

**EFFICIENCY OF SMALL SCALE FARMERS AND LAND REFORM IN
ZIMBABWE**

BY

ABBYSSINIA MUSHUNJE

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL**



ECONOMICS

University of Fort Hare
IN THE
Together in Excellence

**DEPARTMENT OF AGRICULTURAL ECONOMICS, EXTENSION AND RURAL
DEVELOPMENT**

FACULTY OF AGRICULTURE

UNIVERSITY OF FORT HARE

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ABSTRACT

The role and significance of agriculture in the Zimbabwean economy needs no further emphasis. The whole economy depends on a stable agrarian growth. Agriculture accounts for 11-14 percent of the GDP and contributes 33 percent of formal employment.

Currently the government of Zimbabwe is forging ahead with its controversial Land Reform programme. This is intended to achieve higher agricultural output, higher labour absorption and a more equitable income distribution. Land Reform is believed to alleviate rural poverty.

This study attempted to assess the relative technical efficiency and allocative efficiency of small scale communal and resettlement area farmers of Zimbabwe. Maize and cotton are the two crops that were used. Maize was used because of its importance as a major cash crop and staple food for these farmers. Cotton has recently become an important cash crop for smallholder farmers of Zimbabwe.

A Cobb-Douglas type of production function analysis revealed that resettled farmers, who are a product of the land reform programme, are relatively more technically efficient than small-scale communal farmers in the production of both maize and cotton crops.

As for allocative efficiency both communal and resettled farmers are under-utilising inputs such as land, seed and insecticides. On the other hand they are over-utilising labour and capital inputs. This indicates that resettling people alone cannot guarantee overall efficiency. The government should be

committed to give technical support through well -equipped and effective extension service.

Farmers can also benefit from subsidised inputs such as seed and fertiliser.



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ACKNOWLEDGEMENTS

My major debt of gratitude goes to my supervisor, Professor A Belete whose guidance and inspiration have made this big task possible.

I am also at a loss of words to sufficiently thank Dr J Made, Chief Executive Officer of ARDA (now Minister of Lands, Agriculture and Resettlement in Zimbabwe), for the assistance he rendered me. He gave me some very useful resource material and assisted me with information on Land Reform.



To the management and staff of Chisumbanje and Middle Sabi Estates I am greatly indebted. They provided me with accommodation and transport during my period of data collection.

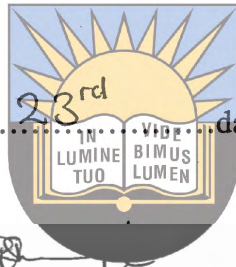
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I owe special thanks to my wife, ~~Together in Excellence~~ for her precious time to proof read my manuscript. Also deserving special gratitude is Professor Brouwer for his immense patience and invaluable time he spent editing my manuscript. This also includes Mrs P Matakane for her excellent work in typing this manuscript.

DECLARATION

I Abbyssinia Mushunje do hereby declare that the work contained in this dissertation is entirely my own work with the exception of such quotations or references which have been attributed to their authors or sources and that all photographs, sketches, maps, plans, overlays and graphs are made or drawn by me save where I have acknowledged that another is the author.

Dated at.....ALICE.....this 23rd day of APRIL.....2001



Signed..........

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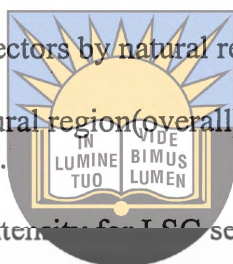
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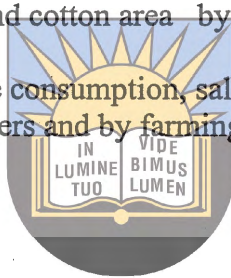
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ACRONYMS

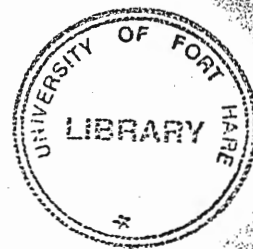
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|---------|---|
| AFC | Agricultural Finance Corporation |
| ARDA | Agricultural Rural Development Authority |
| CA | Communal Area |
| CMB | Cotton Marketing Board |
| CSC | Cold Storage Commission |
| DMB | Dairy Marketing board |
| DRSS | Department of Research and Specialist Services |
| EO | Extension Officer |
| GDP | Gross Domestic Product |
| GMB | Grain Marketing Board |
| LSC | Large Scale Commercial farming |
| MCB | Maize Control Board |
| NR | Natural Region |
| PIB | Pig Industry Board |
| RA | Resettlement Area |
| SSC | Small Scale Communal farming |
| TMB | Tobacco Marketing Board |
| UDI | Unilateral Declaration of Independence |
| ZANU PF | Zimbabwe African National Union Patriotic Front |



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CHAPTER ONE

INTRODUCTION



1.1 Background information

Agriculture is the backbone of Zimbabwe's economy and will continue to be so in the foreseeable future. It produces a diversity of crops and animals ranging from maize, groundnuts, sorghum, coffee, soyabeans, sunflower, barley, wheat, cotton and tobacco to cattle, sheep, goats, pigs and chickens (Rukuni 1994a). Horticultural crops like flowers, fruits, citrus and vegetables are also produced to increase foreign currency earnings.



The sector provides employment for some 70 percent of the population and about 60 % of all raw materials, for industry, come from the sector. It also provides 11-14 percent of Zimbabwe's GDP (Ministry of Information, 1998). Zimbabwe's agriculture sector is highly dualistic with farm size and income disparities being greater than anywhere in Africa except South Africa (Mutangadura and Norton, 1999). Although it was assumed that at independence some large scale commercial farms held by whites should be distributed to the landless, Zimbabwe is still confronted by the very vexing issue of land reform.

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The demand for land among communal farmers and the landless has not been satisfied. The majority of Zimbabweans continue to live in rural areas mostly on small farms in less favoured agro-ecological zones. As stated by Mutangadura and Norton, (1999), the split between large scale commercial (LSC) and small scale communal (SSC) farms continues to divide, primarily along racial lines, heightening the political sensitivity of the size and

income disparity issue. Using the international standards whereby all farms less than 10 hectare are classified as small, we find that in Zimbabwe one-third of the land belongs to the 4 500 LSC farms (Table 1).

TABLE 1.1 ZIMBABWE: LAND DISTRIBUTION BY FARM SECTOR AND NATURAL REGION, 1988 (000ha)

| NR | Large-Scale Commercial Farms | | Small-Scale Commercial Farms | | Communal Areas | | Resettlement Areas | | State Farms | | Parks and Wildlife Areas | |
|-------|------------------------------|------|------------------------------|------|----------------|------|--------------------|------|-------------|-----|--------------------------|------|
| | Ha | % | Ha | % | Ha | % | Ha | % | Ha | % | Ha | % |
| I | 202.2 | 1.8 | 7.3 | 0.6 | 135 | 0.8 | 30 | 0.9 | 10 | 2 | 50.1 | 1.0 |
| II | 3,687.0 | 32.8 | 222.2 | 17.9 | 1,270 | 7.8 | 590 | 17.9 | 10 | 2 | 25.0 | 0.5 |
| III | 2,405.4 | 21.5 | 438.3 | 35.4 | 2,820 | 17.2 | 1,240 | 37.8 | 160 | 32 | 545.9 | 11.0 |
| IV | 2,429.1 | 21.7 | 473.3 | 38.2 | 7,340 | 45.8 | 810 | 24.6 | 60 | 12 | 2,514.1 | 50.3 |
| V | 2,489.7 | 22.2 | 97.6 | 7.9 | 4,790 | 29.3 | 620 | 18.8 | 260 | 52 | 1,843.0 | 37.2 |
| Total | 11,213.4 | 100 | 1,238.7 | 100 | 16,365 | 100 | 2,290 | 100 | 500 | 100 | 4,978.1 | 100 |

NR = Natural Region

Source : Adapted from Rukuni (1994b)

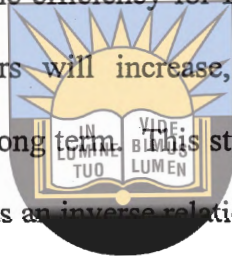
The main objective of the government under Land Reform is that the redistribution of acquired land should go beyond the political and moral imperatives. It should include economic management and higher agricultural productivity among not only the newly settled, but also those remaining in the communal areas who will be re-organised simultaneously with the resettlement programme. This objective envisions improved productivity through efficiency.

Land reform, which is the redistribution of land ownership titles or other interventions in land use rights (von Blankenburg, 1993), should be based on the premise that the new settlers will be more productive than their predecessors. It should also address the nation's growing problems of unemployment, poverty and the general deterioration of the quality of the people's lives.

This study is to look at farm efficiency because it is an important subject in developing countries agriculture (Zimbabwe included), where resources are limited but high population growth is very common. A study on the efficiency of small-scale farmers is important because they are now producing the greater proportion of food consumed in the Third World, especially in sub-Saharan Africa, (Odulaja and Kiros, 1996). The same authors mentioned that at least 73 % of all rural Africans are small-scale farmers, but despite the fact that such a high percentage of the population farms, food demand cannot be met from this source. The population growth rate is about 3.3 % but agricultural growth is lagging behind at 1.5 % per year (La-anyami, 1986). This begins to suggest that Land reform should always be linked to efficiency.

The study will look at both technical and allocative efficiencies. Most of the empirical literature dealing with farm efficiency in developing countries has been concerned exclusively with the measurement of technical efficiency (Bravo-Ureta and Evenson, 1994). However, by focusing only on technical efficiency, we ignore the gains in output that could be obtained in the short run by also improving allocative efficiency.

An efficient farm is a farm using less resources than other farms to generate a given output (Kirsten and van Zyl, 1998). The superior performance is shown by higher efficiency ratios, and a lower cost per unit of production. The concept of efficiency is at the core of economic theory. The theory of production economics is concerned with optimisation and optimisation implies efficiency (Torkamani and Hardaker, 1996). The analysis of efficiency, in general, focuses on the possibility of producing a certain level of output from given resources. Agricultural policies like Land Reform can be analysed from efficiency measurements. As argued by van Zyl et al. (1996) the efficiency for Land Reform is that the redistribution of agricultural land to small holders will increase, or certainly not reduce, total factor productivity and efficiency in the long term. This study is based on the findings that in most of the developing world there exists an inverse relationship between farm size and efficiency. This is to say that once a small minimum size is exceeded, family farms relying primarily on family labour are generally more productive than larger farms relying primarily on hired labour.



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Production efficiency is usually analysed by separately examining its two components: technical and allocative efficiency (Wang et al, 1996). Technical efficiency may be defined as obtaining the maximum output from a given set of physical inputs. Allocative efficiency on the other hand is defined as the ability to choose a technically efficient input/output combination that optimises a decision maker's goal(s) given relative output/input prices (Rukuni, 1994b).

Wang et al, (1996) observed that allocative efficiency is evaluated from the producer's point of view of profit maximisation. It does not necessarily reflect social costs and therefore is not necessarily efficient in the sense of social cost benefit assessment.

1.2 The Research Problem

Small farmers are said to crop available land more intensively, using more labour, and fallowing less; whereas large farmers may under utilize land, fallowing more, planting less densely and using less labour per hectare (Byiringiro and Reardon, 1996). According to Kirsten and van Zyl, (1998) there is a mistaken perception that small farms are less efficient than large farms due in part to the illusion of modernity. People believe that when a farm uses sophisticated capital then it is efficient but some studies have corroborated Schultz's "poor but efficient" hypothesis (Xu and Jeffrey 1997).

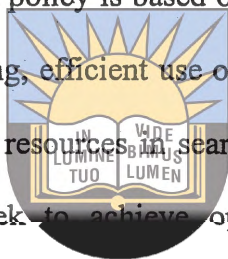
Due to colonialist history the Zimbabwe agriculture is dominated by LSC farmers mainly whites. Small-scale farmers are crammed on barren soils in rural areas, while only 4 500 white LSC farmers take control of about 70 percent of the country's productive land. The SSC farmers have faced numerous constraints because of this skewed land distribution pattern.

At independence the government embarked on the Land Reform programme and the first phase took place between 1980 and 1990. But the land issue remains both emotive and

vexed. The government managed to resettle 71 000 families on about 3.3 million hectares bought from the commercial sector. This was far below the intended target of 162 000 families on 8 million hectares of land.

The government is now trying to implement the second phase of resettlement whereby 150 000 families are to be resettled on 5 million hectares of land. By April 2000 about 2 422 households had been resettled on 66 farms.

The government's Land Reform policy is based on the need to establish a more efficient and rationale structure of farming, efficient use of land and natural resources, as well as to redress inequitable access to resources in search of justice and social stability. The Land Reform policy must seek to achieve optimal land utilisation and increased productivity so as to deliver employment growth, improved income distribution, and environmentally sustainable use of natural resources (Government of Zimbabwe policy document, 1998). As a result this programme should be based on the premise that small-scale farming should exercise more technical, allocative and then economic efficiency in productivity and also that land reform is to reinforce agricultural development and broader economic reforms.

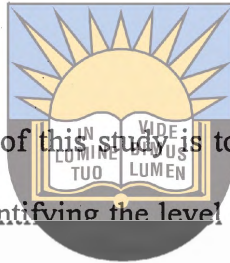


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1.3 The Scope and Objectives of the Study

Land Reform, which is always one of the major components of the processes of agricultural reforms together with the development of small-scale farmers is the primary

focus of this study. Besides fulfilling the political and moral imperatives of land distribution, technical and allocative efficiencies of the whole exercise are to be assessed. This is important so as to avoid a situation whereby the programme will result in untold damage to the economy, which is agro-based. The study should help policy makers to come up with a win-win policy which is good for equity and good for efficiency. They should make benefit-cost analyses which have to do with allocative efficiency, and equity with distributional concerns. The study should help policy makers on how to balance control and access to land, by carefully distributing land from LSC to new small scale farmers.



As a result the main purpose of this study is to contribute to the efficiency literature in developing agriculture by quantifying the level of technical and allocative efficiency for Zimbabwean small scale farmers.

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Specific objectives are as follows:

1. To find out the level of technical and allocative efficiency for small-scale farmers of Zimbabwe.
2. To assess the ability and/or willingness of small-scale farmers to adjust input levels,
3. To find out if there is an inverse relationship between farm size and agricultural productivity,
4. To predict the possible impact of the government's land reform programme on the economy which is agriculturally based,

5. To find out if the redistribution of land will go beyond the political and moral imperatives to include sound economic management and higher agricultural productivity among the newly resettled farmers, and
6. To assess whether land reform will reduce the extent and intensity of poverty among rural families and farm workers who are provided with land for agricultural use.

1.4 Hypothesis

a) General

Land reform is the only panacea to Zimbabwe's rural poverty.



b) Working

i) Small-scale farmers are technically and allocatively efficient in farm production.

ii) There is an inverse relationship between farm size and agricultural productivity.

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1.5 Organization of the Study

Since the purpose of this study is to contribute to the efficiency and Land Reform literature in developing countries whose economies are agro-based, the level of technical and allocative efficiency for samples of small-scale communal and resettled farmers of Zimbabwe will be assessed.

The remainder of this paper is organised into five chapters. Chapter 2 provides a brief overview of the Zimbabwean agricultural sector and the Land Reform programme. Chapter 3 deals with the analytical framework employed in the study and chapter 4 deals with the description of the study areas.

The characteristics of the sample population are discussed in chapter 5 and the production analyses are presented in chapter 6. Chapter 7 gives the empirical results. The last chapter, chapter 8, presents the summary and concluding remarks.



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CHAPTER TWO

AN OVERVIEW OF THE AGRICULTURE SECTOR OF ZIMBABWE

2.0 Introduction

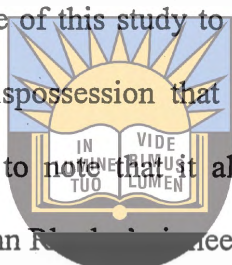
Today Africa is the poorest part of the world's economy. From 1960 to 1990 it has moved from the position of food self sufficiency to a hungry, malnourished, impoverished and disillusioned continent (Chafesuka, 1994). This is supported by La-Anyam (1986) who said that since the 1960s in practically all tropical African countries, food production has failed to match population growth. This is because Africa is characterised by high population growth rate and an unfavourable age distribution. The literacy rate is very low and natural resources are either very limited or they are under-utilised. The climate is unfavourable, soils are poor, complex land tenure systems, and the use of traditional technology of low productivity is the order of the day. Belete et al, (1991), as quoted by Seyoum et al (1998) argue that the poor performance of the Agricultural sector is due to inadequate attention given to agricultural research and education which are considered to be important inputs in agricultural development.

Zimbabwe is one of the African countries and the role and significance of agriculture in the Zimbabwean economy hardly needs any emphasis. The economy is relatively diversified but dependent on stable agrarian growth. Agriculture accounts for 11 % of the gross domestic product. It also accounts for 33 % of formal employment. The agricultural sector, as is often the case with less developed countries (LDCs) plays a key role in Zimbabwe's development

strategies. In prosperous agricultural years, tobacco and cotton exports account for 25 % of total exports while the sector as a whole can account for 40 % of all exports. Since agriculture provides raw materials for the industrial sector, the growth of the latter and services too are closely dependent on expanding agricultural production. The majority of the Zimbabwean people depend on agriculture for both employment and economic benefits.

2.1 The Historical Perspective of Land ownership

Although it is not the objective of this study to give a detailed historical account of the nature and process of land dispossession that occurred in Zimbabwe since the early colonial wars, it is important to note that it all started in the last decade of the 19th century. This is after Cecil John Rhodes and his pioneer column had arrived from South Africa. They were looking for gold but they failed to find it. The 'Second Rand' (Mumbengegwi, 1986) and they started to take land from the black indigenes. In 1896/97 the blacks fought the white settlers and this was called the First Chimurenga. The blacks were defeated and land dispossession continued unabated.



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2.1.1 Zimbabwe's Land Question

In 1898 Native Reserves were created where blacks were to live on marginal lands which, under a growing population could not sustain their farming systems, and thus led to further land deterioration. According to von Blankenburg (1993) from the settlement

policy of the whites became more aggressive on land of good quality and the white settlement developed as follows (Table 2.1).

Table 2.1: The development of the white settlement.

| Year | Number of settlers |
|------|--------------------|
| 1904 | 545 settlers |
| 1911 | 1 324 settlers |
| 1921 | 2 355 " " |
| 1945 | 3 699 " " |
| 1955 | 6 255 " " |
| 1980 | 5 000 " " |
| 1990 | 4 500 " " |

Source: Adapted from von Blankenburg (1993)

The dispossession of the indigenous people in the course of the European occupation and settlement of large tracts of the other continents has had a lasting imprints (Christopher, 1994). In Zimbabwe the process of land dispossession continued uninterrupted such that by 1925 the structure of land occupation was as shown in Table 2.2.

Table 2.2 Morris-Carter Land Commission allocation proposals of 1925

| | |
|---|-----------------------|
| 1. White Land | 19,7 million ha |
| 2. Reserves' Land (Later TTL, and now communal areas) | 11,7 million ha |
| 3. Native areas | <u>2,8 million ha</u> |
| Total | 34,2 million ha |

Source: Adapted from von Blankenburg (1993)

The settler government went on to enact a number of legislations that resulted in extensive alienation of blacks. According to Made (1995), the pattern of land ownership that resulted in Zimbabwe has its historical roots in three acts. The Land Apportionment Act (1930), the Native Development Fund Act (1949) and The Native Husbandry Act (1951). Made (1995) argues that all the other acts like the Land Tenure Act of 1969 were just adjustments to these three acts.

The Land Apportionment Act (1930) formalised the dual agrarian structure where land was racially segregated (Rukuni 1994a). Land owned by whites was private while land for blacks was held under traditional tenure and user rights.

The Land Apportionment Act (1930) divided the land in the country as follows:



Table 2.3: Land distribution according to the provisions of the Land Apportionment Act.

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| | | |
|-----------------------|------------------|-------------------|
| European Area | 49,149,174 acres | (19,9 million ha) |
| Native Reserves | 21,600,600 " " | (8,7 million ha) |
| Native Purchase Areas | 7,464,566 " " | (3,0 " ") |
| Forest Area | 590,500 " " | (240.000 ha) |
| Unassigned Area | 17,793,300 " " | (7,2 million ha) |
| Undetermined Area | 88,540 " " | (36,000 ha) |
| Total | 96,686,080 " " | (39,1 million ha) |

Source: Adapted from Rukuni, (1994b)

Blacks were evicted from their land and land was given to white ex-servicemen who were returning from World War II. The Native Land Husbandry Act (1951) was meant to remove Blacks remaining in white areas and to enforce freehold tenure for the whites. In

1969 the Land Tenure Act was promulgated and it repeated the Land Apportionment Act. This new Act redefined the Land categories and allocated an equal amount of land to blacks and whites irrespective of their number. The new structure was as shown below.

Table 2.4: Principal Land Categories under the Land Tenure Act (1969)

| Land category | Area (ha) | % Of Total |
|--|------------|------------|
| 1. European Land General Farming Land Other Land-parks, Forests etc | 15,337,096 | 39.4 |
| | 2,768,020 | 7.1 |
| | 18,145,116 | 46.5 |
| 2. National Land Total Zimbabwe | 39,074,817 | 100.0 |

Source: Adapted from Moyo (1997)

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By 1969 white settlers dominated the best lands which were reserved exclusively for them (Sobhan, 1993). Their farms accounted for 40 % of all agricultural land. By contrast the majority of the black population controlled the less fertile 41,5 % of the land. This was despite the fact that the whites amounted to 5 % of the population only. The displacement of the black population into reserves (which became known as Tribal Trust Lands) meant that they were put into areas where there was poor, infertile soil which today are called communal lands.

The Tribal Trust Lands contained over 80 % of the entire rural African population in 1970. The Land Appointment Act, of which Made (1995) has noted that it was subject to sixty amendments but without ever affecting the principles applying African Land, led to overpopulation in the communal areas thereby depressing peasant production, and created a growing class of the landless within the communal sector. By 1977 there were already 675,000 cultivators in the Tribal areas, nearly three times the maximum numbers these areas could accommodate. Made (1995) went on to quote Roger Riddell, an economist, as saying that the land was not only acutely over-populated but that there was little or no land left for potential young farmers and in some areas over 40 percent of the men between ages 16 to 30 were landless. Actually a range of policy instruments were used by the white regime to achieve its objectives and these included physical and political coercion of African peasants, legislative discrimination and a host of direct economic measures designed to disadvantage the indigenous blacks.



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2.2 The Agrarian Structure of Zimbabwe

Zimbabwe has a total land area of 39,6 million hectares. Thirty-three million hectares are reserved for agriculture while the rest is reserved for national parks, forests and urban settlements. The quality of Zimbabwe's land resources has been classified into five "natural regions" which represent land-use potential according to average rainfall quantities and their variability. This land classification also reflects generally recommended cropping and livestock production patterns (Fig. 2.1 and Table 2.5).

