

**AN ESTIMATION OF THE EFFECTS OF FOOD AID ON DOMESTIC
FOOD PRODUCTION AND COMMERCIAL FOOD IMPORTS IN
ZIMBABWE**



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Together in Excellence

BY

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DECLARATION

I, the undersigned Chenai Chiweta, hereby declare that this dissertation hereby submitted by me for my Master of Science Degree in Agriculture (Agricultural Economics) at the University Of Fort Hare is my own independent and original work. This dissertation has not been previously submitted and will not be submitted at any other university.

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DEDICATION

I dedicate this dissertation to my beloved parents, my father, Mr Richard Chiweta and my mother, Mrs Angela Chiweta, for believing so greatly in me and in the potential that I have to achieving greatness. I want to continue making you proud.

ABSTRACT

Food aid and domestic food production capacities in Zimbabwe have been compromised by the poor performance in the country's agricultural sector, which has necessitated an increase in and a continual need for humanitarian assistance over the past decade. The country's commercial cereal food import capacity has not been an exception as it has also been greatly affected by the poor performance of the agricultural sector and the shortage of foreign currency that hit the country in the past few years.

Secondary data on food aid, commercial cereal imports and cereal food production was obtained from World Food Programme (WFP), Food and Agriculture Organisation (FAO), the Grain Marketing Board (GMB) of Zimbabwe and from Zimbabwe Statistics (ZimSTATS) databases. This time series data was then analysed in the Vector Autoregression (VAR) analysis. Trends observed in the time series data reveal that commercial cereal food imports and cereal food aid inflows to Zimbabwe had been increasing between 1988 and 2008. Domestic cereal food production levels however were observed to have been declining within the same period.

The restricted VAR model which was specified to investigate the short and long term effects of food aid on food production and on commercial food imports in the country revealed a low statistically significant positive relationship between domestic food production and food aid volumes. Results from the model also indicated a negative relationship between commercial food imports and food aid volumes. This means that as food aid volumes to Zimbabwe increase, the volume of commercial cereal food imported into Zimbabwe falls. This result therefore suggests that food aid in the country had a displacement effect on commercial cereal food imports in the short term. The results of the Granger causality test and the estimation of the Impulse Response Functions also helped to confirm and reinforce these findings from the vector error correction model.

The conclusions drawn from the study were that the responsiveness of domestic food supply, that is, cereal production, to food aid inflows in the short term has been elastic. That is to say, an increase in food aid inflows would influence an increase in the level of domestic food production in the short term. However, in the long term, findings confirm that food aid does indeed discourage domestic food production in the country. Also, for the relationship between food aid and commercial food imports, it can be concluded from the study findings

that food aid in the short term has caused a reduction in commercial food imports whereas in the long term, food aid inflows have actually stimulated the commercial food import capacity.

In recommendation, the Government of Zimbabwe, the private and public institutions as well as the Non-Governmental Organisations should partner and work together in defining the criteria for vulnerability assessment, food aid targeting and distribution, and in the implementation of strategies for ensuring national food availability. Such partnerships would help in ensuring the sustainability of food aid and food security in Zimbabwe, which is the main goal.

Keywords: Food aid, commercial cereal imports, food production, Vector Autoregression (VAR), Granger Causality, Impulse Response Functions

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ABBREVIATIONS

AID	All in Diary
CEEPA	Centre for Environmental Economics and Policy in Africa
CFSAM	Crop and Food Supply Assessment Mission
DFID	Department for International Development (UK)
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO (UN) Statistics Division
FEWSNET	Famine Early Warning Systems Network
GDP	Gross Domestic Product
GAO	General Accounting Office of the United States
INTERFAIS	International Food Aid Information System
UNECA	United Nations Economic Commission for Africa
USAID	United States Agency for International Development
VAR	Vector Auto Regression
VEC	Vector Error Correction
WFP	World Food Programme
ZIMVAC	Zimbabwe Vulnerability Assessment Committee

CHAPTER ONE: INTRODUCTION

1.0 Preamble

The food available to feed a nation originates from three sources; domestic production, commercial imports or aid flows from donor countries and organisations (Moore and Stanford, 2010). Domestic food production especially in low-income economies however is notoriously volatile as production is relatively dependent on rain-fed agriculture and also given the reasonably stable per capita consumption requirements and little or no inter-annual grain inventories carryover in these poor countries, fluctuations in domestic per capita production often leads to highly variable annual import requirements (Barrett, 2001). When domestic production fails to meet a nation's food requirement, trade, in the form of commercial imports, becomes the next best option as it is a principal means for international food distribution at the macro level (Barrett, 2002). But poorer countries often lack the foreign exchange necessary to purchase commercially all the food needed to meet their population's nutritional requirement, in which case, food aid is thus seen as a way to cope with the variable import requirements (Timmer, 2003).

Differences in climate, technology and the availability of land and water create sharp differences in agricultural productivity around the globe. On balance, the world today enjoys significant and growing food surpluses (CEEPA, 2006). These surpluses are concentrated in a relatively small number of countries, especially in North America, Europe, Australia and South America, where most commercial food trade takes place among these countries and the large economies that do not enjoy large domestic food surpluses, such as China, Japan and Russia (Lowder, 2004). Food trade has grown quite rapidly over the past generation as increasing incomes and falling costs of commerce have stimulated faster expansion in trade than in output (OECD, 2005). Nonetheless, a large share of the world's population continues to suffer food insecurity or hunger and many low-income countries have insufficient food available to provide nutritionally adequate diets for all their citizens even if food were evenly distributed throughout the population (Belfrage, 2006). Food aid is thus intended to address the commercial food distribution problem that leaves 800 million or more people hungry in a world enjoying food surpluses (Barrett, 2002).

Food aid involves country-to-country donations of food items, usually in the form of cereals and is given as a grant or on concessional terms from a donor to a recipient government or organization (Makenete *et al.*, 1998). It is usually divided into 3 categories of roughly equal

importance in quantity terms: emergency aid, project aid and programme aid. Emergency aid is generally given in instances of climate shocks and conflicts, while project aid has an explicit development orientation (Maunder, 2006). Project food aid is usually administered within the framework of development projects and targeted feeding programmes such as food-for-work projects and school feeding programmes designed to improve rural infrastructure and the school attendance and performance of children which will in the long run lead to increased labour productivity and high wage earners (Riely *et al.*, 1999).

Unlike the targeted and in many cases, United Nations- distributed aid in the emergency and project categories, programme aid is normally donated directly from government to government and used as budget support after being sold on the market (Maunder, 2006). This form of food aid is usually monetized, that is, sold at market prices and the counterpart funds generated can be used for supplementing government budget allocations for economic development (Barret and Maxwell, 2005). This implies that programme food aid is usually not used as food assistance directly targeted towards the most impoverished and undernourished segment of the population.

Belfrage (2006) acknowledges that food aid accounts for a mere 3% of world trade in food but as much as 80% of food availability in some recipient countries and, according to Barrett (2002), food aid receipts consistently replace 60-80% of the commercial food imports that recipient economies would have made. Despite the fact that food aid and its distribution has recently been rapidly changing with respect to observed declines in global food availability and an exhibit of a rapidly growing interest in and experimentation with cash-based alternatives (Coke, 2009), food aid for at least half a century has been the most readily available resource for responding to food crises of all kinds, from chronic food insecurity associated with endemic poverty to acute humanitarian emergencies following natural or man-made disasters (Moore and Stanford, 2010).

While there are various motives for giving food aid, the primary goal is to provide short term assistance to recipient countries, over time it is expected that the development process of these countries would be enhanced, thereby reducing the long-term dependency on aid (Moore and Stanford, 2010). Abdulai *et al.* (2004) also concurs that the long-term aim of food aid for agricultural and market development in recipient countries should be to use short lived food aid to stimulate local production, processing and distribution capacity with the

objective of replacing food aid with domestic production or commercial imports within a few years

1.1 Background Information

Most countries in Southern Africa depend on agriculture as the main source of food, employment and income (GAO, 2003). According to UNECA (2007), agriculture accounts for more than 15% of GDP for low income countries of the Southern African region; Malawi, Lesotho, Mozambique, Zambia, DR Congo and Zimbabwe, where Malawi, Zambia and Zimbabwe, are among the largest food aid recipients in the Southern African region on a per capita basis in 2003. More recently Zambia however has had better agricultural performances in the southern African region with its agriculture sector contributing about 20% of GDP (ReSAKSS, 2009). According to ReSAKSS (2009), Zambia has managed to achieve such a performance through increased expenditures in agriculture and through the implementation of the Comprehensive Africa Agriculture Development Programme (CAADP) which aims at a 6% annual agricultural growth in the country supported by the allocation of at least 10% of national budgetary resources to the agriculture sector.

While cereal production has been on the increase in general, there has been a downward trend in per capita cereal production (FAO, 2009). The Southern African region's cereal exports have also declined sharply, amounting to only 30 % of what they were at the turn of the 1990s (UNECA, 2007). On the other hand, cereal imports and food aid, which had been on the decline after reaching the peak of 1992 (the year of severe drought), have been increasing steadily over the past years (WFP INTERFAIS, 2011). Because of these and several other underlying structural, socio-economic and socio-political factors, the region now has the highest proportion of food insecure people in the world (Barrett and Maxwell, 2005).

Zimbabwe is a southern African country where agriculture forms the basis of the economy and provides a livelihood for about 70% of Zimbabwe's population and is also the main source for domestic food supply (CEEPA, 2006). According to WFP (2010), agriculture in Zimbabwe contributes about 18.5 % of GDP. Agriculture has also been an employment provider, contributing 30% of formal employment and also accounting for about 40-50 % of the country's total export revenues (All In Diary, 2009).

The United Nations 2008 statistics estimate that Zimbabwe has a population of 13.5 million people, and that about two-thirds of this population has traditionally lived on communal

lands. These communal lands make up approximately 42% of Zimbabwe's land mass (FEWSNET, 2010). Small-scale farmers work average plot sizes of about two hectares per farmer. Smallholder farmers produce 70% of the country's staple foods, mainly rain fed and statistics indicate that a total of 75% of communal land receives 600mm or less, rainfall per year (All In Diary, 2009). Two-thirds of this communal land is fairly dry and suitable for livestock, and only one-third of the communal land is productive (Mutisi, 2009).

According to USAID (2010), agricultural production in Zimbabwe has been falling dramatically over the last decade, and in 2002 when drought struck the Southern African region, Zimbabwe's agricultural production was already plummeting. Various factors have been at play thereby contributing to its downfall. One of these challenges for agricultural and food securities include land reforms in 2000 which led to a transfer of approximately 25% of Zimbabwe's productive land from the white commercial farms to the landless black farmers (USAID, 2010). Many of these black farmers had limited technical expertise and poor access to infrastructure and modern technologies (FEWSNET, 2010).

Another challenge over the years has been that of the continual economic crisis that has been crippling the purchasing power of households, and the availability of foreign currency which resulted in the failure to import the necessary agricultural inputs that were not available locally (All In Diary, 2009). Also, severe cholera outbreaks and the on-going prevalence of HIV/AIDS are factors affecting the productive capacity and nutritional requirements in many households, (USAID, 2010). FEWSNET (2010) reported that erratic rainfall, poor harvests and falling livestock numbers are affecting livelihoods and food security levels for many vulnerable people, especially the people living in the rural smallholder farming sector.

Also, over the recent years in Zimbabwe, hyper-inflation, acute shortages of basic supplies and a series of very poor harvests have led to serious food shortages and acute food insecurity (FAO, 2010). Together these factors have contributed to increasing levels of vulnerability and the situation necessitated large-scale humanitarian food assistance operations in the country (FAO, 2009).

The worst series of severe drought in Zimbabwe were experienced in the 2007/8 and 2008/9 agricultural seasons where very poor yields were obtained by the smallholder farmers, and it was further worsened by the political unrest that surrounded that same period (All In Diary, 2009). From June 2008 to August 2008, the government of Zimbabwe ordered a 3 month suspension of Non-Governmental Organizations (NGOs) operations across the country and

this severely affected the rural and urban poor by preventing humanitarian access for the distribution of food, social and medical services and material support such as crop inputs for the 2008/2009 planting season (USAID, 2010). The NGOs in that time were making available necessary medical, food and crop inputs at a time when the government could not offer these services and many others to its people due to economic, political and climatic instabilities.

1.2 Problem statement

The greater part of food aid has come to be provided in the context of, and in response to, emergency and crisis situations, and so an important issue is the developmental implications of this aid provided with a mix of objectives, including humanitarian relief, protecting livelihoods as well as promoting economic stabilization (OECD, 2005).

Indeed under certain conditions, food aid can cause disincentive effects through depressed producer prices, and distortion of markets for service and reinforce dependency (Tembo, 2006). However, the extent to which these effects will take root is a function of several factors. These include economic characteristics of the commodity in question, economic conditions of the target area including; the state of infrastructure, and the existence of markets, for example, and the procurement, targeting and timeliness of food aid (Maunder *et al.*, 2006).

Since the early 1960s, the controversy on the opportunity cost of food aid for food aid recipient countries remains unabated (Barrett, 2006). While there is no doubt that targeted and temporary food aid gives a major positive contribution in emergency relief, some policy makers and development practitioners in the Non- Governmental Organization community emphasize the increasing costs of food aid programmes over time (Boussard *et al.*, 2005).

According to Boussard *et al.* (2005), the main arguments are summarized as follows: first, recipient countries incur budgetary costs of storage, transport and delivery of food aid funded by donors. Second, when poorly- targeted and used over long periods, in large quantities and in situations where there is no real food shortage in the country, food aid can exert a downward pressure on domestic food prices and act as an disincentive to produce and invest. And finally, excessive reliance on food aid may become politically unsustainable especially in Africa; political legitimacy may erode with the decreasing credibility of the state as

provider of the basic needs of its population and its perceived growing dependence and accountability towards donors rather than toward its own citizens.

The identified problem is that the short and long term effects of food aid in Zimbabwe, with respect to its effect on domestic food production and commercial food imports are unknown. Food aid has become a major mode of intervention during periods of crises due to inadequate or total lack of alternative social protection systems in southern Africa (UNECA, 2007). However, the observed trends of declining per capita cereal production and exports, and rising cereal imports and food aid have raised concerns about the possible adverse effects of food aid on long-term agricultural development sustainability and food security sustainability in the southern African region (UNECA, 2007).

Barrett (1998) however argues that, the “win- win” opportunities and results that can be created by food aid are certainly feasible in theory, but in practice, whether food aid has been successful at either assisting recipient country agricultural development or fostering donor country commercial food exports to recipients is still unclear. The lack of empirical evidence has often resulted in premature negative conclusions about the impact of food aid in recipient countries (Mabuza *et al.*, 2009). This study therefore seeks to investigate and provide insights on what the short and long term effects of food aid in Zimbabwe are, especially with regards to food aid’s effect on domestic food production and commercial food imports.

1.3 Objective of the study

Several policy debates surrounding food aid have led to research which analyzes the relationship between food aid and agricultural sector growth and the effects of food aid on local farmers, agricultural markets and governments’ tightened control of food exports and imports (Coke, 2009). Therefore the objective of this study is to investigate the relationships between food aid, domestic food production and commercial food imports. The specific objectives of the study are:

- To outline the trend in Zimbabwe’s cereal food production from 1988 to 2008.
- To outline the trends in food aid inflows and in commercial food imports in Zimbabwe from 1988 to 2008.
- To analyze the relationship between food aid and domestic food production in Zimbabwe.
- To examine the relationship between food aid and commercial food imports in Zimbabwe.

1.4 Research Hypotheses

The main thesis statement to be investigated is that food aid distributions have created a disincentive effect for domestic food producers causing decreases in domestic agricultural food production levels in the long term and food aid has been stimulating commercial food imports in Zimbabwe in the long term.

The specific research hypotheses are:

- There has been an overall downward trend in cereal food production in Zimbabwe from 1988 - 2008.
- There has been an overall increasing trend in both food aid inflows and commercial cereal food imports in Zimbabwe from 1988 to 2008.
- Food aid in Zimbabwe has had no effect on domestic food production in the short term (inelastic domestic food supply), but discourages domestic food production in the long term.
- Food aid in Zimbabwe has in the short term caused a reduction in commercial cereal food imports, but in the long term stimulates commercial imports.

1.5 Delineations

The study will focus on the cereal food production of four main food crops grown in Zimbabwe, which are, maize, wheat, sorghum and millet (FEWSNET, 2010). As maize and wheat (which is used mainly for bread) are the country's food security commodities and maize being not only the staple food crop, but also the major cereal crop grown (Mudimu, 2003), the commercial food imports to be considered in this study are therefore import quantities of maize, wheat and rice only, which according to FAO (2008) are the major cereal food imports to Zimbabwe. The study will also focus on cereal food aid only, which is, emergency, programme and project food aid totals, which form the bulk of the food aid delivered to Zimbabwe (WFP INTERFAIS, 2011). Because cereals food aid accounts for more than 90% of total food aid shipments to Africa, cereals serve as a reasonable proxy for overall trends in food aid and production (Abdulai *et al.*, 2005). The study will make use of data from 1988 to 2008 and the food aid inflows in this study imply cereal food aid only because the complete data available for food aid quantities on the WFP and FAO databases covers from 1988 to 2008.

