin.*

Where:

LCHM = Logarithm of Choma monthly wholesale maize price series in levels.

LCHT = Logarithm of Chipata monthly wholesale maize price series in levels.

LKBW = Logarithm of Kabwe monthly wholesale maize price series in levels.

LKAS = Logarithm of Kasama monthly wholesale maize price series in levels.

LLSK = Logarithm of Lusaka monthly wholesale maize price series in levels.

LMOG = Logarithm of Mongu monthly wholesale maize price series in levels.

LNDL = Logarithm of Ndola monthly wholesale maize price series in levels.

DLCHM = Logarithm of Choma monthly wholesale maize price series in first difference.

DLCHT = Logarithm of Chipata monthly wholesale maize price series in first difference.

DLKBW = Logarithm of Kabwe monthly wholesale maize price series in first difference.

DLKAS = Logarithm of Kasama monthly wholesale maize price series in first difference.

DLLSK = Logarithm of Lusaka monthly wholesale maize price series in first difference.

DLMOG = Logarithm of Mongu monthly wholesale maize price series in first difference.

DLNDL = Logarithm of Ndola monthly wholesale maize price series in first difference.

5.6.2 Testing for Integration

In order to determine the level of integration of each price series, univariate tests were done on the transformed series using the Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and the Philips-Perron (PP) test procedures for tests of unit roots. All the three tests indicate that the hypothesis that the price series are not I(0) could not be rejected at 5 percent or even 10 percent level of significance. This means that all the price series are non-stationery in levels. The

price series were then differenced and found to be all stationary at the 1 percent level of significance (see Table 5.1). Since the variables are all non-stationary in levels but are stationary in differences the test for market integration was tested using co-integration analysis as outlined in the previous section.

Table 5.1: The Dick Fuller, Augmented Dick Fuller and Philips Perron Test Statistics for Unit Root Tests of Logged Price Levels

Variable		Levels [I(1) V. I(0)]		First Differences [I(2) V. I(1)]		
	DF	ADF	PP	DF	ADF	PP
Choma	-1.19	-1.96	-1.65	-7.04	-6.05	-7.09
Chipata	-0.19	-0.75	-0.54	-10.01	-7.1	-10.51
Kabwe	-0.97	-1.73	-1.42	-7.09	-5.86	-10.49
Kasama	-1.62	-1.64	-1.81	-9.76	-6.56	-7.25
Lusaka	-0.8	-0.58	-1.18	-8.58	-5.93	-8.87
Mongu	-1.18	-1.57	-1.54	-7.89	-5.23	-7.96
Ndola	-1.38	-1.98	-1.57	-10.1	-6.06	-10.25

Source: Based on Data Collected by CSO, Lusaka.

Note: The null hypothesis in the Dickey-Fuller, Augmented Dickey-Fuller and Philips-Perron Tests is that the two price series under investigation are I(1). In all three cases the null is rejected when the calculated test statistic is less than the critical value (c) with c=-3.58 and -2.93, and -2.60 at 1%, 5%, and 10% levels of significance, respectively, for 50 observations (Fuller, 1976).

5.6.4 Cointegration Results

For the multi-variable model, cointegration is tested using the Johansen's maximum likelihood procedure (Johansen and Joselius, 1990) using the two test statistics, the trace and eigenvalue specified in equations 5.16 and 5.17. These two statistics use residual vectors obtained from the cointegrating equation (i.e., equation 5.1).

The variables used in the model are defined as follows:

$X_t = [LCHM_t, LCHT_t, LKBW_t, LKAS_t, LLSK_t, LMOG_t, LNDL_t]$

where, X_t is vector of logged wholesale prices for Choma (LCHM), Chipata (LCHT), Kabwe (LKBW), Kasama (LKAS), Lusaka (LLSK), Mongu (LMOG) and Ndola (LNDL).

Then the lagged and differenced variables are defined as:

$\Delta X_{t-i} = [D(LCHM)_{t-i}, D(LCHT)_{t-i}, D(LKBW)_{t-i}, D(LKAS)_{t-i}, D(LLSK)_{t-i}, D(LMOG)_{t-i}, D(LNDL)_{t-i}]$

for i = 1,2,3,....,p;

The maximum lag was 2 and was determined using the Aikaike Information Criteria (AIC) and the Scwartz criterion (SC). Table 5.2 provides the test results for cointegration of the seven regional maize prices. The results indicate that the rank of Π for the maximal eigenvalue statistics is zero while the rank of Π for the trace statistics is 1. That is, using the results of the maximal eigenvalue we find zero cointegrating vectors and seven common trends. This suggests that the seven price series are segmented with no long-run relationship between them. On the other hand, the results from the trace test statistics reveal that there is one cointegrating vector and six common trends.[16] This suggests that the maize market system is stationary in one direction and non-stationary in six directions. That is, the system converges to a long-run equilibrium in one direction. These results suggest that during the period 1993 and 1997 there was one cointegrating vector and six common trends. This would indicate the Zambian maize markets are not tightly linked together and, therefore, the long-run equilibrium is less stable. In other words, the maize market system is not strongly integrated.

[16] The number of common trends is calculated by subtracting the number of cointegrating vectors from the dimension of the matrix, which in this case is equal to seven (Ismet *et. al.*, 1998).

Table 5.2: Cointegration Results

Null Hypothesis	Maximum eigenvalue (λ_{max})	Trace Statistic (λ_{trace})	95% Critical Value
r = 0	0.64	145.86*	124.24
r = 1	0.6	93.84	94.15
r = 2	0.32	47	68.52
r = 3	0.23	27.08	47.21
r = 4	0.15	13.82	29.68
r = 5	0.1	5.49	15.41
r = 6	0.001	0.03	3.76

Note: * indicates rejection of the null hypothesis at 5% significance level.
Source: Based on Data collected by the Agricultural Market and Information Center (AMIC), Ministry of Agriculture, Food and Fisheries.

5.6.5 Causality and Integration of Maize Markets

Before the Granger causality test was carried out the VECM model was tested for presence of any diagnostic problems in order to check for adequacy of the model. The model was found to have no major diagnostic problems.

The results for causality tests are inferred from the F-test statistic and are presented in Table 5.3. The results indicate the strength of causality from regional market R to regional market P and vice-versa. A Granger causality test to establish the appropriate direction of the flow of price information is implied if the null that there is no causality from R to P, or vice-versa, is rejected. The discussion is limited to those market pairs that are cointegrated. This means that Choma which was not cointegrated (at 5% or 10%) with any of the markets is dropped from the analysis (see Map 5.1).[17]

[17]The direction of causation shown in Map 5.1 is for 95% level of significance while the discussion is also done for 10% level of significance.

Table 5.3: Causality Test Results

FROM Market R / TO Market P	Lusaka	Ndola	Chipata	Kabwe	Choma	Kasama	Mongu
Lusaka		6.44**	6.56**	2.81*	1.07	16.25**	2.81*
Ndola	1.52		2.88**	2.47**	2.87**	4.31**	1.77
Chipata	1.06	2.12*		1.74	1.72	4.69**	0.97
Kabwe	2.31*	13.87**	12.47**		4.19**	15.34**	2.68**
Choma	2.87**	10.47**	12.58**	1.23		14.02**	4.97**
Kasama	0.74	0.51	2.29*	1.14	1.34		1.82
Mongu	3.49**	10.80**	6.33**	5.07**	4.46**	8.10**	

Source: Based on Data collected by the Agricultural Market and Information Center (AMIC), Ministry of Agriculture, Food and Fisheries, Lusaka.

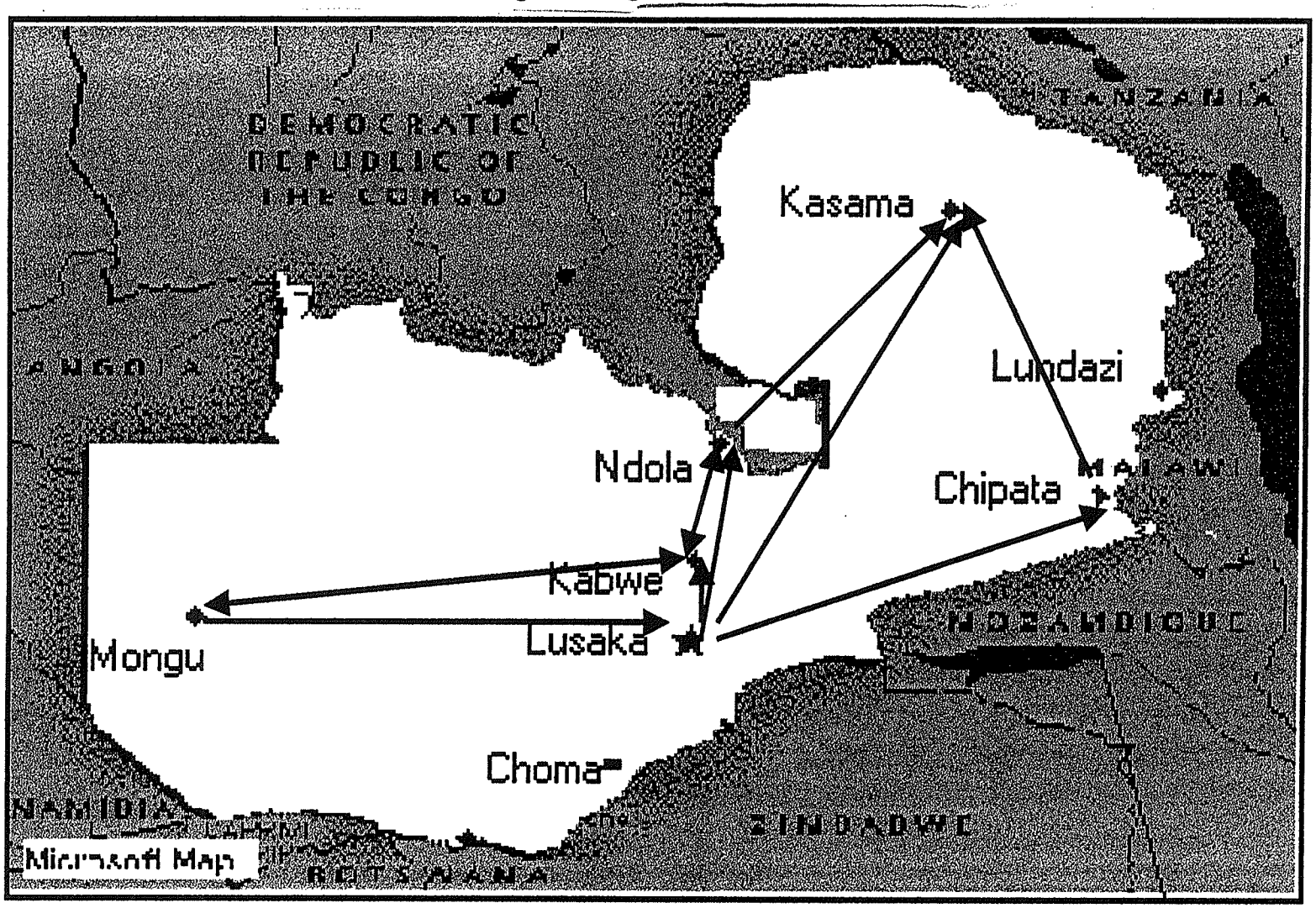
Notes: The figures indicate the calculated F values associated with the hypothesis that there is Granger causality from market R to market P and vice versa.

* Significant at the 10% level

** Significant at 5% level

- Statistically non-significant

Map 5.1: Direction of Causation for Cointegrated Regional Maize Markets



The results suggest that Lusaka "Granger causes" price changes in Ndola, Chipata and Kasama at 5 percent level of significance, and those in Kabwe and Mongu at 10 percent. Price changes in Lusaka are, however, Granger caused by those in Mongu at 5 percent and Kabwe at 10 percent. This indicates a two-way causation of prices between Lusaka and Kabwe and Lusaka and Mongu. The results for Kabwe and Mongu are as expected. Kabwe is a major surplus regional centre located in the major maize producing area in the country, Central province. On the other hand, Mongu is a regional centre of the largest maize deficit remote province (i.e., Western). The fact that Mongu Granger causes Lusaka could be due to demand pressure for imports since imports come through Lusaka before they get distributed to the remote areas such as Mongu. No causality was found from either, Ndola, Chipata or Kasama to Lusaka. This implies that there was a unidirectional causation originating from these three regional centres to Lusaka. In this respect Lusaka leads the price formation process as far as these areas are concerned.

The overall picture that emerges is that Lusaka only leads prices in three regional centres, i.e., Chipata, Kasama and Ndola, but there is a bi-directional causation between Lusaka and Mongu, and Lusaka and Kabwe. Thus, Lusaka is not a central market. Ndola is the capital of the largest urban deficit province (i.e., Copperbelt) in the country. The results reveal a significant (at 5% level of significance) unidirectional Granger causality culminating from Ndola to Kasama only, an insignificant causality to Lusaka and Mongu and a bi-directional causality with Kabwe. These results suggest that Ndola is a source of price formation for only Kasama and in this sense it can be concluded that Ndola is not a major central market for the other regional centres.

Another interesting result is that Chipata does not have any apparent causative effect on any other price changes except Kasama, with which it has a bi-directional causation. Chipata

however, is Granger caused by price changes in Lusaka, Kabwe and Kasama in a unidirectional way. The uni-directional results are as expected, but the bi-directional results are rather surprising.

Kabwe Granger causes all markets and its price changes are Granger caused by those in Lusaka, Ndola and Mongu. Thus, even though Kabwe is a major maize surplus area and is located in the major producing province, it is not a price leader for three of the markets, Lusaka, Ndola and Mongu. Significant bi-directional Granger causality was established between Mongu and Kabwe.

The overall conclusion is that there is no dominant market whose price changes influence all the other markets. The bivariate model reveals that price changes in Zambia appear to be organized around more than one market. These results are more in line with the nature of markets in developing countries, in that markets are more complex than is portrayed by the Ravallion radial configuration of markets. These results also confirm what Silvapulle and Jayasuriya (1994) found in the Philippines rice market.

5.6.6 Dynamic Analysis of Maize Market Integration.

It is not sufficient to know that markets are integrated. It is also important to know the extent to which markets are integrated. This requires distinguishing between the short- and long-run impact of price changes emanating from one region to another. The speed of adjustment, the length of time needed for prices to be transmitted from one region to another, can then be studied within the context of dynamic adjustments.