Table 2.5 Land Areas by Natural Regions

| Natural region | Suitable intensity of land use | Characteristics |
|-------------------------------|-----------------------------------|---|
| I 613,233 ha (1.56 %) | Specialised and diversified crops | 1,050 mm plus rainfall per annum with some rain in all relatively low temperature periods |
| II 7,343,059 ha (18,68 %) | Intensive | 700-1,050 mm rainfall per annum with rainfall confined to summer |
| III 6,854,958 ha (17,43 %) | Semi-intensive | 500-700 mm rainfall per annum with relatively high temperatures and infrequent, heavy falls of rain and subject to seasonal drought |
| IV 13,010,036 (33,03 %) | Semi-extensive | 450-600 mm rainfall per annum and subject to frequent seasonal droughts |
| V | Extensive | Normally less than 500 mm rainfall per annum. Very erratic rainfall. Northern low-veld may have more rain but the topography and soils are poorer |

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NB: The remainder of 1,220,254 ha (3,1 %) is unsuitable for any form of agricultural use

Source: Adapted from Moyo (1986) and Muir (1994)

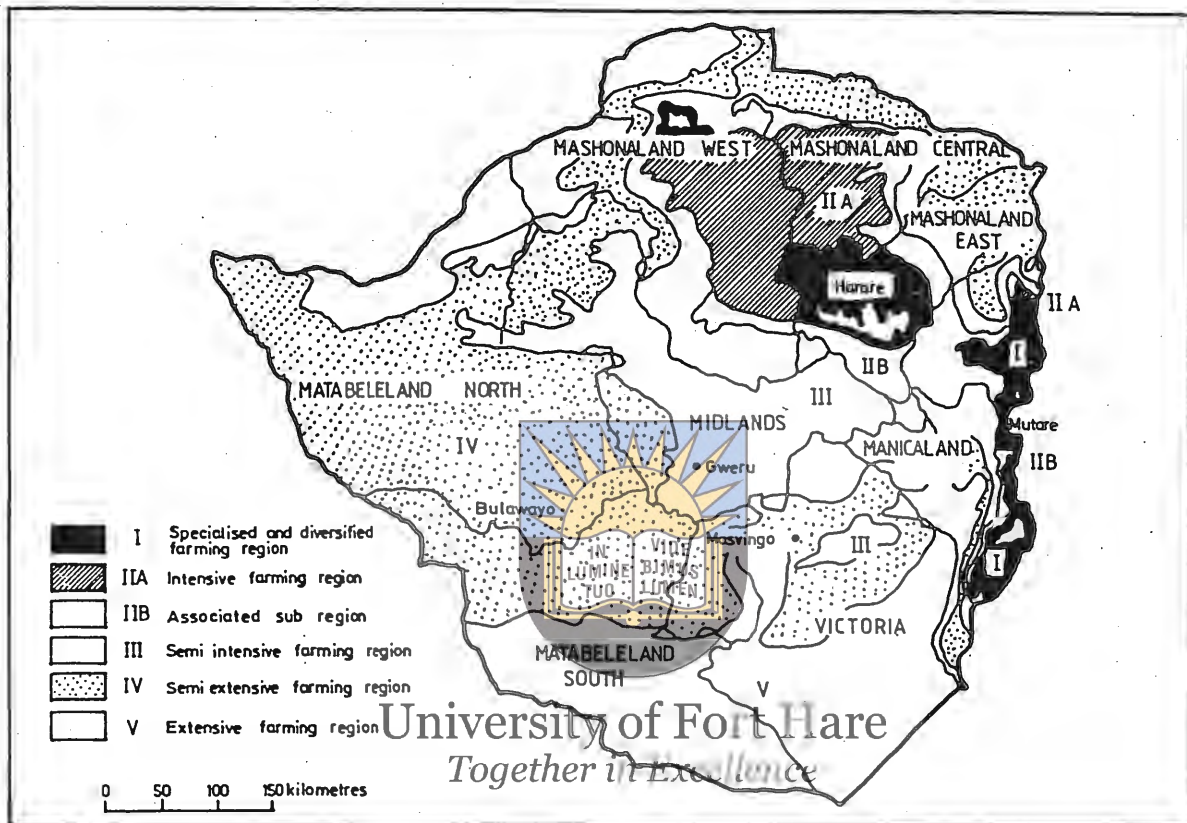


Figure 2.1 The distribution of natural regions by province

Adapted from Wekwete (1991)

At independence the government of Zimbabwe inherited a racially skewed agriculture and land ownership structure. The dualistic agricultural sector has 4,500 large-scale commercial farmers (LSC) who privately own 11 million hectares and they use relatively capital-intensive technologies. On the other hand there are about 700 000 farming families who occupy less than 50 % of the agricultural land.

2.2.1 The Large Scale Commercial Sector

This sector owns 45 % of the agricultural land, half of which lies in the high agro-ecological potential regions I; II and III (Table 2.6 and Figure 2.2). Of the 4,500 farmers only about 7 % are blacks. Owner-operated farms dominate this sector with 29 percent owning farms of between 1,000 and 2,000 hectares each. Large corporate and multi-nationally owned farms are mainly confined to sugar and forestry and some ranches in region V and some specialising in coffee, wheat, tea, cotton and horticulture.

Table 2.6: Distribution of farming sectors by natural regions



| Natural Region | Average Annual Rainfall (mm) | Areas Km ² | Total | Communal Resettlement ^a & | LSC&Small commercial ^b % |
|----------------|------------------------------|-----------------------|-------|--------------------------------------|-------------------------------------|
| I | >1,000 | 7,050 | 1,8 | 19 (1) ^a | 64 |
| II | 750-1,000 | 58,750 | 15,0 | 21 (8) | 77 |
| III | 650-1,000 | 72,900 | 18,6 | 39 (17) | 52 |
| IV | 450-650 | 147,700 | 37,8 | 50 (45) | 29 |
| V | <450 | 104,500 | 26,7 | 46 (29) | 36 |
| Total | 650 | 390,900 | 100 | 42 (100) | 43 |

NB: ^a The figure in brackets gives the proportion of communal area located in that region

^b Large scale, small-scale commercial and urban areas

Source: Adapted from Rukuni (1994b)

Under colonialism and racial segregation white (LSC) farmers benefited heavily from government support services. This sector developed within this enabling environment into a seemingly efficient, superior sector as compared to the other sector, the SSC. This sector produces over 70 % of the value of agricultural output in most years and achieve high yields by international standards.

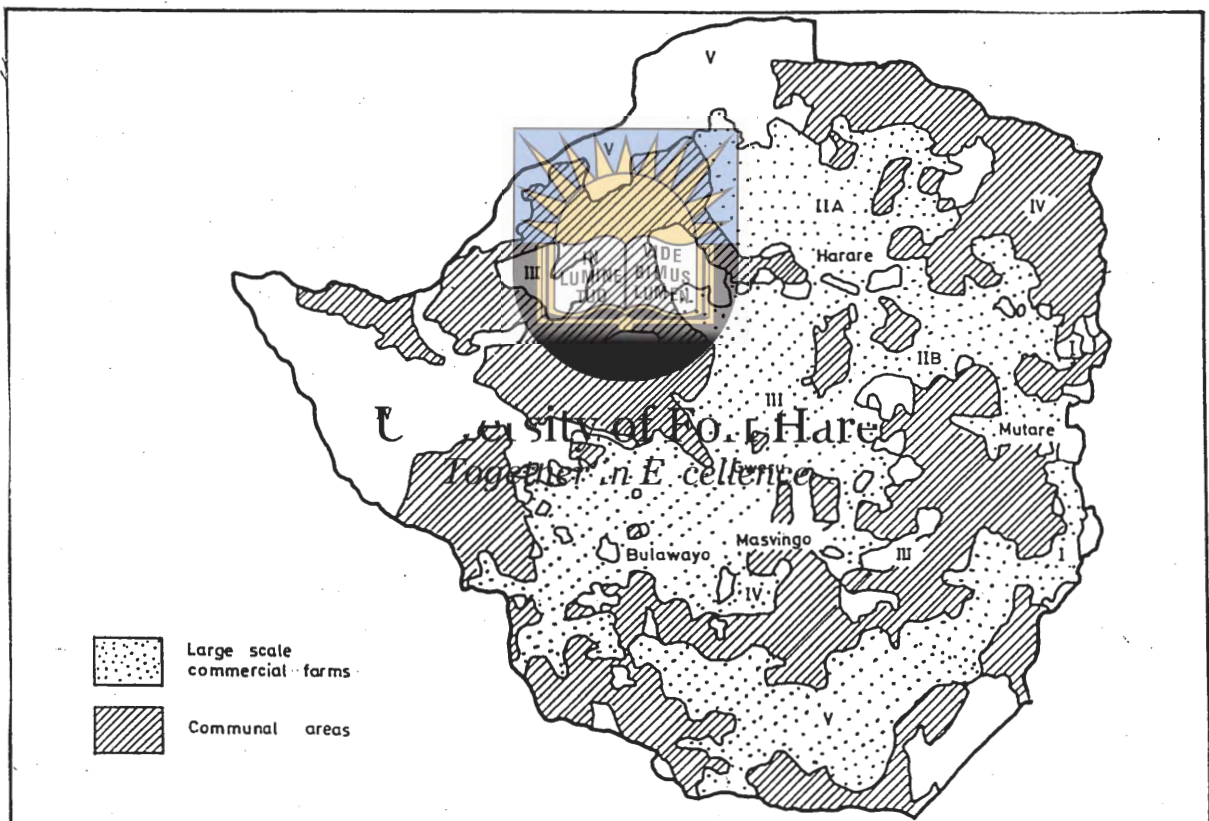


Figure 2.2 : Distribution of large scale commercial farms and communal areas by natural region.

Adapted from Weiner et al (1991)

Since Zimbabwe (Rhodesia by then) was under sanctions from 1965-80 the government worked hard to keep the farmers on the land. The thrust of agricultural policy during the UDI (Unilateral Declaration of Independence) period was aimed at maintaining the dominance of white agriculture and perpetuating the lopsided pattern of development that had already evolved over preceding decades (Mumbengegwi, 1986). Purposive and systematic measures were designed so as to serve the interest of the minority white settlers. The policy instruments chosen were intended to guarantee that the commercial farmers played the pivotal role in the pursuit of the regime's objectives.



In 1966 the government set up an Agriculture Assistance Committee to extend short term loans to farmers to cover the cost of inputs, living expenses, hire-purchase commitments and so on (Rukuni, 1994a). Farmers were also paid a subsidy on nitrogenous fertilisers and diesel fuel. The commercial agricultural sector of Zimbabwe is today rated as one of the best in Africa. This is probably a result due to the deliberate policies that included long leases or free grants of land, soft loans to purchase land at very low prices, and at very low interest rate with very long grace periods.

During UDI (1965-80) the pricing policy played a pivotal role in maintaining the economic viability of the commercial farm sector. Actually the pricing policy had two objectives. One was to support product diversification and the second was to safeguard the LSC sector from bankruptcy by setting official guaranteed prices in line with the cost of production. To keep the costs of production low and increase profitability, wages for agricultural workers were kept very low. It was observed that although agriculture was

the biggest employer of labour, accounting for 33 % of formal wage employment in the economy, its wage bill was only 6 % of the national total, whereas agricultural earnings were 25 % of the national earnings (Mumbengegwi, 1986).

By independence in 1980 (and even up to now) this sector was far better than that of small-scale farmers. They are technologically well advanced due to their close contacts with agricultural research. Their management tends to be efficient and they run capital-intensive enterprises producing for the national and international markets. As a result they are the major suppliers of the food for the nation and guarantee hard currency earnings through export production.



2.2.2 The Small-scale Communal Sector

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By 1998 this sub-sector included about 700 000 farming families who occupied less than 50 % of the agricultural land, 75 % of which is located in agro-ecological regions IV and V which is of poor soil fertility (Table 2.6). It is composed of over 70 % of Zimbabwe's population. Population densities have long exceeded the carrying capacity of the land

and have resulted in severe degradation of land resources in many localities. The sector is characterised by an increasing population and declining average farm sizes

The problems of small-scale agriculture include the use of traditional technology, low productivity, extension services which are inadequately funded, a shortage of oxen for

cultivation and shortages and poor distribution of agricultural inputs (Seyoum et al, 1998). This Ethiopian type situation, common to less developed countries, describes the Zimbabwean situation. This sector was created as reserves which were not expected to be agriculturally or economically viable. It acted as a labour pool for the modern sector, which included the LSC farms. By 1984 at least 58 % of the SSC sector had arable holdings of below 6 acres (2.5 ha), Rukuni (1994b).

This sector was marginalised by government interventions which favoured large European farms. Restrictive market differentiation gave large farms legal rights to grow specific crops for export. These policies were used to reduce the reservation utility of the SSC and these included restrictive land labour and output market regulations. As a result, this sector continues to use traditional technologies and remains too small to be able to attract the provision of services needed to be able to significantly increase productivity.



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The capacity of this sector to feed its increasing population and its capacity to produce cash crops and animals has since declined. The factors which limit production are land and capital for crop and animal inputs. SSC farmers were hard hit by the 1992 drought during which they lost most of their draught power. The small plots they have are located on poor soils where rainfall is always erratic.

This sector has very limited capital and tends to over-utilise labour. They have employed little capital, but with limited labour and land they have managed to produce

export and subsistence crops and livestock. When given the necessary back-up from government or NGOs they have adopted and used new seeds, animals and technologies.

2.2.3 The Resettlement Sector

This is a product of the government's land reform programme and it was created after independence in 1980. The poorest peasant farmers, the landless and the urban unemployed were the beneficiaries. A number of problems, which include the Lancaster House Constitution, which tied the government's hands by entrenching property rights, resulted in poor, infertile lands being made available for resettlement (Table 2.7).



Table 2.7: Land distribution by natural region (overall) compared with land acquired for resettlement

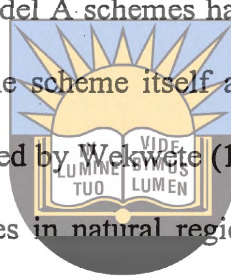
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| Natural Region (NR) | Total land Area (ha) | Land acquired For resettlement (ha) | % Of Total | % Distribution by NR |
|---------------------|----------------------|-------------------------------------|------------|----------------------|
| I | 703,400 | 21,452 | 3.10 | 1 |
| II | 5,861,400 | 509,293 | 8.69 | 18 |
| III | 7,287,700 | 973,970 | 15.36 | 37 |
| IV | 14,782,300 | 649,312 | 4.39 | 25 |
| V | 10,441,100 | 216,695 | 2.08 | 19 |
| Total | 39,075,900 | 2,370,722 | 6.07 | 100 % |

Source: Compiled from Mutizwa-Mangiza and Helmsing (1991) and Moyo (1994)

From Table 2.7 it is evident that the government has continued to resettle people in semi-arid areas which makes it difficult for them to be self-sufficient and have food security.

During the first phase of the resettlement programme, from 1980 to 1997, a total of 71,000 families were resettled on 3,5 million hectares, which was a 'remarkable achievement' (Herald, 31/03/2000). Slightly over 60 % of them were from communal lands, the rest being former refugees, the landless and the unemployed. These have so far contributed immensely to the country's agricultural production (11 % of SSC output) in spite of a host of problems, such as absence of infrastructure, escalating costs of inputs and high interest rates. Bratton, (1994) noted that such positive news about the performance of the new settlers needs to be analysed carefully. This is because the performance of settlers on model A schemes has been highly variable, depending on the agro-ecological location of the scheme itself and the movable assets brought by each settler family. This is supported by Welwete (1991) who stated that during the early 80s results from model A schemes in natural region III showed that the average value of production per hectare had been higher for resettlement schemes than the former LSC farms.



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2.3 Government Support Services

The factors, which limit the SSC farmers' production, are land, capital for crop and animal inputs and in some case labour (Made, 1995). As a result the capacity of this sector to feed its increasing population and to produce cash crops and animals has ever been declining. Nevertheless SSC farmers never received protection from the government before independence. No subsidies were provided and most of them were not eligible for loans from the Agricultural Finance Corporation (AFC).

The World Bank report (1998a) notes that the strengthening of public institutions and improvement in the provision of public goods and services (e.g. extension, credit, market information and quality public services) is essential for successful agricultural production. During the world depression of the 1930s LSC farmers were assisted by subsidies meant to support white agriculture and the survival of the white community. The SSC farmers (blacks) were left in the cold, Marketing Boards were created. These included the GMB, TMB, CSC, DMB, PIB etc but small holder farmers did not have access to them. For example the small holders did not fall under the jurisdiction of the Maize Control Board (MCB) and they sold their surplus on local markets. In 1934 white farmers, excluding the largest producers, received prices 40 percent higher than world market prices, but blacks and the largest white farmers received minimum prices after MCB covered the export losses.



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Small-holders did not benefit much from agricultural research projects. This is because extension work was only based on the willingness of the smallholder farmer. There were two extension services, one for commercial farmers and one for small holder farmers. A very small number of communal farmers benefited because the ratio of extension officer (EO) to SSC farmers was too high, i.e, 1:1000 (Rukuni 1994a). Clearly then, to understand the existence of the different land sizes between the two major agricultural production sectors and the resultant economies of scale we should closely review the historical policies that existed before independence. The small holder farmer never

enjoyed privileges such as tax shelters and credit subsidies, general bailouts and blanket debtor relief that were accorded to large scale commercial farmers.

2.4 Land Reform in Zimbabwe

In Zimbabwean society land is regarded as the property of the community. Land, according to Yakubu, (1985) is the solid portion of the earth surface as opposed to sea and water. It is a space or room and surface upon which life takes place. Ownership and distribution of land is a key factor in class formation, structure and differentiation (Wekwete, 1991). In a purely farming society like Zimbabwe's, land dominates as the main source of wealth and power, and it reflects the social, economic and political status of those who have land ownership rights.



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In a predominantly agricultural country like Zimbabwe, the problem of land reform has naturally been one of the most important subjects of political agitation and economic upheaval. Zimbabwe's land distribution is highly skewed and the status quo is not politically, socially or economically sustainable. This has been the state of affairs since the British invasion of 1890. It is this inequitable distribution of the economy that has prompted the black people who took up arms and fight for independence. At independence the government decided to embark on the land reform programme.

Land reform involves changing and restructuring of the economic, legal and political arrangements governing the ownership and management of agricultural land. It

represents the attempt to update the land tenure system in line with overall national economic development. A restructuring of land tenure systems results in direct changes in the social class and political and economic power structure of the society (La-Ayami, 1986). From land reform programmes greater equality and better social justice may result. Land reform serves both the purposes of redistribution of land and achievement of increased productivity.

Land reform has been carried out in many countries but failed attempts have been as frequent as successful ones. Most land reform policies were not optimal and failed to fulfill socio-economic and political expectations (Morvaridi, 1990).



Success stories have been registered in countries like China, Vietnam, and Iran and recently in Moldova (World Bank Report, 1998b) and the Ukraine (World Bank Report, 1997). According to Majd (1991), Iran's land reform (1962-71) is an important instance of a comprehensive and economically successful reform that was implemented by a non-revolutionary state with a dual economy. Sobhan (1993), also notes that China and Vietnam effected a comprehensive distribution of land eliminated landlessness and realised a complete equal access to land. von Blankenburg (1993) added Japan, South Korea and, with some reservations Chile and Egypt to the least of countries that have had some economic success stories with land reform.

Most governments that have failed with their reform efforts gave more attention to political and social goals and effects than to the economic ones. Zimbabwe has been

cautious about its implementation since 1980, but as from 1991 the government seems to have bowed to pressure from the landless electorate and has adopted a more radical approach to land reform.

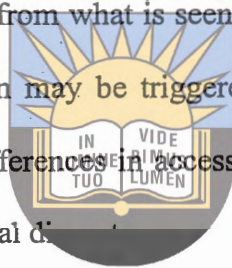
2.4.1 The National Debate on Land Reform

All sectors of the agricultural community agree that land reform is inevitable in Zimbabwe for both socio-economic and political stability. The great problem is to reconcile the contradiction between equity and efficiency. As noted by Moyo (1986), the debates from the late 1970s up until today have centred, mainly, around the merits and demerits of the distribution of land, not to argue that 'some' land should not be redistributed. Questions as to how much land and which land should be redistributed are always raised. Cost-benefit analyses of the whole programme are made in terms of levels of output, foreign exchange earnings, land productivity, agricultural employment and the loss of agricultural expertise (white farmers).

Wekwete (1991) said that although the government has to respond to pressure for land from the majority of the population (SSC) it must at the same time retain the confidence of the LSC farmers (whites) who continue to be central to overall agricultural production. The LSC farmers, despite periodic droughts, have been relatively successful in terms of satisfying domestic consumption and exporting a wide variety of cash crops.

2.4.1.1 Proponents of Land Reform

The proponents of land reform advocate for large-scale redistribution of land especially lands considered under-utilised. They argue that the opponents do not focus on the demerits of not redistributing land (e.g. continued land hunger, food shortages, unequal distribution of income) but on drawbacks related to losses in national output and decreasing financial flows. The proponents argue that if land redistribution does not take place the problem of land reform remains a minefield. Joireman (1996) notes that tensions in a society resulting from what is seen to be unjust distribution of land are like hidden mines whose explosion may be triggered by external factors such as violence, famine or ethnic conflict. Differences in access to land between blacks and whites still provide the kindling for political dis



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Van Zyl et al (1996) also adds his weight behind land reform programmes. He states that the failure to execute a major land reform in countries with highly dualistic farm size structures, like Zimbabwe, or delayed implementation of such reforms and continued neglect of native peasant sectors seems to have had far more adverse consequences than the relatively minor risks associated with the process of land reform.

Bratton (1994) shows that the proponents of land redistribution argue that the goals of growth and equity do not necessarily conflict. They agree with the important role that the LSC farming sector is playing in Zimbabwe agriculture, but they argue that these farmers do under-utilise the land and that substantial portions of land can be made available for

land redistribution without necessarily affecting the national output. They argue that the prime land of Zimbabwe is under-utilised by LSC farmers to the tune of only 15 % although opponents to the programme give percentage utilisation levels of 75-90 %. Moyo (1986) and others have carried out a survey on land utilisation by LSC farmers in Mashonaland provinces (areas within NR II and NR III). The total area in these provinces amounts to 4,3 million hectares, which constitutes 32 % of the overall land owned by the LSC. They found that only 10 % of this prime land is actually cropped, and this represents 75 % of the total area cropped by LSC farmers in the country as a whole (Table 2.8)



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Table 2.8: Mashonaland cropping Intensity for LSC Farm Sector 1981-1982 Crop Season

| Province 1 District | A Total Area | B Area under Crops | C % Total | D Total arable Land | E % Cropped | F Net arable Area | G % Cropped | H Non-cropped Net Arable Land |
|----------------------------|--------------------|--------------------------|-----------------|---------------------------|-------------------|-------------------------|-------------------|-------------------------------------|
| Mashonaland West | | | | | | | | |
| Lomagundi D | 943,911 | 120,123 | 12,7 | 452,133 | 26,6 | 307,450 | 39,1 | 187,327 |
| Chegututu D | 494,286 | 53,479 | 10,8 | 263,949 | 20,3 | 179,485 | 29,8 | 126,006 |
| Hurungwe D | 359,779 | 31,787 | 8,8 | 120,166 | 26,5 | 81,713 | 38,9 | 49,926 |
| Kadoma D | 454,991 | 18,768 | 4,1 | 72,344 | 25,9 | 49,194 | 38,2 | 30,426 |
| Total | 2,252,967 | 224,157 | 9,9 | 908,592 | 24,7 | 617,842 | 36,3 | 393,685 |
| Mashonaland Central | | | | | | | | |
| Bindura D | 153,170 | 23,706 | 15,5 | 63,106 | 37,6 | 49,912 | 55,2 | 19,206 |
| Mazowe D | 403,698 | 67,644 | 16,8 | 192,564 | 35,1 | 130,944 | 51,7 | 63,300 |
| M+ Darwin | 63,676 | 5,115 | 8,0 | 17,866 | 28,6 | 12,146 | 42,1 | 7,034 |
| Centenary | 121,655 | 10,589 | 8,7 | 35,900 | 29,4 | 24,470 | 43,3 | 13,881 |
| Shamva | 103,810 | 11,240 | 10,8 | 46,300 | 24,8 | 30,806 | 36,5 | 19,556 |
| Total | 846,009 | 118,291 | 14,0 | 354,822 | 33,3 | 241,278 | 49,0 | 122,987 |
| Mashonaland East | | | | | | | | |
| Morondera | 456,718 | 23,866 | 5,2 | 240,599 | 9,9 | 163,607 | 14,6 | 137,741 |
| Goromonzi | 179,771 | 25,927 | 14,4 | 111,710 | 23,2 | 75,963 | 34,1 | 50,036 |
| Harare | 386,446 | 40,492 | 10,5 | 250,069 | 16,2 | 170,047 | 23,8 | 129,555 |
| Mrewa | 114,905 | 6,147 | 5,3 | 38,114 | 16,1 | 25,918 | 23,7 | 19,771 |
| Mutoko | 68,545 | 1,367 | 2,0 | 17,136 | 8,0 | 11,653 | 11,7 | 10,286 |
| Total | 1,206,385 | 9,799 | 8,1 | 657,628 | 14,9 | 477,138 | 21,9 | 349,389 |
| MASHONALAND TOTAL | 4,305,361 | 440,247 | 10,2 | 1,921,040 | 22,9 | 1,306,308 | 33,7 | 866,061** |

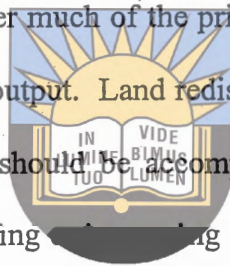
* Double-cropped hectares are counted as one

** 866,061 ha minus 240,000 ha in fallow = 626,061 ha non-cropped net arable area

Source : Adapted from Moyo (1986)

2.4.1.2 Opponents of land redistribution in Zimbabwe

Those opposed to land redistribution argue that the need to resettle landless Zimbabweans must be met in the full knowledge that land is a finite resource. It has to be handled with utmost care. The conservative views have been characterised by a strong view that resettlement areas have not been as efficient as the former commercial farms and that it has been particularly detrimental to conservation (Wekwete, 1991). This is also based on the premise that the white (LSC) farmers are more experienced than SSC farmers. They argue that it is a risk to transfer much of the prime land to inexperienced farmers as this affects aggregate agricultural output. Land redistribution alone will not bring any lasting benefits to agriculture but it should be accompanied by increases in farm and labour productivity. Also simply giving increasing size of land holdings will not achieve the transformation of the native farming sector. There is need for a complete package of the needs of SSC farmers but the government doesn't have resources to achieve this. As a result the opponents argue that the needs of the LSC farming sector should be guaranteed because it is an integral part of the economy, which makes a significant contribution in terms of employment, foreign exchange, and necessary inputs to industry. Here the government's problem is to counter the efficiency and productivity arguments posed by the commercial farmers. This is not easy because, as observed by Mumbengegwi (1986), whenever equity issues are pitted against efficiency arguments, it is the former that usually suffer.