1.6 Definition of terms

a) Food aid

Food aid is a form of transferring food as a commodity from one country or organization known as the donor, to a recipient country or agency either as a grant or on highly concessional terms (Makenete *et al.*, 1998). Food aid consists primarily of imports that are financed by a donor country or organization. Food as a form of aid has been used in a variety of ways, impacting mainly on nutrition, consumer prices and agricultural production.

b) Food Imports

These are usually divided into two categories; commercial and food aid. The important distinction between the two categories is not how they are utilized but rather how they are paid for (FANR, 2009). Commercial imports consist primarily of imports that are financed directly by the recipient country. They may be purchased by the private sector or by the government themselves through a marketing board. Commercial imports are normally channelled through the marketing system, although, they may be used in Government drought relief or other feeding programmes.

1.7 Significance of the study

Questions regarding effectiveness and efficiency in food aid based programmes have created divisions in development organizations' programme design and focus (Coke, 2009). In some studies, researchers have found that food aid was not needed and that it actually caused more harm than good (Leathers, 2004). These studies have led development practitioners and policy makers to question whether investment in agriculture production (external agricultural assistance) is more sustainable and effective than supplemental feeding programmes and the distribution of food aid (Clay, 1991). Therefore in terms of theoretical significance, this study seeks to investigate whether the model that will be used in the analysis will validate or contradict the existing disincentive theory on the impact of food aid.

The study aims at investigating whether food aid is complementing or substituting agricultural production and commercial food imports in Zimbabwe. Several studies (Tschirley *et al.*, 1996; Abdulai *et al.*, 2004; 2005; Gelan, 2007; Mabuza *et al.*, 2008; 2009) have been performed in southern Africa to try and establish the impact of food aid on domestic agricultural production as well as on consumer prices and on nutrition but none

specifically on Zimbabwe. This study also aims to address the observed trends in agricultural food production and commercial food imports in Zimbabwe and how food aid is contributing to this trend.

1.8 Chapter Overviews

Chapter 2 follows with the discussion of literature that touches on food aid issues as viewed from a global, regional and Zimbabwean perspective. Food aid regulations are also discussed in this chapter as well as an overview of Zimbabwe's food production, food aid and commercial food import capacities.

Chapter 3 then follows with the literature review on food aid. It begins by reviewing the key concepts of food aid and the conceptual framework is presented. This chapter will also review evidence of the impact of food aid on domestic agricultural production and on commercial food imports. A critical review of theoretical approaches used in food aid analyses is also presented. The chapter ends with a discussion of the insights about food aid revealed from the literature and a conclusion is drawn.

Chapter 4 begins with a detailed description of the study area, which forms the first part of the chapter. The chapter also discusses the research method that was used in this study, which forms the second part to this Chapter 4. A review of empirical models that have been used in other related studies to analyze food aid and its effects is presented therein also. A brief justification and description of the empirical model chosen for use in this study is also given. The data limitations encountered in the study are highlighted also and the chapter concludes.

Chapters 5 and 6 represent the analysis chapters for the stated hypotheses that were being investigated and the model specification is presented.

Chapter 7 is the concluding chapter giving a summary of contribution of the study, the policy insights and recommendations.

CHAPTER TWO: FOOD AID ISSUES GLOBALLY AND IN ZIMBABWE

2.0 Introduction

This chapter begins by giving an overview of food aid in the global context, followed by a regional (southern Africa) background to the issue of food aid, until focus narrows to food aid issues in Zimbabwe. Regulations that govern the distribution of food aid and the governing bodies are highlighted also in the chapter. Issues touching Zimbabwe's food production and commercial food import capacities are discussed as well. The chapter ends by concluding on the discussed issues.

2.1 An Overview of Global Food Aid

Food aid continues to make up a large component of humanitarian appeals and remains an important tool in responding to crisis. The continuing move away from tied in-kind to untied (triangular) food aid, growing levels of local and regional procurement and the increasing use of cash-based transfers have led to greater flexibility in responding to food crises (Awokuse, 2010). Globally, there has been a decline in the quantities of food aid sent to food aid recipient countries. This is a result of decreased food aid needs by long-term known food aid recipients such as India, Indonesia, South Korea and Turkey (Maunder, 2006).

However, a number of challenges remain if food assistance is to become a more effective tool in emergency and transitional contexts. Some of the global factors that affect the flow of food aid include; governance issues around food aid, donors' trends, and 'best practices' in food aid (Grant, 2006). Governance here refers to the mechanisms that influence moving food aid from the granting to the recipient countries. The Food Aid Convention (FAC) includes a legal agreement on minimum tonnage contracts of donors; meanwhile the World Trade Organisation (WTO) plays a greater role in deciding to give food aid as a loan or grant (FAO, 2002; Timmer, 2003). On the other hand, donors' abilities to grant the food depend on the resources that they have. The 'best practice' factor includes the information systems and analytical tools employed to improve on the food aid programme design and implementation as well as targeting (Lowder, 2004).

According to Wahlberg (2008), global food aid has the following challenges that: it is not enough, it is volatile and its quantities don't respond to global need, it is usually unevenly distributed, it is tied to donor's domestic production and shipping, it is too slow and badly timed, and may at times because of difficulties in targeting, results in exclusion and inclusion

errors in the people that receive the food aid and lastly, the food aid may be disrespectful of local diets and be genetically modified food.

2.2 Categories of Food Aid

Over the last decade, large-scale emergencies occurred every year, from Darfur conflict which started in 2003 to the earthquakes in Haiti, Chile and China in 2010 (WFP, 2010). Many countries are suffering protracted food emergencies; ten countries in Sub-Saharan Africa namely Angola, Botswana, Namibia, Swaziland, South Africa, Zimbabwe, Zambia, Malawi, Lesotho and Mozambique, have declared a food emergency every year for the past ten years (Oxfam, 2005).

Of the three types or categories of food aid, programme food aid and project food aid are considered as non-emergency types of food aid. Figure 2.1 shows the global deliveries of food aid according to the three categories. The graphs in Figure 2.1 show that for the period 1988 to 1996, programme food aid dominated the global food aid deliveries and then declined thereafter and peaked again between 1998 and 1999.

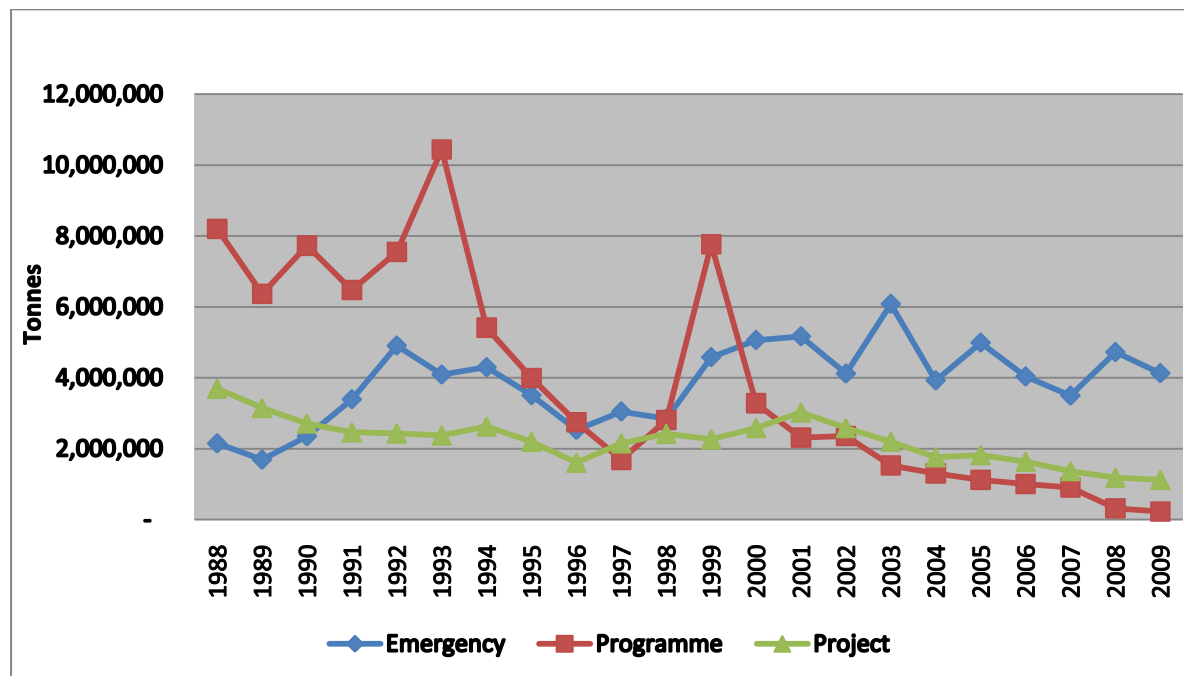


Figure 2.1: Global Food Aid Deliveries by Categories.

Source: WFP INTERFAIS (2011)

From the year 2000 to 2009, emergency food aid is the one that has since dominated the deliveries of global food aid and continues to dominate as illustrated in Figure 2.1. This trend in the dominance of emergency food aid is the result of the persistent droughts in the majority of the major food aid recipient countries such as Zimbabwe, Zambia, Malawi, and Ethiopia among others, and the increasing global climate change and an increasing global food crisis.

2.2.1 Programme Food Aid

Programme food aid is foreign aid in the form of food that is usually given bilaterally as a government to government grant, a concessional sale or loan and the vast majority of global food aid transfers historically fit this category (Awokuse, 2006). Awokuse (2006) documents that programme food aid can be used to alleviate the recipient countries' macroeconomic problems due to balance of payment or budgetary constraints. This form of food aid is usually monetized (sold at market prices) and the counterpart funds generated can be used for supplementing government budget allocations for economic development (Barret and Maxwell, 2005). This implies that programme food aid is usually not used as food assistance directly targeted towards the most impoverished and undernourished segment of the population.

2.2.2 Project Food Aid

This form of aid is primarily given on a grant basis as support for specific social and economic developmental projects for example food-for-work (FFW) programmes and food for education programmes (Awokuse, 2006). It can be given to a recipient government, a multilateral development agency or to domestic and international Non- Governmental Organizations. The World Food Programme (WFP) and various NGOs administer project food aid to support a wide range of developmental projects targeting the poor in developing countries (WFP, 2009). With project food aid, food aid resources are used to relieve unemployment, provide physical infrastructure and in nutritional programmes to alleviate food insecurity of the poor (Barret and Maxwell, 2005). Awokuse (2006) documents that in recent history, parts of this form of food aid have also been monetized and the proceeds from such market sales are used to fund project operational costs of the concerned NGOs.

2.2.3 Emergency or Relief Food Aid

Emergency food aid has a relatively short term nature and this category is considered the most targeted type of food aid, even though perfect targeting is not possible (Wahlberg, 2008). This category of food aid is used as a relief or disaster response mechanism in times

of crises. Figure 2.1 has shown the rising trend in the emergency food aid from the year 2000 up to 2006 emphasizing the importance and increasing need for this category of food aid.

2.3 Food aid regulations

In light of the fears that food aid is a hindrance to agricultural development and commercial trade, it is not surprising to find a number of international agreements and bodies which to some extent regulate the provision of food aid. Such bodies include the Food Aid Committee, the Food and Agriculture Organization of the United Nations (FAO) and the Consultative Committee on Surplus Disposal, which is a subcommittee of the FAO, the World Food Summit and the World Trade Organisation (WTO). The sections below follow with brief discussions on the roles of each of these food aid regulatory bodies.

2.3.1 The Food Aid Committee

The Food Aid Committee is a group of food aid donors, namely Argentina, Australia, Canada, the European Union and its members, Japan, Norway, Switzerland and the United States. This committee has since 1967 regularly updated the Food Aid Convention (FAC). The version now in use was agreed upon in 1999 and its explicit objective is to contribute to world food security and to improve the ability of the international community to respond to emergency food situations and other food needs of developing countries (FAO, 1999).

The Food Aid Convention contains a list of prioritized recipient countries and minimum aid quantity commitments of donor countries. Additionally, it states a number of principles for aid giving, including that all aid forming part of the minimum commitment shall be in the form of grants, cannot be tied to commercial trade, shall be given in a manner that avoids harmful interference with commercial production or trade, and adhere to the Food and Agriculture Organization's (FAO) "Principles of Surplus Disposal and Consultative Obligations" (Barrett, 2002). Furthermore, it is stated that donor countries shall better monitor the effects of food aid, and support recipient countries' efforts to develop and implement their own food security strategies (FAO, 1999).

2.3.2 The Food and Agriculture Organization and the Consultative Committee on Surplus Disposal

The Food and Agriculture Organization of the United Nations (FAO) has the purpose to raise living standards and levels of nutritional intake, increase agricultural productivity and

improve conditions for poor people in rural areas. In 1954 a subcommittee to the FAO – the Consultative Committee on Surplus Disposal (CSSD) – was established and assigned the task of supervising international transfers of agricultural surplus in the form of food aid, in order to avoid harmful interference with commercial trade and agricultural production (FAO, 1999). Its principles for surplus disposal and consultative obligations contain detailed instructions for donor countries concerning how to report food aid. The CSSD has also established the so-called "Usual Marketing Requirements" (UMRs), which are supposed to ensure that food aid does not cause changes in commercial food imports or re-exports by recipient countries (Lowder, 2004).

2.3.3 The World Food Summit

The *World Food Summit* was arranged in Rome 1996 as part of the efforts to fight world famine. The main result from this meeting was a goal for famine reduction: the 187 states present agreed to reduce starvation by half by 2015 (FAO, 1999). At the current rate, however, this goal will not be reached until 2030 at the earliest. For this reason, another summit which came to be called "*World Food Summit – five years later*" (WFSfyl) was held in Rome 2002. The declaration from this meeting states that "trade is a key element in achieving world food security" (FAO, 2002). The importance of domestic production and distribution of food is strongly emphasized, and it is pointed out that 70 percent of the world's poor live in rural areas and are to a large extent dependent on agriculture and rural development. Regarding food aid, its important role in situations of humanitarian crisis and as an instrument for development is acknowledged.

2.3.4 The World Trade Organization

During the *World Trade Organization's* previous round of negotiations, the Uruguay Round 1986-1994, the agricultural sector was explicitly mentioned for the first time. A decrease in export subsidies – which are used for surplus disposal often generated in countries with production-promoting support – was agreed (WTO, 2003). According to Belfrage (2006), the similarly trade-distorting effects of food aid were also recognized, which explains why the agriculture agreement of the Uruguay Round states that members donors of international food aid shall ensure: (a) that the provision of international food aid is not tied directly or indirectly to commercial exports of agricultural products to recipient countries; (b) that international food aid transactions, including bilateral food aid which is monetized, shall be

carried out in accordance with the FAO “Principles of Surplus Disposal and Consultative Obligations” (WTO, 1994).

During the past few years food aid has come to play a more prominent role in the WTO context. In the ongoing (or at least unfinished) Doha Round of negotiations, important actors like the EU and the so-called Cairns Group have demanded stricter rules for the use of food aid.¹ To ensure that food aid does not constitute surplus disposal and circumvent the restrictions on export subsidies, the Cairns Group has proposed that:

- (i) Food aid may only be channelled directly from government to government in the form of emergency aid given in response to appeals from the United Nations or other international or regional agencies,
- (ii) Project and programme aid may only be given through the World Food Programme or other international or regional agencies (Cairns Group, 2004).

The main combatants regarding the role of food aid in global trade agreements, as well as the most important donors – at least in quantity terms – are thus the EU and the US. The EU has demanded rules which more effectively prevent the use of food aid for subsidizing exports of surplus production, ties to commercial imports from the donor country, or as an instrument for keeping competitors out of certain food markets (Belfrage, 2006). Also the EU has advocated requirements that food aid may not be a deal between the donor and recipient countries’ governments, but must be initiated by international agencies or by certain private aid organizations (European Commission, 2000). The United States, which plays a dominant role among food aid donors as well as commercial food exporters and has the largest and most numerous stakeholders in food aid distribution, however had taken a restrictive stance with respect to new food aid regulations (Belfrage, 2006). Hence, further restrictions on food aid designed to avoid interference with commercial trade can be said to be a condition for key moves in the direction of a more liberal agricultural trade regime.

¹ The Cairns Group is composed of 17 agricultural exporting countries wishing to bring about a major liberalization of trade in agricultural products. Its members are Argentina, Australia, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Malaysia, New Zealand, Paraguay, Philippines, South Africa, Thailand and Uruguay.

2.4 A Review of food aid receipts in Southern Africa

Food production in southern Africa is characterized by high variability relative to other regions around the world (USDA, 2003). In general, southern Africa remains vulnerable to food insecurity for a number of reasons, such as extreme weather conditions, low production levels, reliance on subsistence farming, high levels of poverty, the HIV/AIDS pandemic, high levels of debt amongst governments in the region, armed conflict and political unrest (Grant, 2006). These factors suggest that food insecurity in the region is not a short-term phenomenon related to emergency situations but is rather a long-term issue.

Floods in 2001 and lack of rain in 2002 have contributed to reduced production levels of maize, particularly in Malawi, Zambia and Zimbabwe and production shortfalls were most severe in these three countries (USDA, 2003). In 2002/2003, the southern African region faced its worst food crisis in more than a decade where approximately 15.3 million people (26 % of the total population) in six countries- Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe, experienced severe food shortages and the threat of famine (GAO, 2003).