A vector autoregressive model was first estimated with 4 lags and the number of lags was chosen based on the AID and SC. Beginning with four lags, the lagged variables were tested for

significance of the lagged variables and only the variables that were significant were included in the final VECM. This yielded a VECM with two lags.

The finding of just one cointegrating vector and six common trends means that one price can be expressed in terms of the other six prices. For example, if we normalize the long-run relationship by the price changes in Kabwe the result can be interpreted as the long-run price response function for the other six prices. The long-run relationship normalised by β that is associated with the Kabwe prices can be written as follows:

$$LKBW_{(-1)} = -3.00LLSK_{(-1)} + 0.57\,LNDL_{(-1)} + 0.55LCHT_{(-1)} + 0.63LKAS_{(-1)} + 0.07LMOG_{(-1)} + 0.34LCHM_{(-1)} - 1.20.$$

This equation shows that a one percent increase in prices in Lusaka results in a 300 percent decrease in prices in Kabwe, whereas a one percent increase in prices in Ndola increases prices in Kabwe by 57 percent. Prices in Kabwe increase by 55 percent, 63 percent, 6 percent and 33 percent if prices in Chipata, Kasama, Mongu and Choma respectively increased by one percent.

Table 5.4 provides the short-run and long-run results. The short-run dynamics among the variables can be evaluated by examining the significance of and the signs on the estimated lagged coefficients. The short-run results from the VECM revealed that all the estimated short-run coefficients except for 6 were statistically insignificant at 5 percent level. They ranged between 0.01 and 0.66. This suggests that the transmission of price changes from one spatial market to another during the same month is weak. This result is in accordance with the notion that price information is transmitted with a lag.

Table 5.4: Long-run and Short-run Integration Estimates from the Vector Error Correction Model

	D(LKBW)	D(LLSK)	D(LNDL)	D(LCHT)	D(LKAS)	D(LMOG)	D(LCHM)
Estimated ßs	-0.60	0.34	0.16	0.10	-0.25	-0.52	-0.03
	(-2.20)	(1.27)	(0.76)	(0.49)	(-1.03)	(-2.36)	(-0.08)
Estimated as							
D(LKBW(-1)	0.27	0.12	0.09	0.18	0.53	0.20	0.47
	(1.10)	(0.48)	(0.48)	(1.00)	(2.37)	(1.02)	(1.61)
D(LKBW(-2)	-0.66	-0.58	-0.29	-0.30	0.20	0.02	-0.61
	(-2.44)	(-2.18)	(-1.43)	(-1.56)	(0.83)	(0.09)	(-1.88)
D(LLSK(-1)	-0.94	0.43	0.43	0.47	-0.17	-0.76	-0.15
	(-1.55)	(0.72)	(0.94)	(1.09)	(-0.32)	(-1.55)	(-0.21)
D(LLSK(-2)	-0.34	0.23	0.42	0.53	-0.12	-0.30	0.13
	(-0.76)	(0.54)	(1.27)	(1.67)	(-0.30)	(-0.84)	(0.24)
D(LNDL(-1)	0.31	-0.004	-0.25	0.01	0.07	0.01	0.09
	(1.10)	(-0.01)	(-1.19)	(0.04)	(0.28)	(0.06)	(0.26)
D(LNDL(-2)	-0.19	-0.38	-0.11	-0.44	0.13	-0.28	-0.29
	(-0.79)	(-1.62)	(-0.62)	(-2.59)	(0.60)	(-1.47)	(-1.004)
D(LCHT(-1)	0.43	-0.08	-0.20	-0.31	-0.07	0.23	0.19
	(1.60)	(-0.32)	(-1.01)	(-1.63)	(-0.28)	(1.06)	(0.58)
D(LCHT(-2)	0.27	0.24	-0.03	-0.05	0.29	0.16	0.28
	(1.05)	(0.93)	(-0.16)	(-0.25)	(1.25)	(0.76)	(0.91)
D(LKAS(-1)	0.19	-0.002	0.01	0.07	-0.15	0.16	0.02
	(0.97)	(-0.01)	(0.08)	(0.50)	(-0.87)	(1.05)	(0.09)
D(LKAS(-2)	-0.28	-0.22	0.06	0.15	-0.13	-0.01	-0.18
	(-1.93)	(-1.52)	(0.55)	(1.42)	(-0.99)	(-0.10)	(-1.04)
D(LMOG(-1)	0.06	0.39	0.25	0.02	0.03	0.23	0.41
	(0.22)	(1.55)	(1.28)	(0.09)	(0.12)	(1.08)	(1.32)
D(LMOG(-2)	0.55	0.50	0.26	0.42	-0.20	0.03	0.33
	(2.02)	(1.89)	(1.28)	(2.16)	(-0.82)	(0.15)	(1.00)
D(LCHM(-1)	0.34	0.32	0.35	0.28	0.31	0.30	0.32
	(1.46)	(1.38)	(1.97)	(1.65)	(1.50)	(1.57)	(1.16)
D(LCHM(-2)	-0.05	-0.14	-0.19	-0.27	-0.01	-0.09	-0.25
	(-0.19)	(-0.59)	(-1.07)	(-1.59)	(-0.04)	(-0.47)	(-0.88)
CONSTANT	0.04	0.01	0.001	0.01	0.01	0.03	0.004
	(1.66)	(0.41)	(0.09)	(0.69)	(0.72)	(1.83)	(0.16)
Adj. R^2	0.51	0.46	0.56	0.66	0.67	0.49	0.48
S.E	0.14	0.13	0.10	0.10	0.12	0.11	0.16

Note: The figures in parentheses are absolute value of t-statistics while the numbers in parentheses in the first column refer to the lag order.

The adjustment coefficients had a wrong sign for three of the markets and were statistically insignificant for all the markets except for Kabwe and Mongu suggesting that the remaining markets are weakly exogenous to the system. The speed of the adjustment is given by the size of the adjustment coefficient. The results showed low adjustment to the long-run equilibrium in all regional markets except in Kabwe and Mongu. Price changes in Kabwe and Mongu during the period 1993:7-1997:12 were transmitted to the other markets at a rate of 60 and 52 percent, respectively, within one month. This is an indication that price changes in Kabwe and Mongu are faster in adjusting towards the long-run equilibrium. On the other hand, adjustment towards the long run is especially slower in the case of price changes in Chipata (10%) and Ndola (16%). In terms of the parameters estimates for the lagged variables the results indicate that of all the possible combinations only five proved statistically significant after two lags. Given that the vast majority of combinations of market prices are not significant, these results are consistent with the conclusion that there is limited evidence of effective market integration as of 1997.

The speed of adjustment is represented by the coefficient on the error correction term. The error correction term in each of the equations was not statistically significant for most of the regional equations, but had the right sign (i.e., negative). This suggests that the maize markets are less connected in the long-run. The size of the coefficient for the error correction term indicates the speed with which the system adjusts towards the long-run equilibrium. For example, in the case of the Kabwe maize price, 20 percent of the adjustments occur in less than one month. Granger causality results suggest no market dominates in the price discovery of maize in Zambia.

The overall results on market integration in Zambia indicates that, although the seven regional markets in Zambia are cointegrated, meaning that they have a stable long-run relationship, they are nevertheless, weakly integrated in the short-run. This suggests that the maize marketing

system was operating only moderately well by 1997 and that it could be improved upon in future especially once all the structural obstacles have been identified and rectified.

5.7 Summary and Conclusions

The results indicated that the wholesale price series are non-stationary in levels but are stationary in differences. This necessitated the use of an error correction model. The Granger causality results reject the hypothesis that Lusaka is a central market for price discovery of maize in Zambia. Therefore, the findings in this chapter invalidate the use of a radial market approach to market integration in Zambia.

The regression coefficients suggest that the extent of maize market integration was imperfect during the period under review as revealed by the less-than-unitary cross long-run multipliers. These suggest that private maize traders in Kabwe, Chipata and Kasama do not respond completely to price changes in the two urban deficit areas nor to Mongu a rural deficit area.

Short-run results indicate that the maize markets are not well integrated while long-run integration is evident suggesting that the markets do eventually move together in the long-run. Speed of adjustment appears to be linked by the inverse of distance and directly with ease of transport. Thus, the study found that the further away the markets are from each other the longer it takes for the price changes to be transmitted between markets.

The multivariate model indicates that there is one cointegrating equation and six common trends. This suggests that markets are weakly linked together in the long-run. The implication of the policy implications of theses results is that structural rigidities resulting from poor infrastructure and insufficient transportation network are hampering the easy flow of information

between markets and, therefore, the integration of markets. Thus, in order for the maize surplus regional markets to be integrated with the deficit regions, government will have to invest in better transportation and infrastructure facilities. At the same time the provision of market information would help private traders to accurately predict the price signals and respond appropriately and speedily to price changes resulting from different market shocks such as drought.

CHAPTER SIX

PRIVATE TRADER AND FARMER RESPONSE TO MARKET LIBERALIZATION

6.1 Introduction

Chapter three showed that even though the maize market had been fully liberalized by the time of the study in 1996 the environment under which the emerging private trading sector was operating was not yet conducive as indicated by the government's continued (indirect) intervention in maize markets and the high inflation rates and interest rates. Chapter four revealed that although real producer prices had gone up after liberalization, the general result was a downward trend in maize production in the surplus LOR provinces and an upward trend in the non-LOR provinces, suggesting the failure of the private sector to respond effectively to maize market liberalization. Also amounts retained in the non-LOR region decreased while those in the LOR provinces increased further indicating the segmentation of the maize regional markets. Chapter five formally tested for market integration using cointegration analysis and found that for the period 1993:7 and 1997:12 the regional maize markets in Zambia were not yet fully integrated. This suggests that "getting prices right" (Timmer,1986) and dismantling public monopolies alone may not induce market participants to take advantage of the incentives offered by market liberalization in the presence of structural, institutional and other constraints. This chapter attempts to explain the factors that could be constraining the integration of regional markets in Zambia by investigating the response of the private traders and farmers to market liberalization.

The maize marketing system, as pointed out in the previous chapter, involves many actors undertaking particular or several roles that together form a complete marketing chain. The key actors are farmers, traders, creditors, transporters and millers. For the marketing channel to perform

its function of transferring a commodity to where it is required at the right time and in the desired form, all the actors have to perform their component tasks effectively and efficiently. A well-functioning market requires accurate and timely information, well-developed transport network and transportation, adequate financing/access to credit and storage facilities. This chapter highlights the characteristics of the major actors in the liberalized agricultural marketing system and identifies the constraints which may be restricting private sector participation. The methodology used to collect the information from the market participants was elaborated on in chapter 2. This chapter will concentrate on the major findings of the survey.

6.2 Private Sector Response

A number of studies elsewhere in Africa indicate that liberalization has led to the emergence of a fairly competitive trading sector in grain markets in Sub-Saharan Africa since the 1980s (see for example, Lele and Christiansen, 1988; Dione, 1989, Kaluwa and Chilowa, 1991, Chisvo, Jayne, Teft, Weber and Shaffer 1991; Coulter and Golob, 1992, Coulter, 1994; and Barret, 1997). However, a number of constraints have limited the participation of traders both in terms of geographical and volume expansion. These studies reveal further that the majority of entrants into grain markets are often those who had previously traded in general merchandise and had branched into grain trading upon liberalization of the market (Staatz, Dione, and Dembele, 1989).

In Zambia the few studies that have been undertaken suggest that there has been a rapid emergence of traders. However, there appears to be segmentation between the large-scale and small-scale traders as they seem to operate in different circuits with the former supplying exclusively the industrial mills located in the major urban areas and the latter supplying the public markets, mostly in rural areas (GRZ, 1994). Also the efficiency of the movement of maize between cities i.e.,

farm-to-wholesaler marketing of maize appears to have decreased since liberalization (Kahkonen and Leathers, 1999). The inefficiency of the farm-to-wholesaler marketing of maize was attributed to a number of non-price factors, such as inadequate transportation infrastructure, insufficient access to information, lack of access to credit, on-farm storage and inputs and weak contract enforcement.

6.3 Research Findings on Farmer Response to Market Liberalization

6.3.1 Farmer Characteristic

The results are based on descriptive statistics including tabular, cross-tabulations and chi square tests. In the tables where the number of observations in each cell met the minimum required for a chi-square test, such a test was made. However, all chi-square results obtained were not statistically significant. This indicates the results obtained do not vary significantly among the six locations sampled.

The farmers covered in this study were medium- and small-scale farmers who eke out a livelihood mostly from agricultural production. According to Zambia's official statistics, medium-scale farmers produce an average cropped area of between 5 and 20 hectares while small farmers crop less than 5 hectares on average (GRZ, 1996). Small-scale farmers rely heavily on hand hoe cultivation with only a very small number using oxen and most of the farm labor is obtained from unpaid family workers. They use little input technology, restricted mainly to fertilizer and seeds. Livestock is mostly of local, indigenous breeds reared under traditional and semi-traditional husbandry. This is contrasted to characteristics of large-scale (commercial) farmers with extensive mechanization, use of high-level technology and management, rearing of exotic breeds and heavy reliance on permanent and casual labor. The characteristics of medium-scale (emergent) farmers are

found between these two extremes.[18]

Table 6.1 shows the different characteristics of the sampled farm household heads in the six blocks visited. Seventy-eight percent of the total sample (188) were male and only 22 percent were female. In Lundazi 71 percent of the sampled farmers (98) were male while in Chipata North males accounted for 85 percent of the total sampled farmers (90). The distribution of household heads by sex in the six blocks is mostly men (70% and above) except for Chitandika block, where all the sampled farmers were male.

The majority (51%) of the total farm household heads was below 35 years of age while 37 percent were between 36 and 55 years old and only 12 percent were above 55 years old. The corresponding age distribution for Lundazi was 46%, 42 % and 12%, respectively. For Chipata the corresponding age distribution was 54%, 31% and 15% respectively. There were no significant differences at the block level in terms of age distribution except in Emusa where the majority was aged between 36 and 55 years.

The survey established further over two-thirds of the total sample had attained primary education, slightly over a quarter had secondary education and only 5 percent of the farmers interviewed had no formal education. At the block level more than two thirds had attained primary education except in Chikomeni, where only 57 percent had primary education. Although these figures indicate that farmers had attained basic education, which is important in receiving and processing agricultural information to raise their productivity, much of the literacy gained is often lost. This can be attributed to lack of opportunities to consolidate upon what was learnt in school. In

[18] These definitions are adopted from GRZ (1994d): *National Census of Agriculture (1990/92): Census Report Part* I, Central Statistical Office, Lusaka. See also GRZ (1996*): Agricultural Sector Performance Analysis and A Review of Implementation of the Agricultural Sector Investment Program*, Preliminary Report prepared for the Ministry of Agriculture, Food and Fisheries.