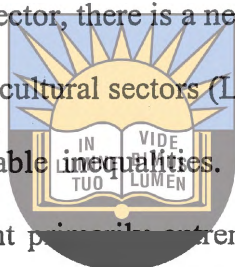
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The fear that productivity will decline if land is taken from white settler farmers and given to peasant (SSC) farmers takes us to a discussion of the efficiency in the small holder farmers of Zimbabwe.

2.5 The Efficiency Argument for Land Reform in Zimbabwe

As Zimbabwe forges ahead with its policy of land reform, facing a number of obstacles and resistance from the LSC sector, there is a need for the government to critically assess the efficiencies of the two agricultural sectors (LSC) and SSC). It is not going to be easy to redress the present intolerable inequalities. It will be no easy task to bring about effective change to the present primarily entrenched patterns without at the same time seriously impairing the productive capacity of agriculture and without incurring costs which are at times unacceptable to society as a whole.

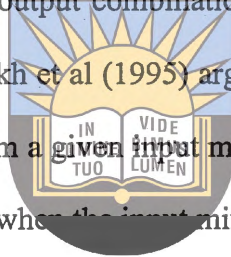


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The efficiency for land reform is that the redistribution of agricultural land to small holders will increase, or certainly not reduce, total factor productivity and efficiency in the longer term (van Zyl et al, 1996). This argument is based on the findings that in most of the developing world there exists an inverse relationship between farm size and efficiency. This is to say that once a small minimum size is exceeded, family farms relying primarily on family labour, are generally more productive than larger farms relying primarily on hired labour. They also create a lot of employment for the ever-growing unemployed population of Zimbabwe.

Farm efficiency and how to measure it, is an important subject in the agriculture of developing countries (Parikh et al, 1995). Production efficiency is usually analysed by separately examining its two components, technical efficiency and allocative efficiency. Technical efficiency is the ability to produce a given level of output with a minimum quantity of inputs with a certain technology (Xu and Jeffrey, 1997). Allocative efficiency refers to the ability to choose optimal input levels for given factor prices. Economic or total efficiency is the product of technical and allocative efficiency. An economically efficient input-output combination would be on both the frontier function and the expansion path. Parikh et al (1995) argue that technical inefficiency arises when actual or observed output from a given input mix is less than the maximum possible, and allocative inefficiency arises when the input mix is not consistent with cost minimisation.



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2.5.1 Labour Use

Although Von Blankenburg (1993) agrees that an inverse relationship between farm size and output could not be confirmed in some countries, Van Zyl et al (1996) argue that this is because we make partial analyses, often relating output only to land rather than to all inputs. Yield is believed to be an imperfect indicator of efficiency. This may be due to the existence of market imperfections, which tend to favour large farms (e.g capital and insurance markets) and to negate the inverse relationship between farm size and productivity. Van Zyl and Thirtle (1998) also support the idea that yields can give

misleading results and this will undermine the credibility of the profession in giving advice on important policy matters.

Efficiency should be viewed as the ability to make use of the most abundant resource rather than scarce resources. In Zimbabwe labour is quite abundant so smaller farms which are said to be more labour intensive than the larger mechanised farms should be promoted. Made (1995) encouraged the government to go ahead with land redistribution and not to be short-sighted and worry about imagined loss of productivity. His argument was that if land is given to peasants more land is to be brought under cultivation and this will create employment and stop the current rural-urban drift.



The Zimbabwe LSC sector greatly benefited from the support services it received from government during UDI. It became sophisticated and highly mechanised. This resulted in the substitution of labour by machinery and yet things should have happened the other way round. As noted by Dalton et al (1997), labour, purchased inputs and drought capital implements are substitutes for one another and also per hectare yields rise roughly in proportion to simultaneous increases in all inputs. Hence farmers in Zimbabwe can substitute labour for other inputs.

In 1980 at independence, in terms of factor productivities, land and labour, were six and seven times greater respectively in the LSC than in SSC areas. Wekwete (1991) found different results. He noted that preliminary results from resettled farmers (SSC) in

natural region III show that the average value of production per hectare has been higher for resettlement schemes than for the former LSC farms. This means there is greater utilisation of labour, reflecting some form of job creation. This is because there are more people working in the schemes than would normally be the case on LSC farms.

Numerous theoretical papers have shown how dualistic labour markets, with family labour cheaper and more productive than hired labour (Kevane, 1996). This is because of incentive problems combined with other market imperfections. LSC farmers are believed to cultivate extensively and SSC farmers to cultivate intensively and to utilise labour more.



On average, Model A schemes (resettlement) employ six persons per hectare compared to 5.4 persons per hectare in LSC and 3.5 in the small-scale commercial sector. On resettlement schemes that specialise in tobacco, three times as many people are employed per hectare as compared to LSC farmers. Between 1990 and 1994, settler families were employing about 8 465 non-family members per annum, of which 1880 were permanent workers and the rest casual. During the same period, an average of 810 500 family members worked on family farms (Government Policy framework document, 1998). Actually most of the inputs in the SSC sector are said to be in the form of labour which means a thorough utilisation of this abundant resource in the LSC sub sector.


Just as in South Africa, the Zimbabwean commercial agricultural sector followed a pattern of growth that is far from normal due to the distortions prevailing during a long

history of persistent government intervention in its favour. Commercial farmers were privately profitable and technically efficient but there was no improved economic efficiency. There could not be any efficiency where there is no optimal use of the most abundant resource, labour.

2.5.2 Food Security

Zimbabwe is self-sufficient in food and consistently exports maize (staple food) to neighbouring countries. It is regarded together with South Africa as the breadbasket of Southern Africa. In the context of growing food deficits in most of Sub-Saharan Africa over the last two decades, Zimbabwe has been hailed as a success story since it has been able to achieve and maintain a reasonable degree of self-sufficiency in food production

(Mumbengegwi, 1986)



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Despite the self-sufficiency in food, the paradox of household food insecurity still exists in Zimbabwe especially for those people who stay in arid areas. These, ironically include farm workers on large commercial farms where much of the maize is produced. This was also noted by Jackson and Collier (1991) when they pointed out that there are glaring contradictions where malnourished infants, children and mothers at risk stand right next to the mountains of food being piled at the district and regional depots. They go on to speak of the spectre of the coexistence of increasing exports of food 'surpluses' to the SADC region and a significant domestic hunger, as a very real possibility.

Economic efficiency is very difficult to justify if LSC farmers enjoy the monopoly of producing for national and international markets when the majority of blacks are landless and starving. The SSC do not contribute anything to the GDP although it is believed that they could possibly do so effectively if given the right opportunities.

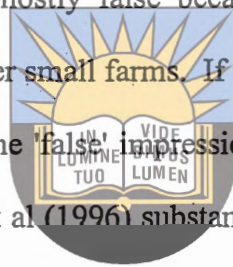
2.5.3 Economies of Scale

Economies of scale are concerned with the relationship between the scale and the use of a properly chosen combination of all production services and rate of output of the enterprise. International evidence indicates that the large scale mechanised sector is generally inefficient especially compared to small-scale family type farm models (Van Zyl et al, 1996). This contradicts the mistaken perception that small farms are less efficient than large farms. As stated by Kirsten and Van Zyl (1998) the perception emanates in part from the illusion of modernity. A farm endowed with tractors and combine harvestors looks modern and appears to be efficient. People's view that large, capital-intensive farms are more economically efficient than small farms is based on beliefs about economies of scale in farming.

Weiner et al (1991) presented evidence for doubting this stereotypical image of Zimbabwe peasants as intrinsically unproductive and inefficient, when compared to highly mechanised large-scale commercial farmers who, incidentally, receive adequate rainfall and almost limitless governmental support. They go on to argue that the SSC

farmers, given the right conditions, will respond with increased production and marketable surpluses.

SSC farmers are said to have managed to achieve higher profitability with roughly the same level of physical yields and without new capital investment. This is due to more efficient use of other resources like labour and purchased inputs. Kirsten and van Zyl (1998) note that a large majority of agricultural production function studies have found either no or negative economies of scale in farming. Although there may be very real economies of scale they are mostly 'false' because they are usually the result of policies which favour larger farms over small farms. If these policies be reversed to promote SSC we might be able to reveal the 'false' impression about the economies of scale. This is because, as noted by Wang et al (1996) substantial productivity gains can be obtained by continuously improving farm household production efficiency.



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The economies of scale arguments in favour of LSC sector include lumpy inputs like farm machinery, access to credit and risk diffusion, economies of scale in processing, management skills etc. LSC farmers are not the only ones who can enjoy benefit of these economies of scale. If small farmers organise themselves well they can efficiently exploit these economies of scale. Machinery rentals can be used efficiently well up to a certain level of farm size because these technical economies vanish when farm size is increased beyond optimal scale for these lumpy inputs. As for the managerial skills the Agrirex Department can improve their advisory role by reducing the ratio of extension worker to small holder farmers for greater effect.

As far as access to credit facility is concerned there could be a development of rural credit schemes, including co-operative banking (as recommended by the World Bank report, 1998) and other savings mobilisation mechanisms.

All these measures can help to take care of the economies of scale argument said to enhance the LSC sector, although Rukuni (1994b) notes that some studies on the cropping of LSC farms in Zimbabwe suggest that farms with high productivity are associated with areas of decreasing farm size. Efficiency has to be analysed with land conservation in mind. LSC farmers argue that SSC farmers will make the prime land deteriorate in terms of deforestation, soil erosion and lower productivity.



2.6 The First Phase of Land Reform 1980-1990

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As noted by Bratton (1994) the Zimbabwe government promptly inaugurated a land-resettlement programme in September 1980, just five months after independence with several objectives. These were:

1. to reduce civil conflict by transferring land from Whites to Blacks,
2. to provide opportunities for war victims and the landless,
3. to relieve population pressure in the Communal Lands,
4. to expand production and raise welfare nationwide, and
5. to achieve all of the above without impairing agricultural productivity or aggregate production.

This first phase of the resettlement programme was actually rehabilitative since it targeted refugees, displaced people, squatters and the landless and addressed land shortages in over-populated communal areas in that order of priority.

2.7 The Second Phase of Land Reform (1991-2001)

At independence in 1980 the government set out to redress the land imbalances but the process was delayed and frustrated by a number of constraints, the main one being the shortage of funds. Only about 53 000 families were resettled 10 years after independence. The landless people were growing more anxious as the programme suffered further delays. They were threatening to take the law into their hands and to invade the white owned farms. Sensing the danger and the possibility of anarchy in the country the government ~~Some time in 1980~~ quickly and come up with a renewed programme for the nineties.

As noted by Made (1995), the future success of the country's land reform was to depend on whether the government could adequately remove many of the past constraints, especially those imposed by the Lancaster House Agreement of 1979. The government now wanted to buy land from productive natural regions at low cost.

At the expiry of the Lancaster House Constitution the government came up with a transparent legal and administrative framework for land acquisition. The "Land

Acquisition Bill, 1992" was democratically enacted on 13 March 1992. It was very explicit about compensation.

2.7.1 Objectives of Land Reform and Resettlement (Phase II)

The second phase of the Land Reform and Resettlement programme aims to:

1. Acquire five million hectares of land from the LSC farming sector for redistribution.
2. Resettle 91 000 families and youths graduating from agricultural colleges and others with demonstrable experience in agriculture in a gender sensitive manner.
3. Reduce the extent and intensity of poverty among rural families and farm workers by providing them with adequate land for agricultural use.
4. Increase the contribution of agriculture to GDP by increasing the number of commercial small-scale farmers using formerly under-utilised land.
5. Promote the environmentally sustainable utilisation of land.
6. Increase conditions for sustainable peace and social stability by removing imbalances in land ownership.

Government land policy in 1990 established that the strategic structure of the distribution of land holdings among various land tenure categories required that Resettlement Land Areas secure 8.3 million hectares for the benefit of 162 000 families.

2.7.2 Progress of the second phase of land reform

Given the effects of the drought, resistance of the commercial farmers to the programme, the Land Bill (1992) and the lack of financial resources, the land distribution programme may continue to fail to achieve its targets. These were very prophetic words of Made (1995). Although the Land Acquisition Bill was made into law in 1992, very little has been done so far. By 1994 only just over 200 000 hectares had been acquired and the situation had improved by just 0,5 percent in 1998 (Table 2.9)

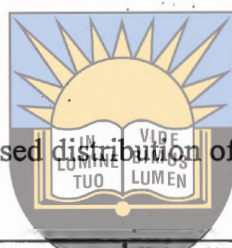


Table 2.9: Past and proposed distribution of land.

| Sector | Distribution in 1980 | Distribution in 1992 | Distribution in 1998 | Future distribution |
|------------------------|----------------------|----------------------|----------------------|---------------------|
| Communal areas | 42 % | 42 % | 43 % | 42 % |
| LS Commercial | 39 % | 29 % | 28 % | 13 % |
| Small scale commercial | 4 % | 4 % | 4 % | 3 % |
| National parks/urban | 15 % | 15 % | 15 % | 15 % |
| Resettlement | 0 % | 8 % | 9 % | 21 % |
| State farms | 0 % | 1 % | 1 % | 6 % |

Source: Derived from (Made, 1995) and the Farmer Magazine, (March 1998)

If the present rate continues it will take over 20 years to complete the desired task of resettling some more 110,000 more families on 5 million hectares of land. A number of reasons have been put forward for delays in the implementation of Phase II. The government did not have enough resources to implement the programme. Even in March

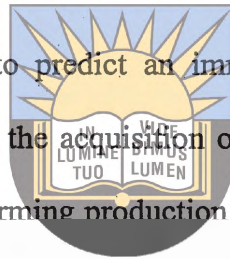
1998, the government acknowledged that it could take them 5 to 10 years to acquire the farms identified for acquisition. A lot of criticism was also received from across the world including the donor community. The World Bank and the IMF also started to quiz the government about how it was to implement the process. The UK and USA also set conditions to be met before they could assist. They also insisted on total transparency in the whole process of land reform. The commercial farmers, although in principle not against land redistribution, put up a fierce resistance to the Land Bill (1992), i.e. land acquisition process.

As acknowledged by the President of the Commercial Farmers Union, Swanepoel (1999), compulsory acquisition of land in the national interest for resettlement in terms of the Land Acquisition Act (1992) was accepted by farmers and government as a means, in addition to negotiated land sales, of acquiring land within the parameters of derelict land, vacant and held under multiple ownership, for social and political reasons (under which alternative land would be offered to the farmers concerned). But the question of under-utilised land remained a thorny issue, which drew the battle lines between the LSC farmers and government. This is because, to escape designation, they planted gum-trees and introduced wildlife and livestock farming to justify the use of their land.

When the government listed 1 471 farms for acquisition on 28 November 1997 most of the owners contested this with the Administrative Court. On 11 September 1998 about 600 farms were delisted in notices published in the Government Gazette. On 11 November 1998, the government acquired the remaining 841 farms (2.24 million ha)

The commercial farmers continued to contest the manner in which more than 800 farms were compulsorily acquired. Most farms, they argued, were never seen or assessed for suitability by any government official. There had been no consultation with them and there had been no determination of compensation. They also wanted disclosure of the actual beneficiaries of these 841 farms. These concerns received a lot of international attention and definitely contributed to a situation where the investment climate was no longer positive.

The LSC farmers went on to predict an imminent national economic decline if the government went ahead with the acquisition of 5,3 million ha of land for resettlement. They pointed out that LSC farming production in 1996/97 brought revenue of more than Z\$14 billion while the value of exports from this sector was Z\$10 billion.



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They projected that after the acquisition of 5 million hectares the production would drop to some Z\$8,8 billion and the value of exports from this sector would drop to some Z\$6,6 billion. Also, the LSC farmers employed 327 000 people during the same season. After the acquisition it was estimated that the work force in the remaining LSC farming sector would drop to about 180 000 people.

If we were to go by the CFU's findings, the redistribution of land might cause some serious economic imbalances. Some other economists heavily refute this.

2.8 Discussion

Solutions that take into consideration the interests of all Stakeholders, private sector, rural communities and other interested parties should be found now to save the country from economic collapse. If they delay the consequences are likely going to be detrimental for every person in Zimbabwe, whether they be an office worker, a peasant farmer (SSC) or a mine, industrial or farm worker.



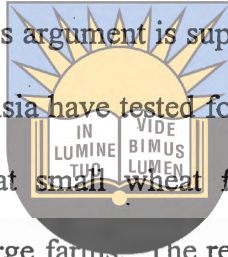
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CHAPTER THREE

METHODOLOGY

3.1 Introduction

A number of studies have observed an inverse relationship between farm size and yields. Van Zyl (1995) points out that international evidence indicates that a large-scale mechanised farm sector is generally inefficient especially when compared to small-scale family type farming. Van Zyl's argument is supported by Adesina and Djato (1996) who note that previous studies in Asia have tested for relative efficiency differences in terms of farm size and found that small wheat farms in the Indian Punjab were more economically efficient than large farms. The results from studies carried out in Pakistan were opposite to those of the Indian State. Some studies have also failed to come up with concrete evidence of differences in the relative economic efficiency or its components of technical or allocative efficiency, between small and large farms.



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The proponents of the evidence of the inverse relationship have used this theory to campaign for the redistribution of land from large-scale farmers into smaller unit holdings. In Zimbabwe the government believes that if some land is redistributed from the Large Scale Commercial (LSC) to the Small-Scale Communal (SSC) farmer there will be some increase in productivity and improved income distribution for the people of the country.

Since the findings from studies on the efficiency of the two agricultural sectors are contradictory it is dangerous to generalize from them. Moreover studies carried out in countries other than Zimbabwe and more so outside Africa are difficult to use in Zimbabwe.

This is because of differences in agricultural and institutional settings, which have their roots in past colonial and other policies. Also as indicated by Townsed et al (1998) most of the empirical work on the farm size productivity relationship has been flawed by methodological shortcomings, and has failed to deal adequately with the complexity of the issues. As a result the main aim of this study is to establish whether the small scale farmers are both technically and allocatively efficient in farm production so as to support land reform in Zimbabwe.



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Effectively, this means that one has to measure the efficiency of both the resettlement and the SSC farming sectors. It is hoped that the findings will help policy makers in their agrarian reform planning. An underlying premise behind this work is that these farmers are over-utilising the land input and as a result if land is redistributed it may be possible to increase overall productivity and efficiency. The study is to try and quantify efficiency of resettled and SSC farmers in Zimbabwe.

The question to be faced is how to measure the efficiency of each farming sector. There are three major and distinct approaches to measuring efficiency. These are based on cost, profits and production functions, (Parikh et al, 1995), but Torkamani and Hardeker

(1996) adds the fourth approach, mathematical programming. Technical inefficiency arises when actual or observed output from a given input mix is less than the maximum possible and allocative inefficiency arises when the input mix is not consistent with cost minimization. Economic or total efficiency is the product of technical and allocative efficiency.

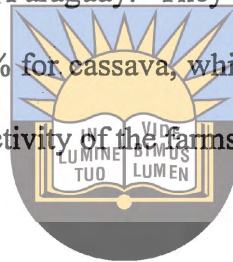
3.2 Review of Previous Studies

Empirical studies of productive efficiency have used a variety of approaches in modeling frontier production functions, parametric vs. non-parametric, deterministic vs. stochastic, and programming methods vs. statistical method (Xu and Jeffrey, 1997). Byiringiro and Reardon (1996) carried out a farm productivity study in Rwanda. They found that there was a strong inverse relationship between farm size and land productivity and the opposite for labour productivity. For smaller farms they found some evidence of allocative inefficiency in the use of land and labour, probably due to the factor market access constraints. They also found that farms with greater investment in soil conservation had much better land productivity than farms with average investment in soil conservation.

Parikh et al (1995) measured economic efficiency in Pakistani agriculture and they used the cost function approach and combined the concepts of technical and allocative efficiency in the cost relationship. They argue that any errors in the production decision translate into higher costs for the producer. The derived measure of inefficiency was then

related to socio-economic, demographic and farm size variables. They found that land fragmentation had a negative effect on efficiency, thus disapproving the inverse relationship between farm size and efficiency.

Bravo-ureta and Evenson (1993) acknowledged that most studies on efficiency do not go beyond the measurement of technical efficiency in developing country agriculture. In their study they used a stochastic efficiency decomposition methodology to derive technical, allocative and economic efficiency measures separately for cotton and cassava for peasant farmers in eastern Paraguay. They found an average economic efficiency of 40.1 % for cotton and of 52 % for cassava, which shows that there is considerable room for improvement in the productivity of the farms sampled.



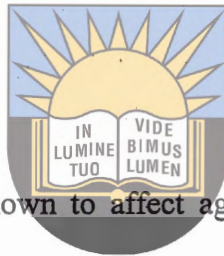
Tadesse and Krishnamoorthy (1997) examined the level of technical efficiency across ecological zones and farm size groups in paddy farms of the Southern Indian State of Tamil Nadu. Their study shows that 90 % of the variation in output among paddy farms in the state was due to differences in technical efficiency. The level of technical efficiency among paddy farms in the state differs significantly across agro-ecological zones and size groups as well. Small sized and medium sized farms showed relatively higher technical efficiency.

The inverse relationship between farm size and productivity was examined in Africa by Adesina and Djato (1996). They looked at farm size, relative efficiency and agrarian policy in Côte d'Ivoire. They applied the profit function analysis to rice farms. No

differences in relative economic efficiency of small and large farms were found. Nearer to Zimbabwe, Townsend et al (1998) examined the inverse relationship between farm size and productivity on wine producers in South Africa. Using data envelopment analysis, they found out that wine grape producers operated under constant returns to scale. The inverse relationship between farm size and both land productivity and total factor productivity was weak, and not consistently negative and differed between regions.

3.3 The Econometric Model

3.3.1 General consideration



A number of variables are known to affect agricultural production. As a result it is important to use models which relate production of farmers to these variables for better understanding of the functional relationships.

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3.3.1.1 The production function form

In this study, the analysis is going to focus on two important crops grown by both small-scale and large-scale farmers. These are maize and cotton. Maize is the staple food among small-scale farmers and it is also a cash crop for them. Cotton is the main cash crop for small-scale farmers in Zimbabwe.

A production function relating output to inputs is employed. Other 'conditioners' such as the socio-economic factors are considered. The specification of the production function used is of the Cobb-Douglas type. The most general expression at the Cobb-Douglas function is

$$Y = AL^aK^b$$

where Y stands for output, L measures labour input and K capital. A is the constant term which represents the technology of the society that generated the observations upon which the parameters of the function were to be estimated. Parameter A might also be thought of as the combined impact of inputs that are considered to be fixed on the production function.



Two important properties of the Cobb-Douglas function (Coudere and Marijse, 1991) are:

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- (a) the a and b are elasticities of production with respect to labour and capital:

$$a = \frac{\frac{dy}{dL}}{\frac{Y}{L}}$$

$$b = \frac{\frac{dy}{dK}}{\frac{Y}{K}}$$

- (b) The function is homogenous of degree, a+b. If a+b>1, there are increasing returns to scale; a+b = 1 indicates constant returns to scale and a+b<1 indicates diminishing returns to scale.

The Cobb-Douglas production function has a number of limitations. The major criticism of the Cobb-Douglas function is that it cannot represent the three stages of the neo-classical production function. It represents one stage at a time. The elasticities of production for the Cobb-Douglas type of production function are constant irrespective of the amounts of each input that are used.

Despite its well-known limitations, the Cobb-Douglas function is chosen because the methodology employed requires that the function be self-dual (Bravo-Ureta and Evenson 1994). Xu and Jeffrey (1997) also noted that although there are other more flexible forms the functional form has a limited effect on empirical efficiency measurement.