According to a report by GAO (2003), multiple factors contributed to this food crisis, factors such as, erratic weather which reduced maize production and a poorly functioning agricultural sector which caused food supply shortages. Also, government actions including the sale of Malawi's grain reserve and Zimbabwe's land reform – further cut available food. Widespread poverty contributed to food insecurity and the HIV/AIDS epidemic exacerbated food shortages by reducing the labour force.

Food aid averted famine, but the overall response did not prevent widespread hunger. About 93 % of the total cereal gap- the difference between domestic needs and production- was accessed during the end of the April 2002- March 2003 crisis period (GAO, 2003). However food aid deliveries fell short in several countries and vulnerable households had limited ability to purchase commercial maize. Slow donations, poor infrastructure, and concerns about biotech food were major obstacles to an effective response (Grant, 2006). Poor transportation systems and storage facilities hampered efficient food delivery. Zambia rejected food aid because of concerns regarding biotech food; other countries like Zimbabwe required milling maize for the same reason (USDA, 2003).

Figure 2.2 shows the trend in food aid received in Southern Africa during the period 1988 to 2009. The highest volume of food aid followed the drought of 1991/92 cropping season. After the 1992 drought, food aid received declined because of reduced food gaps and production in 1993 improved because of good weather.

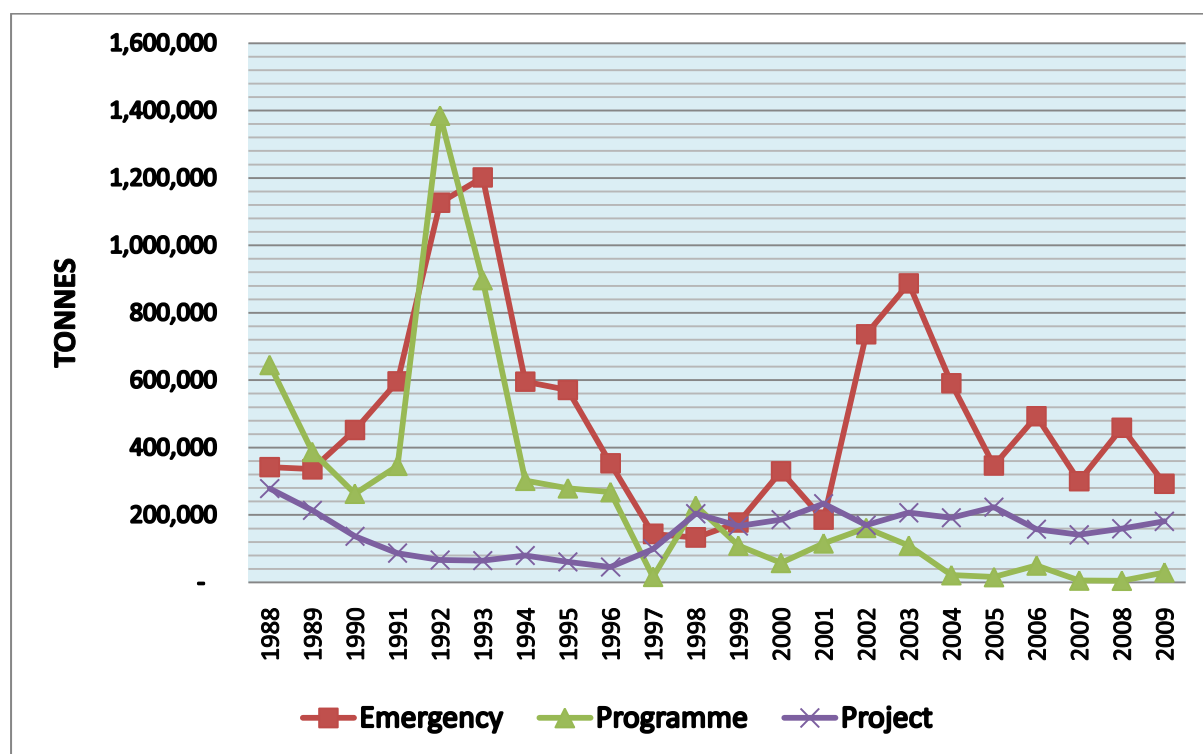


Figure 2.2: Food aid receipts by type in Southern Africa 1988- 2009.

Source: WFP INTERFAIS (2011)

The southern African region also witnessed an increase in food aid in 2002 and 2003 as shown in Figure 2.2, in response to the severe drought of 2001/02. After that, there was a decline in food aid inflows due largely to improved weather. The 2005/06 and 2007/08 seasons also saw an increase in food aid, a direct result of drought during these years.

The amount of food aid inflow in the southern African region increase during times of droughts and the recurring and persistent droughts in the region have been the main cause for the high quantities of emergency food aid type over the years from 1988 to 2009. Both programme and project food aid is government to government foreign aid where programme food aid is for balance of payments support and project aid is for development projects such as Food for Work (FFW) (Maxwell, 1991). However, over the years, there has been great variation in the exact composition of the different types of food aid delivered (Barret, 2006).

Awokuse (2010) notes that whereas emergency food aid has been on the increase due to the frequency of droughts and floods, programme food aid has declined and project food aid has remained almost static over time as shown in Figure 2.2. Maunder (2006) credits the decline in programme food aid to the change in policies of the food aid donor countries, which are moving away from supporting production in recipient countries and focusing on emergency and disaster support.

A comprehensive evaluation of the impact of food aid allocations to various developing countries has also concluded that programme food aid has not been very effective in fighting poverty in recipient countries and thus a reason for the decline in its volume (Clay *et al.*, 1998; Awokuse, 2010). Between 1988 and 1997, the volume of programme food aid in the region was as high as that of emergency food aid. However, since 1999, emergency food aid has been the major food aid received in the region.

Figure 2.3 shows the volumes of food aid inflows to three of the major food aid recipient countries in the Southern African region; Malawi, Zambia and Zimbabwe. It is clear from the graphs that Zimbabwe has always maintained the position of being the highest food aid recipient in the region since the 1980's.

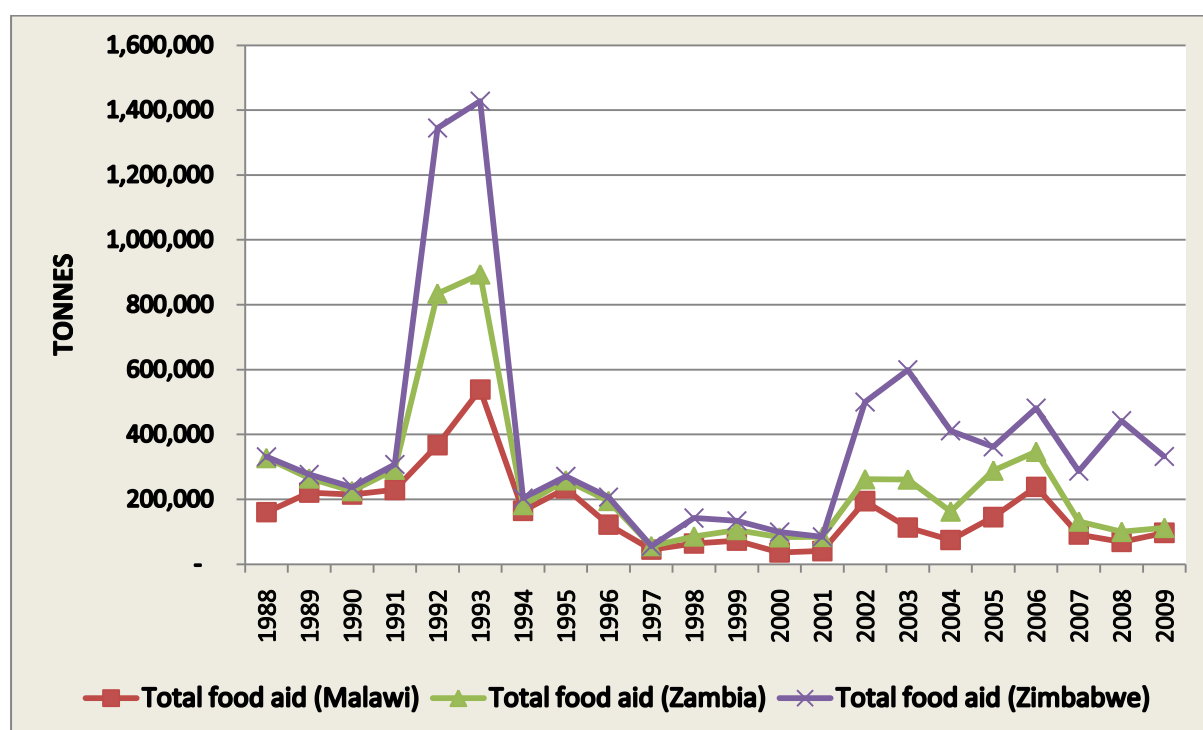


Figure 2.3: Food aid inflows to three major food aid recipient countries in Southern Africa

Source: WFP INTERFAIS (2011)

Even though Zimbabwe was called the breadbasket of the Southern African region, the graphs show that the country has been the highest food aid recipient. The possible reason for this apparently contrasting scenario is that between 1985 and 1990 large scale maize production declined by more than 40% which led to accelerated diversification in 1992 as large scale commercial farmers only planted 78 000 hectares of maize opposed to 125 000 hectares in the previous year (Rohrbach *et al.*, 1990). This diversification away from grain crops was significant as Zimbabwe's ability to remain "self-sufficient" in food became increasingly dependent upon farmers in more vulnerable communal areas (Rukuni, *et al.*, 1994). Though a greater part of these farmers was concentrated in the better farming lands of the country, that is in the Mashonaland, and though they were able to provide enough maize for the nation as a whole, there still remained six out of the then eight provincial districts that were consistently unable to meet local food requirements and chronic malnutrition continued to be a major problem in the country (GoZ, 2000).

Households in the vulnerable natural regions (natural regions four and five) had to secure food via other sources once their own supplies were finished. This was either through informal networks between households, directly from the Grain Marketing Board (GMB) depots or from local retailers in the form of mealie-meal. According to AIAS (2006), the distorted marketing systems that existed during these 1990s and even continued up to 2008, which saw the GMB as the central buying and selling point of the nation's grain primarily affected smallholder households and increased their vulnerability in two ways:

- For those rural areas that were better serviced by tarred roads and closer to urban centres, it resulted in the dependence of rural consumers on highly priced commercially refined mealie-meal resulting in households spending a disproportionate amount of the household income on purchasing food.
- In areas that were more isolated food sold to the GMB was transported out of the area without the necessary mechanisms available to ensure the re-importation of the reasonably priced food stuffs. Hence the paradoxical existence of hungry, food insecure people being found in a country that was known as the breadbasket of the region where around the 1990s, the silos were almost overflowing with maize.

2.5 Food production and food aid in Zimbabwe

Food production in Zimbabwe, a country which previously was the breadbasket of the southern African region, has remained below subsistence levels since 2000 (FAO, 2010). The

poor performance of the agricultural sector has had economy-wide effects due to the forward and backward linkages between agriculture and other sectors of the economy. The worst series of severe drought in Zimbabwe were experienced in the 2007/8 and 2008/9 agricultural seasons where very poor yields were obtained by the smallholder farmers, and it was further worsened by the political unrest that surrounded that same period (All In Diary, 2009).

Supply-side constraints have also led to a decline in the agricultural sector. These include power outages, lack of credit facilities, high fuel prices and shortages that made agriculture production expensive and delayed land preparation, shortages of foreign currency to meet farmers' requirements of inputs, persistent droughts, and the deteriorating land quality (Mudzonga and Chigwada, 2009). According to Mutisi (2009), crumbling irrigation systems and the disincentive effect of the government's price controls have also reduced agriculture production, resulting in widespread shortages of goods and services, high unemployment levels and declining living standards.

The agricultural sector has suffered neglect that has resulted in decreased productivity and the lack of investment in the agricultural sector, including research and development, has also contributed to low output (All In Diary, 2009). Added to this is a lack of public-private partnership investment in the rural and agricultural commodity sector which is a prerequisite and important catalyst for agricultural development and food production in developing countries (Mutisi, 2009). Delays in the processing of payments to farmers who would have delivered their crops to the Grain Marketing Board (GMB) and the limited coordination on the procurement and distribution of key inputs, such as seeds, fertilizers and chemicals, are some of the challenges faced in the agricultural sector (FAO, 2007).

According to Matondi and Dekker (2011), decreased production in the sector has also been affected by the land reform programme. After independence in 1980, most of the productive farmland remained in the hands of whites, and through the 1990s the government worked to shift the ownership by seizing and redistributing land without compensation (Rukuni *et al*, 2006). As hundreds of farms were taken over, production and exports of grains collapsed and the biggest challenge currently is ensuring that farmers get the necessary support services to be more productive (Mutisi, 2009). Before the land redistribution from the white farmers to black farmers, the white farmers who were mostly large scale commercial farmers were able to produce enough food to meet the country's food needs as well as surplus for exports. This was possible because the white farmers had strong credit support lines, efficient farmers'

unions, extension support, practical farming knowledge and equipment and equipped themselves with adequate market information (Mutisi, 2009). The economic downturn in Zimbabwe has left one-third of the population malnourished and about 2.5 million people receiving food aid (FEWSNET, 2010) and it has also further reduced saleable assets for smallholder farmers, leaving them vulnerable and food insecure.

Zimbabwe has experienced a fall in maize production in recent years and it is likely that this reduction may have been influenced by food aid inflows (Mudimu, 2003). According to Chipika (2006), food aid in general has had no impact on market prices since the huge inflow of food aid that took place during the 2002-2004 period did not affect market prices in a substantial way, and this author also asserts that food aid complements commercial imports rather than displace them as the food aid is not large enough to meet the food shortfall. However, Mudzonga and Chigwada (2009) argue that food aid to vulnerable farm workers and the rural poor has diluted the economic incentive for them to seek and to value farm employment which is normally poorly paid.

There are different forms of food aid programme reaching vulnerable populations in Zimbabwe, some of which have greatly helped to avert starvation. These include the WFP programme of supplementary school feeding, family child health nutrition support, vulnerability feeding groups (VGFs), institutional feeding, home-based care for HIV/AIDS affected Orphans and Vulnerable Children (OVC), and food for assets (WFP, 2010). Other programmes which have been adopted to work in conjunction with food aid programme to ensure food security and boost production capacities of the country's farmers, particularly the smallholder farmers includes the National Programme for Food Security (NPFS) which is premised on FAO's framework on food security (FAO, 2011).

The National Programme for Food Security (NPFS) focuses on the production, storage and distribution of food in the country and its five pillars are; stabilization of the macro-economic environment, transformation of the food economy, community empowerment and poverty reduction, decentralisation, integration and sustainable use of resources, and food insecurity and vulnerability monitoring information system (FAO, 2011). To that end, the government has also introduced programme such as the crop and livestock input schemes, the farm mechanization programme, the setting up of the food and nutrition council, the strengthening of the research and extension services as well as initiating research into traditional crops that are suited to the ecological conditions of Zimbabwe's agricultural regions, all this being

aimed at enhancing food production and reducing food insecurity in the country (Mutisi, 2009).

These government efforts to ensure household and national food security are being complemented by FAO's interventions through its Emergency and Rehabilitation and Coordination Unit (FAO, 2009). This unit has been actively involved in implementing programme aimed at boosting agricultural production and ensuring food security in Zimbabwe (FAO, 2011). These programmes are as follows:

- Agricultural input support to vulnerable smallholder farmers coupled with extension and training;
- Crop diversification by promoting production of cassava, small grains and legumes;
- Conservation agriculture; seed multiplication;
- Animal production and health through disease surveillance and livestock vaccinations;
- Mainstreaming HIV/AIDS, food and nutrition and;
- Coordination of humanitarian interventions in the agricultural sector.

Key donors in FAO's humanitarian interventions over the last seven years (2004-2011) include the European Union (EU), Department for International Development (DFID), Sweden, Spain, Ireland, Norway and the United States of America (FAO, 2011).

2.6 Factors influencing food production and food aid in Zimbabwe

The factors described below highlight in general some of the problems that the agricultural sector is been faced with, factors which also ultimately influence the continual need for food aid assistance in the country. The sections below therefore outline in detail each factor as it influences production.

2.6.1 Lack of institutional coordination

There is very little coordination between institutions. Research, training and extension institutes, in most cases, work independently of each other and there is hardly any collaboration between any given institutes with other relevant stakeholders (Hanyani-Mlambo, 2002). In addition, access to formal financial services has been severely constrained.

2.6.2 Unsustainable use and poor management of redistributed land

The current agrarian reform exercise has been distributing acquired large-scale commercial farms to landless peasants and other players. Adequate training of the new owners in proper land management has not followed up the land allocation (Chitiga and Mabugu, 2008). As a result, there has been rampant felling down of trees and other agricultural practises that are environmentally unfriendly and unsustainable.

2.6.3 Technological constraints

The use of technologies such as improved seeds and methods of cutting down pre and post harvest losses is lower in Zimbabwe when compared to other African countries. The relatively high cost and risks associated in adopting new technologies discourage many smallholder farmers in the country from adopting the technologies. In addition, the non-availability of the technologies on the formal markets in the country does not help the situation. The prevailing logistical conditions and lack of linkages and communication between research and extension is also an issue that has complicated the dissemination of new known technologies widely.