Table 6.1: Farmer Characteristics by Agricultural Block

Characteristics	Lundazi				Chipata North			
	Mwase lundazi	Emusa	Chikomeni	Total	Chankanze	Chiparamba	Chitandika	Total
Sex								
Total number	30	40	28	98	31	29	30	90
% male	73%	70%	71%	71%	74%	82%	100%	85%
% fem	27%	30%	29%	29%	26%	18%	0%	15%
Age								
15-25	7%	5%	18%	10%	23%	11%	17%	17%
26-35	50%	28%	29%	36%	42%	39%	30%	37%
36-45	27%	43%	21%	30%	16%	25%	23%	21%
46-55	13%	13%	11%	12%	6%	11%	13%	10%
56 and Up	3%	13%	21%	12%	13%	14%	17%	15%
Education								
no education	7%	5%	14%	8%	7%	3%	0%	3%
Primary	67%	65%	57%	63%	74%	66%	73%	71%
Secondary	27%	28%	29%	28%	19%	31%	27%	26%
College	0%	3%	0%	1%	0%	0%	0%	0%

Source: *Private Agricultural Marketing Survey*, August, 1996.

any cases, farmers when they report having gained primary education do not refer to having completed the full seven years of primary education and hence this could be much lower.

6.3.2 Farming Activities

The major crops grown in Eastern province are maize, cotton, groundnuts, sunflower, barley tobacco. Minor crops grown include, soybeans, mixed beans, cowpeas, finger millet and cassava.[19]

In spite of liberalization, maize still dominates in Eastern province. In fact when farmers were asked to rank the crops they grow in order of importance maize ranked first followed by groundnuts, cotton and sunflower (Table 6.2). At the block level, maize also ranked first in all the blocks except in Chankanze where cotton was ranked first.

Table 6.2: Crop Production Preferences by Rank by Agricultural Block in Lundazi and Chipata

BLOCK	CROP RANK				
Chipata North	1	2	3	4	5
Chankanze	Cotton	Hybrid maize	G/nuts	Finger millet/ Cassava	Soybean
Chiparamba	Hybrid maize	Cotton	G/nuts	Irish potatoes	n.a
Chitandika	Hybrid maize	Cotton	G/nuts	Sweet potatoes	Local maize
Lundazi					
Chikomeni	Hybrid maize	G/nuts	Cotton	Finger millet	Mixed beans/ Soybean
Emusa	Hybrid maize	G/nuts	Mixed Beans	Finger millet	Sunflower/ Vegetables
Mwase	Hybrid maize	Sunflower	G/nuts	Mixed beans	Finger millet

Source: Field survey data, August 1996.
Note: Rank 5= most preferred crop, while rank 1 = least preferred crop

[19]Before liberalization of crop marketing, maize used to be the major food crop as well as the major cash crop. But with market liberalization, input credit for maize is no longer readily available and as such, small-scale farmers have been forced to switch to those crops which either have a source of input credit or do not require fertilizer to produce and consequently, some farmers are now growing enough maize only for home consumption.

An interesting feature that seems to be emerging, especially with liberalization, is that more and more farmers are switching from maize to other crops in Eastern Province. Although no time series data on crop production patterns were collected from farmers, the picture that emerged from the answers given in the process of administering the questionnaire was that farmers were diversifying into other crops, away from maize. The Lundazi based farmers seem to have switched to groundnuts, sunflower and cotton. In Chipata, the shift seems to be overwhelmingly in favor of cotton. For instance, during the 1994/95 production season, total area under cotton production in Eastern Province was 15,000; but during the 1995/96, area supported by Clark Cotton alone was 15,000 hectares (GRZ 1993). There are at least three other major organizations supporting cotton production under out-growers scheme. Further investigation of this emerging production pattern revealed that farmers were shifting to cotton for two major reasons. First there was a ready market for cotton compared to maize. In fact the cotton companies, Sable, Clarke Cotton collected the cotton from farmers soon after harvest from the farmers doorstep. Second, input required for cotton growing were readily available to farmers through the out-growers scheme whereas maize did not have such a structure. Thus, with the removal of fertilizer subsidies the cost of acquiring fertilizer for maize has become too high for most farmers. Also the elimination of the state marketing boards without a concomitant emergence of private traders means farmers have to rely on the few traders coming to their areas.

6.3.3 Pricing Behavior

A striking feature regarding the behavior of small-scale farmers and product pricing is their inability to negotiate for better prices for maize with private traders. Most small-scale farmers were found to accept the price offered by private traders. It is this failure of farmers to negotiate for better

prices that has led many farmers to exhibit strong feelings and views against crop market liberalization. Asked why farmers are not in position to influence the product price levels, most of the respondents attributed this to the abject poverty in which they find themselves. They argued that they have no money most of the year and huge expenditure backlogs build up.

Econometric studies have shown that farmers are rational in that they respond positively to relative prices. Thus, when farmers were asked if they would increase the area planted to maize if they expected prices to increase, more than 63 percent and 43 percent of the farmers in Chipata North and Lundazi, respectively responded that would expand their hectares (Table 6.3). For those who indicated that they would not expand their hectares, the bias was in favor of cotton, groundnuts and tobacco. Within Lundazi, 37%, 33%, and 61% of the farmers in Emusa, Mwase Lundazi and Chikomeni respectively, reported that they would be influenced positively by expected increases in farm-gate prices. In Chipata North, the responses were 68%, 58% and 63% in Chankanze,

Table 6.3: Would you be Encouraged to Expand Hectare Based on Expected Increases in Prices?

Block	YES		NO	
	Number	Percent	Number	Percent
Mwase Lundazi	10	33%	20	67%
Emusa	15	37%	25	63%
Chikomeni	17	61%	11	39%
Chankanze	21	68%	10	32%
Chiparamba	17	58%	12	41%
Chitandika	19	63%	11	37%
Total Sample	99	53%	89	47%

Source: Field survey data, August 1996

Chiparamba and Chitandika, respectively. For the majority of the farmers, however, non-price factors, in particular, the availability of inputs such as fertilizer and grain bags, were the binding constraints. This suggests that non-price factors play a major role in hectare expansion.

Farmers were asked to what degree they understood the liberalized crop marketing system (Table 6.4). The majority (69%) the of the farmers who responded to this question had little (34%) or no understanding (35%) while only 18 percent understood the new marketing system fairly well and 17 percent understood it very well. Even for those who reported that they understood the new marketing system 84 percent did not like the system while only 16 percent appreciated the system. The majority (46%) indicated that they did not like the system because the prices they were receiving for their maize were too low while 16 percent were still expecting government guidance on who should buy their produce and at what price.

Table 6.4: Percentage Distribution of the Degree to which Farmers Understand the Implications of Market Liberalization

Degree	Mwase Lundazi	Emusa	Chikomeni	Chankanze	Chiparamba	Chitandika	Sample
Not at all	33%	53%	43%	29%	21%	17%	34%
Just a little	47%	25%	29%	42%	45%	23%	35%
Fairly well	17%	8%	11%	13%	21%	20%	14%
Very well	3%	15%	18%	16%	14%	40%	17%

Source: Field survey data, August 1996.

Mid-way through the 1996/97 marketing season, farmers were still approaching the District Marketing and Co-operative Office (DMCO) to inquire about producer prices. This suggests that farmers do not have a clear and well-informed understanding of the implications of marketing liberalization. It seems, for the liberalized crop marketing to function as expected there is need to

teach farmers some basics regarding the interactions of supply and demand as well as how to find out about prices on offer.

6.3.4 Constraints to Performance of the Smallholder Sub-sector

A number of problems have surfaced following the liberalization of crop marketing which, if not addressed, are likely to depress the positive response from farmers. External factors and environmental factors, such as the drought of 1991/92 season have understandably conditioned the performance of the smallholder sub-sector. Of all the crops grown in the two districts, maize was identified as the most problematic crop to market compared to other crops like cotton and groundnuts. Fifty-one farmers indicated maize was difficulty to market compared to 8 and 13 farmers for groundnuts and cotton. In addition to marketing problems the following were identified as the major problems constraining farmer response to market liberalization

6.3.4.1 Limited Access to Marketing Facilities

Before liberalization, NAMBoard and the Cooperative Unions had a well-developed marketing structure whereby marketing depots were established in all crop-producing areas. This made it relatively easy and inexpensive for farmers to deliver their crops for sale. But with liberalization, and the subsequent withdrawal of financial support by government to the cooperatives, not only have these marketing depots become dysfunctional but also most of them have closed down. The new selling points (depots) that have emerged are not only few and scattered (making them inaccessible to most farmers) but are mostly mobile. In addition, marketing points have drifted away from the farming community to the nearest urban centers.

Due to lack of transport and the nature of the road infrastructure most farmers are only able

to sell their crops within their localities as opposed to other districts where they could sell at higher prices (Table 6.5). Thus most farmers may not actually be benefiting from regional price variation given these problems of market accessibility.

Table 6.5: Can You Easily Sell Produce? (Percent)

Block	Within District				Outside District		
	Sample	Yes	No	Not Stated	Yes	No	Not Stated
Mwase Lundazi	30	57%	37%	6%	43%	53%	4%
Emusa	40	50%	35%	15%	20%	73%	7%
Chikomeni	28	54%	39%	7%	21%	79%	-
Chankanze	31	48%	39%	13%	36%	55%	10%
Chiparamba	29	59%	41%	-	41%	55%	3%
Chitandika	30	67%	30%	3%	53%	47%	-

Source: Field survey data, August 1996.

The Agricultural marketing and Information Center publishes weekly bulletins on input and product price information. This information is broadcast on radios. It was also observed that farmers in the study areas had limited access to market information to enable them to make critical decisions as regards to which crops to grow, where and to whom to sell the crops. Over 50 percent of the sampled farmers sampled in the two districts reported to be receiving price information, but the majority (52%) received this information from extension officers, 23 percent from the radio, 11 percent through negotiations with traders and the remainder through credit co-ordinators (6%) and visitors to the area (8%). All the six blocks reported access to market information but the levels of access varied greatly (see Table 6.6). Farmers in Chipata had better

access compared to farmers in Lundazi while access in Chikomeni was reported by only 18% of the reporting farmers. On the other hand, in Chipata access was as high as 80% in Chitandika. The difference arises from the fact that Chipata is the provincial capital of Eastern Province and is serviced with better communication facilities than Lundazi

Table 6.6: Do You Have Access to Market Information? (%)

BLOCK	YES	NO	NOT STATED
Chipata			
Chankanze	77.4	22.6	0.0
Chiparamba	58.6	41.4	0.0
Chitandika	80.0	20.0	0.0
Lundazi			
Chikomeni	17.9	78.6	3.6
Emusa	27.5	70.0	2.5
Mwase	46.7	50.0	3.3

Source: Field survey data, 1996.

6.3.4.2 On-farm Storage

A better market information system in itself is not useful unless farmers understand the meaning conveyed in the information and are able to utilize it in their decision making-process. Perhaps due to the fact that small-scale farmers appear not to understand or appreciate the implications of a liberalized crop marketing system (see Table 6.4), farmers were not taking advantage of price variations and market information due to lack of on-farm storage as is indicated in Table 6.7. For the whole sample 80 percent of the farmers were not practicing on-farm storage

while only 20 percent were practicing on farm storage. The few that practiced on-farm storage had poor facilities, only the traditional type (*nkhokwe*), which was not appropriate during the wet season. A few had the improved storage (silo) (see Table 6.8). Apart from the limited storage capacities, farmers also were unable to engage in speculative storage due to pressing cash obligations immediately after harvest. Also the farmers spoken to feared that they would incur more in interest rate charges if they stored their commodities so they preferred to sell immediately after harvest and repay their loans as quickly as possible.

Table 6.7: Percentage of Farmers Practicing On-farm Storage

BLOCK	NO		YES	
	Number	Percent	Number	Percent
Mwase Lundazi	23	77%	7	23%
Emusa	32	80%	8	20%
Chikomeni	20	71%	8	29%
Chankanze	25	81%	6	19%
Chiparamba	22	76%	7	34%
Chitandika	28	93%	2	7%
Total Sample Reporting	150	80%	38	20%

Source: Field survey data, 1996.

Table 6.8: Type of Storage Used

TYPE OF STORAGE BLOCK	TRADITIONAL TYPE (NKHOKWE)	IMPROVED STORAGE (SILO)
Chipata		
Chankanze	35.5	32.3
Chiparamba	34.5	3.4
Chitandika	23.3	16.7
Lundazi		
Chikomeni	21.4	17.9
Emusa	25.0	5.0
Mwase	10.0	26.7

Source: Field survey data, 1996.

6.3.4.3 Low Product Prices

The major constraint to meaningful participation by small-scale farmers in a liberalized market environment is the abject level of poverty characteristic to most small-scale farmers. Low prices was one of the complaints lodged by 44% of the 174 farmers who responded to the question about problems with maize marketing. Because farmers are always in need of cash to meet their cash obligations in most cases they are forced to sell their produce at very low prices even as low as K5, 000 per 90 kg bag of maize.

6.3.4.4 Inputs

One of the major constraints facing farmers is the lack of inputs, i.e., fertilizer, seeds and empty grain bags. Lack of inputs was also another problem that that was cited by 32 percent of the reporting farmers (174). These inputs are not easily available within the localities and to a large extent, even from the nearest urban centers. Farmers have to travel long distances to different urban centers in search of these inputs especially, empty grain bags. This makes crop marketing extra expensive for the farmer. These problems are compounded by the fact that not many traders deal in input trading. For inputs like fertilizer and grain bags, credit coordinators have come to the rescue of farmers but even then it is only the registered farmers who gain. And even for credit coordinators the supplies of these inputs are erratic, as their availability is problematic.

6.3.4.5 Access to Credit

The survey results indicate that small and medium farmers are constrained by credit availability. Eighty percent of the farmers in Mwase Block in Lundazi indicated that they did not have access to credit. The lowest percentage of farmers without access to credit (48%) was

Chiparamba in Eastern Province (Table 6.9). However, most of those that had access to credit obtained it from non-financial institutions and individuals. Agricultural marketing firms in this regard were identified as the most important. Credit was provided mostly through contract farming and provided an important development in the marketing chain after liberalization.