The general model for this study relating production, Y, to a given set of resources X, and other conditioning factors is given as follows:

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$$Y = B_0 X_1^{B_1} X_2^{B_2} X_3^{B_3} X_4^{B_4} X_5^{B_5} X_6^{B_6}$$

- Where X_1 = Land devoted to either maize or cotton
- X_2 = family and hired worker days used in maize or cotton production
- X_3 = Capital
- X_4 = Fertilizer used in kg
- X_5 = Seed used in kg

X_6 = Expenses on pesticides, irrigation water and chemicals in Zimbabwe \$ plus draught expenses

U = The disturbance term

Y = Annual total farm output of cotton or maize

$B_1, B_2, B_3, B_4, B_5,$ and $B_6,$ are elasticities to be estimated

3.3.2 Model Specification

In order to be able to use the least squares procedure for estimating, the function is linearised and come up with the following regression specification.



$\ln Y = \ln B_0 + B_1 \ln X_1 + B_2 \ln X_2 + B_3 \ln X_3 + B_4 \ln X_4 + B_5 \ln X_5 + B_6 \ln X_6 + U$

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Output (Y) is the total quantity of either maize or cotton harvested in that year and is measured in tones per hectare.

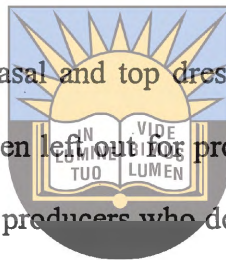
Land (X_1) is the area of the farm(s) devoted to the production of maize or cotton. It is measured in hectares.

Labour (X_2) is the total of maize or cotton activity. It is expressed in adult equivalent days per hectare and is the sum of family labour and hired labour. Male and female labour is counted equally, 1 for adults (aged between 16 and 60) and children's labour is discounted to half of one adult hour, if the child is in school it is discounted to one

quarter ($\frac{1}{4}$). For adults who are above 60 years, the labour is also discounted to half of the adult equivalent. Children at boarding schools and who do not spend the whole of their holidays on the farm were not considered.

As for capital (X_3) Coudere and Marijse (1991)'s argument was used. There is not much variation in the types of equipment these farmers possess. They all have a plough and a number of hoes. To represent capital the number of cattle which is used for draught power is used.

Fertilizer (X_4) includes both basal and top dressing fertilizers. Although some farmers use animal manure, this has been left out for problems of aggregation. It is measured in kg. For the resettlement cotton producers who do not own cattle the cost of hired draught power and irrigation was used as a proxy for capital.



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Seed (X_5) both certified and home-produced, is considered and is measured in kg.

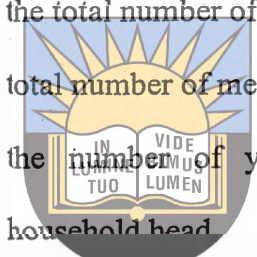
Cotton producers used some pesticides and the cost was used. It is measured in Zimbabwe (\$) dollars (X_6).

According to Bravo-Ureta and Evenson (1994) several authors have investigated the relationship between efficiency and various demographic and socio-economic variables, but these analyses have been criticised by some who argue that the socio-economic variables should be incorporated directly in the production function model because such

variables may have a direct impact on efficiency. But, as argued by the same authors, Kalirajan (1991) defended this practice by contending that the socio-economic attributes have a roundabout effect on production and, hence, should be incorporated into the analysis indirectly. This study examined the possible relationship between efficiency and socio-economic characteristics.

The following variables were incorporated directly into the production function to investigate their effect on output.

- (1) LAND SIZE = the total number of hectares held by the farmer
- (2) FAMILY SIZE = total number of members of the household
- (3) EDUCATION = the number of years of schooling completed by the household head
- (4) AGE = the age of the household head
- (5) INCOME = all income the farmer receives per annum
(excluding income from crop under study)



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3.4 The Data

Zimbabwe is divided into eight administrative provinces. Manicaland province which borders with Mozambique was purposively selected for this study. This was mainly because of three reasons. Firstly, this province has the highest population densities, which means high demand for land for resettlement. Secondly, it has the largest number of resettled households. This is because many farms were abandoned during the war

since this province experienced the war more intensely than most of the other provinces. Thirdly, it is the only province that has all the five natural (agro-ecological) farming regions.

Two crops are chosen and they are maize and cotton. Maize is chosen because in Zimbabwe as a whole, maize is the major crop, occupying more than 50 % of all land cropped and providing more than 65 % of gross farm income (Dalton et al, 1997). As for cotton the small-scale farmers now produce more than 50 % of the entire marketed crop.

3.4.1 Information Sources



Secondary data was obtained from government institutions like the Central Statistics Office (CSO), Ministry of Agriculture and Resettlement, Department of Extension, banks and farmer organisations like the Commercial Farmers Union.

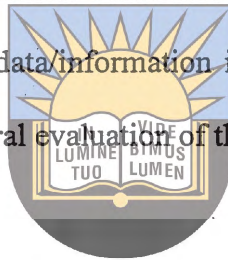
Primary data was collected in two parts. The first one was from verbal discussions with extension officers, bank officials, resettlement officers and personnel from maize and cotton companies.

In the second part farm level data is obtained from a cross-sectional survey of small-scale farmers from both the communal areas and the resettlement areas. Data on household composition, farm production, inputs and other socio-economic characteristics are collected via a questionnaire (See Appendix 1) which was administered to 45 SSC

farmers who produced maize and 31 resettled farmers who also produced maize during this previous season. The same was done for cotton production but the focus was on the 1998/1999 season since the previous season, 1999/2000, was affected by floods. Thirty four (34) SSC and 30 resettlement farmers were sampled.

3.4.2 Design of the questionnaire

The survey is designed to go beyond official statistics and capture information on the performance of small-scale farmers. Therefore the questionnaire was designed in such a way that reasonably accurate data/information is obtained to validate the hypotheses of the study and also for the general evaluation of the performance of these farmers.



The questionnaire was organised into several areas to cover input and output activities plus some socio-economic characteristics. It was administered as a single interview. Some deliberate overlap or duplication was incorporated to provide for internal consistency checks.

In most cases the questionnaire had some open-ended questions to allow the respondents to give more information.

3.4.3 Sampling Procedure

Multi-stage sampling design was adopted taking into consideration the natural endowment of the farmer according to agro-ecological characteristics. The four districts, Mutasa, Marange, Zimunya and Chipinge were deliberately chosen taking into consideration the coverage of all the five natural regions (NR). Farmers were stratified according to whether they produced maize or cotton. For maize four natural regions (I,II,III,IV) were covered but for cotton only natural region V was considered.

As for resettlement areas also four schemes were chosen. These are Nyachiuti, Mutanda, Nyagundi and Middle Sabi. A cross-section of 60 farmers were randomly sampled from each sector; i.e. resettlement areas and communal areas. This was done for both cotton and maize.



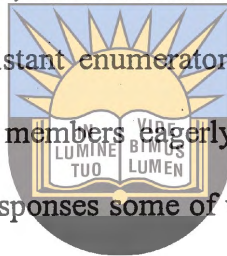
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3.4.4 Interviewing Procedure

In each area surveyed an assistant enumerator was used. They were in most cases local school teachers or local villagers. Agricultural extension workers were not used because it was felt that the respondents might give unreliable information to please the officers. The questionnaire also asked questions about the extension service so that the responses would very likely to be biased.

To each and every farmer enumerated, the research objectives and questionnaire were first discussed and explained. Permission was then sought. When granted the interviews commenced. In all cases people were very willing to respond. The local enumerators helped to interpret some of the questions and answers. At times the interview had to digress from the questions on the questionnaire and this was found to be helpful as it gave more insights into the characteristics of the farmers and also established a good rapport between the enumerator and the respondents.

Responses were, in some cases, recorded according to the units well known to or given by the respondents. The assistant enumerators helped with the standardization of the units. In most cases family members eagerly participated in the discussions and this helped to clear out illogical responses some of which were due to the level of literacy of the head of household.



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3.5 Data Analysis

Cross tabulations of output and certain variables was done. Shazam statistical package was used to estimate the B coefficients (production elasticities). From the coefficients one could determine the variable(s) that are most limiting in the production process in the small-scale farming sector of Zimbabwe.

Since the objective of this study is to assess the ability of farmers to achieve the maximum realisable crop output with a minimum level of inputs under the existing

resource environment, it was necessary to measure farm specific technical efficiency and input specific allocative efficiency is tested by computing the MVPs of the inputs. These MVPs are then compared with factor market prices (MFC). From this we can determine the requisite adjustments in equating the marginal revenue with marginal cost for profit maximisation.

As for technical efficiency measurement Saleem's (1988) approach was used. It is a method that was developed by Lau-Yotopoulos and it uses the Cobb-Douglas production function. The relative measure of technical efficiency is shown by the intercept in the model. The higher the value of the intercept the relatively more efficient the farm is.



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CHAPTER FOUR

DESCRIPTION OF THE STUDY AREAS

4.1 Agro-Ecological Potential

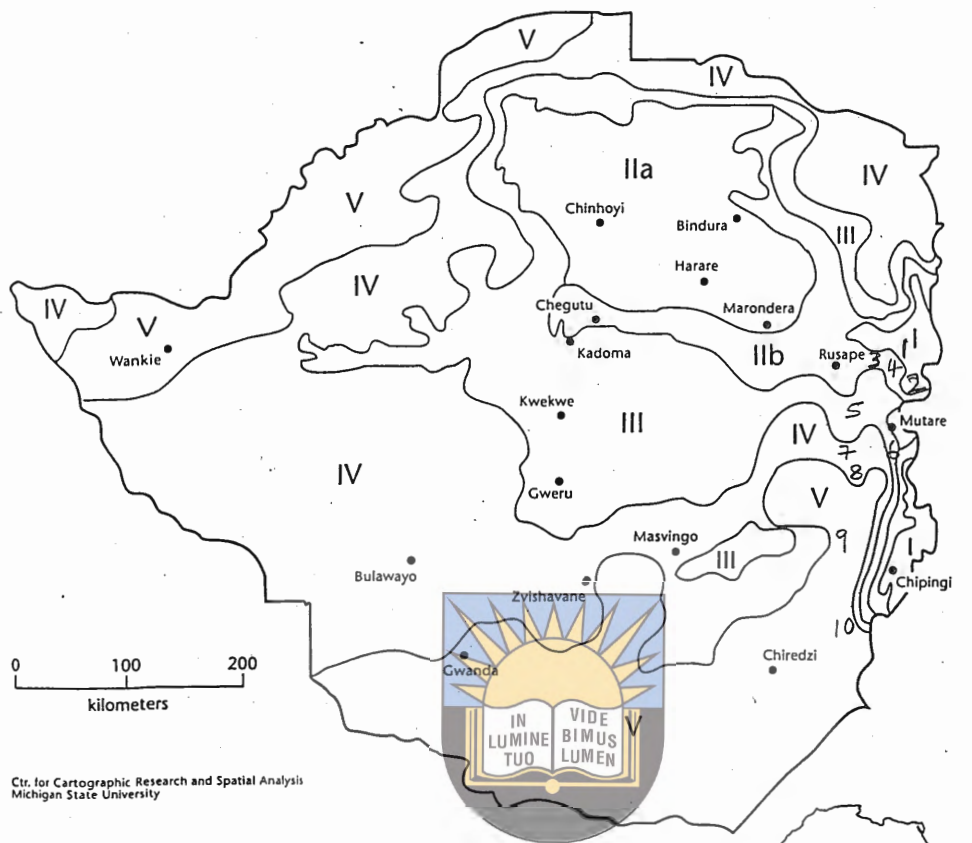
Manicaland province and the specific study areas within the province were chosen in terms of two main criteria. These are the type of agricultural sector (SSC or RA) and the agro-ecological zone (NR). See figure 4.1.

4.1.1 The Natural Resources Base



The physiographic features or natural resources of an area are the major determinants of its production potential. ~~These natural resources~~ together with human and capital resources (socio-economic factors) dictate the viability of the agricultural enterprise and the economic development of the area (Sebotja, 1985). As shown in figure 1 and explained in chapter 2, Zimbabwe is divided into five broad Natural Regions (NR) in which the dominant natural factor conditioning agricultural production is climate, mainly rainfall. They are also based on soil types.

Zimbabwe: Natural Regions



Ctr. for Cartographic Research and Spatial Analysis
Michigan State University

INDEX

Communal Areas

1=Mutasa

4=Nyakatsapa

6=Rowa/Zimunya

8=Marange

10=Chisumbanje

Resettlement Areas

2=Nyachiuti

3=Domborinotinhira

5=Mutanda

7=Nyagundi

9=Middle sabi

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ZIMBABWE

Figure 4.1: Map of Zimbabwe showing natural regions and surveyed areas

Adapted from Rukuni (1994b)

Manicaland is the only province where each of the five NRs are represented. Briefly NR1 is characterised by high altitude (The Eastern Highlands) and low temperatures with an annual rainfall greater than 1000 millimeters. It is suitable for the production of crops such as tea, coffee and forest crops and suitable for intensive livestock production. NR II

receives between 750-1000 mm of mostly reliable. It is suitable for the production of maize, tobacco, cotton, wheat, as well as for intensive livestock production.

NR III receives between 500-700 mm of rainfall per annum with relatively high temperatures and infrequent, heavy falls of rain and subject to seasonal droughts (Muir, 1994). NR IV receives between 450-600 mm rainfall per annum and is subject to severe dry spells. It is a semi-extensive farming region where livestock is the only sound basis of the farming system. NR V is generally not suitable for dry land cropping. Rainfall is very erratic and generally less than 500 mm per annum. Extensive livestock production is the only possible farming system if there is no irrigation.



4.2 Population

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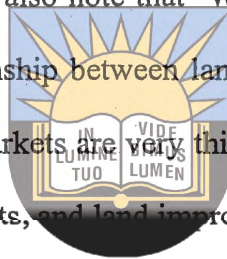
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In 1992 Manicaland province was the most populous of Zimbabwe (i.e. 15 percent). In 1997 the population density of Zimbabwe was 30 persons per square kilometer (CSO, 1997). Manicaland province again had the highest density 50 persons per square kilometer. These statistics suggest a high demand for land by the people of this province. The land suffers from environmental. This is in the form of land degradation and the destruction of natural resources.

4.3 Land Tenure

Forms of land ownership affects agricultural productivity. Land tenure is thought to influence agricultural productivity through security (or investment demand) effect (Gavian and Fafchamps, 1996). Land tenure constitutes the rules and procedures governing the rights, duties, liberties and exposures of individuals and groups in the use and control over the basic resources of land and water.

Gavian and Fafchamps (1996) also note that World Bank studies from Ghana, Rwanda and Kenya found little relationship between land rights and credit, in part because both formal and informal capital markets are very thin. In these three countries there was no link between title, or land rights, and land improvement. Existing empirical studies have failed to establish strong links between land rights investment and agricultural productivity on African crop lands.



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In this survey three types of land ownership systems were found. These were freehold, communal ownership and leasehold.

4.3.1 Freehold System

Of the 140 respondents only 3,6 percent had title deeds to their land. This is a very small fraction of the smallholder sector of Zimbabwe. When after independence when some white farmers were leaving the country they pooled resources and bought these farms as a

group. They then subdivided it into smaller portions of 12 acres. The new owners farm in the same way as do the communal farmers.

4.3.2 Communal Ownership System

This is the most common system of land ownership among the smallholder farmers of Zimbabwe. Our survey indicates that 50 percent of the whole population falls under the communal ownership system. The land belongs to the state but the administration of the land is bestowed in the hands of the traditional chiefs. Land is held permanently by individual families. Land can be inherited by farming members in the event of a death. Owners have usufruct rights and they can modify land but are strongly discouraged to sell the land. If a farmer wants to emigrate, the ownership of land reverts to the traditional chief, who settles disputes and allocates open lands to newcomers. The chief does not get any payments from farmers for the fields they farm.



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4.3.3 Leasehold

The resettled farmers are not given title deeds to the land. Although they do not pay any money to the government they are said to be leasing the land. The original plan was to give title deeds to good performers and then take away land from non performers. Due to the political nature of such a policy this has not materialized. This survey shows 25 percent of the respondents to fall in this category.

The remaining 21.4 % is made up of cotton producers who were settled under the Settler (out grower) Development Programme. These are found around a number of ARDA estates. The concept was to settle farmers on plots around core government estates so that they can benefit, at cost, from support services. These services include tilling machinery, combine harvesters, transport, irrigation facilities and maintenance units.

Originally lease - purchase arrangements were made. Title deeds were to be given to farmers after 5 years of satisfactory performance. The government seems to have shelved this arrangement as no farmer has been given title deeds. They are no longer paying money to the government.



4.3.4 Infrastructure

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4.3.4.1 Roads

The areas under study are all linked by both primary and secondary road systems. The primary road system is made up of the main road network which links main urban centres. These roads are tarred. The rural areas are linked to the main roads by gravel roads. All these roads are serviced by very reliable transport systems. Some of the resettled farms are linked to urban centres by a rail network.

4.3.4.2 Marketing

All the areas under study are close to either the grain or the cotton depots in the province. The furthest distance to a depot mentioned by respondents was 40 km, which is generally not very far.

4.3.4.3 Transport

Although said to be expensive, transport is said to be always available for the farmers. Farmers use buses, lorries, or freight trains to deliver their produce to the markets. Inputs to their farms are delivered in the same manner.



4.3.4.4 Post and Telecommunications

Farmers do not have problems with the mailing system. Trucks, buses and trains transport the mail. Farmers can even collect their cheques at nearest schools through the mail. Although the telecommunication system has been greatly improved some farmers still have to walk some distance to go and make a phone call.

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4.4 Discussion

The province of Manicaland has all the five natural regions of Zimbabwe. It is the most densely populated province such that the demand for land is so high. The communal ownership system of land tenure is the dominant system among the

communal area farmers and all resettled farmers fall under the leasehold system. The infrastructural system is quite conducive to supporting a viable agricultural system.



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CHAPTER FIVE

CHARACTERISTICS OF THE SAMPLE POPULATION

5.0 Introduction

The human resources component of a farming enterprise forms an indispensable ingredient in agricultural production. It is through man's ingenuity that production inputs are sequentially integrated and made compatible with one another in order to produce a desired result. Man is able to manipulate the production requisites to meet his own ends. A human being may therefore rightly be considered the origin as well as the destination in the production process (De Klerk, 1980, as quoted by Sebotja, 1985).



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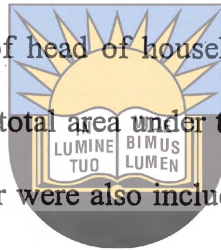
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Land, capital labour and management are always given as the main factors of production in agriculture. The management input includes both the physical properties and personal qualities possessed by the farmers. Bembridge (1987) subdivides the human resource input into two distinctly different and mutually exclusive inputs, (a) labour and (b) decision making and management.

Bembridge (1987) also observes that the human element is a key factor in agricultural and rural development because of its importance in decision making; which is fundamental to good management and successful farming. Sebotja (1985) who also points out that the biological characteristics as well as social, economic and

psychological traits of a farming community influence the efficiency of farming and dictates the communication strategy and the technology that must be developed for the area.

This survey therefore considers some socio-economic characteristics of the sample. These are going to be assessed as to whether they have a positive or negative impact on efficiency. These characteristics include household size, sex of head of household and the members of the household, total number of years of schooling for head of household, age of head of household, income from non-maize/cotton sources, average non-farm income and number of wives of head of household. Data on number of cattle, credit availability, extension services, total area under the ownership of the head of household, land tenure and source of labour were also included. The data is used in the analysis to identify important characteristics influencing efficiency in maize/cotton production.



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The following are the findings on a number of important human factors in the survey area:

5.1. Sex of heads of household

The findings concerning gender of heads of household run counter to general notion that most household in rural areas are headed by women due to male migration to urban areas. As shown in figure 5.1 most of the households are headed by men.

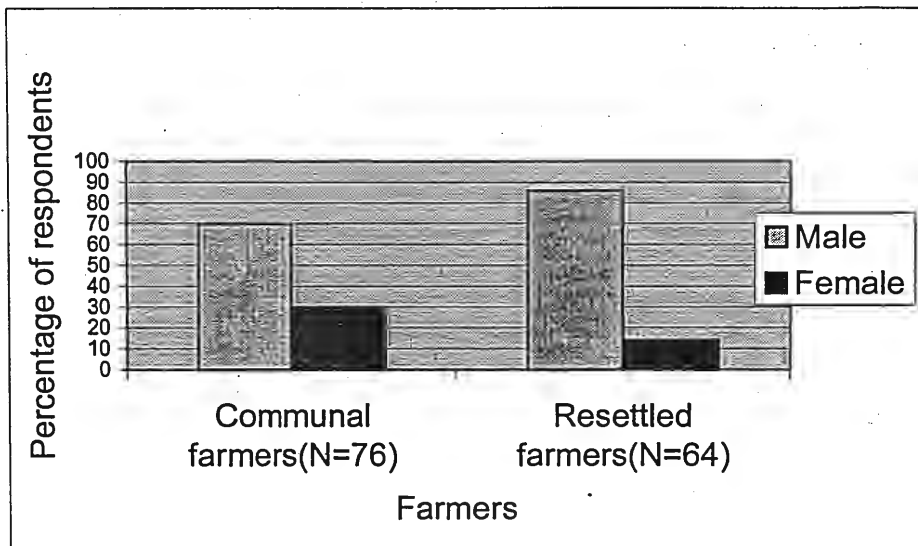
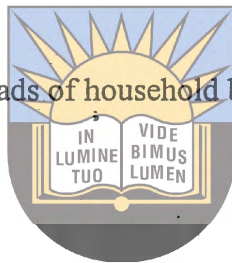


Figure 5.1 : Sex of de facto heads of household by farming sector



This is even more so with resettled farmers where only 14% of the heads of households are women. This may stem from previous legislation that did not allow women to own land causing mainly men to apply for resettlement.

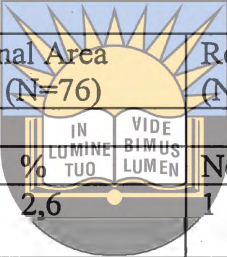
Population growth in the province of Manicaland has been higher than employment growth (CSO, 1997). This has resulted in high unemployment in the urban centres of this province. Possibly this explains the demographic imbalance which favours the de facto male heads of households. Shortage of employment in the urban areas is driving back male members of the family to the rural areas. This makes households to heavily depend on agriculture. Although these conditions could be an incentive to agricultural development, it does put

more pressure on the available land and increase the demand for land among the rural people. This perhaps highlights the urgency for land reform in Zimbabwe.

5.2 Marital Status of respondents

The marital status of the respondents in the communal and resettlement areas is shown in Table 5.1

Table 5.1 Distribution of respondents according to marital status.



| Marital Status | Communal Area Farmers (N=76) | | Resettled Farmers (N=64) | |
|----------------|------------------------------|------|--------------------------|------|
| | No | % | No | % |
| Single | 2 | 2,6 | 1 | 1,6 |
| Married | 61 | 80,3 | 56 | 87,5 |
| Widow/er | 13 | 17,1 | 7 | 10,9 |

Source : Field survey (2000).

From Table 5.1 it is evident that there are fewer widows in the resettlement areas. This shows that affirmative action is needed when land is allocated to the people. Women should be given a certain quota to insure that they also get land for farming.

5.3. Age of Respondents

An individual's age is one of the most important factors pertaining to his personality make-up, since his/her needs and the way in which he/she thinks and behaves are all closely related to the number of years he has lived (Bembridge, 1987). Bembridge also observes that although age may have an impairing effect on physical abilities, which is important on family holdings, several research studies in recent years have indicated little or no mental deterioration at least up to 60 years of age.



Since farm management has been considered primarily to be a mental process, it is assumed that increased age does not seriously impair managerial ability. But, Seyoum et al (1998) came up with an opposing hypothesis which said that older farmers are expected to have greater inefficiencies because they are less adaptable to new technological developments. From their research on maize producers in eastern Ethiopia they found out that younger farmers were more efficient in maize production than the older farmers.

This is in line with results of research studies conducted in some parts of Southern Africa which revealed a negative relationship between age and farming efficiency (Sebotja, 1985).

As shown in Figure 5.2 the age distribution is normal for both farming sectors. For both groups of farmers the majority from the sample population is found in the 41-50 and 51-60 age groups. Those above 70 years of age are in the minority. Farmers who are in the

younger age group (less than 40yrs), and who are expected to be more efficient, make up about 20% or less of both groups of farmers.