2.6.4 Inadequate land tenure security and lack of land policy

The redistribution of land that took place under the agrarian land reform programme did not offer title deeds to the recipients of the farms. This has caused insecurity of land tenure and so the lack of appropriate land policy has discouraged the farm recipients from long-term investments (Marongwe, undated; Matondi and Dekker, 2011). The new farmers therefore cannot borrow money from the commercial banks in order to purchase inputs and improve the infrastructure on their farms since they are unable to use land as collateral for loans. In addition, the poorly defined land rights have resulted in unsustainable management of common resources and degradation of land and this has led to a decline in land value and productivity.

2.6.5 Poor agricultural input and output markets

Practically, all smallholder farmers in Zimbabwe have problems in getting their agricultural inputs before the agricultural season commences and this leads to reduced agricultural production (AIAS, 2006). There are a multitude of challenges to inputs availability that include:

- Pricing policy that make input production operations non-viable.
- Foreign currency shortages limit importation of raw materials.
- Old production processes and antiquated machinery that increase fixed production costs.
- Side marketing of subsidized inputs intended for smallholder farmers.
- Black marketing of inputs at unaffordable prices.
- Poor road infrastructure and fuel problems.
- Centralized distribution system in major towns and limited access to agro-dealers closer to smallholder farms.
- Limited diversification into alternative inputs such as organic fertilizers.

Poor access to markets is another problem smallholder farmers have to deal with. The marketing problems diminish agricultural production and lock the rural farmers into an almost inescapable poverty trap (AIAS, 2006). The challenges in marketing include:

- Poor road infrastructure.
- Shortages of fuel for the transporters.
- Poor producer price incentives.
- Lack of market information.
- Low controlled prices for some agricultural products.

2.6.6 Climate constraints

The majority of farms in Zimbabwe depend on rainfall as a source of water. Only 7% of the smallholder areas are under irrigation (All In Diary, 2009). Thus the smallholder farmers are at the mercy of the climate where agricultural production has been exposed to numerous and periodic droughts (Shumba, 2000; CEEPA, 2006; Mutasa, 2011). The frequent droughts have significantly contributed to the food insecurity in the country and unfortunately, adequate drought mitigation strategies, appropriate technologies on drought resistant varieties and planting materials, and adequate low-cost and affordable irrigation facilities to mitigate the impacts of recurrent droughts are lacking in the country (Matondi, 2008; FAO, 2009).

2.6.7 High HIV and AIDS infection

There is no doubt that the HIV/AIDS pandemic has seriously increased poverty and hunger and reduced the capacity for accelerating economic growth in Zimbabwe and in the SADC region (UNDP, 2009). At the macroeconomic level, the disease has significantly reduced the

numbers of skilled agricultural professionals and labour through both death and morbidity. At household level, HIV/AIDS has negatively affected agricultural productivity through death; the time spent caring for the afflicted and limited amounts of money and resources diverted to health care and funerals.

2.7 Commercial cereals imports in Zimbabwe

One of the main features of Zimbabwe's agriculture is the marked shifting from production and exports of cereals to cash crops (Govere and Jayne, 1999). There has been a general decline in cereal production in the country ever since 1985 as shown in the Figure 2.4. Commercial farmers realized that they could reap higher profits by producing more of other cash crops like tobacco and the highly demanded horticultural products in the international market (FAO, 2003). This scenario has since brought about a change in the export composition of the country since 2000, that is, from the domination of cereals to the domination of tobacco and horticultural commodities. This has resulted in increased importation of cereal commodities, an unhealthy situation from the viewpoint of the country's food security. Food security in the country, which is defined in terms of availability of maize as the staple food product, has remained an issue of great concern in view of the increased incidence of drought-related hunger (FEWSNET, 2010).

From 1985, imports have been growing because of the increased shortages of cereals caused by drought, population growth, increased urbanization and the shift of production from cereals to cash crops (Mudimu, 2003). The poor agricultural seasons that prevailed between 1995 and 1997, coupled with the "fast-track" land reform, led to a sharp decline in agricultural production and hence an increase in import quantity and value (FAO, 2003).

Cereals supply in Zimbabwe is largely dependent on domestic production, especially when the rainfall pattern is not erratic. Therefore, without disturbances on farms and depending on the rainfall pattern, Zimbabwe is generally a net food exporter rather than an importer (Mudzonga and Chigwada, 2009). Figure 2.4 shows these trends in cereals imports and cereals production between 1980 and 2009. In Figure 2.4, it is shown that with the exception of the drought year 1992, cereal food production was generally higher from 1980 and 1997, and from 1998 to 2009 food production has been declining. This decline between 1998 and 2009 can be attributed to the various factors that have been already addressed such as

droughts, the fast track land reform programme of 2000, economic meltdown as well as political and social instabilities in the country during that time.

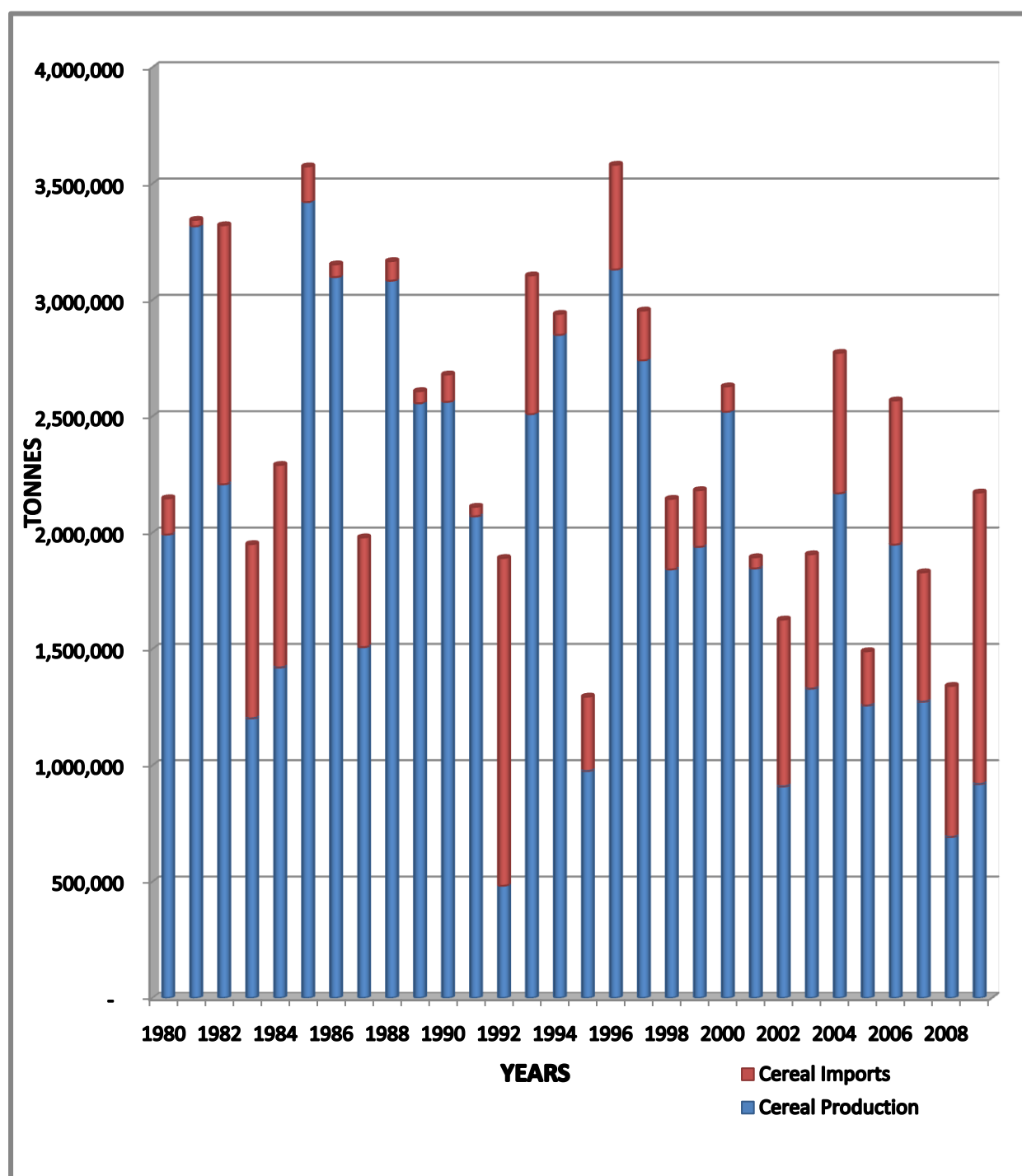


Figure 2.4: Zimbabwe's share of production and imports in cereal supply

Source: FAOSTAT, FAO Statistics Division (2011)

Before the fast track land reform programme around 2000, emphasis was on food security through self-reliance in cereal production rather than through trade and as such, food imports

were minimal (Rukuni *et al.*, 2006). The implementation of the structural adjustment programme in 1990 saw a shift from self-reliance towards trade (FAO, 2003). This caused a steady increase in import value, and the peak in terms of food imports was in 1992 because of the drought. Figure 2.5 shows the volumes of cereal imports into Zimbabwe between 1988 and 2009 and the share of commercial and food aid quantities to these yearly import volumes.

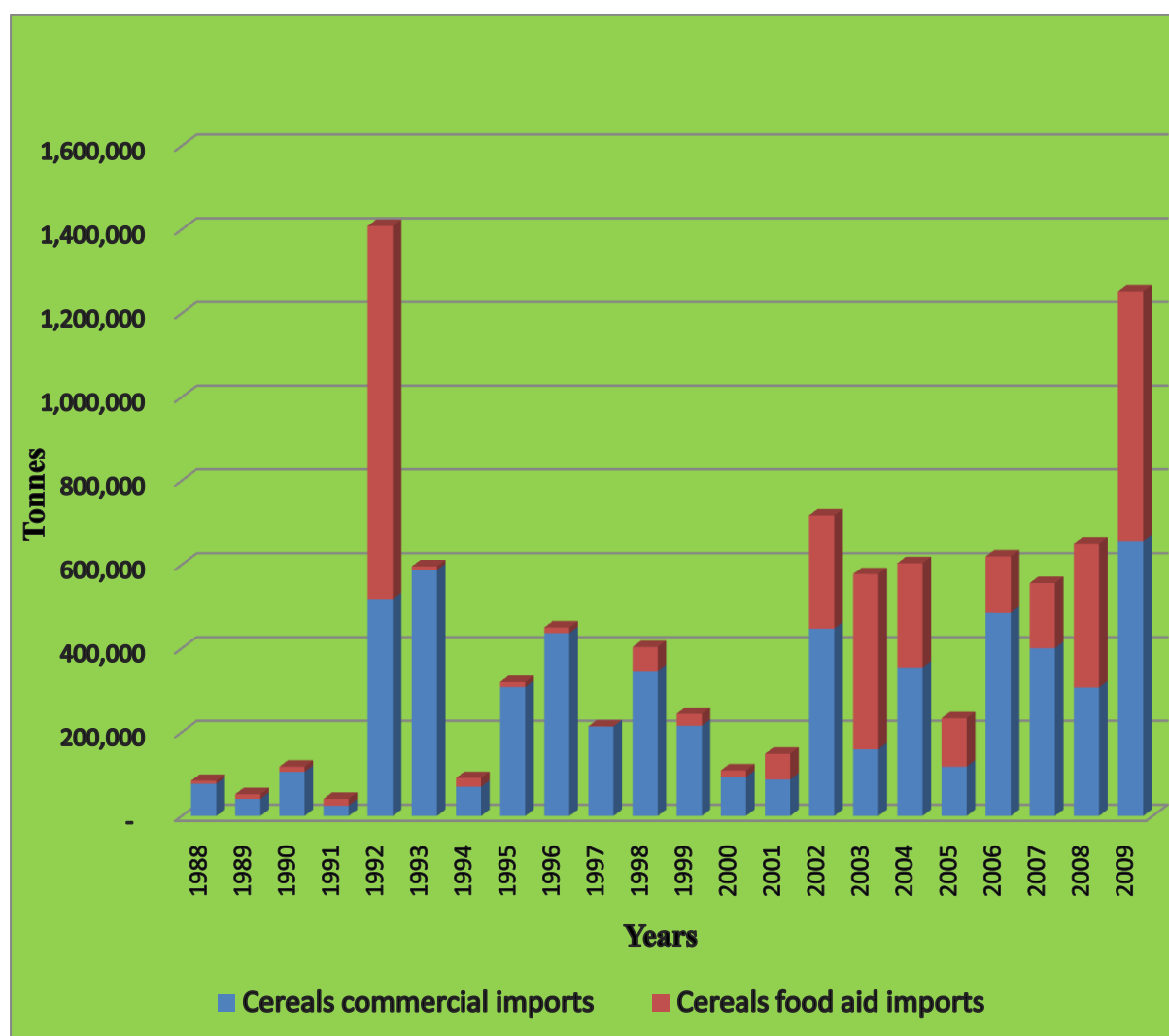


Figure 2.5: Zimbabwe's yearly cereal import quantities (commercial and food aid)

Source: FAOSTAT, FAO Statistics Division (2011)

Figure 2.5 shows that besides the year 1992, the volumes of food aid as a share of cereal imports up to the year 2000 have always been significantly lower than the share of commercial food imports. From the year 2001, the share of food aid in the total volume of cereal imports in the country has been rising. A possible explanation for this rising trend in the share of food aid quantities are droughts and dry spells experienced in the country in

2000/01 and the fast track land reform programme of 2000 as has been already mentioned above.

Also, from around the year 2001 up until 2009, the Government of Zimbabwe has had a monopoly on cereal imports; hence much of the imports in Zimbabwe occurred through its parastatal, the Grain Marketing Board (GMB) (FAO, 2011). The import capacity in Zimbabwe, therefore, was basically determined by the ability of the Government to import (in terms of total export earnings, amount of foreign currency available and/or ability to acquire goods on credit) as well as the willingness to import food by rearranging its priorities for food imports vis-à-vis other imports such as fuel, electricity, chemicals (FAO, 2009). Of which during that same period 2000 to 2009, Zimbabwe faced many challenges among which hyperinflation, shortages of foreign currency, political and economic instabilities which rendered the Grain Marketing Board unable to performance its duty of supplying the nation food to meet the population's food requirement.

Total utilisation of cereals is estimated at about 2.09 million tonnes per year including 1.7 million tonnes for direct human consumption; however, commercial imports in the country are still restricted by financial liquidity constraints (FAO, 2010). Given the grain market liberalization since the beginning of the 2009 marketing year, the private sector has been expected to play a major role in imports of maize (as whole grain or milled), wheat and rice (FAO, 2009). The GMB has been given the role of being the buyer of last resort, setting floor prices for the grains in the market and is also expected to act as a private miller/trader but it lacks financial assets. However, given their infrastructure and vast network, the GMB may be able to cater for certain niche markets, either as a private or public importer to help improve food availability in the country.

2.8 Conclusion

Food aid on the global scale has been declining most recently as literature has shown, and the dominant food aid category in terms of its volume is the emergency food aid, which is mainly given in response to natural or man-made disasters and emergencies in affected nations. Programme food aid on the other hand, which has a development orientation has declined and literature attributes this decline to a change in policies of the food aid donor countries as well as the fact that programme food aid has been evaluated as not having been very effective in fighting poverty in recipient countries.

In terms of food aid and food production capacities in Zimbabwe, the conclusions that can be drawn from the literature are that there has been poor performance in Zimbabwe's agricultural sector which has necessitated an increase in and continual need for humanitarian assistance over the past decade. Various factors have been attributed to this poor performance of the agriculture sector, chief among them being the economic, political and persistent climatic instabilities experienced in the country. The persistent droughts, poor producer prices for the main food crops and the government's lack of foreign currency to import production inputs have also played a significant role in negatively affecting the level of food production and food availability thereby increasing vulnerability in the country. Various Non-Governmental Organisations have been working together with the local government in programme aimed at boosting agricultural production and ensuring food security in Zimbabwe. An example from the discussed literature is the FAO Emergency Coordination Unit which has been actively involved in implementing these programmes.

Lastly, the poor performance of Zimbabwe's agriculture sector and the shortage of foreign currency have not made it easy in the last decade for the then sole purchaser of grain imports, the GMB, to adequately import quantities of food needed to satisfy the nation's food import requirement. Literature reveals as discussed in the chapter, that the import capacity in Zimbabwe is determined by the ability of the government to import; and the willingness to import food by rearranging its priorities for food imports against other necessary imports such as fuel, electricity among others. However, the liberalisation of the grain market beginning 2009 has allowed the involvement of the private sector to step up and import food which has eased the situation in the country and made food available. The expectation of this liberalisation is that it continues to yield positive outcomes as far as stabilising the availability of food in the country, thereby reducing vulnerability even in times of disasters.

CHAPTER THREE: LITERATURE REVIEW OF FOOD AID AND ITS EFFECTS ON FOOD PRODUCTION AND IMPORTS

3.0 Introduction

This chapter presents a critical and thorough literature analysis of the three key study variables; food aid, food production and commercial food imports. The critical reviews of the empirical studies on the impact of food aid and of the theoretical effects of food aid are discussed thereafter. The chapter ends by summarising the insights revealed from the review of literature in the chapter and a conclusion is drawn.