Table 6.9: Do You Have Access to Credit?

BLOCK	NO		YES	
	Number	Percent	Number	Percent
Mwase Lundazi	24	80%	6	20%
Emusa	13	33%	27	67%
Chikomeni	9	32%	19	68%
Chankanze	9	29%	22	71%
Chiparamba	14	48%	14	48%
Chitandika	11	37%	19	63%
Total Sample Reporting	80	43%	107	57%

Source: Field survey data, 1996.

The general perception on credit availability was that it was poorly administered (29%) and that it was difficult to obtain (26%) (see Table 6.10). Lack of credit is partly a result of the liberalization of interest rates in 1992 that occurred in an environment of high rates of inflation, which forced nominal interest rates to skyrocket.

6.3.4.6 Infrastructure Constraints

The poor state of feeder roads has also constrained the response of farmers to maize market liberalization. Most roads in the survey areas are in deplorable state and are usually inaccessible during the rain season. (Table 6.11). The status of the roads in the study sites confirms what has been observed for the country as a whole. CSO (1996) established that 81 per cent of farm households in the country lived within 5 kilometers of a public road. Only 7.3 per cent lived more than 10

Table 6.10: General Perceptions on Credit Availability

PERCEPTION	MWASE LUNDAZI	EMUSA	CHIKOMENI	CHANKANZE	CHIPARAMBA	CHITANDIKA	SAMPLE
Adequate	-	5%	4%	16%	10%	13%	8%
Readily Available	-	-	-	-	7%	-	1%
Properly Administered	7%	10%	14%	13%	10%	17%	17%
Inadequate	3%	-	4%	13%	10%	13%	7%
Poorly Administered	53%	30%	29%	16%	28%	17%	29%
Difficult to Obtain	23%	38%	32%	19%	14%	23%	26%
Interest too High	-	-	4%	-	-	3%	1%
No Response	3%	18%	11%	10%	14%	10%	11%

Source: Field survey data, 1996.

kilometers away from a public road. A GRZ(1996: p. 26) report concluded, "the poor state of feeder roads, impassable at critical times of the agricultural season, is the major problem. Other sources of worry are the lack of bridges and other problems at watercourses." Due to the bad state of feeder roads and perhaps low incomes, the most common mode of transport found was ox-carts, particularly for shorter distances. Farmers who did not have any draught power at times hired ox-carts. For longer distances, farmers used motorized transport but many found this costly. A few farmers living in the communities had one or two trucks that were hired out to other farmers.

Table 6.11: State of the Road from Local Area to Nearest Selling Point

BLOCK STATE	CHANKANZE	CHIPARAMBA	CHITANDIKA	CHIKOMENI	EMUSA	MWASE
Alright	3.2	31.0	26.7	32.1	22.5	0.0
Seasonally Bad	32.3	20.7	6.7	3.6	12.5	10.0
Not good	22.6	27.6	13.3	42.9	57.5	83.3
Bridge bad	6.5	0.0	3.3	3.6	0.0	0.0
Feeder roads bad	6.5	6.9	3.3	14.3	7.5	0.0
Roads not Maintained	29.0	13.8	46.7	3.6	0.0	3.3

Source: Field survey data, 1996.

It can be argued that low incomes is the major reason why farmers prefer to use ox-carts rather than vehicles and hence even if feeder roads were developed the problem would continue. It was, however, observed that those areas with relatively well-serviced roads tended to have private transporters moving farmers' inputs and products and charging prices many farmers were able to afford. Thus, a well-developed and serviced network is a prerequisite to the development of a viable private led agricultural marketing system. A well-serviced network of rural roads not only enhances competition in supplying inputs and marketing agricultural goods, but also ensures timely delivery of agricultural services.

6.4 Research Results on Trader Response to Market Liberalization

6.4.1 Characteristics of Traders

This section presents a summary of the characteristics of the traders interviewed in Eastern Province. A total of 25 traders, 9 in Chipata and 16 in Lundazi, were interviewed. Table 6.12 presents the main characteristics of the traders interviewed. A general picture that emerged is one of a market dominated by a youthful trading sector the majority (84%) of whom were male who had completed mostly primary level education (40%). The majority had entered the maize trading between 1995 and 1996, indicating the easy of entry once the market became fully liberalized in 1995. The kind of trading mentioned ranged from selling merchandise in makeshift shops situated in strategic areas to importing and exporting of goods. In addition, although maize was the dominant crop traded, other crops also featured prominently and traders appeared to prefer trading a combination of crops. Thirty-two percent were trading exclusively in maize while the majority (44%) traded in maize and one crop and 8 percent traded in maize and two other crops. The traders interviewed were found trading in bulrush millet, groundnuts, mixed beans, cotton, soybeans, rice, beans, potatoes, sunflower and sorghum.

The picture that emerges is also one of a constrained trading sector in terms of transportation, storage facilities, and financial resources. The results indicate that traders had limited ownership of market facilities. Only 32 percent of the traders interviewed had transport of their own, while 68 percent relied on hired transport. Only 16 percent of the traders had had their own storage facilities. Also the size of the storage capacity for the majority of the traders suggests that the majority of the traders deal with small quantities of maize at a time. Apart from the lack of specialization, traders are also limited by financial resources, with most of their operations being financed through their

Table 6.12 Characteristics of Traders

	LUNDAZI		CHIPATA	TOTAL
	Small-scale traders	Large traders	Small-scale traders	
Number of observations	10	6	9	25
% aged between 15-25 years	40.0	-	33.3	28.0
% aged between 26-35 years	30.0	33.3	55.6	40.0
% aged between 36-45 years	10.0	50.0	-	16.0
% aged between 46-55 years	20.0	16.7	11.1	16.0
% Male	100.0	100.0	56.0	84.0
% that finished at most primary school education	50.0	17.0	44.0	40.0
% that finished at most secondary school education	50.0	-	56.0	40.0
% that finished a college/University Education	-	84.0	-	20.0
% that entered maize trading before 1991	30.0	-	-	12.0
% that entered maize trading between 1991 and 1994	20.0	17.0	33.0	24.0
% that entered maize trading between 1995 and 1996	50.0	84.0	66.0	64.0
% trading in maize only	10.0	16.7	77.8	32.0
% trading in maize and one more crop	60.0	83.3	-	44.0
% trading in maize and two more crops	10.0	-	-	8.0
% trading in other crops other than maize	20.0	-	22.2	16.0
% with own transport	20.0	83.3	11.1	32.0
% who hire transport	80.0	16.7	88.9	68.0
% with own storage facility	0.0	66.7	0.0	16.0
Source of initial capital obtained from:				
Own resources	71.4	66.6	77.8	72.0
Relatives/friends	30.0	-	22.2	20.0
Commercial bank	-	33.3	-	8.0

Source: Field survey data, August 1996.

own resources (72%), 20 percent from relatives and friends and only 8 percent from commercial banks suggesting the limited access to formal financial institutions.

To take into account the variation in size the analysis that follows is based on a division of the sample into two main categories, large and small traders. Since the sample for the medium- scale

traders was too small (2) for any meaningful analysis they we grouped them together with the small traders. Hence, from now onwards we shall refer to this group as small traders. Large traders were incorporated businesses with all the characteristics of a formal business entity. They were characterized as those handled in excess of 500 bags (90 kgs) of maize in one marketing season. Medium-scale traders were classified as those handling between 101 and 500 bags while small traders handled up to 100 bags.

6.4.2 Trader Entry into Maize Marketing

Table 6.12 indicates that there was a rapid entry of traders into maize trading after 1995 when the maize marketing became liberalized, i.e. among the small traders 50 percent and 66 percent had entered marketing in Lundazi and Chipata, respectively, while among the large-scale traders 84 percent had done so in Lundazi. It would appear that the main attraction to maize trading was the perceived profitability of maize (48%) and the availability of the apparent existence of maize markets (28%). It is, however, interesting to note that for the small-scale traders in both Lundazi and Chipata profitability was the main reason that attracted many small-scale traders to maize marketing while for the large-scale traders it was the availability of the market (see table 6.13). This result is consistent with the conventional neoclassical model of entry in which firms are driven by positive industry profits. But when we calculate the net margins per 90 kg bag of maize that a typical small trader was getting, the margins are not that high as perceived by the small-scale traders, they are very minimal (see Table 6.14). The table indicates that if a small trader based in Lundazi sold his 90 kg bag of maize in Lusaka he would only get a net margin of 13 percent and if he sold it in Chipata his net margin would be 14 percent. Surprisingly, he gets even lower net margin if he sold it in Lundazi. These net margins

Table 6.13: Reason for Starting Maize Trading

REASON	LUNDAZI		CHIPATA	TOTAL
	Small- and medium-scale traders	Large traders	Small-scale traders	
Availability of Market	40.0	50.1	22.2	28.0
Availability of Clients	10.0	16.7	11.1	12.0
Profitability	50.0	16.7	66.7	48.0
Availability of Maize supplies	-	-	-	12.0
Availability storage	-	16.7	-	4.0
No. of observations	10	16	9	25

Source: Field survey data, August 1996.

Table 6.14: Estimated Net Margin (for a 90 kg bag of maize) for a Representative Small-scale Trader Based in Lundazi.

TYPE	SELLING IN CHIPATA	SELLING IN LUNDAZI	SELLING IN LUSAKA
Selling price	15,000	12,000	18,000
Costs:			
Buying price of 90 kg bag	7,000	7,000	7,000
Transport cost/90 kg bag	3,500	2,000	6,500
Handling charges	200	100	500
Cost of grain bag	1,500	1,500	1,500
Storage	150	100	200
Levy	500	n.a	500
Total costs	12,850	10,700	15,700
Transport costs as a % of total costs	27%	19%	14%
Net margin (% of selling price	14%	11%	13%

Source: Field survey data, August 1996.

are much lower than what Wehelie (1989) found in Somalia for maize (30%) or Hayami et.al found in the Philippines (30%). One of the reasons why small-traders in Eastern province may

perceive higher net margins for maize is that they do not take into account some of the transaction costs involved in maize marketing. A discussion held with a group of small traders in Chipata revealed that small traders only consider the transportation costs, while other just considered the difference between the selling price and the buying price. This therefore calls for education of the small traders.

6.4.3 Source and Destination of Maize

The responses from traders indicated that there were no hard and fast rules about where or how traders obtained their crops. The majority (72%)of the traders obtained their maize from within the district of their operation, while 12 percent restrict themselves to within the province and others are ready to transcend provincial boundaries (16%) (Table 6.15). The variations between the traders are also apparent. The majority of the small traders (74%) obtained their maize from within the

Table 6.15: Source of Maize

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small/medium scale traders	Large-scale traders	Small-scale trades	
Within district	50.0	83.3	100.0	72.0
Outside district	10.0	16.7	-	12.0
Outside province	40.0	-	-	16.0
No. of observations	10	6	9	25

Source: Field survey data, August 1996

districts of their residence while 21% and 5% from outside the province and neighboring districts, respectively. Similarly, the majority of the reporting large-scale traders (83%) purchased their maize

from within the district while the remainder purchase maize from outside the district of their residence. Table 6.16 indicates that small-scale traders accounted for only 4 percent of the maize purchased by the sampled traders in 1996 while the large-scale traders accounted for the rest (96%).

Table 6.16: Quantities of Maize Purchased by Private Traders by Source: 1995/96 marketing season (90 kg bags)

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small/medium scale traders	Large-scale traders	Small-scale trades	
Farmers	916	41,000	583	42,499
Other Private Traders	20	-	30	50
Total	936	41,000	613	42,549

Source: Field survey data, August 1996

When traders were asked how their maize is brought to their point of sale, 44 percent indicated that it was brought to them, 32 percent said they go and fetch it from the farmers themselves and the remaining 24 percent said they make orders (Table 6.17). Of those who had the maize delivered to them, received it from mostly from farmers (73%). Small traders had their maize delivered exclusively by the farmers, while large traders were mainly supplied by the small-assemblers (50%). One large-scale trader intimated that preferred the maize to be delivered to him because he incurred significant losses in the previous marketing season as a result of thefts by the workers he sent out to purchase crops. Of those who had the maize delivered to them, about 60% had entered into contracts with the suppliers. (see Table 6.18). The most common contracts entered into included agreements on order-price only (20%), quantity to be supplied (7%), both price and quantity (67%) and price and credit arrangements in the case of contract farming (7%).

Table 6.17: How is Maize Brought to Your Selling Point?

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small-/medium-scale traders	Large-scale traders	Small-scale trades	
MAIZE IS DELIVERED TO TRADER BY:				
Producers	100.0	25.0	100.0	72.7
Small assemblers	-	50.0	-	18.2
Wholesalers	-	25.0	-	9.1
MAIZE IS COLLECTED BY TRADER FROM:				
Producers	100.0	50.0	100.0	87.5
Small assemblers	-	50.0	-	12.5
Wholesalers	-	-	-	-
TRADER MAKES ORDERS FROM:				
Producers	100.0	100.0	66.7	83.3
Small assemblers	-	-	33.3	16.7
Wholesalers	-	-	-	-

Source: Field survey data, August 1996.

Table 6.18: Did you make any promise to Supplier of maize before delivery?

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small-/medium-scale traders	Large-scale traders	Small-scale trades	
% who made promise to supplier before delivery of maize	50.0	66.7	66.7	60.0
Of which:				
Order-price only	60.0	-	16.7	20.0
Order-quantity only	40.0	-	83.3	6.7
Order-quantity and price	-	75.0	-	66.7
Credit	-	25.0	-	6.7

Source: Field survey data, August 1996.

Those who collected their own maize collected it mostly from farmers. And again small traders collected it exclusively from the farmers, while large traders collected 50 percent from farmers and 50 percent from small assemblers. Those who made orders, made them with mostly farmers (83 %). Surprisingly, small traders in Chipata also made orders with small assemblers (33%), although they made most of their orders with farmers (68%).

The destination of the maize, on the other hand, was mostly outside Eastern Province. Maize was sold mostly to millers (98%) while the remainder was sold to consumers at public markets. What is interesting to note is that small traders in both Lundazi and Chipata supplied the bulk of their maize to public markets (46% and 91%, respectively), while the large-scale traders supplied exclusively to industrial mills. In fact when the medium-scale traders are excluded, we find that the small-sale traders in both districts exclusively supply the public markets while the medium-scale supply the millers, i.e., local hammer-millers based in Lundazi and Chipata.