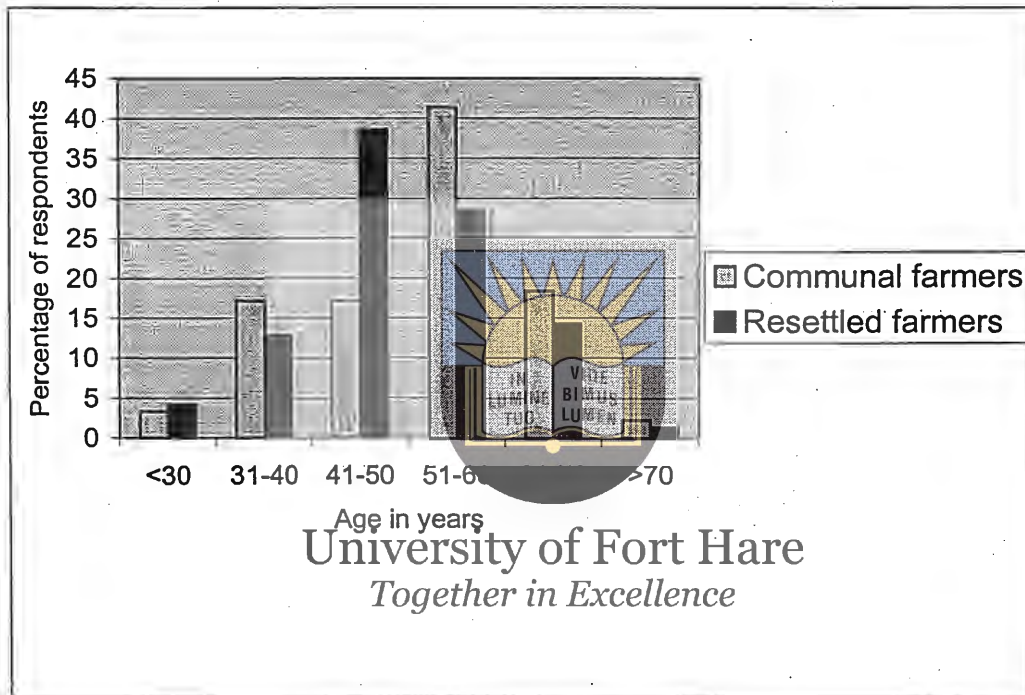


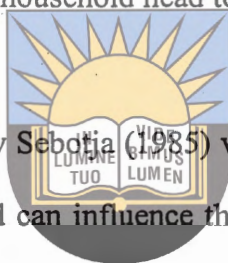
Figure 5.2: Distribution of respondents according to age group

5.4 Family size

Small scale farming heavily depends on its family for labour. Labour inputs largely replace capital inputs. Dalton et al (1997) noted that the bulk of the production costs in Zimbabwean small scale farming system are attributable to labour inputs and the majority of family labour is applied to maize. This is supported by Hayes et al (1997) who found that

seasonal labour shortages have intensified with increasing migration and wage labour participation. These results suggest that access to household labour is an important catalyst for increasing yields.

Although a larger family size puts extra pressure on farm income for food and clothing, it does ensure availability of enough family labour for farm operations to be performed when necessary (Parikh et al, 1995). A larger family size also means that a variety of labour capacity is available in the form of children, youngsters, adults, and elderly members. The mix of labour enables the rational household head to assign the right job to the right person.



This observation was disputed by Sebottia (1985) who argues that the fact that either the de facto or de jure size of household can influence the efficiency of farming operations is not very consistent. That is some members of the household may not be available during periods of peak demand for labour and this may affect farming adversely. In this survey only resident members count as family members. They are people who live under the leadership of the head of the household and depend on the household for food and shelter. Membership of the household includes the following; spouses, sons, daughters, brothers and sisters, sons/daughters in laws, permanent employees, as well as elderly relatives like parents. Details gathered from these members included their sex, relationship to head, age, education and marital status.

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Zimbabwe is a country with one of the highest population growth rates. The fertility rate is over 4.6 per woman and the growth rate is 3.14 percent (CSO, 1997). As shown in Table 5.2 below the size of family varies according to natural regions and according to farming sector.

Table 5.2: Average size of family according to natural regions and farming sector.

| Natural Region | Communal (N=76) | Area | Resettlement (N=64) | Area |
|------------------|--------------------|-----------------|------------------------|-----------------|
| | No of HH | Average Size | No of HH | Average Size |
| I | 5 | 6,2 | 7 | 11,1 |
| II | 11 | 4,0 | 10 | 7,1 |
| III | 9 | 5,2 | 7 | 10,9 |
| IV | 20 | 6,2 | 10 | 5,3 |
| V | 31 | 8,0 | 30 | 5,4 |
| Weighted Average | 6,5 | | 6,9 | |

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Source : Field survey (2000)

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Families are larger in resettlement areas than in the communal areas. The simple explanation to this observation is that households in resettlement areas have access to larger pieces of agricultural lands. In the communal areas natural region five has the largest average family size. This is because this region depends heavily on the production of cotton. Cotton is labour intensive and so large families serve as sources of labour. Most of the farmers are polygamists as shown in Table 5.3 below.

Table 5.3: Distribution of male farmers according to number of spouses.

| Crop | No of wives | Communal Area (N=55) | | Resettlement Area (N=55) | |
|------------------|-------------|----------------------|----|--------------------------|----|
| | | No. | % | No. | % |
| Maize Producers | 1 | 21 | 66 | 13 | 48 |
| | 2 | 8 | 25 | 9 | 33 |
| | 3 | 2 | 6 | 3 | 11 |
| | >3 | 1 | 3 | 2 | 8 |
| Cotton Producers | 1 | 11 | 48 | 24 | 85 |
| | 2 | 7 | 30 | 2 | 7 |
| | 3 | 3 | 13 | 0 | 0 |
| | >3 | 2 | 9 | 2 | 7 |

Source : Field survey (2000)



5.5 Education Levels

Illiteracy has been noted as one of the factors that limits development in less developed countries. Educational considerations generally influence the adoption of new behaviour of farmers (Bester et al, 1999).

Bembridge (1987) notes that education has long been recognized as a central element in the socio-economic evolution of less developed countries. In agriculture more years of formal schooling are expected to enhance efficiency. As noted by Parikh et al (1995) the role of education in improving farmers' efficiency is now widely accepted, in that it enables farmers to acquire and process relevant information more effectively. On the other hand Sebotja (1985) argues that although some empirical diffusion studies indicate that literacy enhances the adoption of innovation, there is not much evidence of improved productivity attributable directly to schooling experience.

Zimbabwe has a higher literacy rate than most countries in Africa. The formal education system begins with a 7-year primary cycle. The secondary system consists of a 6-year programme. The tertiary level consists of universities, teacher training colleges, polytechnic and technical colleges, and agricultural colleges (CSO, 1997).

In the sample population, educational level was taken as the number of years of schooling completed by the head of household. As shown in Table 5.4 below, all farmers have had some formal education. This means they are able to understand information given to them especially that written in their own language.

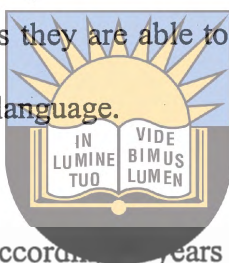


Table 5.4: Distribution of farmers according to years of schooling.

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| Educational Level | Communal Area (N=76) | | Resettlement Area (N=64) | |
|-------------------|----------------------|------|--------------------------|------|
| | No. | % | No. | % |
| 1-5 years | 24 | 31,5 | 14 | 21,9 |
| 6-8 years | 39 | 51,3 | 36 | 56,3 |
| 9-11 years | 12 | 15,8 | 14 | 21,9 |
| 7-11 years | 1 | 1,3 | 0 | 0 |

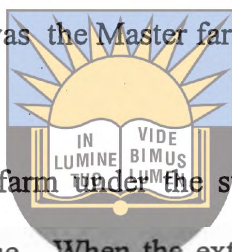
Source : Field survey (2000)

5.6 Vocational Training

Research has shown that peasant farmers with some form of vocational training are likely to be more progressive farmers than those with no vocational training (Bembridge, 1987).

Farmers who have received some form of training are more likely to respond and benefit from new innovations.

Zimbabwean small-scale farmers differ in terms of vocational training received. There are master farmers who have acquired some master farmer's certificate through some non-formal education from the extension service of Zimbabwe (AGRITEX). As pointed out by Rukuni (1994a), due to the diverse nature of the smallholder sector in both clientele character and production systems, a variety of extension approaches and their combinations have been adopted. Among them was the Master farmer training system.



Willing farmers were chosen to farm under the supervision of extension officers. They were assessed over a period of time. When the extension officers are satisfied with their performance, a field day is held on this farmer's plot. That is where other farmers and interested organizations come to see the achievements of this farmer before he is given a certificate.

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This programme was quite vibrant during the 1980's and early 1990's but due to shortage of funds it has dwindled. As shown in the Table 5.5 below a very small number of farmers received this specialized training.

Table 5.5: Status of farmer by farming sector.

| Status of farmer | Communal Area (N=76) | | Resettlement Area (N=64) | |
|-------------------|----------------------|------|--------------------------|------|
| | No. | % | No. | % |
| Master farmer | 9 | 11,8 | 6 | 9,4 |
| Non master farmer | 67 | 88,2 | 58 | 90,6 |

Source : Field survey (2000)



5.7 Discussion

Most of the households are headed by men which shows the dominance of men in the society.

Over 80 percent of the respondents are married. The majority of the farmers for both sectors are found in the 41-50 and 51-60 age groups. The average family size for both sectors is about seven. All farmers have had at least one year of formal schooling with the majority of them having attained between 6-8 years educational levels.

CHAPTER SIX

AGRICULTURAL PRODUCTION ANALYSIS

6.1 Arable Land Holdings

The size of land holdings for the resettled farmers is in line with the assumption given by Bembridge (1987) which says that approximately 4 hectares of dry land is required for subsistence-level farming in medium to high potential agro-ecological areas.



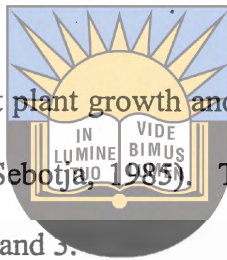
Table 6.1: Mean land holding by natural region and farming sector.

| Natural Region | Communal Area (N=76) | Resettled Area (N=64) |
|----------------|----------------------|-----------------------|
| | ha | ha |
| I | 5,0 | 5,0 |
| II | 2,1 | 4,3 |
| III | 2,0 | 5,1 |
| IV | 3,2 | 5,0 |
| V | 4,5 | 10,0 |

Source : Field survey (2000)

Table 6.1 shows that most communal area farmers operate non-viable farming units. As for the resettled farmers, the government policy of allocating farm holding units of 12 acres (about 5 hectares) to each household, at least ensures that they operate viable farming units. Communal farmers from natural region I have larger holdings because they have acquired the land on a freehold system of land tenure. Otherwise the trend is the larger the land the more marginal is the natural region.

6.2 Production Potential and the Present Production Status



This is the ability of land to support plant growth and depends much on the soil and climatic conditions prevailing in the area (Sebotja, 1985). This is discussed under natural farming regions of Zimbabwe in Chapters 2 and 3.

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6.2.1 Maize

For maize we can use the figures provided by the SEED CO-OP (1999), a seed marketing company of Zimbabwe. We can use their findings as the potential production levels and compare them with the observed production levels for both resettlement and SSC maize producers. For white maize the potential and the observed production levels are as shown in Table 6.2 below:

Table 6.2 : Observed production versus Potential production

| Natural Region | Potential Production (t/ha) | Observed Production | |
|----------------|-----------------------------|----------------------|-----------------------|
| | | Communal Area (t/ha) | Resettled Area (t/ha) |
| I | 3-10 | 0,4-1,5 | 0,5-1,2 |
| II | 7-13 | 0,9-2,8 | 1,1-2,7 |
| III | 7-13 | 0,6-2,0 | 0,8-2,7 |
| IV | 3 -8 | 0,5-3,6 | 1,7-2,8 |
| V | 1 -5 | 0,2-2,5 | 2,5-3,6* |

Source : SEED-CO PUBLICATIONS (1999)

From Table 6.2 we can see that both the communal area farmers and the resettled farmers produce far below the potential level.



6.2.2 Cotton

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As far as cotton is concerned on average LSC farmers have been producing about 2,0 t/ha, resettled and communal area farmers about 1,15 t/ha (CSO, 1998). This information was collected for the period of 1995-1998. This compares very well with the findings from this survey. On average the communal area farmers are producing about 2,3 t/ha while their resettled counterparts, who use irrigation, produce 2,55 t/ha. The figures from the survey are much higher than the CSO ones possibly because the latter is a national average. This possibly means the surveyed province is performing better than most of the other provinces.

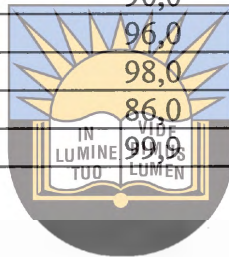
*The cotton producers from the resettled farms in natural region V use irrigation.

6.3 Land Use Intensity

Land use intensity is a measure of the extent of land utilization in the two farming sectors (Rukuni, 1994a). In this survey the land use intensity rates are as follows:

Table 6.3: Land use intensity according to farming regions and farming sector.

| Natural Region | Communal Area (N=76) | Resettlement Area (N=64) |
|----------------|----------------------|--------------------------|
| | % | % |
| I | 90,0 | 68,0 |
| II | 96,0 | 98,0 |
| III | 98,0 | 90,0 |
| IV | 86,0 | 83,5 |
| V | 99,9 | 100,0 |



Source : Field survey (2000).

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The extremely high intensity rates are a clear reflection of the acute shortage of land in areas occupied by small-scale farmers. Actually there are no apparent indications of under-utilization of arable land. With the increasing population pressure in rural and resettlement areas the demand for land (both arable and grazing) remains acute. Natural region V has the highest intensity rates because of the cotton production which is quite lucrative for small-scale farmers.

Rukuni (1994a) gave intensity rates of between 18,7% to 51% for LSC farmers . If we are to go by these findings we may conclude that small-scale farmers use land more efficiently than their LSC farmers counter-parts.

In Zimbabwe maize is the most important crop being the major animal feed grain and staple food of the majority of the population. Zimbabwe is predominantly self-sufficient in maize grain except when there has been a drought. It occupies more than 50% of all land cropped and providing more than 65% of gross farm income (Dalton et al, 1997). Coudere and Marijse (1991) noted two reasons for the predominance of maize over other crops. First maize is less labour intensive than other crops like millet, and secondly maize is a more popular food than other grain crops grown by the small scale farmers.

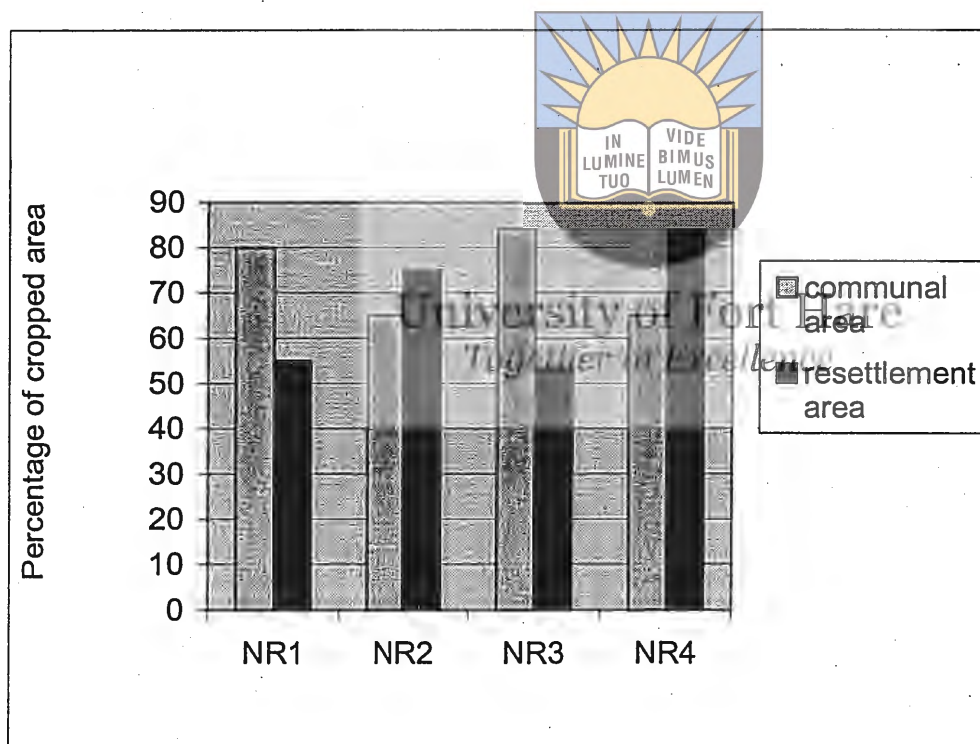


Figure 6.1 :Proportion of maize area as compared to total crop area by natural regions

From figure 6.1 we realise that the importance of maize to both the communal and resettlement farmers needs no further emphasis. Even in marginal regions like natural region IV maize takes up the largest portion of the cropped land.

The scenario is quite different in natural region V where cotton dominates. This cash crop is very popular with these farmers because it gives very high returns. Farmers are now operating on the commercial system whereby they produce a cash crop and then rely on the market for food products like maize meal (See figure 6.2).

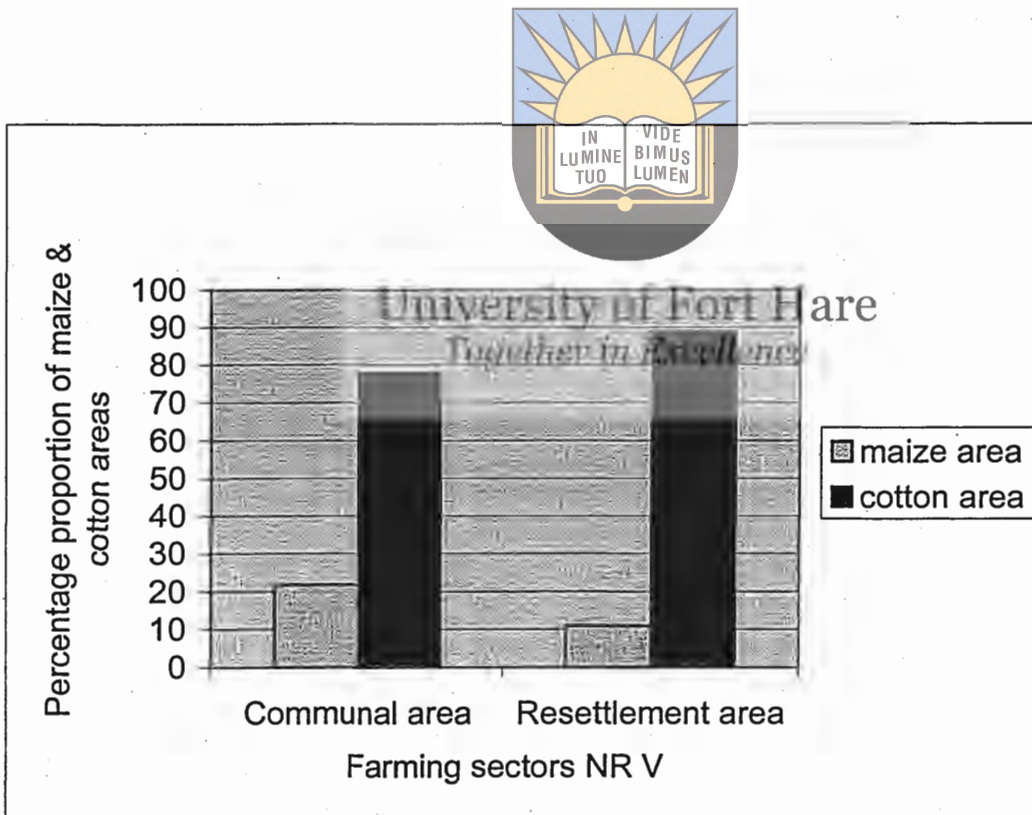


Figure 6.2 : Distribution of maize and cotton area by farming sector

6.4 Household Income

Household income measures relative material well being and it illustrates the degree of dependence on farm and non-farm resources (Bembridge, 1987). During data collection each component of income was considered.

Table 6.4: Distribution of total household income by category of farmers (000Z\$)

| Category | SSC-Maize | | RA-Maize | | SSC-Cotton | | RA-Cotton | |
|------------------------------|-----------|------|----------|------|------------|------|-----------|------|
| | N=45 | | N=31 | | N=34 | | N=30 | |
| | Amount | % | Amount | % | Amount | % | Amount | % |
| Maize income | 505,1 | 27,7 | 854,5 | 51,0 | 194,7 | 2,1 | 228,0 | 1,2 |
| Vegetables income | 417,0 | 22,9 | 413,5 | 24,7 | - | - | - | - |
| Cotton income | - | - | - | - | 8518,9 | 93,8 | 9184,4 | 46,7 |
| Groundnuts income | 73,8 | 4,0 | 59,6 | 3,6 | - | - | - | - |
| Other crops | 251,0 | 13,8 | 129,5 | 7,7 | 33,1 | 0,4 | 10240,0 | 52,7 |
| Total Crop Income | 1245,6 | 68,4 | 1458,7 | 87,0 | 8742,0 | 96,3 | 19463,0 | 99,6 |
| Off farm salaried employment | 210,0 | 11,5 | 34,8 | 2,1 | 311,0 | 3,4 | - | - |
| Local self employment | 156,5 | 8,6 | 96,0 | 5,7 | 4,4 | 0,05 | - | - |
| Remittances | 65,3 | 3,6 | 62,4 | 3,7 | 13,3 | 0,1 | 7,2 | 0,04 |
| Livestock | 142,7 | 7,8 | 26,5 | 1,6 | 2,7 | 0,03 | - | - |
| Total Income | 182,0 | 100 | 1676,7 | 100 | 9077,8 | 100 | 19660,0 | 100 |
| Mean Household Income | 40,5 | | 54,1 | | 267,0 | | 655,3 | |

Source : Field survey (2000)

For the purposes of this study household income was calculated on the basis of a summation of all sources of income. Jackson and Collier's (1991) rural income model was adopted. The reduced and summary form of the model is shown in appendix II.

6.4.1 Crop income

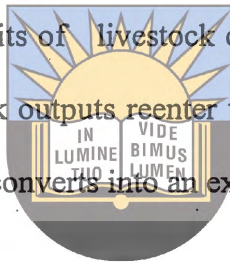
From Table 6.4 we find crop income to be the single most important source of income for both the communal and the resettlement farmers who produce either maize or cotton. For the farmers who produce maize we find maize and vegetables as the two crops that account for over 50% of total income. These results are not all surprising. This is because the maize crop is a dominant cereal crop in Zimbabwe. Also the income from maize was calculated including the produce that was retained for home consumption. As for vegetables almost every farmer (communal and resettled) has a small garden. Vegetables of different types are grown and sold both locally and to the nearest towns and townships. Because of their short gestation periods they are very popular as a source of income for daily household use.

For cotton producers (both commercial and resettlement), cotton has taken precedence over all the other crops. Income from this crop accounts for over 96% of total household income. This crop has become very popular among both types of farmers. In the area of study, Chipinge, the soils are quite heavy and rich that the communal farmers don't use fertilizers but they still get yields above the national average of about 2,0 t/ha. Since fertilizer is one of the most expensive inputs in crop production these farmers are rational enough to take advantage of this endowment.

6.4.2 Livestock

In the calculation of income from livestock only sales during the course of the year were recorded, the low contribution of this source is not surprising at all. The severe droughts of 1992-93 resulted in very serious losses in livestock assets. That is why most respondents indicated that draught power was limiting their ability to produce crops.

The significance of livestock may be greater than what the results show. As noted by Jackson and Collier (1991), the economic benefits of livestock come from having living animals in the mixed farming system. Most livestock outputs reenter the holdings as inputs, e.g. manure and draught power. The growth of the herd converts into an expanded asset.



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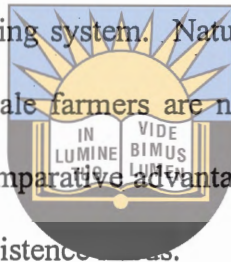
6.4.3 Remittances

In all four farming categories covered this source accounted for less than 4% of total household income. Although not expected to be large this is too low a percentage. After all members of households who are working in cities are expected to look after those who remain on the family plots in the rural areas. This surprising result may indicate a level of poverty in urban areas so that people contribute very little to the income of households in the rural areas.