3.1 The Food Aid, Food Production and Food Security Conceptual Framework

Food aid is in fact a widely debated developmental topic and such debates have given rise to the existence of three schools of thought regarding its resultant effects (Mabuza *et al.*, 2008). Mabuza *et al.* (2008) argue that the general belief is that food aid has disincentive effects, whereas the counter belief is that food aid instead comes with contributory effects to agricultural development. First school of thought is where recent reviews indicate that economic studies on the impact of food aid are often inconclusive about the extent of disincentives for local agricultural production, markets and trade and these findings of previous analyses remain heavily contested (Mabuza *et al.*, 2009). More systematic literature reviews have also typically found that the evidence is inconclusive or ambiguous about either direct disincentive impacts on markets and production or indirect effects through policy dependency on budgetary support (e.g. Clay and Singer, 1985; Maxwell, 1991; Clay *et al.*, 1996; Mohapatra *et al.*, 1999).

The second school of thought is where we have the food aid critics arguing that the giving of food aid can be queried on the grounds that it weakens the resolve of less developed countries' governments to mobilize domestic savings and that it is positively harmful to the economic development and growth of the recipients (e.g. Schultz, 1960; Cathie, 1989; Farzin, 1991; Gelan, 2007). The negative developmental effects of food-based interventions on agriculture and rural communities are also a persistent theme in the reports of developmental professionals and relief workers working closely with agriculturalists, and in poor rural communities (Timmer, 2003). These highly critical professional judgments raise serious issues about the actual practicalities of food aid use and the effectiveness of food aid modalities (OECD, 2005).

Food aid advocates who form the third school of thought, have on the other hand argued that food aid can be beneficial to the recipient countries in that it is a form of intervention which creates “win-win” opportunities by stimulating agricultural development and thus income growth in poor, agrarian nations, thereby creating markets for future commercial exports by United States food producers and other donors (e.g. Lavy, 1990; Barrett, 1998; Lowder, 2004; Abdulai *et al*, 2005; Barrett, 2008; Mabuza *et al*, 2008).

The overall purpose of food aid is to bridge the gap between food access and food needs, thereby preventing asset depletion and promoting asset build-up among households (Barrett, 2002). Yet food aid has other unintended impacts. Barrett (2008) categorises the potential impacts of food aid into intended (short run) and unintended (long-term) effects as shown in Figure 3.1. The most common unintended impact of food aid is development of a dependency by the recipients.

Dependency can be classified into two categories; positive and negative dependency (UNECA, 2007). Positive dependency occurs when individuals, communities or organizations are helped in meeting their basic needs when they otherwise could not and their only alternative is destitution. Dependency is not necessarily an undesired outcome especially for households that cannot support themselves. In which case, dependency enhances the welfare of the vulnerable people and is desired in that sense. On the other hand, negative dependency arises when individuals, communities or organisations are helped in meeting their current needs at the expense of reducing the recipients’ capacity to meet their future needs without external relief (UNECA, 2007).

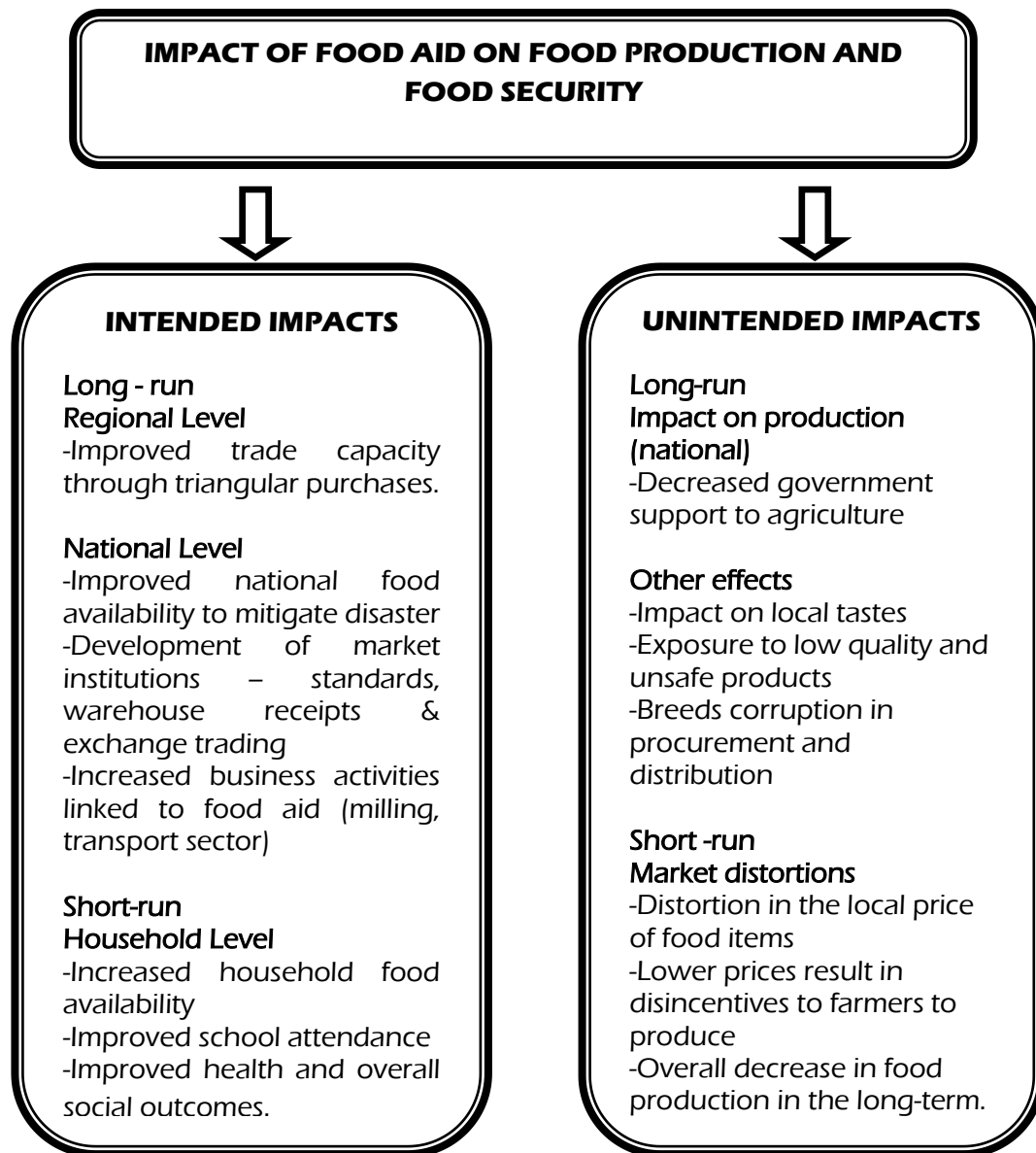


Figure 3.1: Intended and unintended effects of food aid

Source: Adapted from Barrett (2008)

The negative impacts of food aid arise usually when individuals who are expecting some assistance, in kind or cash, resort to behaving in a more risky manner than they would have behaved if they were not expecting any relief (Mabuza *et al.*, 2008). Such changes in behaviour that lead to negative dependency are termed “moral hazard” (Jooma, 2005). This leaves the household more dependent on food aid than they would otherwise have been. At household level, the common unintended impact of food aid is the growing dependency the households develop. At the national level, the government relaxes in supporting the

agricultural sector and the outcome is that agricultural production decreases. Other negative impacts of food aid are related to market distortions (Barrett, 2006).

These unintended impacts of food aid also have effects on food security implications that are felt at household, national and regional levels (Barrett, 2008). Figure 3.1 has summarized the possible effects of food aid under each of these categories, that is, at household, national and regional levels. By increasing the supply of food in the affected communities, for example, food aid could improve food availability at household and national levels but could dampen prices, create dependency, and lower production.

3.2 Evidence of the impact of food aid in recipient countries: A critical review of empirical studies

This review focuses on the impact of food aid on agricultural production and on commercial imports. The evidence of either disincentive effects, positive effects or non-conclusive effects that may have been found to exist in previous studies is thus revealed.

Lowder (2004) postulates that disincentive effects may result from targeted food aid for various reasons. Firstly, the poor may receive more food aid than they need and sell the excess on the local market. Secondly, targeted food aid (which is intended only for the poor) may be distributed to the non-poor who otherwise would have purchased such food. These “unneedy” recipients will accept the free food and decrease their purchases of food from local markets. This translates into decreases in the quantity of food demanded in the market, and to local producers it means lost sales. But one could argue that the food aid recipient will purchase other goods locally as a result of the funds freed up by the food aid receipts.

The disincentive to the staple food producer is, nevertheless, very real and may cause local farmers to move to activities other than food production as their market shrinks; the end result is decreased local production and, unless the country experiences economic growth which allows it to import food, it will become dependent on food aid. The degree to which targeting is not successful in preventing market disturbances determines the extent of disincentives (Lowder, 2004). Many studies have examined the success of food aid targeting and most suggest that targeting is unsuccessful to a greater or lesser extent (Coke, 2009).

3.2.1 Impact of food aid on agricultural production

Mohapatra *et al.* (1999) attribute the ambiguity of the existing evidence on the impact of food aid on recipient countries to the cancelling out of both the positive input and negative output market effects of food aid on the domestic agricultural economy. Mohapatra *et al.* (1999) argue that the net effect of food aid on the recipient's economy is analytically ambiguous because the outcome depends upon diversity in the recipient countries investigated and specific food aid programme characteristics.

Mabuza *et al.* (2008) argues that food aid on its own does not have a negative effect on Swaziland's agricultural production at household level. Their study revealed that even though farmers are being encouraged to shift towards drought tolerant crops, observations reflect that instead of growing such crops, farmers have opted to scale down on their land utilization for agricultural purposes and have ignored the production of drought tolerant crops whilst they continue to rely on food aid to reduce the food gap.

Mabuza *et al.* (2009) investigated the impact of food aid on maize prices and production in Swaziland using secondary national data from 1985- 2006 to measure the impact of food aid using the reduced form market equilibrium model which consisted of maize quantity and maize producer price functions using the two stage least squares (2SLS) method. The analytical results revealed that food aid received by Swaziland does not lower the prices of domestic maize and has no significant negative effect on the quantity of maize produced in subsequent seasons. Lowder (2004) also shows from a cross-country panel data analysis that there is no significant disincentive effect on production, irrespective of whether programme or targeted food aid was analyzed.

In terms of evidence of positive impacts of food aid on recipient countries domestic agricultural production, Lavy (1990) came to the conclusion that there is a positive association between food aid and food production based on the empirical data of sub-Saharan African countries. Lavy (1990) argues also that the key issue that emerges from the analysis of the impact of food aid is not whether food aid is good or bad, but how it can be used to promote economic development and improve the nutrition of the food insecure.

Abdulai *et al.* (2005) explored the dynamic relationship between food production and food aid by examining the vector autoregressive (VAR) characteristics of the two variables at the national level. Their results showed that past values of food output affected current levels of

food aid specifically that, the negative and statistically significant coefficients of food production indicate that increases in food production tend to reduce food aid shipments in subsequent periods, while declines in food production are accompanied by increased supplies of food aid. Farzin (1991) and Gelan (2007) also concluded that the evidence of their studies supported the disincentive hypothesis originally put forward by Schulz (1960) who argued that food aid has disincentive effects on the recipient country in terms of its production.

Mohapatra *et al.* (1999) note that it is worth emphasizing that food aid is a marginal resource and is not adequate as the primary means of attacking poverty and hunger in poor developing countries. Its overall impact on the recipients' economic and social development depends on various political and economic institutional factors (Awokuse, 2010).

3.2.2 Impact of food aid on commercial food imports

Relative to the empirical literature on food aid disincentive effects on local production, the issue of food aid's potential to displace commercial food imports remains an empirical question that requires more attention. Little empirical evidence exists on the relationship between food aid and commercial food trade (Cathie 1981; Barrett 1998; Barrett; 2002). The existing empirical literature on the relationship between food aid and commercial food trade has focused primarily on the issue of whether food aid displaces commercial food sales.

It is plausible that targeted food aid displaces imports less than programme food aid does since recipients of targeted food aid are, given effective targeting, those people who have low purchasing power and who therefore are unable to purchase food imports. There are few studies that examine the impact of targeted food aid on imports. Targeted food aid is often monetized or sold on the market in a recipient country; this practice likely makes targeted food aid more similar to programme food aid in its impacts on imports (Lowder, 2004). In a study of targeted food aid that is monetized, Herman *et al.* (1992) find evidence that the effect of the food aid depends on how the recipient government uses revenues generated from monetization; government subsidies of demand for food lead to increased imports whereas stimulus of food supply leads to decreases in imports.

The FAO's (2001) "Principles of Surplus Disposal and Consultative Obligations" requires that food aid should not displace commercial food imports, but should be additional to the Usual Marketing Requirement (UMRs). Were food aid to flow exclusively to those who would otherwise go hungry, and only in amounts and forms such that those needy recipients

did not correspondingly reduce their own production or commercial purchase of food, then food aid would be wholly additional. The term “additionality” is thus central to discussions of food aid efficacy, for one key objective of food aid is to add as much as possible to the food consumption of the poor (Barrett, 2002). This is entirely consistent with the UMR requirement under the FAC, although the UMR exists primarily to defend commercial trade markets.

Nevertheless, this has not been the case as several recent studies have shown that food aid is only partially additional (approximately 30- 60 percent) as it displaces a significant amount of commercial food imports by recipients (Clay *et al.*, 1998; Barrett, 2002). The available empirical evidence on food aid effects on trade suggests that it partially displaces commercial food imports (Clay *et al.*, 1996; Barrett *et al.*, 1999; Abbott and McCarthy, 1982).

The commercial food import displacement effect results entirely because the extra increment of income received by the recipient comes in the form of food. But there may be important dynamic income multiplier effects. Food aid may improve recipient nutrition, thereby creating human capital and improving physical and cognitive performance (Tschirley *et al.*, 1996). Food aid may also provide scarce working capital for productive investments, precisely because it displaces some contemporaneous food purchases, thereby relieving the recipient’s budget constraint. No matter the channel, there is good reason to hypothesize that food aid can have dynamic income multiplier effects among recipients (Mabuza *et al.*, 2008). In that case, induced increases to future income should stimulate future demand for food.

The combination of short-term displacement of commercial food purchases and stimulus of long-term (demand for and thus) purchases of food prompted Barrett (1998) and Barrett *et al.* (1999) to hypothesize the existence of a J-curve effect of food aid on commercial food imports by recipients. The hypothesis holds that commercial purchases initially fall due to less than one-for-one additionality, but they then recover and ultimately surpass the *ex ante* level due to dynamic income multiplier effects. If food aid also helps to shape consumer preferences for the imported foodstuff instead of indigenous foods, this could further reinforce the dynamic trade gains resulting from food aid.

In an empirical study using data from 18 recipient countries, Barrett *et al.* (1999) tested the hypothesis that a J-curve effect exists between food aid shipments and commercial food trade volumes. Their results showed that commercial imports in the recipient countries fell in the

short run since it was initially displaced by food aid; but the commercial food imports by recipients increased in the long run due to dynamic income multiplier effect. That short run fall in commercial imports was empirical support for the J-curve effect.

Food aid receipts consistently replace 60-80 percent of the commercial food imports recipient economies would have made (Barrett, 2002). Barrett (2002) argues that the proper targeting of food aid distribution plays a key role in determining if food aid displaces commercial food imports by recipient countries. This implies that when food aid is well targeted, it would be less likely to displace commercial food imports.

3.3 Effects of food aid in theory: A critical review of theoretical approaches

Food aid may have effects on local production and commercial imports in the short as well as in the long run. Those effects depend on the answers to a number of questions: what would the supply of food look like in the absence of food aid, how well integrated are the world food markets, do the particular food items included in food aid complement or substitute for items supplied from other food sources, where is the food procured, what do the government and consumers of the recipient country do with the resources freed by food aid, and so forth. Bhagwati (1986) and Srinivasan (1989) have shown how the effects of food aid can be analyzed in a two-sector general equilibrium model. The following is an attempt to demonstrate how, in the simplest possible manner, one may think about the short-run effects of an inflow of food aid on local production and commercial imports of food. Thereafter, potential long-run effects are discussed.

3.3.1 Effects on the market for food in recipient countries in the short run

In Figure 3.2, local food output is represented by a vertical line denoted S , in order to reflect the almost non-existent possibilities for local agriculture to adapt its output to price changes in the short run. Domestic food demand is represented by the demand curves denoted D_0 and D_1 , which are downward-sloping, reflecting the assumption that the lower its price the more food is likely to be demanded (Belfrage, 2006). D_0 represents the original demand curve and D_1 denotes the new demand curve showing a change in demand. According to Belfrage (2006), if the transport-cost-inclusive price of imported food is low enough for consumers to want more than the sum of local output and food aid, and if the recipient country is too small in economic terms to influence world market prices, then there will be a supply of commercial food imports, which can be illustrated by the horizontal line drawn at the price p^*

in the figure. That will also be the price that local producers receive and the per-unit market value of any food aid received.