These results suggest that the traders are segmented in their trade. These results are consistent with those found by GRZ(1994). For instance, 32 percent of the traders (mostly large- and medium-scale traders) sold their maize to millers outside their districts and province (mostly Lusaka) (see Table 6.19). Small-scale traders on the other hand sold within their province, mostly to consumers at the markets in small quantities. The results indicated that at the time of the survey, even though large-scale traders were small in number they accounted for the bulk of the maize sold by the sampled farmers, while small-scale traders that were large in number only accounted for 4 percent. Small-traders accounted for 4 percent awhile, large scale accounted for 96 percent of the total maize sold by the surveyed traders in 1996.

Table 6.19: Quantities of Maize Sales by Private Traders by Destination 1995/96 Marketing Season (90 kg bags)

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small/medium scale traders	Large-scale traders	Small-scale traders	
Millers	580	41,000	56	41,636
Consumers at public Markets	486	-	542	1,028
Total	1,066	41,000	598	42,664

Source: Field survey data, August 1996.

These above results, therefore, indicate that in general traders are buying maize from within the districts and selling it to deficit districts and provinces. Very little of the maize was being exported to neighboring countries at the time. Thus, the flow of crops traded is from surplus regions to deficit regions.

In order to determine whether traders were engaging in speculative buying/selling, they were asked to indicate the strategies they employ in buying or selling maize. Table 6.20 indicates that 68 percent of the traders buy progressively over the year but sell immediately upon purchase of their maize (48%) indicating quick turnover and lack of storage facilities. The scenario is the same for small-scale traders. For large-scale traders, however, the majority (67%) buy at harvest and sell immediately (50%), an indication that they are not involved in speculative storage. Part of the reason is the lack of markets and high costs of storage. Storage costs ranged between ZK30,000 – ZK50,000 per month for a district shed with a capacity of 30,000 bags and ZK1 million per month for a SIDA shed which has a capacity of 55,000 bags of maize.

Table 6.20: What is Your Strategy for Buying and Selling Maize?

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small-/medium-scale traders	Large-scale traders	Small-scale trades	
BUYING STRATEGY				
Harvest time	-	66.7	-	16.0
Progressive buying over whole year	70.0	33.3	88.9	68.0
Progressive buying over whole year with big buy before shortage	30.0	-	11.1	16.0
SELLING STRATEGY				
Sell immediately	50.0	50.0	44.4	48.0
Sell throughout the year	20.0	16.7	33.3	24.0
Hold until price increases	-	16.7	-	4.0
Contractual selling	-	16.7	11.1	8.0
Offer discount to client	20.0	-	-	8.0
No strategy	10.0	-	11.1	8.0
No. of observations	10	6	9	25

Source: Field survey data, August 1996.

6.4.4 Constraints

Among the major problems faced by traders, lack of transport was the most pressing (40%) followed by lack of sufficient funds (24%), lack of clients (20%) and last, poor storage facilities (16%) (see Table 6.21). Among the large-scale traders, lack of sufficient funds was the most pressing while among the small traders in Lundazi it was lack of transport. In Chipata, poor storage facilities appeared to be the most problematic.

Table 6.21 Problems Traders Encountered in Their Trading

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small-/medium-scale traders	Large-scale traders	Small-scale trades	
Lack of Clients	20.0	16.7	22.2	20.0
Lack of sufficient funds	20.0	66.7	22.2	24.0
Lack of mean of transport	60.0	-	22.2	40.0
Poor storage facilities	-	-	33.3	16.0

Source: Field survey data, August 1996.

6.4.4.1 Lack of Transport

Access to the means of transport is essential to the private traders' operations. The majority of small and medium scale traders did not own transport (68%) but instead depended on hired transport like trucks, oxcarts, bicycles or a combination of oxcarts and vans/trucks. Others hitchhiked whatever transport they could get. During the field study, several groups of traders were found who had not been able to secure transport for periods longer than one week. This general lack of transport had translated into very high transport charges. Traders' lack of transport facilities was due to the poor state of roads. Those that had transport, especially transporters, were unwilling to service the remote surplus areas that had bad roads and bridges for fear of breakdowns.

Transport charges were normally based on per kg (per tone) load, distance or hours spent in transit or their combination. For example in 1986 the hire charges for transporting maize ranged from K75/ton/km to K270/ton/km. The price per ton was higher for remote areas than for urban areas due to the poor road infrastructure. Because transport charges were found to be exorbitant, 50% of the traders were located within 10 km of their main point of sale.

6.4.3.2 Lack of Start Up Capital

Inadequate funds means that traders cannot expand their operations. Discussions with a few large traders indicated that access to formal credit was limited. The study found that most traders (72%) had used their own resources while the remainder either borrowed from friends/ relatives (8%) and banks (8%), and the remainder from other sources. These results suggest that the majority of traders rely on their personal financial resources.

6.4.4.4 Lack of Storage Facilities

One of the major assumptions underlying market liberalization is that the private sector will take advantage of the price variations seasonally. What is interesting however, is that most of the traders including, the large-scale traders, do not seem to store their crops for speculative purposes, but rather sell everything at once (see Table 6.20). A major reason for this kind of behavior was attributed to lack of storage facilities coupled with the high storage costs involved, especially in terms of rentals and spoilage of the crop. The general picture, however, is that very little storage for speculative purpose is going on among the traders. For the large traders, the storage costs as well as the bulky nature of agricultural commodities discouraged many of them to store. The small-scale traders, on the other hand, are mostly opportunists who want to make quick money. They do not seem to take advantage of the benefits of storing for speculative purposes. In any case they deal in smaller quantities that do not require long-term storage. Also, they have immediate cash needs that prevent them from waiting for such a time when prices peak later in the season.

6.4.5 Traders' Perception Market Liberalization

Table 6.22 shows the different opinions offered by the interviewed on different aspects of government policies pertaining to market liberalization. It is clear from the table that the majority

Table 6.22: Traders opinion on marketing issues

TYPE	LUNDAZI		CHIPATA	TOTAL
	Small-/medium-scale traders	Large-scale traders	Small-scale trades	
Government regulations				
Good	70.0	66.7	66.7	60.0
Not favorable	10.0	-	11.1	16.0
No opinion	20.0	16.7	22.2	24.0
Financing				
Good	10.0	33.4	-	12.0
Poor	70.0	33.4	55.5	48.0
Not aware	20.0	-	44.4	16.0
No opinion	-	33.3	-	24.0
Transportation				
Good	10.0	16.7	11.1	16.0
Inadequate	50.0	16.7	-	24.0
Very bad roads	10.0	16.7	-	16.0
Expensive	20.0	16.7	44.4	28.0
Not aware	-	-	22.2	8.0
No opinion	10.0	33.3		8.0
Leasing state storage facilities				
Good	30.0	16.7	11.1	16.0
Too expensive/inaccessible	60.0	16.7	22.2	36.0
Inadequate	10.0	16.7	44.4	24.0
Not aware	-	-	22.2	4.0
No opinion	-	50.0	-	16.0
Marketing liberalization policy				
Very good	90.0	16.7	22.2	48.0
Good	10.0	33.3	55.6	28.0
Poorly implemented	-	-	22.2	12.0
No opinion	-0	50.0	-	12.0

Source: Field survey data, August 1996.

of traders (76%) believe that liberalization of maize market was the best thing that government ever did. This is in contrast to the feelings expressed by the farmers who felt that government should get back to controlling the agricultural sector. However, the table indicates that government should not have rushed to withdrawal from the maize market but should have maintained some form of regulation (60%). In addition traders felt that government had poorly administered the financing of maize and that its policy on leasing storage facilities gave traders limited accessibility to them as they were very expensive, not many of them could afford them. Traders also felt that transportation was inadequate and that roads were bad.

Overall however, traders seem to have embraced the liberalization of the agricultural sector compared to farmers who still were calling for the return of the marketing system.

6.5 Summary and Conclusions

The liberalization of the agricultural sector in general and the maize market in particular, seem to have been embraced by the private traders compared to the farmers. This is in spite of the constraints that traders were facing. The chapter revealed that the maize market is segmented with the private traders supplying different market circuits. Part of the reason is due to the constraints that the traders are facing. The large-scale seem to be constrained much more by lack of finances which in turn have prevented them in reaping economies of scale and investing in storage facilities. Small traders on the other hand are constrained mostly by lack of transport, hence their failure to purchase large quantities of maize at any one time. They also do not engage in speculative storage because the rental charges are too high and they do not have their own storage facilities.

Farmers on the other have not responded positively to real producer prices due to the lack of markets, credit, road infrastructure and storage facilities. The removal of the fertilizers subsidies and

the state marketing organizations has paused a big challenge to farmers. In the long-run this will lead to reduction in maize marketing (see Mwanaumo 1995 and Holden 1993 as quoted in Mwanaumo).Most of them are willing to expand their hectarage but the prices they receive are too low and they lack access to agricultural inputs. They also do not engage in speculative buying due to lack of on-farm storage or inadequate storage facilities.

The chapter also indicated that all the sites visited had limited accessibility due to the poor state of feeder roads. All the blocks had motorized feeder roads that were passable during the dry season but were difficult to use during the rainy season, particularly at bridges. The situation appeared to get worse as one moved away from the district's center. Development of basic social infrastructure facilities, such as schools and medical centers, were also noted to be insufficient. The most common diseases in all the areas visited are malaria and diarrhea and this tends to become more acute during the rainy season at the peak of labor demand when fields must be prepared for planting and weeding has to be done. Poor health has been complicated by the advent of AIDS. In one village visited, interviews could not take place on several occasions because four deaths had occurred within one week. Another factor complicating the health of the population in the sites visited was the poor supply of water, particularly in the rainy season. The declining health status of the rural population has made it difficult for small farmers to increase their levels of production.

An assessment of the situation in the study sites clearly showed, therefore, that liberalization occurred at a time when areas visited were ill-prepared for a private-led agricultural marketing system. It was likely that poorly maintained roads and the absence of storage facilities would causes the new agricultural marketing system to marginalize the farmers in remote areas rather than integrate them into a well-functioning market. In all the places visited and through the group interviews farmers indicated that they were generally dissatisfied with the current marketing

arrangement except in areas nearest to district centers where the road infrastructure was relatively better. It was a general view that Government had withdrawn too rapidly from agricultural marketing.

The survey results indicated that in those areas where the road infrastructure is poor, especially in the remote areas where transportation costs are prohibitive to many traders, private sector marketing activities have not yet emerged. For the efficient movement of goods within the rural areas, in particular remote rural areas, a good transportation network is necessary. These include things like bicycles, oxcarts and four-wheel drive vehicles. For transporting goods outside the producing areas to consumption centers, it is important to have proper and adequate road network, transport and communication networks. Characterization of the actors has revealed a private sector that lacked the capacity to enter the market and immediately take over completely the functions previously performed by cooperatives. If the objectives of liberalization were to be met, Government would need to initiate a program to improve the capacity of the private sector undertake these functions.

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

7.1 Introduction

Zambia is endowed with abundant land resources and a climate that is conducive to growing a number of crops. In comparison to other African countries, the arable land per capita available in Zambia is high, estimated at 4 hectares in 1995. However, these resources remain under-utilized. Of the total available land for cultivation only 25 percent was under cultivation in 1995. Also the share of agriculture in total GDP has oscillated around 20 percent per annum during the 1990s. Zambia's population has increased from a mere 4 million people in 1969 to an estimated 9 million people in 1995. It is estimated that by the year 2025 Zambia's population will increase to over 19 million. As a result, the demand for food is expected to increase substantially.

Prior to liberalization in 1990, the government intervened in the agricultural sector. The main objectives for government intervention were to achieve sustainable domestic food supplies, i.e., self-sufficiency in major food crops in order to feed an ever increasing urban population; to stabilize and ensure low food prices for urban consumers; and to achieve an equitable regional development (FAO, 1997a). At the end of the 1980s these objectives were being achieved mainly through the following strategies: controlled producer prices, consumer subsidies, transportation and storage subsidies, and agricultural inputs and credit subsidies.

Studies indicate that these policies had an overall negative impact on agricultural production of most crops, especially maize, and the fiscal budget. As a result there was a reduction in area under cultivation for most crops (FAO 1997a). Also the policies of uniform pricing led to a shift in

the production of the staple crop from the LOR provinces to the non-LOR provinces located away from the major consuming areas (Kalinda, 1993).

Zambia's aggressive reform agenda is with few parallels on the sub-continent. Within one year of coming to power in 1991, the MMD Government had put in place a number of radical reforms targeted at macroeconomic stabilization and introducing new systems of managing the economic and social sectors. At the macro level an attempt was made to reduce the fiscal budget and reduce inflation. Within the agricultural sector, the reduction of government intervention in maize marketing has been one of the major components of structural adjustment policies. Policy instruments used included the abolition of the national marketing board (i.e., NAMBoard) and the decontrol of pan-seasonal and pan-territorial prices. The latter implies that prices are to respond to regional and seasonal price differentials. The former means the participation of the private sector in regional maize marketing. With these measures introduced, the Zambian government expected that by the end of 1996 the new marketing system, led by the private sector, would have developed fully without a need for government to come in prop up the private sector. However, by early 1996 it became clear that the marketing system was not working as anticipated: farmers were complaining of a lack of market outlets for their surplus maize and that traders were swindling them in their trade. On the other hand, the traders appeared to be concerned with the continued government intervention and the unstable developments in real interest rates.

The main question that this thesis attempted to answer is whether the spatial maize markets in Zambia were becoming integrated and if not why not. To answer this main question three major issues were examined:

- What has happened to quantities of maize produced and to maize retention at the farm level?

- Have the regional markets become integrated?
- Has a vibrant private trading sector emerged to fill up the gap left by the government parastatal?

The rest of the chapter is organized as follows: Section 7.2 provides the major findings from the study. A conclusion and policy implications follow this.