Overall, the mean household incomes for all categories look impressive. In actual fact its not surprising to find that most of the small scale farmers are poor. This is because this total household income is not the net household income. From this income farmers derive their

subsistence money, money for agricultural inputs, school fees etc. Given the current devaluation of the Zimbabwean dollar and an inflation rate of close to 70% most of these farmers are living in abject poverty. According to the CSO (1997) the per capita income for 1996, at current prices stood at ZW\$7000. The figure is now likely to be much higher.

One interesting trend is the higher income levels of the resettled farmers. This appears to confirm the hypothesis that land reform in Zimbabwe helps to eradicate rural poverty. The high levels of cotton production by both the communal and the resettlement farmers show that small-scale farmers are rational in their farming system. Natural region V is arid and not good for maize production. So these small scale farmers are now going commercial and invest their resources in an enterprise they have comparative advantage in. From the sale of the cotton they then use the income to satisfy their subsistence needs.



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6.5 Maize Production

Sebotja (1985) quotes an assumption by Tapson which states that a peasant farmer is by definition a maize consumer and not a maize producer. In his study of the Krokodilheuwel irrigation scheme he found that maize was grown solely for home consumption. The extra bags of maize produced by the individual farmers were not seen as surplus production to obtain cash and support the non-form communities, but rather as money equivalents to pay for production costs.

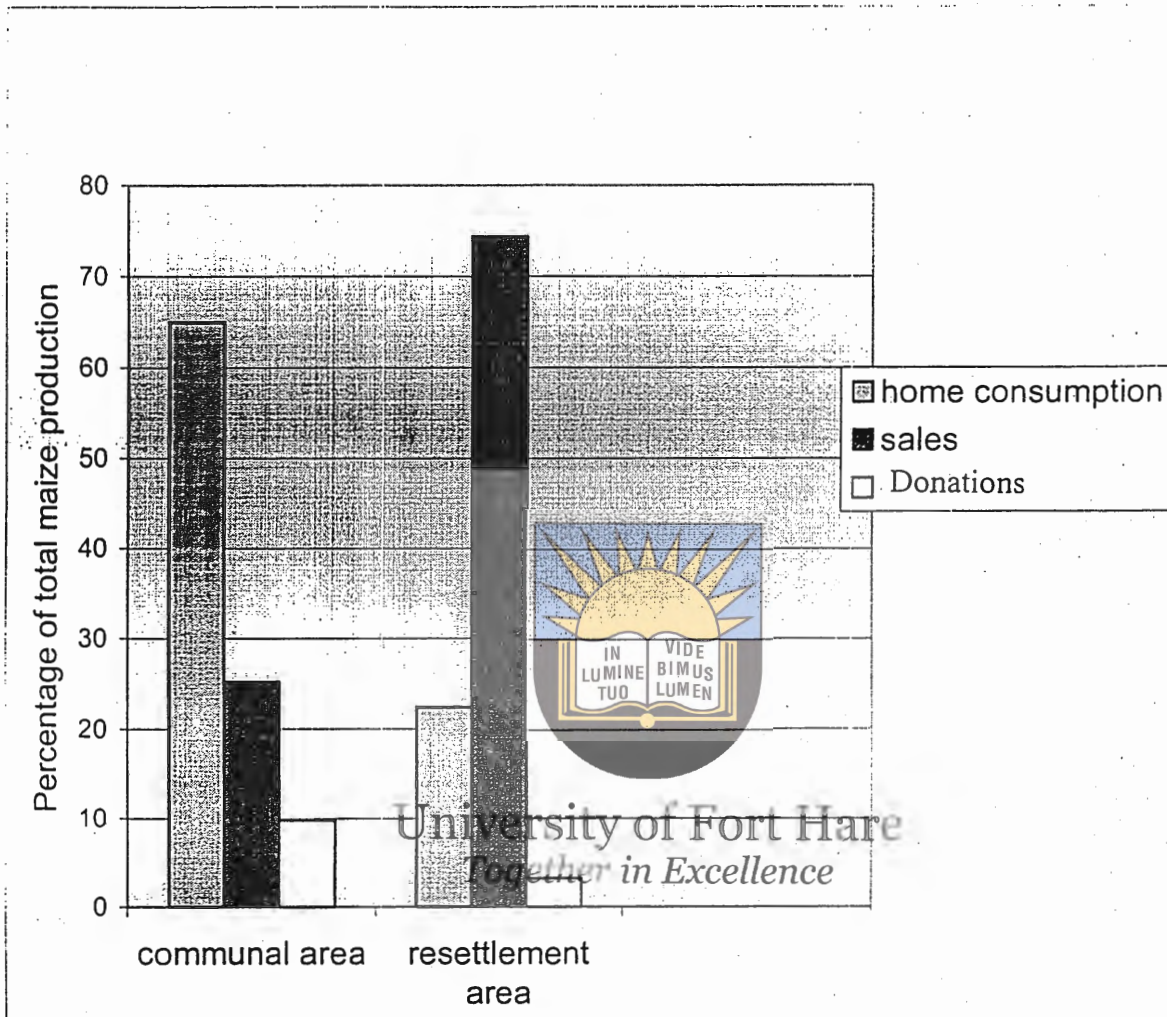


Figure 6.3 : Apportionment to home consumption , sales and donations of maize grown by farmers according to farming sector

The Tapson assumption appears to apply in part for communal area maize producers. Over 65 percent of the produce is for home consumption and only about 25 percent is for sale. This seems to show that maize is produced specifically for home consumption. Only the surplus

during a good season is marketed. Selling of maize takes place locally among the communal farmers themselves.

The farmers said that they can fetch more money by storing their maize and then sell to other farmers who do not produce enough grain to last them a year. They agreed that in the process they lose some grain through pests that feed on it during storage. Although they apply some pesticides it seems as if they apply low dosages. Specific data on dosage rates was not collected.



Figure 6.3 shows that the assumption that a peasant farmer is a maize consumer and not a maize producer does not hold for the resettlement farmers. Only about 22,4% is produced for subsistence needs. Over 74% is produced for sale. This is consistent with government objective that land redistribution would have small-scale farmers participate in the GDP of the country. They produce maize which they sell to institutionalized markets and so provide food for the urban populace.

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6.6 Draught Power

Small-scale farmers generally use animal draught power for the tillage of land. Most of them use cattle for draught power and very few use hired tractors or donkeys. Over 50% of the farmers mentioned draught power as a limiting factor in maize production, but only 10,3% did not own at least one herd of cattle. Data on animals used as draught power was not collected.

6.7 Credit

Land reform serves to redistribute land and to achieve increased productivity. Higher productivity can only come about as a result of changes in the structure of support services such as research, extension and credit. Taylor et al (1986) notes that over the previous two decades, one of the primary policy actions directed toward improving the productivity and incomes of traditional farmers in developing countries has been the provision of agricultural credit at subsidized rates of interest. This was meant to transform the traditional agricultural production technologies to more modern and productive technologies.



Parikh et al (1995) in their study of the economic efficiency in Pakistani Agriculture found that credit availability shifts the cash constraint on inputs and thus enables farmers to make timely purchases of those inputs, which they cannot provide from their own resources.

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At independence in 1980, small-scale farmers got access to credit from the AFC (an agricultural financing institution) The number and value of loans granted to farmers are as shown in Table 6.5.

Table 6.5 : Number and value of loans granted to each farming sector by the Agricultural Finance Corporation.

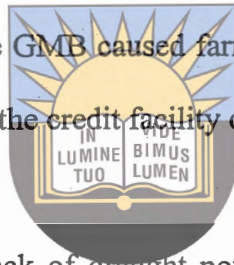
| YEAR | SECTOR | | | | | |
|------|----------|-----------------------|------------------------|-----------------------|--------------|---------------|
| | COMMUNAL | | LARGE SCALE COMMERCIAL | | RESETTLEMENT | |
| | Number | VALUE IN MILLION ZW\$ | Number | VALUE IN MILLION ZW\$ | Number | VALUE IN ZW\$ |
| 1980 | 18000 | 4.2 | 2526 | 86.9 | Nil | Nil |
| 1981 | 30150 | 10.1 | 2103 | 88.8 | 911 | 0.5 |
| 1982 | 38912 | 13.2 | 1645 | 88.7 | 4154 | 1.5 |
| 1983 | 50036 | 23.4 | 1400 | 110.2 | 19874 | 10.6 |
| 1984 | 65793 | 32.0 | 1484 | 110.3 | 19926 | 10.7 |
| 1985 | 77526 | 38.9 | 1308 | 113.0 | 13866 | 8.5 |
| 1986 | 77384 | 60.0 | 1007 | 94.9 | 11800 | 8.6 |
| 1987 | 69885 | 49.4 | 910 | 91.0 | 11217 | 9.0 |
| 1988 | 57679 | 41.3 | 906 | 117.4 | 7022 | 5.9 |
| 1989 | 43846 | 33.4 | 720 | 113.1 | 5193 | 5.9 |
| 1990 | 30190 | 26.4 | 1133 | 195.1 | 4658 | 4.7 |
| 1991 | 27344 | 29.7 | 1499 | 358.2 | 6307 | 10.5 |

Source Adapted from Rukuni (1994b)

The results of this noble policy were quite mixed. A small number of the beneficiaries managed to improve their productivity such that some of them were able to compete squarely with their LSC farmers counterparts. The majority of small scale farmers just confirmed Shultz's hypothesis that traditional farmers are "poor but efficient." Taylor et al

(1986) stated that the provision of agricultural credit will be ineffective for improving productivity and incomes since investment opportunities are limited. Traditional farmers are hypothesized to be efficient but faced with technological barriers that cannot be overcome by the mere influx of capital provided by credit programmes alone.

Most of the Zimbabwean small-scale farmers did not have enough knowledge about how to manage the loans. The high extension officer to farmers ratio aggravated the problem. Some farmers did not understand the concept of interest. Also the 100 percent stop order arrangement between AFC and the GMB caused farmers to sell produce to free agents who exploited them and in the long run the credit facility did not help the small scale farmers.



Technological barriers too, like lack of draught power, lack of knowledge of how to use agricultural chemicals and, fertilizer application rates prevented the credit programmes from having a significant impact on capital formation and incomes. Small-scale farmers were, in the main given soft loans to buy seed and fertilizers at very low interest rates. Default rates were said to be as high as 33 percent. This was because farmers diverted the money to buy other assets or marry more wives to create more labour power.

Very few farmers sampled in the study received loans from either the commercial banks or the AFC. Only the cotton producers from NR V got loans from companies that buy cotton. They were given the inputs at the beginning of the season and repaid when they marketed their crop to the respective companies.

Table 6.6: Proportion of farmers who received credit by natural region and by farming sector.

| | | AFC | | Commercial Banks | | Cottco/Cargil | | Others | | Did not | | Total |
|------|----|-----|----|------------------|---|---------------|----|--------|----|---------|----|-------|
| | | No | % | No | % | No | % | No | % | No | % | |
| NR 1 | CA | 1 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 80 | 5 |
| | RA | 1 | 14 | 0 | 0 | 0 | 0 | 3 | 43 | 2 | 29 | 6 |
| NR 2 | CA | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 36 | 7 | 64 | 11 |
| | RA | 1 | 10 | 0 | 0 | 0 | 0 | 2 | 20 | 7 | 70 | 10 |
| NR 3 | CA | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 33 | 6 | 67 | 9 |
| | RA | 3 | 43 | 0 | 0 | 0 | 0 | 1 | 14 | 3 | 43 | 7 |
| NR 4 | CA | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 36 | 14 | 64 | 22 |
| | RA | 1 | 10 | 0 | 0 | 0 | 0 | 3 | 30 | 6 | 60 | 10 |
| NR 5 | CA | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 |
| | RA | 2 | 7 | 1 | 3 | 3 | 27 | 0 | 0 | 0 | 0 | 30 |

Source: Field survey (2000)

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Table 6.6 shows that the column under others, which represents farmers who either borrowed from friends or relatives, represents a significant proportion. This indicates that most farmers need credit but the prohibitive interest rates of up to 60 percent scare them. As a result, most farmers do not realize their potential productivity.

6.8 Extension Services

Extension education exposes farmers to improved techniques (Parikh et al 1995). It provides a technique for enhancing the chances of increasing production without any significant quantitative increase in the basic factors of production e.g. land, labour and capital. It enhances entrepreneurship and managerial ability. The vigorous promotion of the extension

system that took place during the 1980s in Zimbabwe proved to be beneficial. It resulted in the adoption of high yielding varieties of maize and the use of fertilizers such that much of the maize now produced in Zimbabwe comes from the small-scale farmers. They have also diversified into some cash crops like cotton.

The returns from this programme is proving to be continuative. Although the department of extension faces some financial constraints most farmers still do well without the assistance from the extension workers. As shown in Table 6.6 below very few farmers received assistance from extension season.



Table 6.7 : Proportion of farmers who received some extension services by farming sector.

| | CA (N=76) | | RA (N=64) | |
|----------------------|-----------|------|-----------|------|
| | No | % | No | % |
| Extension service | 6 | 7.9 | 3 | 4.7 |
| No extension service | 70 | 92.1 | 62 | 97.3 |
| Total | 76 | 100 | 64 | 100 |

Source : Field survey (2000)

6.9 Discussion

Average land holdings in communal areas are below the required optimum levels. Although the land use intensities are extremely high for both the CA and RA maize producers the levels of production are far below the potential levels for the respective natural regions. Agriculture is the mainstay of the small holder farmer of Zimbabwe as it accounts for 68-90 percent of total income for these farmers.

The government should seriously consider the revamping of the extension services. This can be blend with training of more master farmers. More funds should be injected into this critical service.



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CHAPTER SEVEN

RESULTS OF THE EMPIRICAL ANALYSIS

7.1 The Production Function

As stated in chapter 4 a production function was chosen to analyze the data. This is used to measure the effect of inputs on output as inputs are applied to produce output and the quantity and quality of inputs used influences the nature of output. To determine the relevant variables for the production of either maize or cotton prior consultation with the producers took place. All the variables were explained in chapter 4.



The specified Cobb-Douglas production function was used. This was chosen because of its ease of interpretation of returns to scale. The function is homogeneous of degree, $a+b$.

If $a+b$ exceeds unity, then there is increasing returns to scale, when $a+b=1$ there is constant returns to scale and $a+b<1$ indicates diminishing returns to scale.

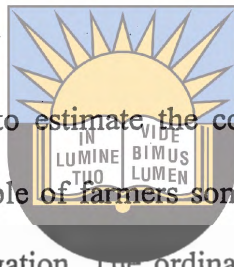
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Before the results are presented, it is important to state that an assumption was made about the variables used. It was assumed that all inputs are sufficiently homogeneous and unambiguously defined. For example, labour was taken to consist of family and hired labour. The two types of labour were added together, thus implicitly assuming that they have the same effect on output. The same assumptions were made for other inputs like land, capital, fertilizer, seed etc. It is important to note however that the value of the elasticities might be somewhat affected by a possible heterogeneity of the inputs e.g. productivity of land from different natural regions, variety of seed and type of fertilizers. The effect of inter-cropping is also overlooked

7.2 Results

Four groups of farmers were analysed. These are :

- (1) communal area maize producers (CA-Maize),
- (2) resettlement area maize producers (RA-Maize),
- (3) communal area cotton producers (CA-Cotton), and
- * (4) resettlement area cotton producers (RA-Cotton)



The computer package used to estimate the coefficients (elasticities of production) is called Shazam. For each sample of farmers some preliminary analyses were made with various levels of input aggregation. The ordinary least squares (OLS) estimates which show the average performance of the sample farmers and with the highest adjusted R² value (normal criteria of goodness of fit) were chosen. The results of the least squares regression estimates of production function for various producing groups of farmers are presented in table 7.1

*It is important to note here that the resettlement area cotton producers are designed to operate as small scale commercial farmers as they are assisted by ARDA (a government farming organisation which owns several commercial farms). They use irrigation in their agricultural production.

Table 7.1 Production function estimates, by producer group

| Producer group and no of observations | Constant (1) | Land (2) | Seed (3) | Labour (4) | Capital (5) | Insecticides (6) | Fertilizer (7) | Sum of bs (8) | Adjusted R ² (9) |
|---|--|--------------------------------|---------------------------------|---------------------------------|-----------------------------------|------------------------------------|---------------------------------|---------------|-----------------------------|
| Communal area maize producers (45) | 0.10876 [1.389] ^a (-1.597) ^b | 0.80717* [0.223] (3.623) | 0.18068 [0.205] (0.882) | 0.10493* [0.228] (0.4656) | 0.1169** [0.091] (1.282) | N/A ^c | 0.21651 [0.0944] (2.2926) | 1.4263 | 0.68 |
| Resettlement area maize producers (34) | 0.19274 [1.584] (-1.039) | 0.4114** [0.321] (1.282) | 0.76388* [0.225] (3.396) | -0.2069 [0.251] (-0.826) | 0.14690** [0.0649] (1.2783) | N/A ^c | 0.04928 [0.1536] (0.3208) | 1.1646 | 0.70 |
| Communal area cotton producers (31) | 1.09186 [3.702] (-0.024) | 1.1134** [0.748] (1.488) | -0.0215 [0.495] (-0.044) | 0.20792 [0.404] (0.515) | 0.03940 [0.2338] (0.1494) | -0.06530 [0.27062] (-0.2413) | N/A ^d | 1.1951 | 0.58 |
| Resettlement area cotton producers (30) | 2.25000 [1.271] (0.638) | 0.67056* [0.237] (2.828) | -0.3199* [0.194] (-1.648) | -0.152** [0.134] (-0.137) | 0.4320 [0.2864] (1.3235) | 0.30252 [0.44196] (0.84480) | 0.8480 [0.0874] (0.9705) | 0.7710 | 0.83 |

^a figures in brackets are standard error of the estimates. ^b Figures in parentheses are t-ratios of coefficients.

^c the use of insecticides by maize producers is insignificant. ^d communal area cotton producers do not use fertilizers

* significant at 5% level

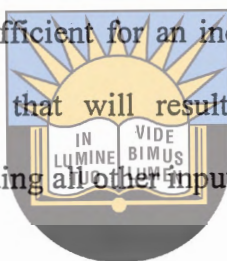
**significant at 10%

Source : Field Survey (2000)

Table 7.1 shows that the estimations of the four production functions resulted in adjusted R^2 values of between 0,58 and 0,83, which means that the inputs used in the model were able to explain between 58% to 83% of the variation in maize or cotton production by the two farming sectors. According to Coudere and Marijse (1991) an R^2 of 0,54 is fairly a good result for regression of cross-sectional data. This, then means that the 58-83 % range is quite good a result.

7.3 Elasticities of Production

An elasticity of production coefficient for an individual input expresses the percentage increase (decrease) in output that will result if the particular input is increased (decreased) by one percent, holding all other inputs constant (Truran and Fox, 1979).



7.3.1 Land

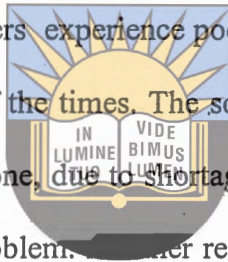
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From the coefficients (column 2) it is evident that access to land is by far the most important variable explaining differentiation in output. Land elasticity is highly significant for all four producer groups but especially for the communal area cotton producers. According to Cornia (1985), land elasticity is regularly higher in land scarce than in land-rich countries. This is quite interesting because all these small scale farmers are in short supply of land. The communal area cotton producers are even go so far as to rent land from farmers in Mozambique. They are located along the Zimbabwe-Mozambique border.

7.3.2 Seed

The production elasticity of seed (column 3) is quite low in most of the producer groups. In the resettlement area for maize producers, this input surprisingly explains much of the differentiation in production. A one percent increase in the quantity of maize seed, holding all other inputs constant, will result in 0,76 percent increase in maize output.

In cotton production both groups of farmers over-utilize seed input. The most probable explanation for this is that farmers experience poor germination and as a result they have to do some gap fillings most of the times. The soils are heavy and need proper seedbed preparation. When this is not done, due to shortage of capital or effective draught power germination is going to be a problem. Another reason may be poor knowledge about the right seed rates per unit of land. This results in an over-population of plants which the soil is unable to sustain.



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7.3.3 Labour

The elasticity of production for labour input does exhibit a very predictable pattern of response. In all groups of farmers the elasticity is very low and the resettlement areas even give negative values, which means an over-utilization of input. The low estimated elasticities points in the direction of sufficient or excess labour for the hectareage that can be cropped. This is in conformity with findings that marginal product of labour under labour-surplus conditions is very low. These low labour elasticities suggest disguised

unemployment and under-employment in this small scale farming sector. Output might well be increased by utilizing the same labour force on larger tracts of land.

Since labour can be used as substitute for other inputs such as capital, the apparent over-utilization of it is not surprising. Draught power shortage can force farmers to use manual labour to cultivate the land. Farmers (respondents) also cited weeding as the most demanding activity in the production of both maize and cotton. Labour input is also used for harvesting and transporting the produce from the field to the storage buildings. Another possible reason for the over-utilization of labour is that one of the crops under study; cotton is labour intensive in nature. People have to make at least three rounds in picking the fibre at every harvesting time. One other possible reason is that, because of the high unemployment rate in Zimbabwe the cost of labour is very low so that farmers tend to over-utilize this input.



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7.3.4 Capital

Cattle was used as proxy for capital (column 5), for all the groups except the resettlement cotton producers. Unlike in the other groups, livestock (cattle) does not play an important role in cotton production of RA-cotton farmers. All ploughing is done by hired tractors from ARDA. This made it plausible to take the cost of hiring the tractors and the cost of irrigation water as a proxy for capital.

Where cattle was taken as a proxy for capital it was found that there will be a marginal effect if access to more cattle is promoted. This was to be expected as almost every farmer has access to at least two animals which are used as draught power. This was the main reason why cattle were used as an explanatory variable in the production of maize or cotton. A 100 percent increase in capital for the CA and RA maize producers will respectively result in a 12 and 15 percent increase in maize output. As for the resettlement area cotton producers, the elasticity of production has a relatively higher value. Notwithstanding the problems that might come about as a result of the definition of capital, this input has a significant influence on cotton production, relative to the inputs other than land.



7.3.5 Insecticides

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The elasticities of insecticides (column 6) are both low although their margin is quite wide. These results are not at all surprising. The negative value exhibited by the communal area cotton producers shows an over-utilization of the input. These farmers do not use fertilizers as their soils are quite heavy and rich. Insecticides is their major costly input. These farmers are given advance loans in the form of insecticides by either Cottco or Cargil, the companies that market cotton in Zimbabwe. Farmers can get the chemicals they want as long as they are going to market their crop to the respective company. As a result farmers seem to hoard chemicals and even apply it in excess. Without the cost of fertilizer they are guaranteed of high profits from this crop.

The resettlement area farmers have a higher elasticity possibly because they are more efficient in their use of this input. These farmers use both fertilizers and irrigation both of which are very expensive. As a result they are more careful in their use of the input.

Knowledge and equipment also count in the use of this input. The resettlement farmers are more advanced and have more money to buy enough knap-sacks to use in the spraying. The fact that they get assistance from ARDA, which has trained and experienced personnel, puts them at an advantage over their communal area counterparts.



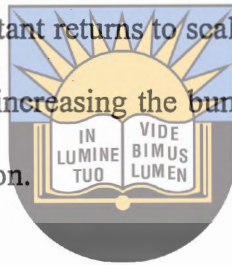
7.3.6 Fertilizer

Although higher coefficients of elasticity for fertilizer (column 7) were expected the pattern of results is not surprising. Firstly, since small scale farmers are resource poor, some relatively higher coefficients were expected which imply comparatively less use of this input. The results show that the communal area maize producers seem to be relatively more efficient in their use of the input. The other remaining two groups show that very insignificant increases might result from some increase in the use of this input. With the exception of the resettled cotton farmers the possible reason might be the use of animal manure as a substitute for the chemical fertilizers. Data on the use of organic manure was not collected.

7.4 Returns to scale

When we want to consider the returns to scale for each group of farmers we add up the coefficients of elasticity of each individual group. The sum is then used as an indicator of returns to scale. Cornia (1985) stated that constant returns to scale are assumed to occur when the sum of the coefficients falls within the interval 0,95-1,05; below 0,95 or above 1,05 one has decreasing or increasing returns.