Regardless of whether the items included in food aid are sold in local markets (as in the case of programme aid) or whether they are distributed for free to individual consumers there, they constitute an addition to the supply of food in the recipient country, which is denoted A in Figure 3.2. Receipts of food aid can thus in the absence of commercial imports be expected to cause a fall in food prices in the recipient country or, if commercial imports are present, have no impact on food prices but cause a reduction in commercial imports.

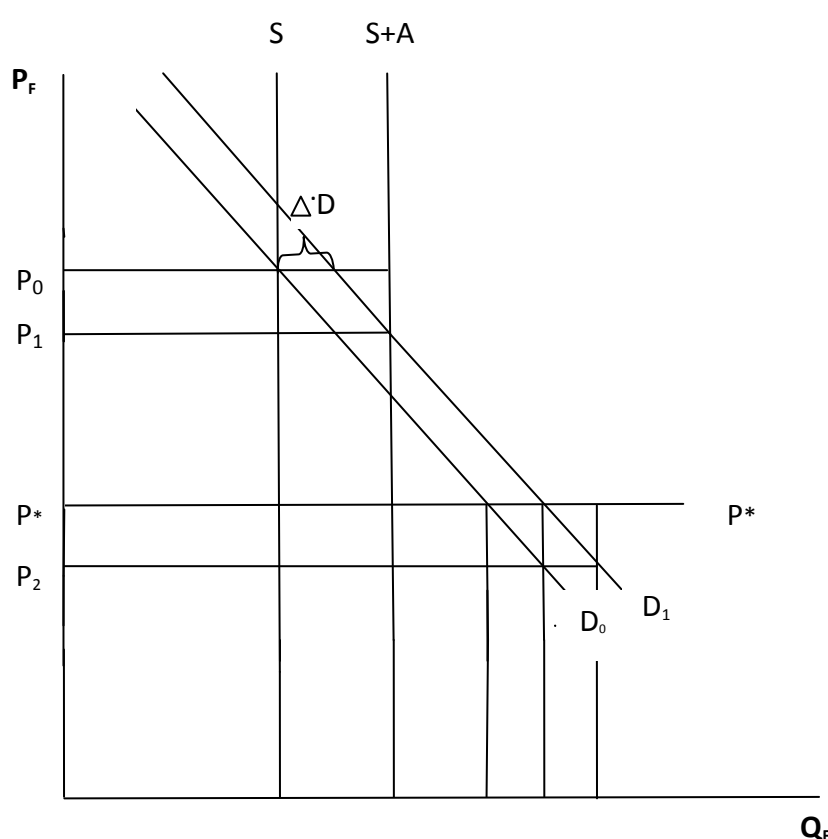


Figure 3.2: Short-run effects of food aid in the recipient country food market

Source: Adapted from Belfrage (2006).

The extent of those effects of food aid on food prices or commercial import quantities will however be determined by its effects on demand. If the food included in aid shipments is sold on the market by the recipient government, additional government revenue is created and an increase in the incomes of some local residents can be expected. To the extent that this additional income is devoted to food, the demand curve shifts to the right (as illustrated by

the horizontal difference ΔD between the curves D_1 and D_0 in Figure 3.2). The same kind of effect can be expected from food aid that is instead directly distributed to households in the recipient country (as is common in the cases of project and particularly emergency aid). Since the food that is received makes it possible to reduce market purchases, households can also under these circumstances be said to have received an addition to income that to some extent may be spent on food.

The increase in demand (at constant prices) that follows a food-aid-induced increase in food supply is sometimes referred to as additionality. It can be expressed as the ratio between the demand shift (ΔD) and the inflow of food aid (A), which is a little less than 50 percent in Figure 3.2. How close to full (100 percent) additionality is reached will primarily depend on who ends up with the extra income that food aid brings (targeting) and when that income arises (timing). Should the government, for instance, distribute the revenue from food aid sales (or directly distribute the food received as aid) to the very poorest at a time when their incomes are particularly low (so that they are on the brink of starvation), there will be very close to full additionality and very small effects on food prices or commercial import quantities.

To summarize, in Figure 3.2, the inflow of food aid A , giving rise to some but not full additionality, would cause a fall in the price of food from p_0 to p_1 if there are no commercial imports. If commercial imports are available at the transport-cost-inclusive price p^* , that price will prevail both with and without food aid, and the entire adjustment to food aid comes as a reduction in imports equal to the difference between food aid and the additional demand that it creates. If, however, the recipient country government fulfils demands from donors to ensure that the inflow of food aid does not lead to a reduction in commercial imports (according to the "usual marketing requirements" dictated by international agreements on food aid), there will be a negative effect of food aid on food prices (from p^* to p_2 in Figure 3.2).

The simple analysis carried out so far thus implies that in the presence of commercial imports, food prices in the recipient country will be unaffected by food aid, unless the recipient country is forced to ensure that pre-aid import levels are maintained (Barrett, 2002). An important implicit assumption is that the actual food items included in local production, commercial imports and food aid are identical or at least viewed as perfect substitutes by consumers in the recipient country (that is, food is viewed as a homogeneous good). If, in

practice, there are significant content differences, the effects of food aid will depend on (i) how close substitutes the items included in food aid are to the contents of local production and commercial imports, and (ii) how the additional income inherent in food aid affects the demand for locally produced and commercially imported food items (Barrett, 2006). If, for instance, the contents of food aid are closer substitutes for local production than for commercial imports, and only a small part of an addition to income would be devoted to locally produced food, then it is reasonable to expect a downward pressure on prices received by local producers also in the presence of commercial food imports.

Furthermore, the conclusions drawn do not take into account the fact that the cost of imported food may vary between regions in a recipient country. In practice, while some regions may have to rely completely on local production and food aid due to prohibitively high transport costs for imported goods, other regions (perhaps with better access to ports or road networks) may be able to engage in commercial imports at reasonable cost (Barrett and Maxwell, 2005). In some countries, it may therefore be possible to observe a mix of the expected effects on food prices and commercial import quantities (Mohapatra *et al.*, 1999)

3.3.2 Effects on net incomes from agricultural production in the short run

If an inflow of food aid leads to lower food prices, a fall in agricultural sales revenue accruing to recipient country farmers can be expected. It is, however, far from self-evident that a fall in food prices caused by food aid will lead to a fall in their net income, even in the short run.

Through effects on costs as well as the use of freed resources, food aid might actually increase net farm incomes in the recipient country. The costs of agricultural production could in theory fall more than food prices, as shown by Mohapatra *et al.* (1999). If agricultural labour is paid with food (or if wages are indexed to food prices), labour costs will fall as much as food prices. If exchange rates are highly sensitive to changes in import quantities, for instance, in the presence of balance of payments problems, then food aid which replaces commercial imports may carry the added benefit of significantly reducing the costs of importing inputs such as fertilizers and equipment.

Aside from the just mentioned direct effects on labour and input costs, food aid may also affect the costs of agricultural production indirectly through reductions in the overall demand for intensively used resources. An even more indirect manner in which food aid could raise

the net incomes of recipient country food producers, as pointed out by Lahiri and Raimondos (1996), exists in the many cases where recipient countries have tariffs on industrial imports. Those tariffs make industrial production expand, which puts upward pressure on the costs of resources that are useful for both industrial and agricultural production. The industrial import tariffs thus do harm to food production by raising its costs, but they constitute a difficult to replace source of public revenue. By reducing the recipient government's need for tariff revenue, food aid can therefore indirectly support local agriculture by facilitating a tariff removal.

3.3.3 Effects on the market for food in recipient countries in the long run

In those cases where receipts of food aid do end up causing lower net incomes from agricultural production in the short run, there may be effects on output in the longer run (Abdulai *et al.*, 2004). If farmers have adaptive expectations, in the sense that low prices this year are seen as indications of low prices in coming years as well, land improvement and cultivation efforts may be reduced (Gelan, 2007). Furthermore, credit market imperfections may make current agricultural investments sensitive to current farm incomes. Belfrage (2006) asserts that if such links between short-run income declines and long-run output are important, a dependency on food aid could arise (at least if food aid does not contribute to sustained expansion of other economic activities).

A key factor is the utilization of the additional resources made available to the country through food aid. Prominent, at least among the official purposes of the non-emergency forms of food aid, is the promotion of food production in the recipient country (Yamano *et al.*, 2005). As already mentioned above, food aid provides an opportunity to finance trade policy reforms that would reduce the discrimination of agricultural production, which often prevails in developing countries. One alternative use of the freed resources is to invest them in improvements of rural infrastructure such as roads, drainage and irrigation – common features of project food aid (Awokuse, 2010). Another is the development of and/or provision of information about more effective production methods. If well selected and implemented, such uses of the resources added or freed by food aid have the potential of raising future agricultural productivity in the recipient country (Abdulai *et al.*, 2005). Under the right circumstances, one may hence expect positive long-run effects of food aid on local food production (Barrett, 2008).

Receipts of food aid may also have long-run effects on food demand. If the food items of which the aid consists, differ from locally produced foods and if the free sample of for example, foreign cereal types, leaves a taste for more, there may be a long-run shift in demand from locally produced toward imported food (Barrett, 2002). If, on the other hand, successful targeting yields improved nutrition (and thus improved bodily strength, avoidance of disease and disabilities, as well as improved school attendance and learning), productivity improvements may follow and eventually local food demand will rise (Abdulai *et al.*, 2004).

3.4 Insights from the literature review

From the conceptual framework, the desired purpose/impact of food aid is to bridge the gap between food access and food needs, thereby preventing asset depletion and promoting asset build-up among households. However, from the conceptual framework also food aid has unintended impacts such as depressed government support, lower producer prices resulting in disincentive to farmers to produce and an overall decrease in food production in the long-term.

A critical review of empirical studies provides evidence on the impact of food aid on agricultural production and on commercial food imports. Evidence on the impact of food aid on agricultural production varies from being ambiguous or inconclusive, to having a negative or disincentive effect and lastly, evidence indicates that food aid can have a positive impact as well on agricultural production in the recipient country. Evidence from the literature also suggests that the impact of food aid on agricultural production depends on factors such as the political and economic institutional factors in the particular countries under analysis. Evidence of the impact of food aid on commercial food imports on the other hand indicates that food aid has also had both positive effects and disincentive effects by displacing imports in recipient countries depending on factors such as the composition of the food aid basket with respect to the commercial import basket.

The critical review of the theoretical approaches as presented in graphical demand and supply illustrations have shown clearly the economic effects of food aid in theory. If food aid could be perfectly additional, there would be no trade distortions. Economic theory offers the clear prediction that income transfers in the form of food will not prove wholly additional in the short-term because food is a normal good characterized by relatively low income elasticity of demand among all but the poorest subpopulations in the world. Theory suggests also that

food aid is expected to have no effect on local food output in the short-run reflecting the almost non-existent possibilities for agriculture to adapt its output to price changes which may have been caused by food aid. In the long-run however, theory contends that food aid may discourage domestic agricultural production in the case where farmers have adaptive expectations, in the sense that low prices this year are seen as indications of low prices in coming years as well. In the short-run, food aid in theory is expected to have the effect of reducing commercial food imports but in the long-run is expected to increase local food demand and hence increasing the recipient country's commercial food imports.

3.5 Conclusion

The methods used in this study are based on the theoretical underpinnings presented in this chapter. The research objectives related to the effect of food aid on agricultural production and commercial imports were drawn from what the theory of food aid and its effects on food production and imports stipulates would be the short and long-run effects of food aid on agricultural production and commercial imports in the recipient countries. The theory stipulates that food aid is not expected to affect agricultural production in the short-run in any way, whereas in the long-run food aid could foster disincentive effects on the level of agricultural production. For commercial food imports, from theory, food aid is expected to negatively affect recipient country commercial import volumes (or displace them) in the short-run, whereas in the long-run food aid provides a long-term stimulus to food import demand in recipient economies due to increased local demand for food.

CHAPTER FOUR: DESCRIPTION OF STUDY AREA AND RESEARCH METHOD

4.0 Introduction

This chapter is presented in two parts. The first part of the chapter presents a description of Zimbabwe, which is the study area. The chapter begins by describing the geographical setting in the country, then moves on to a description socio-economic setting and lastly a sector by sector break down of the economy is discussed. The second part of this chapter describes the research methodology used in this study.

4.1 Geographical Settings of Zimbabwe

Zimbabwe is a landlocked country in Southern Africa and the country lies between the Zambezi River on the North and the Limpopo River on the South, which are its main drainage systems. Zimbabwe is bounded on the North and East by Mozambique, on the South by South Africa, on the South West by Botswana, and on the North West and North by Zambia (FAO, 2011).

The country lies almost entirely over 1 000 feet (300 metres) above sea level. Its principal physical feature is the broad ridge running 400 miles from Southwest to Northeast across the entire country, from Plumtree near the Botswana frontier through Gweru and Marondera to the Inyanga Mountains, which separate Zimbabwe and Mozambique (McArthur, 1992). About 50 miles wide, this ridge ranges in altitude from 4 000 to 5 000 feet, until it eventually rises to 8 504 feet (2 592 metres) at Mount Inyangani, the highest point in Zimbabwe in the Eastern highlands.

The climate of Zimbabwe is tropical, although markedly moderated by altitude. There is a dry season, including a short cool season during the period May to September when the whole country has very little rain. The rainy season is typically a time of heavy rainfall from November to March (FAO, 2010). In years when it is poorly defined there is below average rainfall and a likelihood of serious drought in the country as happened in 1983 and 1992 (FAO, 2010).

The agricultural land in Zimbabwe is divided into five agro-ecological zones known as Natural Regions (NRs) which relate to climatic conditions, soils and to the appropriate farming systems adopted (see Figure 4.1). The quality of the land in terms of agricultural productivity declines from NR I through to NR V (Chitiga and Mabugu, 2008).

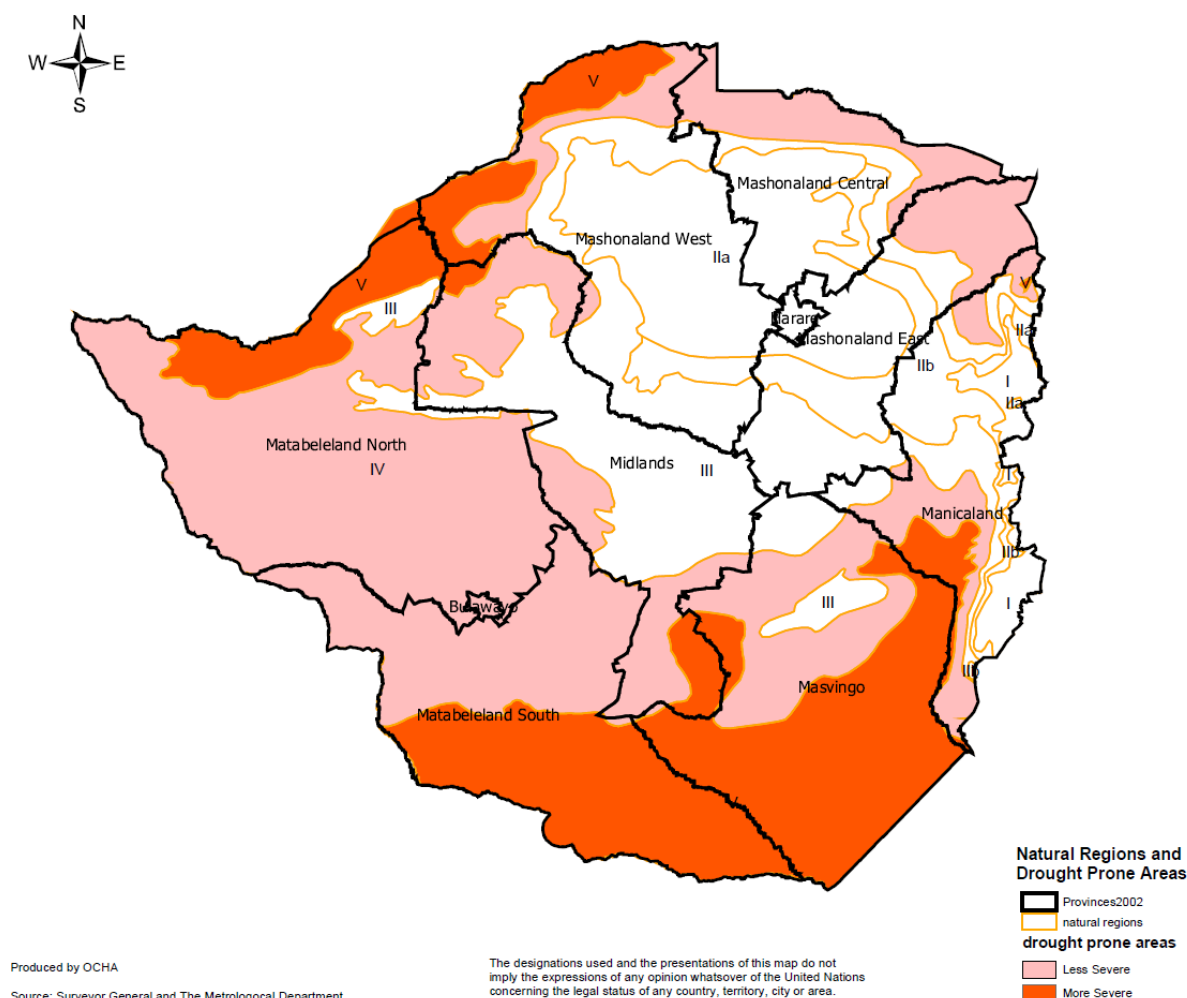


Figure 4.1: Map of Zimbabwe showing the Natural Regions and Drought prone areas

Source: WFP, (2010)

Natural Regions I and II of Zimbabwe are agro-ecologically rich regions that receive higher rainfall amounts ranging between 750 to 1 000 mm per annum (WFP, 2010). These two regions are thus suitable for specialised and diversified farming and, intensive farming. Specialised and diversified farming occurs in Natural Region I and it includes afforestation, fruit and intensive livestock production as well as tea and coffee growing (FAO, 2010). Intensive farming is practised in Natural Region II and it comprises of intensive farming systems based on crops and/or livestock production (Mudimu, 2003).