7.2 Summary of Major Findings of the Study

7.2.1 Changes in Maize Deficit /Surplus and Retention

Although real producer prices of maize have shown an upward trend, production of maize at the national level reveals a downward trend between 1980 and 1997. Production fluctuated from a high of 20 million 90-kg bags during the 1988/89 season to a low of 5 million 90-kg bags during 1991/992. By 1992/93 it increased to almost 18 million bags, the highest it ever reached during the entire post-reform period. In 1995/96 it fell to 16 million bags and finally by 1996/97 it had fallen to just below 11 million bags. With liberalization of the maize market, the production of maize was expected to increase in regions close to consumption areas located along the LOR (i.e., Lusaka, Central, Southern and Copperbelt) and decrease in regions far from consumption areas and located in the non-LOR (i.e., Eastern, Luapula, Mongu, Northern and Northwestern). However, the statistics suggest that the LOR has experienced a downward trend in maize production while the non-LOR provinces indicate an upward trend in maize production during the period 1980 to 1997. The decline in production was largely due to a decline in area planted, which in turn was a result of drought, especially during the 1991/92 season. Although the area planted to maize showed an upward trend, it declined from a high of 1million hectares during the 1988/1989 season to 520 thousand hectares in

1994/95 before increasing to 676 thousand hectares in the following season. However, by 1996/97 season it had fallen to 648 thousand hectares.

To exclude the effect of drought on the surplus/deficit position at the national, regional and provincial levels we picked two years that had normal rainfall conditions, a pre-liberalization year (1989) and a post-liberalization year (1996). The study also revealed that even under normal rainfall conditions, full liberalization of the maize marketing did not bring about any significant changes in maize supply and amounts retained at the farm level. If anything, the analysis revealed that even under normal rainfall conditions Zambia experienced a decline of 70 percent in its surplus position after the maize market was completely liberalized. This decline was, however, less than what was recorded during the drought years of 1982/1983 and 1991/199 (1065%). The deficit position in Lusaka increased by 27 percent while that in Copperbelt declined by 37 percent between 1989 and 1996. In the non-LOR the three deficit provinces still maintained their deficit position, even if the magnitude of their maize deficits had declined: Western by 36%, Luapula 25% and Northwestern 18%. The analysis also revealed that the three surplus provinces (i.e., Central, Southern and Eastern provinces), that account for over 70 percent of the total maize produced in the country in most years, experienced a decline in their surplus position after liberalization. The surplus position for the surplus regions should have been greater than that before liberalization. But this does not seem to be the case. These results suggest a limited response to price liberalization by the farmers in Zambia as well as the presence of structural rigidities.

An examination of the changes that have occurred in on-farm storage revealed that maize retentions by maize increased 58 percent in the LOR and declined by 5 percent in the non-LOR provinces suggesting not only a limited response by farmers but also a lack of maize markets.

7.2.3 Integration of the Regional Maize Markets

This study examined spatial integration of maize markets as opposed to inter-temporal or vertical integration of markets. Spatial market integration implies the smooth transfer of price signals and information across spatially separated markets. For a country like Zambia that is sparsely populated, undertaking a study on spatial integration is important not only for ensuring regional balance among food-surplus and food-deficit regions and regions producing non-food cash crops (Delgado 1986) but also for improving policies on market liberalization.

The study used the Johansen cointegration procedure and a multivariate vector error correction model (VECM) to examine the long- and short-run market integration, respectively. Using the Johansen procedure, the study found only one cointegrating vector and six common trends among the seven markets suggesting that the seven regional markets were weakly connected during the period 1993:7 to 1997:12. According to Ismet, Barkely and Llewelyn (1998: pp. 287 - 288) "[the] number of cointegrating vectors supported by the multivariate test is an important indicator of the extent of market integration among variables in the price system and is directly related to the number of common stochastic trends (unit roots) in the system.... [Therefore] an increase (decrease in such vectors is viewed as an increase (decrease) in the strength and stability of price linkages."

The finding of just one cointegrating vector and six common trends means that one price can be expressed in terms of the other six prices. We found that a one percent increase in prices in Lusaka results in a 300 percent decrease in prices in Kabwe, whereas a one percent increase in prices in Ndola increases prices in Kabwe by 57 percent. Prices in Kabwe increase by 55 percent, 63 percent, 6 percent and 33 percent if prices in Chipata, Kasama, Mongu and Choma respectively increased by one percent.

The short-run results from the VECM revealed that all the estimated short-run coefficients

except for 6 were statistically insignificant at 5 percent level. They ranged between 0.01 and 0.66. This suggests that the transmission of price changes from one spatial market to another during the same month is weak. This result is in accordance with the notion that price information is transmitted with a lag.

The adjustment coefficients had a wrong sign for three of the markets and were statistically insignificant for all the markets except for Kabwe and Mongu suggesting that the remaining markets are weakly exogenous to the system. The results showed low adjustment to the long-run equilibrium in all regional markets except in Kabwe and Mongu. Price changes in Kabwe and Mongu during the period 1993:7-1997:12 were transmitted to the other markets at a rate of 60 and 52 percent, respectively, within one month. This is an indication that price changes in Kabwe and Mongu are faster in adjusting towards the long-run equilibrium. On the other hand, adjustment towards the long run is especially slower in the case of price changes in Chipata (10%) and Ndola (16%). The Granger causality results suggest no market dominate in the price discovery of maize in Zambia.

The overall results on market integration in Zambia indicates that, although the seven regional markets in Zambia are cointegrated, meaning that they have a stable long-run relationship, they are nevertheless, weakly integrated in the short-run. This suggests that the maize marketing system was operating only moderately well by 1997 and that it could be improved upon in future especially once all the structural obstacles have been identified and rectified.

7.2.4 Response of Smallholder Farmers and Traders

The surveys of traders and farmers was carried out to give some insight to the problems of maize market integration in Zambia alluded to in Chapters four and five. However, caution should be taken when interpreting the results since the sample sizes were too small.

Our survey results confirm a rapid increase in the number of trader participation. Of the total reporting traders 20 percent had entered the maize market by 1990. The majority (95%) started their maize trading in 1995 one year after the maize became liberalized. However, numerous small-scale traders dominate the local maize markets. There were only a handful of large-scale traders and almost a non-existent middle-scale trade sector. Although the small-scale traders dominate the local maize market they only accounted for less than two percent of the total purchases made at the time of the survey in Eastern province in 1996, compared to large-scale traders who accounted for 97 percent. The small-scale traders were found to be youthful, inexperienced, unspecialized, lacking in transport facilities, finances and storage facilities and consequently handle limited quantities of maize at a time. These small-scale traders purchased their maize mostly from within the district of their operation (74%) and sold it mostly at public markets or to hammer millers within their district of residence/operation. The majority (83%) of the large-scale traders, on the other hand, purchased their maize in bulky mostly from large- scale farmers within the district (especially Lundazi) but sold it exclusively outside their province (Eastern province) at wholesale to large-scale millers in the major urban centers of Ndola and Lusaka. These results confirm the segregated nature of the maize market in Zambia with the large scale supplying exclusively the industrial mills in the major urban centers and the small-scale traders supplying exclusively the public markets, mostly in rural deficit areas. This finding is consistent with other studies carried out in Zambia (GRZ, 1995).

A few of the large-scale traders had transport of their own, and most were constrained in their trade expansion by a lack of finance and like the small-scale traders most did not engage in speculative storage due to limited access to storage facilities that were also prohibitive.

Lack of access to information can raise transaction costs, such as search costs, bargaining costs and screening costs (Kähkönen and Leathers, 1999). In Zambia the Agricultural Marketing and Information Center (AMIC) publishes a weekly market bulletin that contains prevailing wholesale and retail prices of selected agricultural crops and inputs in the major cities. The same information contained in the weekly bulletin is broadcast on the radio. Access to this information was a problem for 72 percent of the reporting traders. Only 28 percent had access to official price information. Large traders however, had more access to this information compared to small traders (67% and 87% in Chipata and Lundazi, respectively). The majority of the small traders obtained their information from other traders.

The situation is, however, different with millers who in most cases had been operating even before liberalization. They were the most capitalized players in the market owning not only the industrial mills but also a sizeable fleet of transport with storage facilities that stored around three months of supply. Millers appeared to perform the function of maize trading much better than traders themselves. This tended to reduce the cost of the grain they milled but had the disadvantage of not making them specialize in milling and gain from increased economies of scale.

The farmer survey revealed that two thirds of the farmers had only primary education, and consequently most of them either did not completely understand (43%) or understood very little (35%) the implication of market liberalization, particularly as regards to speculative storage.

A fundamental reason why agricultural marketing liberalization proved disappointing for many of the farmers is the existence of a number of structural rigidities. Small-scale and emerging farmers, who produce over 60% of the maize at the national level, dominated the production of maize in the study sites surveyed in 1996. Wide-scale adoption of maize production, although dating from the colonial era, resulted from an aggressive promotion by the Government with all the agricultural delivery systems such as research, extension and marketing targeted principally at maize production. The result was an agricultural system that was overwhelmingly dominated by maize production that accounted for more than 50% of the area planted to crops in most years. And, consequently, maize related technologies were the only ones that small and medium farmers knew while extension officers themselves had little practical experience in advising on any other technologies.

Also liberalization implicitly assumed that market signals would make farmers adopt the production of crops in which their areas had a comparative advantage relative to other parts of the country. However, the structure of agricultural production presented a powerful lock-in factor that could not make farmers change quickly. This was worsened by the poor human capital characteristics prevailing in the rural areas that made it difficult for the small farmers to receive and process new information on production technologies very quickly and start growing other crops.

Our survey of farmers revealed that the structure of agricultural production in Eastern province has continued to present a powerful lock-in factor that will not make farmers change their production patterns quickly in the near future. The survey results indicate that even after liberalization maize still ranks as the preferred crop grown by farmers in Eastern Province, despite Eastern Province being in a disadvantaged position, vis-à-vis the primary urban markets. Cotton ranked as the second most important crop grown by farmers in Chipata North while groundnuts

ranked second after maize in Lundazi. Maize being a staple crop it is unlikely that farmers will completely stop growing maize in Eastern Province. If they do it will be because of lack of inputs and limited access to markets. This was echoed during the discussion groups held by farmers and discussions with extension officers.

Farmers like the traders have not been able to take advantage of the opportunities resulting from the liberalized markets due to a number of constraints. For example, seventy percent of the farmers reported that the condition of their roads were bad throughout the year while 15% said the roads are not maintained and the remaining 15% said the roads are bad during the rain season. In terms of distance the majority (53%) of the farmers reported that the distance to the nearest peri-urban town was between 1 and 5 km, while 37% said it was between 10 and 30 km and the remaining 10% said it was over 30 km. Due to this infrastructure problem it is very difficulty for most farmers in remote rural surplus areas to transport their produce to the market, especially during the rain season.

Farmer participation in the liberalized market has not only been constrained by the quality and availability of the road infrastructure but also by the lack of access to price information. Our study found that few farmers had access to this information and that over 50 percent of these were in Chipata, a not surprising result since Chipata being a provincial capital has relatively better communication facilities than Lundazi. Instead the majority of the farmers relied on extension officers for price information and a few received their information during negotiations with traders and the remainder through credit co-ordinators. These findings are consistent with those by Kähkönen and Leathers (1999) who also found only a few farmers having access to the published price information. In their study however most farmers relied on other farmers while our study

suggests that most farmers relied on extension officers.

One of the major consequences of marketing liberalization has been the withdrawal of government institutions from procurement and storage of crops. With liberalization the challenge facing farmers is the lack of on-farm storage facilities. Producer incentives can be thwarted by lack of on-farm storage facilities, since without storage facilities farmers may not be able to engage in speculative storage. Lack of storage facilities also means that some of the maize crop would spoil while farmers wait to dispose of their maize.

With the decontrol of pan-seasonal pricing it was expected that farmers would engage in speculative storage. Our study found that 80 percent of the reporting farmers were not practicing on-farm storage largely because they did not have proper storage facilities or adequate storage facilities. In all the sites visited farmers had little storage capacity to store any part of the crop for marketing purposes apart from storing for their own consumption needs. Although the government has a number of storage facilities, access to these storage facilities is limited for many smallholder farmers. For one the rental charges are too high. While a group of about 4 of farmers had got around this problem by engaging in communal storage, not many farmers engaged in communal storage, tradition and social norms in Zambia have hindered the development of communal storage (Tyler and Sakufiwa 1994).

The fact that farmers were not practicing on-farm storage is in conformity with the observation made during the survey which revealed that farmers were disposing of their maize produce immediately after harvest and they did this at whatever price level they received. However, this could also be due to the need for cash immediately after harvest. These results are also consistent with the reduction in maize retentions for the province between 1989 and 1996. Maize retained at the farm level declined by 5 percent for the non-LOR provinces but the decline was larger

in Eastern province compared to other non-LOR province.

The ability of farmers to participate in maize marketing also depends on the access to credit or lack of it. Access to credit was a problem for 70 percent of the reporting farmers (157). Those that had access to credit obtained it mostly from private traders. A few obtained credit through contractual arrangements with credit co-ordinators and credit institutions that they owed money.

7.3 Conclusion and Policy Implications

This study has shown that although a long run relationship exists among the Zambian regional markets, the adjustment of the regional wholesale maize prices to deviations from this long-run equilibrium is slow, suggesting a weak integration of the maize markets. These results are consistent with studies in other countries that have liberalized their markets such as Bassolet and Lutz (1999) on cereal markets in Burkina Faso and Palaskas and Harriss-White (1993) on rice markets in West Bengal. The study further found that, although there has been an increase in the number of traders in Zambia, like in many other countries in Sub-Saharan African countries (see for example, Dione 1988; Kaluwa and Chilowa 1991; Coulter and Golob, 1992; Duncan and Jones 1993; and Coulter 1994), there is still a lack of effective competition among traders (especially large-scale traders) at the farm level. This result is largely consistent with the results we found on market integration in Zambia. It is also in conformity with other studies in Zambia and elsewhere. These include, studies on maize and cotton in Zambia (Kähkönen and Leathers, 1999), on maize marketing margins in Zambia (GRZ 1995), maize trade in Zambia (GRZ 1994), maize markets in Malawi (Silumbu 1992) and maize markets in Malawi and rice markets in Madagascar (Badiane et.al., 1997).

The lack of market integration in Zambia like in many other countries is due to a number of bottlenecks related to non-price factors. These were identified as lack of finance, storage and transportation and poor road infrastructure. Withdrawing from agricultural marketing does not mean that Government abdicates completely its responsibility in making sure that private traders and farmers are able to execute their marketing functions effectively. For the maize markets to be fully integrated in Zambia the government will have to intensify its efforts at providing an enabling environment that will encourage private participation in not only maize markets, but also other agricultural products, storage, transportation and input and credit provision. This would involve the provision of effective price information, improved road and storage infrastructure, and credit.

The provision of an effective market information system is vital for the transmission of prices and efficiency of the marketing system. Although an attempt has been made by the Zambian government to put an information system in place, access to the market information by farmers and traders, especially in remote areas is limited. The government needs to take measures that would strengthen the agricultural price and marketing information system targeted at both farmers and traders.