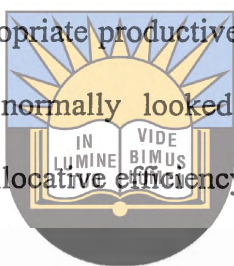
When farmers experience constant returns to scale they are indifferent as to whether they should increase production by increasing the bundle of inputs or should just continue to operate at that level of production.



The results show (column 8) that the first three groups of farmers seem to experience increasing returns to scale. As a result there are incentives for them to increase production until they experience constant returns to scale. As far as the resettlement area cotton producers are concerned they are experiencing decreasing returns to scale. This indicates some inefficiency as they are spending more on inputs than they should in view of the output. This result is not surprising since farmers are expected to operate as small-scale commercial farmers. Their livelihood depends on farming. They do not have any other sources of income besides farming. As a result they over-invest resources so as to maximise output. The other groups of farmers keep animals as a source of income. They can also go out and find employment in town or at some farm estates near their villages.

7.5 Efficiency analysis

Efficiency may be described as the relation between ends and means and has application in production analysis as well as consumption theory and demand analysis (Llewelyn and Williams, 1996). Its measurement is very important in agriculture because it is a factor for productivity growth. It helps to determine how much of the neglected resource(s) can be used to raise productivity given the existing resource base and the available technology. In traditional agriculture the study of efficiency helps to evaluate, recommend and formulate appropriate productive techniques that help to raise resource-use efficiency. Efficiency is normally looked at using economic efficiency's two components of Technical and allocative efficiency.



7.5.1 Technical Efficiency

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Relates to whether the farmer uses the best available technology in the production process. According to Llewelyn and Williams (1996), in economic terms, technical inefficiency refers to failure to operate on the production frontier and generally is assumed to reflect inefficiencies caused by timing and method of application of production inputs. It is normally caused by inadequate information or insufficient technical skills.

The measurement of technical efficiency is not all that simple. A number of studies have employed different techniques in order to measure it. These range from mathematical

programming methods to the use of stochastic production frontiers. Some authors like Panda (1996), and Bagi and Huang (1983) adopted Greene's use of corrected ordinary least squares (COLS) method of estimating the frontier production function.

Grabowski and Pasurka (1988) used a non-parametric production frontier to measure relative technical efficiency of North and South U.S. farms in 1960. They claimed that their approach makes it possible to determine whether technical inefficiency is the result of operating off of the isoquant (pure technical inefficiency) or operating at an inappropriate scale (i.e., not operating at constant returns to scale). They utilized a linear programming (LP) problem to calculate overall technical efficiency.



This study did not employ such complex mathematical approaches simply because its aim is to compare the relative efficiencies of the two farming sectors. For the purposes of comparison, Saleem's (1988) approach was adopted. This method was developed by Lau-Yotopoulos. It uses the Cobb-Douglas production function which is specified to have two variables and one fixed input as outlined in appendix III. The relative measure of technical efficiency can be shown by the intercept in the model.

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From the Cobb-Douglas function $Y=AX_1^{B1} X_2^{B2}$ A (the intercept) represents the technology of the group that generated the observations upon which the parameters of the function were to be estimated. The higher the value of the intercept the more positively it affects the yield.

As a result the farm with a higher value is more efficient. The values of the intercepts

which are used to measure the relative technical efficiencies of the different farming sectors are presented below.

Table 7.2 Relative Technical Efficiencies of different farming sectors

| Category of farmers | Maize production | Cotton production |
|---------------------|------------------|-------------------|
| Communal | 0.110 | 1.09 |
| Resettlement | 0.193 | 2.250 |

Source : Field survey (2000)

From the above results we find that in both categories the resettlement farmers are more technically efficient than their communal area counter-parts. The margin is even wider between the cotton producers. Such results are not at all surprising although the extent of inefficiency would be overstated due to the inability to measure such variables as the skills of the farmers. If we assume that the measurement errors of both sectors of farming are not significantly different the relative efficiency results should be accurate. The results could have been more interesting if the LSC farming sector had been included in the study. It would then have been possible to conclude with certainty the effect of size of land to technical efficiency.

Since most of the communal area farmers operate very small tracts of land that are non-viable it is not possible for them to operate at technical efficiency. This may mean that the land size is below the threshold level that would enable them to operate efficiently.

All unexplained variations in the samples, systematic or random, contribute to measured

technical inefficiency. Age of farm could be a contributing factor to the lower efficiency of communal farmers. Some of the resettlement farms had been used for grazing or were lying fallow before independence. The significantly higher technical efficiency for resettlement cotton producers was quite predictable. These farmers have access to capital, such as tractors and combine harvesters from ARDA. They also have access to irrigation. These farmers are also expected to have better farming skills since they were selected on merit. They were chosen for demonstrating some farming skills and for having some capital.



Since in this study only one crop (maize/cotton) was looked at, at a time, the practice of inter-cropping that is very common among the small-scale farmers, has been overlooked. If the value of all crops had been taken together for evaluation different values of technical efficiency may have been identified.

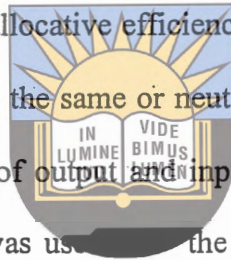
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The higher technical efficiencies for cotton are quite interesting. This means that cotton producers relatively are technically more efficient than the maize producers. Cotton is a higher value crop than maize. As a result farmers exercise more efficiency in this crop to maximize output (thereby maximizing profit). This underscores the point that most communal farmers are not maize producers but maize consumers. Maize is generally produced for subsistence purposes and only the surplus is marketed. Unlike maize, cotton production is a typical farm business venture. Hence to remain in the business, efficiency should always be uppermost in farm management strategising.

7.5.2 Allocative efficiency

Whereas technical efficiency refers to the manner in which inputs are used, allocative efficiency is measured in terms of the amounts of inputs combined in production. While technical inefficiency arises as a result of the inability to produce the maximum output from given inputs, allocative inefficiency comes about as a result of the inability to combine inputs in optimal proportions given input prices.

A rigorous comparison of the allocative efficiencies of any two groups of farms requires that (a) they are represented by the same or neutral production function and (b) they are facing the same configuration of output and input prices. In this study the same Cobb-Douglas production function was used. The data show no significant variations in output and input prices. Farmers sell their products to depots that are well distributed all over the province. This reduces the differential transport costs that are incurred. Prices of inputs did not show much variation between farmers. As a result average prices were used for both groups of farmers.



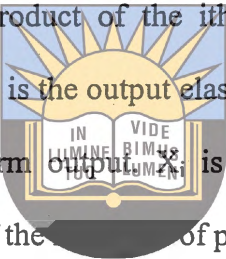
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Shapiro (1988) referred to allocative efficiency as the equivalence of marginal value product and marginal factor cost (MFC) of each factor. MVP is derived from the marginal physical product (MPP) or marginal productivity of an input. The marginal productivity of an input measures the additional or marginal output resulting from the use of one or more units of input ceteris paribus (Truran and Fox, 1979). The MVP of an input depends on the amount of that input being used, and on the levels of the other

factors of production utilized.

To test of the allocative efficiencies, this study adapted the method used by Bagi (1981) whereby the following equations for the Cobb-Douglas production function were estimated:

$$MVP_i = K_i P_i = a_i (V/X_i)$$

 MVP_i is the marginal value product of the ith input. K is the allocative efficiency coefficient of the ith input and a_i is the output elasticity of the ith input V is the geometric mean of the value of gross farm output X_i is the geometric mean of the ith factor production, and P_i is the price of the ith factor of production.

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For the method of estimating the allocative efficiency coefficient (k) see appendix IV.

The factor of production is over-utilized if $K < 1$, and too little of the resource is being utilized in the production process if $K > 1$. A ratio of MVP:MFC (P_i) which is 1 (ie $K=1$) implies that absolute efficiency has been achieved in the allocation of this particular factor of production. Table 7.3 summarises the allocative efficiency values for each of the producer groups.

Table 7.3 Allocative Efficiency coefficients (K_i s) for the different producer groups.

| Inputs | Communal area(CA) maize producers | Resettlement area (RA) maize producers | Communal area (CA) cotton producers | Resettlement area (RA) cotton producers |
|--------------------|-----------------------------------|--|-------------------------------------|---|
| Land (ha) | 1.20 | 1.51 | 3.13 | 0.99 |
| Seed (kg) | 3.37 | 7.15 | 10.86 | 2.85 |
| Fertilizer (kg) | 1.38 | 1.47 | N/A | 1.09 |
| Labour (days) | 0.53 | 0.97 | 0.72 | 0.64 |
| Capital (Z\$) | 0.34 | 0.68 | 0.90 | 0.14 |
| Insecticides (Z\$) | N/A | N/A | 1.20 | 1.60 |

Source : Field survey (2000)



7.6 Allocative Efficiency Coefficients

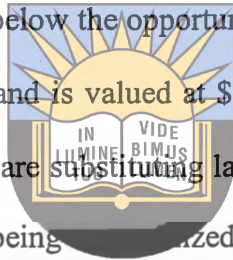
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7.6.1 Land

Table 7.3 shows some very surprising results, especially for the CA - cotton producers. A heavy reallocation of land is needed to change the MVP of land in order to arrive at the equality of MVP and MFC. RA - cotton producers exhibit absolute efficiency in the use of land and the CA - maize producers do not under-utilize land to a great extent.

These farmers, especially the cotton producers are expected to allocate land efficiently because of its scarcity. A number of reasons could explain the unexpected under-utilization of land exhibited. One, the method used to come up with the MFC (price) of land might be biased.

Neither the communal nor the resettlement area farmers have title deeds to their land. As a result there are no accurate guides relative to the cost of land against which to compare the MVP of land. Farmers are not allowed to sell their land and rentals are not permitted either although they are not uncommon. The area where rentals of approximately ZW\$2000 per hectare were common is NRV where cotton is produced. This figure of ZW\$2000/ha was adopted because it is very close to the figures being charged by headmen and chiefs when they allocate land to new farmers, although this is illegal. This figure could be far below the opportunity cost of the land although according to government statutes all this land is valued at \$1/ha. The other possible reason for the $K_s > 1$ may be that these farmers are substituting labour for land since labour is abundant and cheap. As a result labour is being over-utilized.



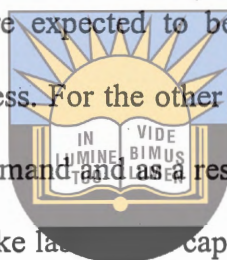
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7.6.2 Seeds

The results of allocative efficiency coefficients of seed are in contradiction with the results on the elasticities of production for this input which suggested its over-utilization. Table 7.3 shows that all farmers, especially the CA- cotton producers, are under-utilizing this input. These results are not at all unexpected. The cost of seeds is very high in Zimbabwe. As a result farmers buy less of it and compensate this by other inputs like labour and capital. Farmers need to reallocate their input (resources) and try to increase the usage of this input, seed. Possibly there is also a need to look at the varieties grown. Sometimes other varieties give better results.

7.6.3 Fertilizer

The results on fertilizer appear to lead to a conclusion similar to that about estimated technical efficiencies. The RA-cotton producers who were found to be the most technically efficient group gives the k measure which approximates absolute allocative efficiency. These results are as expected. The RA-cotton producers are more resource rich than the other three groups (i.e the CA and RA-maize producers as well as the CA-cotton farmers. Coupled with their better management skills, and with access to extension and irrigation services, they are expected to be more efficient in their allocation of fertilizer to the production process. For the other groups of farmers, the cost of fertilizer is rather beyond their level of demand, and as a result they are under-utilizing this input in favour of other cheaper inputs like labour and capital. Actually all the farmers seem to be substituting fertilizer with certain farm operations involving manual labour such as weeding, hoeing or applying organic manure. A proper combination of various fertilizer nutrients, depending on the soil deficiencies and particular crop requirements, should be looked into.



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7.6.4 Labour

This is the input that delivers the most interesting results. The results are in line with findings from the estimated input elasticities of production. All four groups of farmers make very intensive use of this input. Labour use by the RA-maize producers appears to approach an economically efficient level

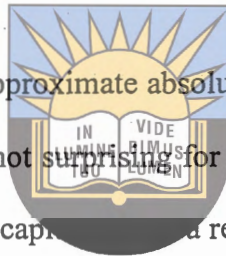
Labour for all groups is made up of both family and hired labour. The allocative efficiency coefficients which are well below unity are a result of surplus labour, both family and hired. This is because, as noted by Truran and Fox (1979), in agriculture under surplus labour conditions the marginal product of labour is zero or near zero. The superfluous workers could theoretically be transferred to the industrial sector without a loss of production in agriculture.

When the supply of labour is excessively high its price will be low. Hence these farmers are investing more labor in agriculture and utilize less of the other inputs like fertilizer and other purchased inputs. Also the nature of the crops, especially cotton, dictates that more labour be used. Cotton is highly labour intensive especially during the harvesting (picking) periods. During data collection farmers pointed out that weeding for both crops and picking for cotton demands much of the labour. These farmers are resource poor and cannot afford to buy herbicides. As a result these farmers spray insecticides by hand. They cannot afford to hire aircraft to do the spraying for them.

Although the coefficient for labour is low and seems to reflect superfluous labour supply, the farmers noted that they experience seasonal labour shortages during certain periods. This is usually during weeding and, especially for cotton, harvesting. The reason is that hired labour also has to attend to their own plots during such peak periods.

7.6.5 Capital

The level of allocative efficiency for capital appears to follow a similar pattern to that of labour. All groups of farmers, except the RA-cotton producers, own a number of cattle/donkeys that could be used, as bullock labour was used as a proxy for capital. As for RA-cotton producers, Saleem's (1988) approach of using tractor services as a proxy for capital was used. Since they are not allowed to keep animals on the farm they hire tractor for draught power.



Only the CA-cotton producers approximate absolute allocative efficiency. The rest over-utilize the capital input. This is not surprising for either the maize producers or the CA-cotton producers. They own this capital and as a result it has low opportunity cost outside agriculture. They tend to utilize this capital for other uses. Anyone who is familiar with these producers' farming system will know that they use the cattle to plough the field twice before planting. They do what is called winter-ploughing before the rains come to loosen the soil. After that they plough again at planting time after weeds start to germinate (weed control strategy). Just before weeding the land is ploughed again in between plant rows. This time the mouldboard is removed from the plough. This process helps to simultaneously destroy weeds and loosen the soil. Some farmers with planters use draught power to pull the planter.

When organic manure (anthill soil, humus or animal manure is used animals are used to pull the scotch carts. At harvesting it is also animals that are used to transport the harvest

to the storage building or to the market. Although the measure of the marginal unit cost of capital (or MFC) is imprecise, it is clearly evident that all the farmers are over-utilizing capital. This is especially the case with the RA-cotton producers. The fact that they have access to capital assistance from ARDA, which is highly capitalized, tempts them to over-utilize this resource. It is possible that they are hiring the services of capital to tasks that are not very crucial. Since they are able to hire aircrafts for spraying, its possible that they are using capital to substitute for labour. It is possible that some plots are too small to warrant hiring an aircraft rather than labour which is cheaper.

7.6.6 Insecticides



As far as this input is concerned it is interesting to note that the CA-cotton producers exhibit better allocative efficiency than their resettlement area counterparts who are assumed to be more skillful. Both groups exhibit some under-utilization of the input.

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During data collection both groups of farmers pointed out that this was the most limiting input in the production of cotton. The price of this input relative to the price of other inputs is too high. This has led quite a number of producers to quit cotton production. It is also why Cottco and Cargil, the companies that buy cotton comes in and give loans to farmers in the form of insecticides. Because of the high cost of this input farmers tend to use less of it. More insecticides should be used to change the MVP in order for the MVP to equal MFC.

7.7 The effect of some socio-economic variables on efficiency

According to Bravo-Ureta and Evenson (1993), several authors have investigated the relationship between efficiency and various socio-economic variables using two alternative approaches. One approach is to compute correlation coefficients or to conduct other simple non-parametric analyses. The second way, usually referred to as a two-step procedure, is to first measure farm level efficiency and then to estimate a regression model where efficiency is expressed as a function of socio-economic attributes.



This study did not use any of these approaches but follows the argument that the socio-economic variables should be incorporated directly in the production function model because such variables may have a direct impact on efficiency. Seyoum et al (1998) also incorporated variables such as age, education and extension into the Cobb-Douglas stochastic production function for maize farmers within and outside the SG 2000 project in eastern Ethiopia.

The following variables were included in the production functions of each group of producers:

Y (output)=gross output per hectare

X1 (income)=gross non-maize/cotton income per annum.

X2 (size)=total number of arable hectares in the farm unit

X3 (family)=total number of family members

X4 (age)=the age of the household head

X5 (education)=The number of years of schooling completed by the household head.

The OLS estimates for the parameters of the Cobb-Douglas production functions for the four groups of producers are given in Table 7.4

Table 7.4 The Elasticities of the production for maize and cotton producers by farming sector.

| Producer group and no of observation | Constant (1) | Income (2) | Land area (3) | Family size (4) | Age (5) | Education (6) | Sum of bs (7) | Adjusted R ² (8) |
|--------------------------------------|--------------|------------|---------------|-----------------|---------|---------------|---------------|-----------------------------|
| CA-maize(45) | -0.5243 | 0.1282 | -0.1893 | -0.0268 | 0.3111 | 0.2626 | 1.486 | 0.23 |
| RA-maize(31) | -2.6843 | 0.1748 | 0.1955 | -0.0149 | 0.4612 | 0.07407 | 0.558 | 0.53 |
| CA-cotton(34) | -2.9376 | 0.1326 | 0.1110 | -0.1497 | 0.4401 | 0.25697 | 0.80 | 0.12 |
| RA-cotton(30) | -1.4027 | 0.0576 | N/A | -0.0316 | 0.2381 | 0.36207 | 0.63 | 0.12 |

Source : Field survey (2000)

7.8 Elasticities of production for the socio-economic variables

7.8.1 Income

Although all the estimated coefficients are positive, their values are rather low. The positive signs mean that for percentage increase in income there is a positive resultant increase in output. For example, increasing income for both groups of communal area

producers by 100 percent there would, *ceteris paribus*, be an increase of 13 percent in total output. Hence income has a low influence on both maize and cotton production. For the sample groups this means a heavy reliance on the two crops for their income. Maize and cotton crops in particular, and agriculture in general, prove to be the most important sources of income for these farmers. Any policy that is aimed at improving income distribution for small scale farmers should take agriculture into consideration.

7.8.2 Farm Size

RA-cotton producers all have 10 ha each so this variable was not included in the production function. The coefficient of land size is negative for CA-maize producers which indicates that a 10 percent increase in land will result in a decrease of 1,9 percent for the value of production. This result implies that land is being over-utilized in this sector, and also in the other sectors which gave low coefficients of elasticity. Only increasing the farm size therefore, will not improve production. Other variables like capital, purchased inputs, skills, etc have to be provided in adequate quantities first.

7.8.3 Family Size

Surprisingly, the coefficients are negative in all the sectors. In terms of provision of labour it would be expected that family members are more productive than hired labour. Positive and high coefficients of elasticity were therefore expected. The results tend to indicate an over-utilization of family labour such that any additional member will reduce

total production. The practice of polygamy, where some farmers having more than 10 wives in the resettlement area, does not seem to be productive.

One other reason may be that family planning practices are not well accepted in these areas. As a result the number of infants among the families is always high. These infants need a lot of attention and this affects the effective time spent in the fields. Another reason may be of schooling. Most family members are of schooling going ages. Their contributions to farm operations is minimal.

7.8.4 Age



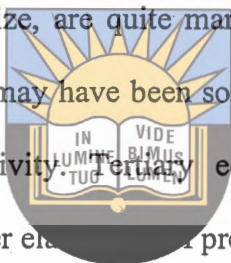
The estimated coefficients for age coefficients are positive for all groups of producers. This suggests that the older the farmer, the more productive he is. Although the opposite is usually the case, as young farmers are expected to be more innovative and receptive of new technologies, this result is not surprising.

Young farmers do not take farming seriously. As soon as they finish school they go to cities to seek employment. Those who later come back to the farm do so just to while away time. As soon as other opportunities outside farming arise they are always ready to leave farming. By contrast older farmers are content to farm and are prepared to invest everything into farming. Also older farmers are expected to own their own cattle, scotch carts and other farming implements and do not depend on hiring. The elasticity of age is more than one for CA-maize which indicates that they are operating on increasing returns

to age.

7.8.5 Education

The elasticities of education are positive for all groups of farmers. These results tend to indicate that farmers with greater years of formal schooling tend to be more productive. The farmers with more education respond more readily to new technology. Although an additional year of schooling might result in some positive increments in output the changes, especially for RA-maize, are quite marginal. Since most of the farmers have had 6-8 years of schooling, it may have been so elementary that it does not have much effect on agricultural productivity. Tertiary education especially from agricultural colleges, might give much higher elasticity of production.



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CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

8.1 Summary and conclusions

This study has attempted to go beyond official statistics and the general literature to capture information on production efficiency of small-scale farmers at farm level. The results from the two sectors of small scale farmers are meant to be compared with those of the large scale commercial sector in order to determine land reform policy in Zimbabwe.

Unfortunately, due to the unstable political climate in the country especially so at a number of the commercial farms, it was impossible to collect data from this farming sector. Only the communal area and resettlement farmers were surveyed.

The logo of the University of Fort Hare features a shield with a sunburst at the top, a book in the center, and the Latin motto 'LUMINE TUO BIMUS LUMEN' on either side of the book. Below the shield, the text 'University of Fort Hare' is written in a serif font, with the tagline 'Together in Excellence' in a smaller, italicized serif font underneath.

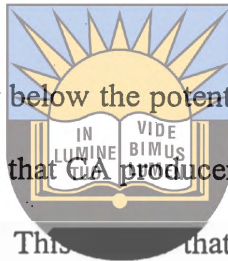
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The Cobb-Douglas production function model, besides some of its known limitations, was used to come up with the elasticities of production estimates.

The findings have established that households for both groups of producers are headed by males. This implies that any land reform program should consider gender balance in its implementation. Family size is relatively high, the resettlement farmers having the larger families, as they tend to practice polygamy to increase labour supply.

Most of the farmers have received between 6-8 years of formal schooling which means most of the farmers in both sectors are literate. This aspect is very important for extension purposes. A small proportion of the farmers (9-12%) have been trained as master farmers.

Communal farmers have very small plot holdings (between 2 and 5 ha). They operate below the recommended farm size threshold below which any form of agricultural production is not viable. The RA farmers are operating on between 4 and 10 ha of land. This means that if they are efficient enough they could be viable.



Both groups of farmers operate far below the potential production levels. If we exclude RA farmers who use irrigation, we find that CA producers are operating at 14 percent of potential level and RA producers at 25%. This means that a lot has to be done for and by these farmers to improve their production efficiencies so that they can attain the potential levels of production.

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The critical shortage of land among small-scale farmers is evidenced by the extremely high land use intensity values, especially for the CA producers. Maize has proved to be the most important crop for both groups of farmers in NRs 1-1V. In natural region V maize has been superseded by cotton, which has proved to be producing high returns for the farmers. NRV receives very little rainfall and cotton, which is more drought resistant, does better than maize.

As far as household income is concerned agriculture has proved to be the mainstay of small-scale farmers. In all four sub-categories of producers crop income accounted for between 68-99 percent of total income. Any programme that intends to improve income distribution and reduce rural poverty should seriously take crop production into consideration.

Access to credit from institutionalized markets is quite minimal. With interest rates of over 50% it is not rational for small-scale farmers to borrow money for inputs. Farmers have resorted to borrowing from each other at 0% interest rates. Only the cotton producers are benefiting from the loans offered by both Cargil and Cottco, the companies that market cotton in the country. That is why these farmers have exhibited higher relative technical efficiency.



8.1.1 Technical efficiency **University of Fort Hare** *Together in Excellence*

In this study Saleem's (1988) method of using relative technical efficiency was used. The method was developed by Lau-Yotopoulos and it uses the Cobb-Douglas production function. From the analysis it appears that the RA farmers are relatively more technically efficient for both crops than their CA counterparts. Since the main difference between these farmers is the size of land holdings it appears here that access to land enhances technical efficiency. The results could have been more interesting had the values for the other sector, the LSC also been included.

8.1.2 Allocative efficiency

With the present form of resource allocation it seems all groups of farmers are relatively efficient in fertilizer utilization. This is because returns to fertilizer are close to the cost of a unit of this input.