Natural Regions III and IV are drought prone regions; however, the severity of drought in these regions is less than that of Natural Region V (WFP, 2010). Natural Region III is a semi-intensive farming region which is suitable for maize, tobacco and cotton production, or

for enterprises based on crop production alone (Mutasa, 2011). Natural Region IV is a semi-extensive farming region which is subject to periodic seasonal droughts and severe drought spells during the rainy season. The rainfall received in this region is too low and uncertain for cash cropping except in certain favourable localities, where limited drought-resistant crops can afford a sideline (WFP, 2010). The farming system in this region is therefore based on livestock production, but it can be intensified to some extent by the growing of drought-resistant fodder crops (Chitiga and Mabugu, 2008).

Natural Region Five (V) is the agro-ecologically poorest region in Zimbabwe and is suited for extensive farming (Mudimu, 2003). It is located in the low-lying areas in both the north and south of the country, occupying 27% of the agricultural land. It experiences a highly erratic rainfall pattern with an average precipitation of less than 450 mm per year and as such, the rainfall in this region is too low and erratic for the reliable production of even drought-resistant fodder and grain crops, and farming has to be based on the utilization of veld alone. The commercial farmers of this region practise extensive beef production and ranching while the smallholder farmers are mostly into livestock and crop production with maize and small grains as the dominant crops (Mangoyana and Meda, 2001).

Drought is one of the most common disasters in Zimbabwe and it greatly affects both crop and livestock production in the country especially in the already drought prone Natural Regions IV and V, and the areas in these two Natural Regions are usually the target area for humanitarian assistance (FAO, 2010). These encounters with droughts and famines have also equipped the farmers in Zimbabwe with the necessary experiential knowledge to deal with the disasters, and the accumulated indigenous knowledge continues to be in use in the country (Shumba, 2001).

4.2 Socio-Economic Settings of Zimbabwe

Zimbabwe regained independence from the United Kingdom in 1980. From then on until 2009, the country has had an exclusive government led by one ruling party, but in 2009 there was the formation of a new power-sharing regime; the Government of National Unity (GNU), which is an inclusive government which was formed following elections of 2008 (GoZ, 2009). Zimbabwe is a semi-presidential system republic, which has a parliamentary government. Under the constitutional changes in 2005, an upper chamber, the Senate, was reinstated and the House of Assembly is the lower chamber of the Parliament (IMF, 2010).

Zimbabwe has a population of 13.1 million people, according to FAO (2011), and there has reportedly been a significant amount of out-migration of people from the country particularly into South Africa and overseas since 2003. This has resulted in the loss of skilled labour and negatively impacting on the country's own economic growth. According to World Bank (2010), Zimbabwe has a population density of 32.68 people per square kilometre. In terms of population distribution, urban population makes up 30% of the total country population, peri-urban population is 6% of the country population and the rest is rural population (64%).

The high prevalence of HIV/AIDS, especially in the rural population, remains one of the constraints to optimal production, further subjecting the rural population to vulnerability and food insecurity. FAO (2010) reported that household food security in general improved markedly in 2009 as compared to the previous year's mainly due to the improved production in most areas and because of the liberalisation and stabilisation of the economy which made more goods, food, and cash available.

Zimbabwe suffers from a low life expectancy of 39 years of age and a high infant mortality rate of 126 per 1 000 live births (FAO, 2011). In addition to these health issues, 39% (5.1 million people) of Zimbabwe's overall population is estimated to be malnourished (FAO, 2011). Recent findings by FEWSNET (2011) indicate that despite the relatively stable macroeconomic environment and some economic growth experienced in Zimbabwe in the last two consecutive years (2009 and 2010) which ensured stable food availability, poverty levels remain relatively high and low incomes and high levels of both unemployment and underemployment continue to constrain the ability of poor households to access adequate food. There has been little change in social conditions with the poverty rate currently estimated to be more than 70% and since 2006 unemployment and poverty levels have increased sharply (IMF, 2010). Zimbabwe was rated 173rd out of 187 countries with comparable data on the Human Development Index in 2010 ranking it among the countries with low human development (UNDP, 2010). These observations are in line with Zimbabwe's calculated high Gini-coefficient of 50.1% (UNDP, 2009 estimate) which indicates high income-inequality and thus a relatively high number of people who are vulnerable to food insecurity in the country.

Zimbabwe had always maintained positive economic growth throughout the 1980s (5% GDP growth per year) and 1990s (4.3% GDP growth per year). However, the economy declined from the year 2000: 5% decline in 2000, 8% decline in 2002, 18% decline in 2003 and has

been declining until recently in 2009 (FAO, 2010). The trend has therefore been that annual economic decline continued year-on-year for nearly a decade as there was a continual negative growth in the country's real gross domestic product (GoZ, 2009).

The adoption of multiple currencies, which has resulted mainly in the use of the United States Dollar, the South African Rand and the Botswana Pula, has left the central bank with limited control on money supply and inflation (IMF, 210). The establishment of the Government of National Unity in February 2009 and the adoption of macroeconomic stabilisation policies including this multi-currency regime have since been linked with some signs of economic recovery in the country following years of economic destabilisation (IMF, 2010).

4.3 The Structure of the Zimbabwean Economy

Agriculture is the mainstay of Zimbabwe's economy and over three quarters of the population derive their livelihood from agriculture and related activities (All In Diary, 2009). Zimbabwe offers increasing trade and investment opportunities in both productive activities and services, particularly in horticulture and tourism that have exhibited exceptional growth in many years (Mudzonga and Chigwada, 2009). Zimbabwe's exports are predominantly agricultural commodities, minerals and low value-added goods (GoZ, 2000).

Very strong linkages exist among the agricultural, manufacturing, mining and commercial sectors. Due to these intricate linkages, economic growth patterns during the last few years have been significantly influenced by drought (Mutisi, 2009). Whenever the agricultural season was good, the performance of the other sectors was correspondingly good and *vice versa*. During the last decade, the whole Southern African region has been subjected to recurring droughts (WFP, 2010). The economy has been facing severe challenges, with the annual real GDP growth suffering declines averaging -5.9% since 2004. The deepening economic crisis was reflected in sectoral performance, which followed the same trend (GoZ, 2009). Since 2006, virtually all sectors recorded declines in output, with agriculture, manufacturing and mining estimated to have declined by 7.3%, 73.3%, and 53.3% respectively in 2008 (Ministry of Industry and Commerce, 2011). The sections following give detailed explanations of the sector by sector performance in Zimbabwe.

4.3.1 Manufacturing

Zimbabwe has a diversified manufacturing sector producing a wide range of commodities ranging from food and beverages to chemicals, clothing and metal products of all kinds (GoZ, 2009). The Zimbabwean manufacturing sector was developed under import substitution industrialization policies of the white minority regimes prior to the attainment of independence in 1980 (Mudimu, 2003). The country was under sanctions from 1965 to 1980 and import substitution was used as a strategy to ensure self sufficiency for most of the basic consumer products (Rukuni *et al.*, 1994). The import substitution industrialization strategy was carried forward into the post-independence period until the adoption of the Economic Structural Adjustment Programme (ESAP) in 1991.

Despite many years of import substitution industrialization, the manufacturing sector remains highly import dependent, requiring a wide range of imported inputs ranging from packaging materials to components used in the manufacturing process (GoZ, 2000). The performance of the manufacturing sector in the post- independence period has also been mixed with brief periods of substantial growth interspersed with decline in other years. Although manufacturing's contribution to the economy has fallen to the current levels of about 12% of GDP, it remains an important sector that is critical for the economic development of the country (Ministry of Industry and Commerce, 2011). The sector employs about 15% of the total formal sector labour force and 20% of total exports in 2002 were manufactured goods (All In Diary, 2009).

The falling trend in the manufacturing sector's contribution to the GDP can be attributed not only to the drying up of lines of credit owing to a number of macro-economic reasons, but also to the impact of sanctions (GoZ, 2009). Industry itself was operating at low capacity utilisation across the board which reached record lows of 5% on average in 2008 (IMF, 2010). Furthermore, the country suffered an exodus of qualified and technical personnel who were emigrating to greener pastures in neighbouring countries (Mudzonga, 2009). The situation was made worse by the poor performance of and delivery by, utilities such as telecommunications, water, electricity and rail transport. The sum total of these woes has been the informalization of the economy, as most manufacturing seems to be booming in its informal sector (Ministry of Industry and Commerce, 2011).

4.3.2 Investment

All sectors of the Zimbabwean economy continue to be constrained by infrastructure deficits. Power generating capacity is currently lower than it was in the 1980s, with frequent and widespread power outages (Mudzonga, 2009).

Confusion and uncertainty exist with regard to laws which state that all companies with more than US\$500 000 in assets as mandated by government, must submit proposals to ensure that indigenous Zimbabweans own 51% of the business within five years (World Bank, 2010).

In 2010, Zimbabwe implemented two business reforms and the Zimbabwe Investment Authority (ZIA) was also re-launched in December 2010 with the intention of streamlining and harmonising the handling of investment proposals. The first business reform was aimed at making the opening of businesses easier, as it reduced registration fees and speeded up the name search process, and company and tax registration. The second reform was a lowering of the corporate income tax rate from 30% to 25%.

The strong export orientated sectors for investment in Zimbabwe include sectors associated with the production of minerals, tobacco, cotton, sugar, and food and beverages (GoZ, 2009). Opportunities are available both in primary production – such as food and cash crops, horticulture, livestock, poultry farming, fishing and fish farming and game and wildlife ranching - and in value addition (ZimTrade, 2005).

4.3.4 Mining

Zimbabwe is endowed with mineral wealth, which has been successfully exploited for the economic development of the country. Over 40 different minerals are known to exist and most of these have been exploited at one time or another. The Zimbabwe Government acknowledges the importance of the minerals sector to the socio-economic development of the country (GoZ, 2009). The mining sector remains very lucrative with some of the world's largest platinum reserves and relatively big diamond deposits.

The mining sector is a major contributor to foreign currency earnings of the country. The major mineral exports are gold, ferroalloys, nickel, and platinum group of metals, asbestos, coal, black granite and diamonds. These mineral commodities have huge growth potential given the country's huge mineral endowment.

4.3.5 Agriculture

Agriculture is the engine of the Zimbabwean economy. Zimbabwe has a total land area of 39.6 million hectares of which 33.3 million hectares (85%) is agricultural land and the remaining area consists of national parks, state forests and urban land (All In Diary, 2009). Because of strong forward and backward linkages that exist between agriculture and other productive activities and commercial services, the performance of the entire economy is heavily influenced by how the agricultural sector is faring (Mutisi, 2009). As a result, any positive developments in agriculture filter through to the rest of the economy and *vice versa*. As highlighted before, linkages between agriculture and manufacturing are particularly strong. The latter processes many agricultural outputs, while also supplying agriculture with many of its input requirements. Agriculture's contribution to Gross Domestic Product is at 19% (FAO, 2011).

In 2000, the government of Zimbabwe embarked on an agrarian reform programme to ensure equitable distribution of land. The programme has enabled the majority of the people to acquire land and contribute to commercial agriculture. Today, thousands of Zimbabweans, who were hitherto confined to peasant agriculture, are producing commercial export crops such as tobacco, cotton, perishable vegetables, cut flowers, oil seeds and wheat (Matondi and Dekker, 2011). Land reform has also resulted in the decongestion of areas where the land was no longer able to support the population (Rukuni *et al.*, 2006). However, Zimbabwe currently has “no” National Land Policy, but a series of statements and legal instruments that have been used to guide the implementation of the Fast Track Land Reform Programme (Matondi and Dekker, 2011). Land tenure is crucial in any future National Land Policy, for it will provide signals on how the Government of Zimbabwe (GoZ) would move the land and agrarian programme forward (Chitiga and Mabugu, 2008). The government has since 2000, enacted various policies and laws to facilitate land transfer and these include the Land Acquisition Act, the Rural Land Occupiers Act (Prevention from Eviction), Farm Machinery Acquisition, and various other guidelines (Mutisi, 2009).

Apart from tobacco, the other major agricultural exports include sugar, tea, coffee, cotton, fruit and vegetables, fresh cut flowers, seeds, maize, small grains and oilseeds. The country also exports animals and birds, beef and dairy products, wildlife and poultry meat, as well as exotic livestock meat and products. Opportunities for investment in processing and other downstream industries exist. The agricultural exports contribute 22.94% to the percentage of

total exports in the country and agricultural imports are 21.92% of the nation's total imports (FAO, 2011).

4.4 Research Method

This second part of the chapter focuses on the empirical methods that were used in this study to analyse the relationship between food aid, food production and commercial food imports. A description of the data used and the sources of the data are given. The sections following then go on to review methods used by other scholars in previous studies on the same subject of food aid and its effects. Justification for the choice of method in this study is also given and lastly, the method used in this study is described.

4.4.1 Research Data

The study relied on secondary data of national level statistics of food aid and time series cereal production data in Zimbabwe from 1988-2008. Time series data from ZimSTATS, the national source of Zimbabwean statistics were used as well as data from INTERFAIS. The World Food Programme (WFP) database and FAOSTAT, available from the internet, were accessed for food aid supply and food production data respectively for Zimbabwe. Data on the quantities of commercial food imports to Zimbabwe were obtained from the Grain Marketing Board (GMB), a government owned institution which is responsible for the country's food imports. Data for the cereal imports were obtained from the Ministry of Finance as it is this ministry of the government of Zimbabwe that pays for these imports.

Statistical tools that were employed in this study include; descriptive statistics, vector auto regression analysis, the granger causality test and impulse response functions. All data were analyzed using the Econometric Views (Eviews 7) statistical software.

4.4.2 Limitations of the data

According to Lowder (2004), in studying the relationship between cereal food aid, production and trade, the form of the study in terms of the period of study to cover and the methodology to use is largely determined by what data are available and it is unfortunate that data on food aid and cereals are far from precise and comprehensive. WFP INTERFAIS data set is unique in that it is the first data set on food aid from all donors to all recipients that has ever been compiled. Based on the criterion of completeness, the INTERFAIS dataset cannot be surpassed. There are however fundamental problems with it, one of which is the lack of any

documentation detailing the methods of data collection used in compiling INTERFAIS. Furthermore, the cereal classifications used by INTERFAIS do not correspond to those used by the FAO, so that difficulties arise in combining WFP (INTERFAIS) and FAO (FAOSTAT) data. Problems with the FAOSTAT data are also related to the enigmatic nature of the methodology used to collect and compile data (Lowder, 2004). Another problem with FAOSTAT data is that its measures of imports include food aid; if it were possible to identify the exact methodology used by the FAO in its aggregation over various commodities, then disaggregation of the FAO data into commercial imports and food aid imports would be easier.

In order to reduce these data limitations that were presented by the FAOSTAT and WFP INTERFAIS data, this study also collected data from national offices in the country such as the Grain Marketing Board and from the Ministry of Finance, data which was used in combination with the FAO and WFP data sets.

4.5 Review of Methods Used in Other Studies

Most studies relating food aid to food production and imports involve the use of market-level data from a single country (Lowder, 2004). In more recent times, the application of quantitative (empirical) modelling methods to the analysis of food aid effects has become increasingly popular. This trend has been fuelled by the increase in sophistication of statistical modelling techniques and the availability of faster and more powerful computing technology (Awokuse, 2010). In general, the quantitative modelling approaches involve the development of a theoretical economic framework that captures interactions between food aid and other economic variables (agricultural production, trade, etc.). The specific methods used in empirical analyses are diverse and are applicable to both household and national level food aid data.

The quantitative modelling framework could be either partial or general equilibrium analysis; the time dimension could be static or dynamic. The estimation technique could be parametric or non-parametric. Parametric modelling approaches account for the majority of empirical studies of food aid effects. Parametric quantitative testing methods can be classified into two categories: computable general equilibrium (CGE) and regression-based models. The regression models can be further sub-divided into the following sub-groups: static cross-sectional and dynamic time series data modelling techniques.

4.5.1 Computable general equilibrium (CGE) models

Although most of the literature on food aid impacts adopted the partial equilibrium modelling framework, the general equilibrium modelling approach is particularly relevant to the quantitative analysis of the impact of food aid on the overall economy as this usually involves multi-sector and multi-market impact analysis (Awokuse, 2010). CGE models are primarily based on linear and nonlinear programming methods and their analytical scope could entail just a single region (country) or it could be multi-region. The most pervasive and compelling models utilize methods of CGE trade analysis (Awokuse, 2010). However, the large data requirements needed for most CGE models have precluded a wider application of this approach to the analysis of food aid effects.