The government has tried to provide price information for a number of crops through the weekly bulletins and the radio; however, this information is not easily accessible to farmers due to a number of reasons. First with regard to the bulletins, most farmers are not able to interpret this information because they are illiterate (see World Bank 1999). Second, even if the information is disseminated through the radio, many farmers do not own radios and besides most are busy in their fields or busy with other activities to have the time to listen to the radio. What is needed is for the government to make weekly bulletins that are interpreted into local languages and that contain price information specific to demand supply situations in their respective areas. The current price

information is based on demand supply conditions in the provincial centers.

Government can also foster further private participation and market integration by improving the road and storage infrastructure. Improvement of the road infrastructure can be achieved through increased investment in not only road repair and maintenance but also in the construction of new roads and better bridges particularly in those areas that get cut off during the rainy season. The rehabilitation of existing rural roads is particularly important if the remote areas are to be integrated into the market system. The rehabilitation and maintenance of roads in Zambia has largely been the responsibility of government and to a lesser extent by non-governmental organizations. However government has not been able to carry out this responsibility effectively. The poor state of the roads in Zambia has been attributed to insufficient government funding of the road sector and the poor institutional framework (Kähkönen and Leathers, 1999).

Given these problems and the importance of a well functioning rural road network, government needs to increase it's funding. However, given the limited funds from government, alternative sources of finance will be needed. One alternative is to charge user-fees for road users. The Zambian government has since 1993 taken steps in this direction through the imposition of a fuel levy which in1993 was reported to be ZK40 per liter of diesel or gasoline (Kähkönen and Leathers,1999). However, the funds from this levy are for road maintenance only. Given the insufficient funds from government coffers and the inability of the private sector to invest in road infrastructure, the role of donor agencies becomes more important. Funds can be solicited from donor agencies through the Road Sector Investment Program (RoadSIP) under the Agricultural Sector Investment Program (ASIP). The quality of road infrastructure has been shown to have a positive effect on market integration (Goletti, 1994), enhancing total agricultural output (Binswanger

et al., 1993) and increasing the use of fertiliser (Ahmed and Hossain 1990). Therefore, investment in roads makes economic sense. However, as Minten (1999) points out, investment in roads alone does not necessarily lead to increased market access but "soft infrastructure [complemented with] hard infrastructure [would be] beneficial for ..... improved market integration" (p.iii).

Once a road infrastructure has been put in place the logical thing to do is to promote the development of transport. This can be done either directly by the government or indirectly by the private sector. The latter requires providing incentives to the importers of vehicles and to the private individuals, such as an increased allocation of foreign exchange and a deliberate policy on duties on imported vehicles.

There is also need to invest in storage facilities if private traders and farmers are to engage in inter-temporal arbitrage. In particular farmers should be assisted to build on-farm storage facilities so that they take advantage of seasonal price variations.

Introducing agricultural marketing liberalization at the same time as financial liberalization in an environment of high nominal and real interest rates undermined the anticipated private trading sector response. The sharp increase in interest rates has also resulted in a failure by many farmers to service their loans and, as a result, many are now not eligible for further borrowing from the traditional lending institutions, Lima Bank, Zambia Co-operative Federation, Finance Services, and Credit Union Savings Association (CUSA) Zambia Limited. The rising cost of farm inputs, relative to prices of farm produce, has further exacerbated the situation. The terms of trade for farmers have deteriorated significantly. Whereas the farmer could afford one 50 kg bag of fertilizer from one 90 kg bag of maize before liberalization, now the farmer may require up to three bags of maize to afford one bag of fertilizer.

But the efficiency of the maize marketing system in Zambia can be tremendously improved if

access to credit by the farmers and traders is improved. The lack of credit has hindered private traders' investment in storage, transportation and expansion of their operations. Farmers have also been hindered from improving their productivity due to lack of funds to purchase fertilizer. In general credit has hindered both farmers and traders from engaging speculative storage. Therefore to improve access to credit requires putting into place certain measures. These could include banks finding reasonable collateral requirements that traders and farmers can use when they borrow money. It could also include the government stopping to give preferential access to credit to the government appointed agents.

In summary, for market integration to be achieved in the maize markets, and indeed in other agricultural markets in Zambia, the government needs to continue providing an enabling environment for the emerging private sector. As Due (1993) correctly points out, this means a continued commitment to creating a competitive, market oriented economy, with a positive investment climate, well-functioning capita markets and ensuring a growing economy in which inflation is under control. Although much progress has been made, especially in reducing inflation, our results suggest that much still needs to be done if maize markets are to become fully integrated.

APPENDICES

APPENDIX 2.1 PRICE DATA COLLECTION POINTS

PROVINCIAL CENTERS	
	PROVINCES
Livingstone	Southern
Lusaka	Lusaka
Kabwe	Central
Ndola	Copperbelt
Solwezi	Northwestern
Mongu	Western
Chipata	Eastern
Kasama	Northern
Mansa	Luapula
TOWNS ALONG THE LINE OF RAIL AND MAJOR PRODUCTION AREAS	
Kalomo	Southern
Choma	Southern
Kapirimposhi	Central
Mkushi	Central
Mpika	Northern
Kitwe	Copperbelt
Katete	Eastern
Kasempa	Northwestern
BORDER TOWNS AND TRADING AREAS	
Lundazi	Eastern
Kaoma	Western
Chililabombwe/Kapishi	Copperbelt
Mufulira/Mokambo	Copperbelt
Chingola	Copperbelt
Lusaka Rural	Lusaka

Source: Agricultural Marketing Information Centre (AMIC), Ministry of Agriculture

APPENDIX 2.2: RESEARCH INSTRUMENTS

A Checklist for Key Informants

1.0 Community Profile

1.1 Socio-economic characteristics of the community

- Different ethnic (e.g. tribes, nationalities, races) groupings in the area
- Settlement pattern of the area
- Estimated population, number of farm households in the area
- Number of female versus male headed households
- Religion
- Presence of inward and outward migration and its causes
- On-farm and off-farm economic and livelihood activities

1.2 Weather and climatic characteristics of the area

- Water, climate, vegetation soil, etc.

1.3 Institutions operating in the area - NGOs, Government institutions, community- based groups, private firms etc.

1.4 Farming activities

- Agricultural productivity of the area
- Major cash crops grown, area cultivated and harvested, amount produced
- Major food crops grown, area cultivated and harvested, amount roduced
- Type of livestock kept, number and breed

1.5 Level of infrastructural development and availability of basic services - health centers, schools, financial institutions, consumer goods, transport/communication network

Health Facilities

- Distance to nearest health center

- Quality of the health service
- Type and numbers of personnel at the health institution
- Drug supply

School Facilities

- Distance to nearest school
- Whether number of schools is adequate
- Whether schools are adequately staffed or not
- Whether schools has adequate teaching materials e.g. text books
- Developments in drop-out rates and attendance rates.
- Reasons behind these developments
- General level of literacy in the area
- Presence of adult education classes

Financial Institutions

- Availability of credit
- Type - formal or informal
- Institutions providing credit
- Their lending practices
- Lending practices of informal lenders
- The commodities for which credit is available
- Perception concerning credit and the lending practices

Consumer Goods

- Distance to nearest shop

- Types of consumer goods available
- Availability of consumer goods

1.6 Transportation

- Type of transport commonly used in the area
- Distance to nearest road
- Quality of road linking area to the nearest main road
- How well is the area linked to the major towns
- The distance to the nearest market
- Means of getting produce (inputs) to/from the market
- Who maintains the road linking the area to other areas
- How often is this done
- Any communal road repair activities
- Major transportation problems

1.7 Views on the availability and quality of agricultural services, i.e., extension, research, veterinary, marketing and credit.

B. CHECK LIST FOR FARMERS

1.1 Marketing services

- Types of agencies (cooperatives and the different types of private traders) to whom farmers sell their commodities
- Why farmers choose these agencies
- Access to markets
- Distance to markets

- Availability and type of transport
- Quality of roads
- Existence of outgrower arrangements and the perceived advantages and disadvantages
- Commodity prices for both inputs and outputs and consumer goods
- Availability of on-farm storage to take advantage of seasonal price variations
- Farmers views on the new marketing arrangements (the liberalized system).
- what are the perceived problems? What are the suggested solutions?
- Coping strategies to the new marketing system

1.2 Credit facilities

- Availability of credit
- Type - formal or informal
- Institutions providing credit
- Their lending practices
- Lending practices of informal lenders
- The different forms of informal credit
- The commodities for which credit is available
- Perception of farmers concerning credit (availability, type and adequacy) and the lending practices

C. CHECK LIST FOR TRADERS

1.0 Profile of Traders

- The number of years traders have been operating
- Agricultural products/inputs other than maize traded in

- Non-agricultural products traded in
- The background of traders (what business conducted before entry into the market)
- Number of bags traded in, the capital employed and number of workers hired
- Ownership of such assets as transport and storage facilities.

2.0 The Socio-economic Characteristics of Traders

- Estimated range of age and mode
- The participation of women engaged in agricultural marketing
- General indication of the level of education traders
- The ethnic groups engaged in agricultural marketing

3.0 Stocking Behavior

- Type of storage facilities, capacity and location
- The average rental charges/day/week/month
- Views on the quality and adequacy of the available storage facilities
- Views on rental charges

4.0 Pattern, Nature and Direction of Trade

- Level of trading at different times of the year
- Growth of trade (i.e. whether it is increasing, decreasing, constant or widely variable)
- Views on factors determining the variability of trading
- The nature of transactions (i.e. whether cash, barter with consumables or inputs, credit etc.)
- Availability of maize vs consumables and other agricultural products.

- Sources of funds, e.g. credit

- Who sells what to whom and where?
- What do they sell/buy (i.e. commodities, inputs, consumables, etc).

- Views on the emerging pattern of trade

5.0 Price Integration

- Purchase price at different times in the marketing season

- Selling price at corresponding times in the marketing season

- Source of purchase and destination of sales by region at different times of the marketing season

- What factors determine the choice of source of purchases and destination of sales

- Type of transport used, capacity (tons) distances and costs involved

6.0 Profitability:

- Interest charges and their effect as reflected in seasonal prices.

- Levels of profitability viz-a-viz new investments

- Market information - source, relevance, adequacy and accuracy.
- Constraints and prospects

- Scale of operation

- Direction of trade movement, any limitations?

- Stocking behavior

7.0 Views on current agricultural market arrangement

- Government regulations

- Storage

- Financing

- Transportation
- Processing
- General government policy

D. QUESTIONNAIRE FOR FARMERS

IDENTIFICATION

1. Date of interview.....

2. Province.....District.....

3. Block.....Camp.....

4. Enumerator.....

5 Name of Trader.....

6. Age.....Sex: Male.....Female.....

7. Education Level.....

1. FARMING EXPERIENCE

(a) How long have you been in the farming business? _____ Years.
(b) In order of importance, what crops do you produce:
(I) _____
(ii) _____
(iii) _____
(iv) _____
(v) _____
(vi) Other crops:_____

2. CROP MARKEING EXPERIENCE

(a) Who are the major buyers of your crops?

(b) What were/are the product prices during the following crop marketing seasons?

Crops	1993/94	1994/95	1995/96	
_____		_____/	_____/	_____/
_____		_____/	_____/	_____/
_____		_____/	_____/	_____/
_____		_____/	_____/	_____/
_____		_____/	_____/	_____/

(c) Are the buyers locally based or not?

(d) If not to 2c. above, where do the buyers come from?

(e) Is there a large number of buyers?

(f) Can you easily sell your produce when you want to during any time period of the year, especially after the rains have started?

(g) Are you able to sell to other markets other than the local markets here?

(h) Are you organized in any marketing group? If yes, do you feel you would get significantly higher prices if you as farmers are organized in groups?

If no, don?t you think it would be beneficial for you to get organized in farmer groups? Elaborate.

(I) Do you practice on farm-storage? If not, why?

3. PRICING

(a) On a scale of 1 to 10, how attractive are the prices received in 2b.

(b) On the same scale, how would you rank the previous marketing arrangement in

terms of producer price attractiveness?

(c) Given the product prices given in 2b., would you be encouraged to expand production or area cultivated?

(d) Are you involved in any outgrower scheme? If yes, specify.

4. INFRASTRUCTURE

(a) What is the condition of the road network from the local areas to the peri-urban or urban areas?

(b) How far are the distances?

(c) What is the most common mode of transportation for agricultural produce?

If hired transport is used, what are the charges like?

(d) Do you receive any product or input price information from the MAFF or any other source? Specify.

(e) If you receive any product price information, to what degree would you say it helps you bargain for a better price for your produce? State on the rank of 1 to 10.

(f) Are you able to obtain credit for crop marketing purposes?

If yes, from whom and what are the terms?

If no, why?

5. GENERAL KNOWLEDGE

a) What problems do you face in crop marketing in general? And over what crops?

b) What do you think is the solution to the problems?

c) Are you able to cope up with the problems?

If yes, to what degree? Choose from a scale of 1 to 10 and explain as to how you are coping up with the problems associated with the liberalized crop marketing arrangement.

d) To what degree do you understand the liberalized crop marketing system?

i) Not all ii) Just a little bit.
iii) Fairly well iv) Very well

e) If you understand it fairly well or very much, do you appreciate it?

E. QUESTIONNAIRE FOR TRADERS

IDENTIFICATION

1. Date of interview.....

2. Province.....District.....

3. Block.....Camp.....

4. Enumerator.....

5 Name of Trader.....

6. Age.....Sex: Male.....Female.....
7. Education Level.....

GRAIN PURCHASES

8. What year did you start trading in grains? .....

9. What food grains do you generally trade in?.....

   a) maize.....
   b) sorghum.....
   c) finger millet.....
   c) bulrush millet.....
   e) groundnuts.....
   f) other.....

10. How did you decide to trade in maize?
    a) availability of the market.....
    b) number of clients.....
    c) storage facility.....
    d) availability.....
    f) profitability.....

11. Since you started trading where have you normally obtained your maize from?

    a) within the district.....

b) neighbouring districts.....
c) other provinces (specify).....
d) neighbouring country (specify).....

12. From whom did you purchase your maize last year and what quantity?

Source Quantity bought (90kg bags)

Farmer .....

Wholesaler .....

Miller .....

Other private traders .....

Other .....

13. To whom did you sale your maize last year and what quantity (i.e. no. of bags/tins) ?
Destination Quantity bought

Miller .....