High coefficients for land, seed and insecticides indicate that these resources are being under-utilized. As a result there is ample room for increasing output by increasing investments in these inputs, especially seed. The quality of seeds should be assessed, as this can also affect production.



As far as labour and capital is concerned there is a very intensive use of these inputs. Therefore any government intervention should be designed in such a way that it encourages the intensity of labour use, e.g. growing labour intensive crops. Since land seems to be in short supply the farmers are trying to raise yields by increasing labour inputs per hectare. They are substituting land with labour.

Although in most cases the relationship between labour and capital is one of substitution in this study these inputs appear to be complementary. An increase in the use of one input generally entails an increase in the use of the other. A possible reason may be that farmers own the capital in the form of cattle. As a result they continue to use it until its MVP is a fraction of the unit cost of the capital. The capital has a low opportunity cost outside agriculture.

8.2 Policy implications

Although the absence of findings from the LSC Sector did affect the objectives of this study, the results obtained are quite useful to policy makers. No specific pattern was established between the two sectors in view of the absence LSC farming sector data.

The findings from this study do not seem to confirm the opinion of Theodore W. Schultz, that traditional agriculture is “primitive but efficient”. In terms of allocative efficiency producers are either under- or over-utilizing resources. The inconsistency with Schultz’s hypothesis may be due to some market distortions or also due to policy interventions that perhaps induce allocative inefficiency.



A number of policy interventions need to be made by the government if small scale farmers are to improve their technical and allocative efficiencies. The following interventions can be adopted by government.

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8.2.1 LAND REFORM

As a means of attempting to promote agriculture’s participation in an integrated economic and social development program, national policy makers in many countries have often resorted to land reform and redistribution programs (Truran and Fox, 1979). The government of Zimbabwe is forging ahead with its controversial land reform program despite some negative perceived economic impact of the land transfer

programme. The government believes that the process of land reform will give economic, social and political benefits to the new farmers to be resettled.

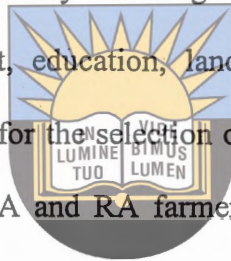
From this study we find the beneficiaries of the land reform programme saying that their standard of living has greatly improved after being resettled. The disparity between the household incomes of the two sectors, (the SSC and RA), is quite wide. This means the objective of income distribution and equity is being achieved through land reform, thereby reducing rural poverty.

The high proportion of maize sales by RA-maize producers dispels the fear that land reform will result in major losses in food output and an increase in food imports. This is in line with what was noted by Moyo (1999) that predicted losses of maize and cotton are quite controversial since small farmers already produce 65% of the national totals. Admittedly, the production of other horticultural crops is going to decline because advanced skills and infrastructure is required to handle these crops. As a result the government needs to spare some of these farms just as they are done for sugar production.

Optimal land utilization, increased productivity, employment growth, improved income distribution, and environmentally sustainable uses of resources are all inter-related and fundamental material components of a poverty elimination strategy in the primary exports-led economy of countries such as Zimbabwe (Moyo, 1999). From this study we find that in most cases, especially the communal area cotton producers, the marginal

value product of land is well above the rental price of land. This implies factor use inefficiency and constraints to land access. Giving more land to these farmers will improve their allocative efficiency.

The government should not be emotive in its implementation of the programme. Its current fast track approach might achieve its political goals but might not improve productivity, at least in the short run. A phased implementation of say 5 years might help to resettle farmers who are more technically efficient in farm production. Since differences in technical efficiency are in general caused by fixed or non-measurable factors such as management, education, land quality etc (Saleem, 1988) a phased implementation might allow for the selection of the right beneficiaries. The allocative inefficiencies between the CA and RA farmers are quite similar and raises questions about the selection criteria used to choose beneficiaries.

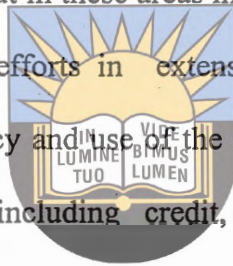


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Land reform will bring about a resource use of labour, which is in line with the country's factor endowment. In this study we find that labour is being utilized until its MVP is just a fraction of its MFC. This implies a 'bottling up' of labour market opportunities (i.e. high unemployment rates). Since this type of land reform will promote smallholder farm plots, which are labour, intensive it will help to employ the 'surplus' household labour while providing more income to the poor. Contrasting with the practice of LSC farmers who are highly mechanized and do substitute capital for labour no equitable income distribution would be realised .

The government should not just dump farmers on new farms without the necessary back up system. In this study the findings revealed that even those farmers who were resettled are under-utilizing intermediate inputs like seed, fertilizer and insecticides. The policy makers should know that these farmers are resource poor and that the prices of these inputs are generally beyond their reach. Also the use of these inputs requires some skills, critical to achieving efficiency in production.

The government's practice of assisting small scale farmers with inputs like seeds and fertilizer helped to boost output in these areas in the 80's and early 90's. The government can also fruitfully increase efforts in extension and education, which are aimed at improving allocative efficiency and use of the available resources (technical efficiency). Although these activities, including credit, are not costless, they are relatively inexpensive and can give short-run gains in output. At the moment the government does not have the resources to invest in new technologies.



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8.2.2 Promotion of more labour-intensive techniques.

Since the findings indicate that there is excess labour in the small scale farming sector, policy makers should try and come up with farming techniques that absorb the surplus labour. Cropping intensity will increase both output and labour absorption. This can be achieved by using better quality seeds, which are fertilizer responsive, along with an adequate supply of fertilizer. In most areas water is a problem. Since RA-cotton producers use irrigation they are always busy throughout the year. They are able to

practice double or triple cropping in a year. This has made their household income to be quite high as compared to the other three sub-categories. The provision of irrigation will promote a 'water fertilizer-labour intensive' technology. This might be expensive to establish especially on newly resettlement schemes, but if the government adopts a phased implementation programme and seeks some donor assistance, this might not be a pipe dream that will never come true. Technological change to increase labour productivity should accompany any effort to change land use patterns.

8.2.3 The creation of additional employment opportunities in agriculture



This can be achieved through the establishment of rural employment projects. Policy makers can promote the establishment of projects like that of cattle fattening. Most of the areas occupied by small-scale farmers are marginal and not good for the production of crops like maize. Hence farmers through intercropping, can grow crops like cowpeas, groundnuts, sorghum, millet, sunflowers, etc.

The products are going to be fed to livestock, which are sold to institutionalized markets like Cold Storage Company. Very high returns can be achieved and the 'surplus' labour is utilized. Poverty, which is quite acute amongst these farmers, can be alleviated.

Small companies can be established in rural areas to buy all surplus produce and process it into both human and animal feeds. These could be sold to farmers at a cheaper price,

as transport costs are reduced. This can promote employment opportunities among the local people.

Milk production projects can also be promoted through the establishment of dairy clubs in the rural areas. Farmers can get dairy animals through credit schemes and sell the milk to the community. If there is an over-supply dairy companies can be approached. This will not only improve income distribution but also the nutritional status of the food afforded to the rural people. The manure from these projects is going to be re-invested in agricultural production.

8.2.4 Education and extension



From the study we find that the elasticity of production coefficient of education and other socio-economic variables is positive. The government and all stakeholders should try to promote agricultural education for small farmers. The training of master farmers should be revisited. These can complement the services of extension officers who are supposed to serve many farmers. The master farmers will have easy access to their farming communities.

These master farmers can act as early adopters of new technologies. The government can also assist with inputs like improved seed and fertilizers as was done in 1980-81 and 1992-93. This will discourage peasants from resorting to selecting open pollinated seeds

from the season's harvest as this will result in a poor crop. Extension services can also help farmers to choose good seed, that germinates well.

The extension service can also help farmers adopt better methods for preserving their grain. A lot of grain is lost due to poor storage methods. Farmers should be educated about the best way to use insecticides to avoid grain loss during storage.

This can also reduce transport costs if 'surplus' grain is not sold to the GMB. Rural farmers are not homogenous and every season some are surplus producers while some cannot produce enough to last the whole season. Resources are wasted selling grain to a depot, far away, in the same community there are deficit producers. If the surplus producers adopt effective methods of preserving the grain they can store it and sell it later when demand and prices are high. They can get better returns than by selling to the GMB which uses a pan-seasonal pricing system.



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APPENDICES

APPENDIX 1

UNIVERSITY OF FORT HARE

FACULTY OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

QUESTIONNAIRE ON INVESTIGATION ON EFFICIENCY OF SMALL SCALE
FARMERS AND LAND REFORM IN ZIMBABWE

| TASK | NAME | DATE |
|---|------|------|
| a) Interviewer | | |
| b) Resettlement scheme/communal area | | |
| c) Village | | |
| d) Actual location of farm [Natural Region (NR)] | | |
| e) Name of person interviewed/reference number | | |
| f) Status of farmer [Master Farmer (MF) or Non Master Farmer (NMF)] | | |
| g) Time taken for the interview | | |
| h) Place interviewed | | |

A. DEMOGRAPHIC INFORMATION

A1 Household characteristics

| | Relation to head of HH | Age | Gender (M/F) | Marital Status | Highest education qualification | Employment status | Occupation | Time on farm |
|-------|------------------------|-----|--------------|----------------|---------------------------------|-------------------|------------|--------------|
| A1.1 | | | | | | | | |
| A1.2 | | | | | | | | |
| A1.3 | | | | | | | | |
| A1.4 | | | | | | | | |
| A1.5 | | | | | | | | |
| A1.6 | | | | | | | | |
| A1.7 | | | | | | | | |
| A1.8 | | | | | | | | |
| A1.9 | | | | | | | | |
| A1.10 | | | | | | | | |



Relationships: (W) wife, (H) husband, (S) son, (D) daughter, (M) mother, (F) father, (BR) brother, (N) Niece/nephew, (SI) sister, (C) cousin, (ML) mother in Law, (GD) grandfa

Occupation: (WE) ~~University of Florida~~ self employment (SS) senior student, (JS) Junior scholar, (U) Unemployed

B. LAND AND AGRICULTURE

B1.0 Arable Land

B1.1 Do you have access to one or more arable fields?
Yes = 1 No = 2

B1.2 If yes
How many fields do you have access to? (indicate number)

B1.3 What is the size of each of the fields?

| | | Area (indicate units) |
|-------|---------|-----------------------|
| B13.1 | Field 1 | |
| B13.2 | Field 2 | |
| B13.3 | Field 3 | |
| B13.4 | Garden | |
| B13.5 | Other | |

B1.4 How did you obtain access to each of the fields? (tick where applicable)

| | | B14.1 Field 1 | B14.2 Field 2 | B14.3 Field 3 | B14.4 Garden |
|---|---|------------------|------------------|------------------|-----------------|
| a | Bought from a private person (Title deed) | | | | |
| b | Rented from another HH | | | | |
| c | Inherited from parents | | | | |
| d | Given by government (resettlement) | | | | |
| e | Given by the headman | | | | |

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B1.5 What are the most common forms of land tenure systems in your area?

- a) Freehold
- b) Communal
- c) Owner - operatorship
- d) Land/tenancy
- e) Other specify

B1.6 Looking at your field, do you consider it to be:

- a) too big
- b) of the right size
- c) too small

B1.7 What crops have you produced in the past 12 months?

| Crops | Area | Units | TOTAL PRODUCTION | |
|-------|------|-------|------------------|-------|
| | | | Quantity | Yield |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

B1.8 What quantities of crops are consumed at home, given away to friends/relatives, sold

| Crops | Home Consumption | Donations | Sales | Price/units |
|-------|------------------|-----------|-------|-------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |



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B2.0 Livestock

B2.1 Which of the following livestock do you own and indicate numbers

| Type | Number owned |
|-----------------|--------------|
| Cattle | |
| Donkeys | |
| Goats | |
| Sheep | |
| Other (specify) | |

C MAIZE AND/OR COTTON PRODUCTION

C1.0 Farm Operation

- C1.1 Do you practice
 a) rain fed farming
 b) irrigated farming
 c) both (a) and (b)

- C1.2 Who does the ploughing of your field (s)?
 a) self only
 b) hired labour
 c) family and self
 d) 'humwe' (type of a community co-operative)
 e) Other: specify

- C1.3 How was the ploughing done?
 a) By oxen
 b) By tractor
 c) By hand/hoes etc
 d) Other: specify



C1.4 What did you pay (in Z\$) for the following inputs last year?
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| Inputs | MAIZE | | COTTON | |
|----------------|------------|-----------------|------------|-----------------|
| | Price (\$) | Quantities (kg) | Price (\$) | Quantities (kg) |
| Seed | | | | |
| Fertiliser | | | | |
| Insecticide | | | | |
| Herbicides | | | | |
| Water | | | | |
| Other: specify | | | | |

C1.5 Where did you buy the following farm inputs for maize?

| Inputs | Local shop | Nearest town | GMB depot | Other: source specify |
|----------------|------------|--------------|-----------|-----------------------|
| Seed | | | | |
| Fertiliser | | | | |
| Herbicides | | | | |
| Insecticide | | | | |
| Other: specify | | | | |

C1.6 Where did you buy inputs for cotton

| Inputs | Local shop (1) | Nearest town (2) | Cotico Depot (3) | Cargil depot (4) | Other: source specify (5) |
|----------------|-------------------|---------------------|---------------------|---------------------|---------------------------------|
| Seed | | | | | |
| Fertiliser | | | | | |
| Herbicides | | | | | |
| Insecticide | | | | | |
| Other: specify | | | | | |



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C2.0 **Labour**

C2.1 Who does most of the work in the field

- a) Husband
- b) Wife/wives
- c) Children
- d) Relatives
- e) Hired labour
- f) Other: Specify _____



C2.2 What Specific activity takes up most of your time?

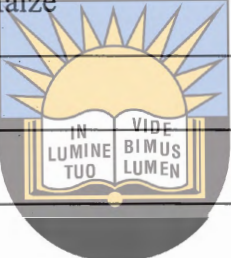
Maize

Cotton

- a) Ploughing
- b) Weeding
- c) Spraying
- d) Harvesting
- e) Other: specify

| |
|--|
| |
| |
| |
| |
| |

C2.3 Roughly, how many hours do you spend in your field working?

| Hours spent | Maize | Cotton |
|---------------|---|--------|
| Per day |  | |
| Days per week | | |

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C2.4 Do you have a problem with obtaining labour?

- a) Yes
- b) No

If yes, state the problem _____

C2.5 Where do you obtain labour?

1. Hired labour from outside
2. Family labour from household
3. Assistance from neighbours
4. Other: specify _____

C2.6 For which operation do you use hired labour from outside and indicate the number of days labour is hired

| Operation | Man days |
|------------------------|----------|
| Land preparation | |
| Planting | |
| Weeding | |
| Spraying | |
| Fertiliser application | |
| Harvesting | |
| Other: specify | |

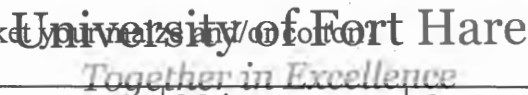
C2.7 How much do you pay in cash or kind for hired labour per day? State it



D. SUPPORT SERVICES

D1.1 Marketing

D1.1 Where do you market your maize and/or cotton



| Market | Maize | Cotton |
|--------------------------|-------|--------|
| 1. Locally to neighbours | | |
| 2. Local shop | | |
| 3. GMB/cottco/cargil | | |
| 4. Nearest town | | |
| 5. Other: specify | | |

D1.2 How far is it to the main market for maize/cotton? State in km

D1.3 How do you get your produce to the market? (state) _____

D1.4 Do you have any problems with getting your produce sold?
1. Yes
2. No

D1.5 If yes, state the problems you have _____

D2.0 Extension Services

D2.1 Are you aware of advisory services or extension or government support institutions in the region?

1. Yes
2. No



D2.2 Where do you obtain advice for your maize and/or cotton production
1. Neighbours
2. Extension officers
3. Sales representatives
4. None received
5. Other: specify _____

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D2.3 How often do extension (Agritex) officers visit your farm?
1. Daily
2. Once a week
3. Once a month
4. Twice a month
5. Other: specify _____

D2.4 What is your opinion on the quality of service provided by Agritex officers who visit you?

1. Excellent
2. Very good
3. Satisfactory
4. Poor
5. Very poor

D2.5 Do you belong to one or more farmer's organisations?

1. Yes
2. No

D2.6 If yes, which ones? (state it) _____

D2.7 What services do this/these organisations perform?

1. Farmer representation at local level
2. Farmer representation at regional/provincial level
3. Facilitation of training
4. Facilitation of finance
5. Other: specify



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D3.0 Credit Facilities

D3.1 Have you ever needed to borrow money?

1. Yes
2. No

D3.2 If yes, who did you borrow money from? _____

D3.3 What interest did they charge you?

Where you borrowed money

Interest charged

Friends

Relatives

AFC

Savings club

Commercial bank

D3.4 Is the information about how to obtain a loan sufficient for you?

1. Yes
2. No

D3.5 If you borrowed money, why did you borrow?

1. To purchase inputs (seed, fertiliser, sprays etc)
2. To purchase farm implements
3. Other:
specify _____

D3.6 When borrowing from the bank or agencies, what collateral (security) was requested from you?

1. Percentage of loan
2. Title deed
3. Insurance policy
4. Other: specify _____



E. INCOME

E1.1 What income did you derive from maize and cotton?

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| Crop | Income per year (\$) |
|--------|----------------------|
| Maize | |
| Cotton | |

E1.2 What additional income did you receive?

| Source of additional income | Amount/month | Net income per annum |
|----------------------------------|--------------|----------------------|
| Salaries & wages | | |
| Remittances | | |
| Rentals | | |
| Lobola | | |
| Income in kind | | |
| Livestock sales | | |
| Maintenance monies | | |
| Crop sales (excl maize & cotton) | | |
| Pensions | | |
| Other: specify | | |

F. GENERAL

F1.1 Do you produce enough to feed yourself and family for the whole year?

1. Yes
2. No

F1.2 If No, why are you unable to produce enough food?

1. Land is too small
2. Soil is too poor
3. Labour is too scarce
4. Area receives little rain
5. Other: specify _____

F1.3 Do you need more land for farming?

1. Yes
2. No



F1.4 If Yes, you need the land for :

1. Grazing
2. Cultivation of maize and/or cotton
3. Cultivation of other crops
4. Garden
5. _____

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F1.5 Where is this land that you need?

1. State land
2. Commercial farms
3. Mission land
4. Other: specify _____

F2.0 Land Reform

F2.1 Do you believe that land reform is inevitable in Zimbabwe?

1. Yes
2. No

F2.2 How do you think the government should take the land from white/commercial farmers?

1. Willing buyer willing seller
2. Compulsory acquisition
3. Other: specify _____

F2.3 What is your opinion on compensation to land acquired:

1. None
2. Compensation for infrastructural developments only
3. Full compensation
4. Other: specify _____

F2.4 Who should be resettled?

1. Master farmers only
2. Farmers from heavily congested areas
3. Anyone who needs land
4. Farmers who are below 50 years of age
5. Other: specify

F3.0 Resettled Farmers

F3.1 Compared to the years before you were resettled, has the quality of life of your household

1. Improved
2. Remained the same
3. Deteriorated



F3.2 Compared to the years before you were resettled, has your agricultural production

1. Improved
2. Remained the same
3. Deteriorated

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APPENDIX II

The Rural Incomes Model

The model presented below was adopted from Jackson and Collier (1991). In its most reduced and summary form, the model is as follows:

HOUSEHOLD INCOME = SUM(CROP INCOMES + LIVESTOCK INCOMES + REMITTANCE INCOMES + OFF FARM WAGES + LOCAL SELF EMPLOYMENT INCOMES)



Where:

HOUSEHOLD INCOME = **University of Fort Hare**
Total Household Income
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CROP INCOMES = Sum of crop incomes

LIVESTOCK INCOMES = Incomes from livestock.

REMITTANCE INCOMES = Remittances from non resident "members".

OFF FARM WAGES = Wage incomes for resident members of the family. who contribute economically to the household on a regular basis.

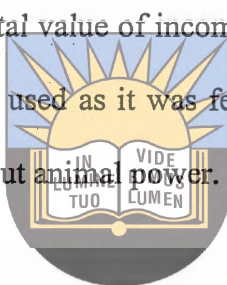
LOCAL SELF EMPLOYMENT = Incomes from local self-employment activities.

CROP INCOMES

Crop income is an aggregation of both its subsistence and marketed components. The crop which featured most for NR I-IV was maize followed by vegetables and groundnuts and then the other crops like munga (type of millet), sorghum, sunflower, cowpeas, roundnuts , rapoko and beans. NR V included cotton as a source of income and it accounted for over 80 percent of total income.

LIVESTOCK INCOMES

Livestock income was taken as the total value of income from livestock sales for the whole year under study. Only sales records were used as it was felt that it would give precise values. This excluded income gained from hiring out animal power.



REMITTANCES

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Its evidence was gathered under the headings cash and agricultural inputs. Other components like food, school fees or clothing were left out as it was felt that they contribute very little to agricultural productivity.

OFF FARM WAGES

This included local off farm wages and salaried income for members of the household who are resident at home but employed as either civil servants in the area or at nearby farms (estates).

SELF EMPOLYMENT

This included income for people who are self employed as builders, mechanics and in occasional activities like roofing thatched houses, constructing gardens, providing draught power, weeding and other casual labour activities.



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APPENDIX III

TECHNICAL EFFICIENCY MEASUREMENT

To measure technical efficiency this study adopted the method used by Saleem (1988). This is a method that was developed by Lau and Yotopoulos in 1973 and it uses a Cobb-Douglas production function.

The complete derivation of the method is not given but what is outlined is only the estimating procedure as shown below:



A Cobb-Douglas production function is specified to have a set of variable inputs and a set of fixed inputs. In this study we are considering two manufacturing sectors, the CA denoted by superscript 1 and the RA denoted by superscript 2.

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The following production functions are developed:

$$Y^1 = A^1 F(X^1, Z^1) \quad \text{and} \quad Y^2 = A^2 F(X^2, Z^2)$$

Where Y is the output

A (a constant) is the technical efficiency parameter which incorporates managerial capability and environmental factors.

F is the (same) functional relationship between inputs and outputs.

X is the set of variable inputs.

Z is the set of fixed inputs

1, 2 are superscripts denoting the farm sector

The two farm sectors are equally technically efficient if, and only if, $A^1=A^2$.

A farm sector is considered more technically efficient than the other, if, given the same quantities of measurable inputs, it consistently produces a larger output.

Farm sector 1 is more technical efficient than farm sector 2 if $A^1>A^2$

As a result the relative measure of Technical efficiency can be shown by the intercept in the model.



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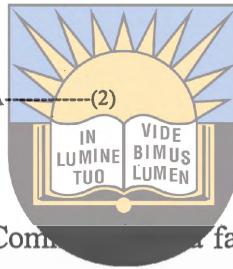
APPENDIX IV

ALLOCATIVE EFFICIENCY MEASUREMENT

The tests for the allocative efficiency were performed by estimating the following equations for the Cobb-Douglas production function as was done by Bagi (1981).

$$MVP_{iCA} = a_{iCA}(V_{CA} / X_{iCA}) = k_{iCA}P_{iCA} \text{-----(1)}$$

$$MVP_{iRA} = a_{iRA}(V_{RA} / X_{iRA}) = k_{iRA}P_{iRA} \text{-----(2)}$$



Where the subscript CA stands for Communal farms and RA stands for Resettlement Area farms.

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MVP is the marginal value productivity, V is the geometric mean of the value of gross output, X_i is the geometric mean of the i^{th} factor of production. P_i is the price of the i^{th} factor of production.

a_{iCA} and a_{iRA} are the output elasticities of the i^{th} input for CA and RA farm groups, respectively.

k_{iCA} and k_{iRA} are the allocative efficiency coefficients of the i^{th} input for the CA and the RA farm group respectively.

*Marginal Value Productivity(MVP)= $MP_i \cdot P_i$, where P_i is the unit price of output.

In this study some inputs like insecticides, capital for RA farmers and income are measured in ZW\$ instead of physical quantity units. As a result in case of these inputs : $MVP_i=MP_i=k_i$, where k_i is the allocative efficiency coefficient of the i^{th} input.

The factor of production is over-utilised if $k < 1$, and under-utilised if $k > 1$; and $k=1$ implies that absolute efficiency has been achieved in the allocation of this particular factor of production. If $k_{iCA}=k_{iRA}$, then the communal area and resettlement farms are equally efficient in allocating their resources.

Also, only if the value of MVP of the input is equal to its price will the input be efficiently used