ZCF .....

Lima Bank .....

CUSA .....

Cooperative Union .....

Other (specify) .....

14. What is the reason for selling where you did?

a) no other alternative buyer
b) the buyer offered a higher price
c) other reasons (specify).....

15. How does maize get to your point of selling?
a) it is brought to me.....

b) I go to fetch it myself.....
c) I make orders.....

16. If the maize is brought to you, who brings it?

a) producers..... b)small Assemblers.....
c) wholesalers..... d) truckers.....
e) others (specify).....

17. If you go to fetch the maize yourself from whom do you get it?

a) producers..... b) small assemblers.....
c) wholesalers..... d) truckers.....
e) other (specify).....

18. If you make orders from whom do you order your maize?
a) producers.....b) small assemblers.....
c) wholesalers.....d) truckers.....
e) other (specify).....

19. What were the major reasons that motivated the choice of your selling point?

a) number of clients.....
b) number of suppliers.....
c) proximity to home.....
d) profitability.....
e) transportation costs.....
f) other (specify).....

20. What is your strategy of buying maize?

a) Harvest time.....
b) progressive buying over the whole year.....
c) progressive buying over the whole year with big buy before shortages.....
d) other (specify).....

21. What is your strategy for selling maize?.....

22. Did you make any promises to your suppliers before they delivered the maize?
Yes..... No.....

If yes, which ones?
a) order-price only.....
b) order-quantity only.....

c) order-price and quantity.....
d) credit.....

23. If you have a maize buying/selling contract and say maize runs out, what would you do?
a) revise the terms of the contract.....
b) import neighbouring province/country.....
c) break the contract.....
d) other (specify).....

24. Suppose you observe that the normal season has failed and there is no stock of maize within your district, what would you do?

a) go look for it in other districts/provinces.....
b) import it from other countries if given a permit.....
c) sell exclusively at retail the little that I have.....
d) other (specify).....

PRICES

25. What is the current selling/buying price for the following grains?

GRAIN	BUYING PRICE		SELLING PRICE	
	90kg	18kg	90kg	18kg
Maize				
sorghum				
Millet				
Groundnuts				

26. How do you get to know about grain prices in other districts/provinces?
a) radio..... b) ewspapers.....
c) other traders..... d) GRZ bulletin.....
e)visiting relatives..... f) other (specify).....

27. What is your major decision variable for fixing the selling price?
.....

TRANSPORTATION

28.Do you have your own means of tran

Yes..... No.....

If yes what type (s)?

a) bicycle..... b) van.....
c) oxcart..... d) trucks.....
e) other.....

If no, how do you transport your grain from place of purchase to your selling point?
a) hire a truck..... b) hire an oxcart.....
c) hire a tractor..... d) other.....

29. What is the cost of hire based on?.....

.....

30. What is the transportation cost per 90kg bag of maize?.....

31. What is the distance which separates you from the most frequent point of supply?.....

32. What is the distance to your major selling point?.....

STORAGE

33.Do you own any storage facilities?

Yes..... No.....

If yes, what type of structure is it?.....

34. What is the capacity of your particular storage facility (e.g. how many bags of maize can it take at a time)?.....

35. If no, do you rent any of the government storage facilities that have been leased and what is the rental charge?

Yes..... Rental charge.....

CREDIT

36. What is the source of your finances?

a) CUSA..... b)Lima Bank.....
c) ZCF/FS..... d) GRZ.....
e) commercial bank..... f) other.....

INVESTMENT

37. How do you find trading in grains, especially maize
....

38. What are the major problems that you encounter in your trade?

a) lack of clients
b) lack of sufficient funds
c) lack of means of transport
d) poor storage facilities
e) unclear government policy
f) other (specify).....

39. Are you involved in any of the following activities?

a) farming
b) farm input trading
c) transportation of goods and services
d) milling enterprise
e) other (specify).....

40. What is your opinion on the following marketing issues?

a) government regulations.....

.....

b) Financing.....

.....

c) transportation.....

.....

d) leasing of storage facilities.....

.....

e) government policy in general.....

Appendix 4.1 Data for Estimation and Trend Analysis

Table 4.1A Maize Area Planted By Province ('000

	Central	Copperbelt	Lusaka	Southern	L0R	Eastern	Luapula	Northern	N/Western	Western	Non-LOR	Total Zamabia
1980	113	12	10	152	287	151	6	38	19	40	253	540
1981	156	31	35	137	358	149	14	40	10	50	264	623
1982	101	7	23	85	216	196	3	25	4	11	238	455
1983	147	8	25	80	260	221	3	36	5	22	287	547
1984	101	10	25	90	226	214	5	42	4	15	280	507
1985	119	15	32	134	301	206	5	47	5	18	281	582
1986	115	17	34	104	270	241	6	46	6	20	319	588
1987	106	20	44	150	321	193	11	50	9	26	289	610
1988	119	25	43	150	337	281	10	56	15	25	386	723
1989	142	29	33	243	447	307	17	190	18	42	573	1021
1990	104	22	26	233	384	262	17	45	16	39	379	763
1991	116	18	29	142	305	242	10	41	12	29	335	639
1992	102	20	48	132	302	256	13	37	12	41	359	661
1993	113	30	29	203	375	129	15	50	18	46	258	633
1994	161	30	31	131	352	175	17	71	25	40	327	679
1995	98	26	20	105	250	150	16	48	19	38	271	520
1996	131	36	31	142	341	208	15	46	19	47	335	676
1997	93	39	27	159	318	199	17	46	25	43	330	648
Average												
1980-97	119	22	30	143	314	210	11	53	13	33	320	633
1980-89	122	17	30	133	302	216	8	57	9	27	317	619
1990-97	115	28	30	156	328	202	15	48	18	41	324	653

Source: Calculated from GRZ(1997): *Agricultural Statistics Bulletin*, Central Statistics Office, Lusaka.

Table 4.2A Maize Production By Province and Region ('000*90 kg bags)

	Central	Copperbelt	Lusaka	Southern	L0R	Eastern	Luapula	Northern	N/Western	Western	Non-LOR	Total Zamabia
1980	3,307	214	260	5,227	9,007	4,298	73	1,109	332	167	5,979	14,986
1981	5,170	481	487	6,147	12,285	2,651	235	596	130	603	4,215	16,500
1982	2,168	113	390	2,307	4,978	2,465	60	664	67	102	3,358	8,336
1983	3,301	159	495	1,808	5,763	3,095	73	1,217	95	146	4,626	10,389
1984	2,759	183	460	1,607	5,009	3,319	95	1,000	93	170	4,677	9,686
1985	3,172	322	720	3,086	7,300	3,669	109	1,074	112	207	5,171	12,471
1986	3,260	404	664	2,978	7,305	3,564	127	1,014	114	227	5,045	12,351
1987	3,131	536	394	2,508	6,569	3,551	199	1,127	169	201	5,247	11,816
1988	4,391	793	988	5,987	12,159	6,481	288	1,830	306	527	9,433	21,591
1989	4,870	667	789	5,068	11,394	6,004	475	1,675	377	555	9,086	20,480
1990	2,573	957	426	3,194	7,150	3,149	430	1,147	255	411	5,391	12,541
1991	3,631	690	514	2,063	6,899	3,512	197	951	291	326	5,278	12,177
1992	1,920	359	439	280	2,998	915	323	800	184	153	2,374	5,372
1993	4,406	882	952	5,140	11,381	3,771	419	1,336	326	520	6,372	17,753
1994	2,433	609	354	2,151	5,548	2,376	526	2,010	484	398	5,794	11,342
1995	1,913	559	215	938	3,625	2,199	348	1,309	373	343	4,573	8,198
1996	3,866	847	849	3,184	8,746	4,177	419	1,256	385	678	6,915	15,661
1997	1,704	590	494	2,799	5,587	2,757	376	1,081	425	444	5,083	10,669
Average												
1980-97	3,221	520	549	3,137	7,428	3,442	265	1,178	251	343	5,479	12,907
1980-89	3,553	387	565	3,672	8,177	3,910	173	1,131	179	291	5,684	13,861
1990-97	2,806	687	530	2,469	6,492	2,857	380	1,236	340	409	5,223	11,714

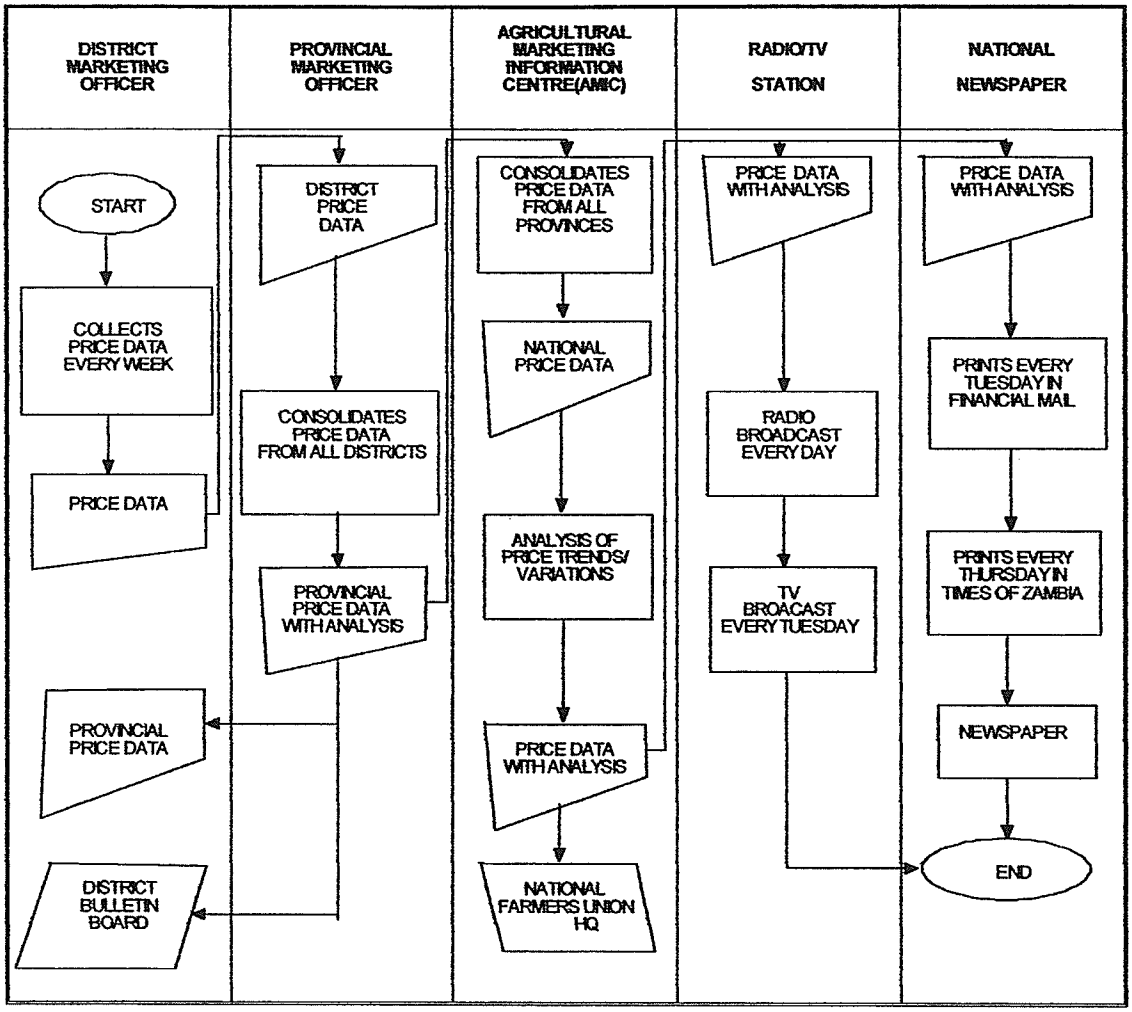
Source: Calculated from GRZ(1997): *Agricultural Statistics Bulletin*, Central Statistics Office, Lusaka.

Table 4.3A Provincial Marketed Maize ('000*90 kg bags)

	Central	Copperbelt	Lusaka	Southern	L0R	Eastern	Luapula	Northern	N/Western	Western	Non-L0R	Total Zamabia
1980	1,519	34	192	2,199	3,944	740	21	159	84	27	1,030	4,974
1981	2,674	135	358	3,039	6,206	1,184	30	328	42	43	1,627	7,832
1982	1,685	66	252	1,642	3,645	1,273	50	649	50	38	2,060	5,706
1983	2,237	90	217	963	3,507	1,600	40	653	51	51	2,395	5,902
1984	2,118	133	193	1,076	3,520	1,849	71	751	67	89	2,827	6,348
1985	2,233	242	267	1,584	4,326	1,781	59	738	75	92	2,744	7,070
1986	2,651	310	317	2,001	5,278	2,116	96	833	80	98	3,224	8,502
1987	2,114	518	374	987	3,993	2,011	152	929	115	96	3,301	7,294
1988	4,177	600	758	3,422	8,957	3,653	244	1,586	235	315	6,033	14,990
1989	4,495	484	466	3,358	8,803	2,471	387	1,447	160	285	4,749	13,551
1990	1,860	293	486	1,705	4,345	1,370	136	667	103	59	2,335	6,680
1991	1,880	293	486	1,705	4,365	1,370	136	667	103	59	2,335	6,700
1992	1,369	185	66	1	1,622	383	240	503	94	36	1,256	2,877
1993	3,406	640	638	2,813	7,498	1,215	300	905	181	233	2,833	10,332
1994	1,260	278	204	836	2,578	680	344	1,378	239	74	2,714	5,292
1995	1,077	319	85	630	2,110	542	162	787	168	62	1,719	3,830
1996	2,538	507	498	1,097	4,640	1,282	217	735	193	357	2,784	7,424
1997	919	195	278	780	2,172	371	196	476	163	85	1,291	3,463
Average												
1980-97	2,234	296	341	1,658	4,528	1,438	160	788	122	117	2,625	7,154
1980-89	2,590	261	339	2,027	5,218	1,868	115	807	96	113	2,999	8,217
1990-97	1,789	339	343	1,196	3,666	901	216	765	155	121	2,158	5,825

Source: Calculated from GRZ(1997): *Agricultural Statistics Bulletin*, Central Statistics Office, Lusaka.

Appendix 5.1: Market Information Flow in Zambia



Source: Agricultural and Marketing Information Center (AMIC), Lusaka.

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