4.5.2. Static cross-sectional regression methods

Regression analyses are popularly used to estimate the ‘influence’ that exogenous variables have on endogenous variables. Regression-based empirical models of the impacts of food aid could be either static or dynamic. The majority of the previous regression-based studies of food aid emphasised static econometric analysis of cross-sectional data (Abdulai *et al.*, 2005). Depending on whether the dependent variable is based on continuous or categorical data, many previous studies applied the ordinary least squares (OLS) estimator and its variants such as probit and tobit models (Awokuse, 2010). In addition, fixed effect model specifications are also commonly adopted in order to account for unobserved heterogeneity issues in the data. Several cross-country level studies employed OLS models (and its variants) to examine the impact of US food aid shipments on developing countries (Hoffman *et al.*, 1994; Barrett, 2001; Diven, 2001). In cases where household (or community) level data were used, the empirical analyses often involve the application of probit and tobit modelling methods (Jayne *et al.*, 2002; Abdulai *et al.*, 2005; Yamano *et al.*, 2005).

4.5.3 Dynamic times series methods

In contrast to static regression models, a few studies investigated the dynamic relationships between food aid allocations and various economic variables (Lowder, 2004). Time series model specifications are particularly relevant to food aid data analysis as they allow for modelling the dynamic relationships inherent to food aid data available through the FAO and WFP databases (Awokuse, 2010). Time series data uses modelling techniques such as vector auto regressions (VAR) developed by Sims (1980), and co-integration and error correction

models proposed by Engle and Granger (1987). In these types of analyses, the emphasis is on testing for Granger causality and measuring the impact of market and/or policy shocks on other economic variables.

Despite the potential benefits from the application of time series modelling methods, very few empirical studies on food aid effects have explicitly accounted for the time series properties of the data used. The first empirical food aid impact study that explored dynamic issues was by Lavy (1990) who examined the validity of the claims that food aid allocations create production disincentive effects. Subsequent studies that considered VAR modelling techniques includes: Barrett (1998), Barrett *et al.* (1999), Lowder (2004) and Abdulai *et al.*, (2005). More recent studies extended dynamic time series models to panel data and also applied generalised methods of moments (GMM) modelling techniques (Lowder, 2004; Abdulai *et al.*, 2005).

The dynamic time series models have the advantage that they explore the dynamics of food aid, production and imports without requiring data on prices or other commodities; these studies use vector auto regression, as first proposed by Lavy (1990) and later utilized by Barrett (1998), Barrett *et al.* (1999) and Abdulai *et al.* (2005). Vector auto regression (VAR) involves a system of simultaneous equations; the dependent variable for each equation is regressed upon its own lags and lagged values of each of the other dependent variables.

Barrett *et al.* (1999) performed one of the first published global studies of the dynamics of food aid using empirical methods. This study by Barrett *et al.* (1999) uses VAR on food aid, production and imports; VAR allows the authors the opportunity to examine the dynamic relationships among the three variables. Conclusions on causation are restricted to causation in the sense of Granger causality. An independent variable is said to exhibit Granger causality on a dependent variable if its inclusion in an equation results in better forecasting of the dependent variable than would be achieved were it excluded from the equation. Barrett *et al.* (1999) chose the method of VAR in order to minimize specification error since VAR techniques impose the fewest restrictions possible.

VAR also gives researchers the opportunity to investigate the relationship between food aid, food production and trade variables without requiring data on prices. The variables used by Barrett *et al.* (1999) in their study are food aid, production and imports. They used annual data on USDA programme cereal food aid per capita for the 18 most frequent recipients of

U.S. food aid from 1961 to 1995. Barrett *et al.* (1999) found evidence that food aid clearly violated additionality and the statistically significant results showed that it substituted contemporaneously for imports. Using an impulse response function, the authors also investigated the dynamic results of an increase in food aid on future trading volumes. The results indicated that in the first four years, an additional kilogram of food aid per capita was expected to decrease commercial food imports. Four years after the increase in food aid, imports increased; trade appeared to have been stimulated by food aid. Production decreased and remained slightly lower after the increase in food aid. Contemporaneous correlations of food aid and production were negative, though negligible and not statistically significant.

On the other hand, Abdulai *et al.* (2005) also explored the dynamic relationship between food production and food aid by examining the vector autoregressive (VAR) characteristics of the two variables at the national level.

Awokuse (2010) notes that overall, the choice of modelling methods in the analyses of food aid effects should be informed by the nature of the research question and the tested hypotheses. The adoption of new quantitative and statistical modelling techniques should be motivated by their inherent benefits and ability to address the weaknesses and limitations in existing analytical tools.

4.6 Justification of the Method used in this study

The most useful empirical studies of food aid rely on dynamic regression analysis methods that allow identification of both temporal causality among variables and cross-sectional variation and which permit estimation of the time path of food aid's effects on international trade and markets (Barrett, 2002). Vector auto regression (VAR) methods are especially appropriate (used by, for example, Lavy 1990, Barrett *et al.* 1999) because they permit unrestricted estimation of the dynamic relationship between food aid flows, trade flows, production volumes and food market prices. Of particular value are the impulse response functions (IRFs) that one can derive from VAR estimation which permit one to trace out the time path of adjustments in the vector of dependent variables to a shock in any one of them.

Since the majority of available macroeconomic data on food aid are time series, Awokuse (2010) argued that it is important that future research on food aid effects take more advantage of recent developments in time series econometric modelling methods. Lowder (2004) also adds that the more promising methods in the analysis of food aid are likely those using CGE

or VAR. Based on these arguments, this study will adapt the dynamic empirical models used by Barrett (1998) and Abdulai *et al.* (2005) in order to test the hypotheses that food aid discourages local food production and that food aid also displaces imports in the long term.

Following limited single country analyses, this study adopts an approach similar to Abdulai *et al.*, (2005) who used a single country approach as well. Most single-country studies use non-econometric methods, single equation models, computable general equilibrium (CGE) or vector auto regression (VAR) (Lowder, 2004). Three variables will be incorporated in the vector auto regression and these are; cereal food aid (FA), imported cereals (IM), and domestic cereal production (CER). The equations for the unrestricted VAR are shown in the sections below.

4.6.1 Vector Auto Regression (VAR) Analysis

A vector auto regression, VAR, is an n - equation, n - variable linear model in which each variable is in turn explained by its own lagged values, plus current and past values of the remaining $n-1$ variables. This simple framework provides a systematic way to capture rich dynamics in multiple time series and VARs provide a coherent and credible approach to data description, forecasting, structural inference and policy analysis (Stock and Watson, 2001).

Because VARs involve current and lagged values of multiple time series, they capture co-movements that cannot be detected in univariate or bivariate models. Standard VAR summary statistics (Granger causality tests, impulse response functions and variance decomposition) are well accepted and widely used methods for portraying these co-movements.

The vector auto regression used in this study will estimate the three following natural logarithmic equations [1], [2] and [3] and the Vector Autoregressive Regression model to be assumed in this study are as follows:

$$\ln(CER_{it}) = \alpha_0 + \sum_{k=1}^n \alpha_k \ln CER_{it-k} + \sum_{k=1}^n \beta_k \ln FA_{it-k} + \sum_{k=1}^n \theta_k \ln IM_{it-k} + \mu_{it} \quad [1]$$

$$\ln(FA_{it}) = \alpha'_0 + \sum_{k=1}^n \alpha'_k \ln FA_{it-k} + \sum_{k=1}^n \beta'_k \ln CER_{it-k} + \sum_{k=1}^n \theta'_k \ln IM_{it-k} + \varepsilon_{it} \quad [2]$$

$$\ln(IM_{it}) = \alpha''_0 + \sum_{k=1}^n \alpha''_k \ln IM_{it-k} + \sum_{k=1}^n \beta''_k \ln FA_{it-k} + \sum_{k=1}^n \theta''_k \ln CER_{it-k} + \delta_{it} \quad [3]$$

Where:

CER = Cereal food production

IM = Commercial food imports

FA = Food aid inflows

t-k = lagged year values

t = current year

k = lag length

μ_t , ε_t , and δ_t = error terms,

$\alpha_0, \alpha'_0, \alpha''_0, \alpha_k, \alpha'_k, \alpha''_k, \beta_k, \beta'_k, \beta''_k, \theta_k, \theta'_k, \theta''_k$ = estimated regression parameters.

There are three varieties of vector auto regressions; reduced form, recursive and structural. This study uses the reduced form vector auto regression. This type of VAR expresses each variable as a linear function of its own past values, all other variables being considered and a serially uncorrelated error term. This type of VAR was chosen for its ability to provide data description and forecasting functions, considering that the recursive and structural VARs are more suited for policy analysis and structural inference purposes, respectively (Obi, 2006).

The study used natural logarithms (LN) because it is one of the necessary steps in building a VAR model as natural logarithms help to avoid the problem of heteroscedasticity (Pesaran and Pesaran, 1997). The following are the steps necessary to build a VAR model according to Pesaran and Pesaran (1997):

- Convert all the variables involved into natural log form to avoid heteroscedasticity problem.
- Choose optimal lag for unit root testing.
- Checking stationarity.
- If the variables are non-stationary, convert it to stationary to estimate.
- Choose optimal lag length for system model.
- Go for co-integration analysis using non-stationary data. This study uses the Johansen-Juselius test for identifying long run relationship or co-integration.

- If the variables are co-integrated, employ Vector Error Correction mechanism. If not, estimate VAR model.
- Perform Granger Causality tests for estimating short run causality running from independent variable to dependent variable.
- Interpret the result of the error correction term.

4.6.2 Granger Causality Test

The Granger-Causality Test is another important test in the co-integration procedure (Obi, 2006). It is standard practice in VAR analysis to report results from Granger-Causality tests. The purpose of Granger-Causality tests is to examine the direction of causation in the economic relationship established by the co-integration analysis (Gupta and Mueller, 1982). Granger- causality statistics examine whether lagged values of one variable helps to predict another variable. For example, if the variable food aid does not help predict cereal production level, then the coefficients on the lags of food aid will all be zero in the reduced form cereal production level equation. This test shows the probability values (p-values) associated with the F-statistics for testing whether the relevant sets of coefficients are zero.

4.6.3 Impulse Response Functions

An impulse response function traces the effects of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables (Eviews Manual, 2009). A shock in the i -th variable directly affects the i -th variable, and is also transmitted to all of the endogenous variables through the dynamic structure of the Vector Autoregressive Regression (VAR). Consider a simple bivariate VAR:

$$CER_{it} = \alpha_{11}CER_{it-1} + \alpha_{12}FA_{it-1} + \varepsilon_t \quad [4]$$

$$FA_{it} = \alpha_{21}CER_{it-1} + \alpha_{22}FA_{it-1} + \theta_t \quad [5]$$

From equation [4], a change in the error term ε_t will immediately change the value of current cereal food production quantity (CER), i.e. CER_{it} . It will also change all future values of CER and FA since lagged CER appears in both equations. In these equations, ε_t is the innovation for CER and θ_t is the innovation for FA. The impulse response function for θ_t in equation [5] would measure the effect of a one standard deviation food aid shock on current and future food production (CER) and food aid inflows (FA). For example in this study, ε_t is the innovation on food aid inflow volumes and the effect of a one standard deviation on the

food aid inflow value will be traced and predicted for values of the endogenous variable cereal food production over a period of ten years.

4.6.4 Trend Analysis

This analytical tool was used in this study to describe the general decrease or increase in agricultural production of maize, commercial food import quantities and food aid assistance over a period of time. This tool showed the trends in the level of food aid, commercial food imports and food production in Zimbabwe over the period of 21 years, that is from 1988-2008.

4.6.5 Descriptive Statistics and Stability Diagnostics

This tool was used to describe the observed data trends in the agricultural production of food, food aid and commercial food import quantities. Statistics such as the means, kurtosis, skewness and the Jarque-Bera test for normality in the variables were estimated. Under stability diagnostics, test statistic views were used to examine whether the parameters of the model are stable across various subsamples of the data. The Chow's breakpoint test was therefore used to test whether there is a structural change in all the equation parameters. A significant difference indicates a structural change in the relationship.

The literature on co-integration theory recognizes structural change as an important factor in the reliability of the models constructed to predict key relationships in the economic system. The majority of econometric models assume that the variables are continuous so that changes in one affect the other variables in a definite and predictable way (Pindyck and Rubinfeld, 1991). But when the underlying data for the model are associated with significant events in the system, the slopes or intercepts, or both, are likely to shift and this will affect the results we obtain from the estimation of the models (Pindyck and Rubinfeld, 1991). Maddala and Kim (1998) identify such events as the Great Depression, a war, a piece of legislation, oil price shocks among others as examples of structural breaks which influence the validity of models using time series data. According to them, such breaks affect the usefulness of the models for purposes of forecasting and analyzing the effects of changes in policy (Maddala and Kim, 1998).

In fact, the existence of structural breaks in a data series have been found to constitute a major source of error (Perron, 1989; Balke, 1991; and Gutierrez, Erickson and Westerlund,

2005). The conventional and also convenient assumption of constant coefficients and cointegrating vectors has been established to be quite restrictive. In the face of a structural break, these are the models that exhibit the worst performance and weakest predictive power (Maddala and Kim, 1998). Most significantly, the effect of structural break on time series data can affect judgment about the statistical properties of the data which has implications for the usefulness of the results when they are employed in estimation procedures. According to Perron (1989) and others, one problem is that if structural breaks are not taken into account before testing for unit root, the tendency is for the result to incorrectly lead to the acceptance of the null hypothesis of the existence of unit root when the true situation is that the data series is subject to trend stationarity.

Econometric literature has provided useful insights into how the presence of structural breaks can be detected in a data series. A number of highly precise tests have been developed for this purpose and the specific tests used will depend on the nature of the data and model, and the amount of prior information the analyst has regarding the series, especially with respect to the precise time of the structural break (Maddala and Kim, 1998).

Since the break points in the data under analysis are known, the test with known break point the Chow's breakpoint test was employed where the year 2000 was used as the break point because in this year that was when the "fast-track" land reform programme was initiated in Zimbabwe. The section following below therefore gives a description of this test with known breakpoints.

4.6.5.1 Tests with known break points

This is the situation where it is known with some certainty that there is a break point and an analysis of variance test is conducted to establish the fact. According to Chow (1960), these tests are appropriate for stationary variables where a single break point may have occurred. These tests are part of the class of tests known as the Chow tests (Pesaran and Pesaran, 1997; Maddala and Kim, 1998; and others). In a linear regression model with k variables and two regimes, implying a single break point, two sub-samples can be defined with their number of observations identified as $n1$ and $n2$. The straightforward rule is that the number of observations within each of the sub-samples must not be less than k , or the number of variables (or parameters) estimated, such that:

$$n1 = OR > k \text{ and } n2 = OR > k.$$

The purpose of the test is to examine the estimated parameters of the model to determine whether or not they are stable across the two sub-samples of the series. The E-Views econometric programme is a convenient tool for carrying out this test which involves the calculation of an F-statistic. In the E-Views programme, the Chow test is applied by first running the single equation regression. When the regression results are displayed and reviewed, the stability test is then run by opening the equation toolbar and entering the break year in the dialogue box that appears. Taking the example of the present study where the sample is for the period 1988 to 2008, by examining the relevant literature the actual breakpoints can be determined as specific years when the event of interest took place. In this particular study, three variables are involved and the test for stability can be run on subsamples each of which must have more than three observations. If a year like 2000 is known to be associated with a particular event, like in Zimbabwe it is associated with the fast-track land reform programme, the year is typed into the dialogue box and specifies two sub-samples as follows:

1988 – 1999

2000 – 2008.

According to Dufour (1982) and Maddala and Kim (1998), it is possible to extend the above approach to cases where multiple regimes can be defined and more than two subsamples can be described.

4.7 Conclusion

This first part of the chapter gave a detailed description of the study area which is Zimbabwe. The geographical and socio-economic settings of the country were explained and focus was also paid on the sector by sector description of the country and their contributions to the economy. The second part of this chapter looked at the research method that was adopted in this study, that is, the type of data used, the data sources and the statistical tools that were used to analyze the data. A review of the methods used by other scholars in their studies of food aid and its effects were also presented and the justification for the researcher's choice of method for use in the study was also stated. The next chapter presents the results of the analysis done in this study.

CHAPTER FIVE: STATISTICAL PROPERTIES OF VARIABLES AND STRUCTURAL BREAKS

5.0 Introduction

This chapter presents statistical properties of the data. In this chapter, descriptive statistics and the trend analysis of the data are presented and results of the tests for structural breaks and unit roots in data are also presented. The chapter ends with a discussion of the results presented and a sub-conclusion is given, rounding off the chapter.

5.1 Descriptive Statistics of the data

Table 5.1 presents the descriptive statistics for the three variables cereal food production (CER), cereal food aid (FA) and commercial cereal imports (IM) in actual tonnes, as obtained from data having been run in Eviews 7 software. These quantities presented in Table 5.1 are in actual tonnes.

Table 5.1: Descriptive Statistics of Variables

	CER	FA	IM
Mean	1 917 667	131 647	334 980
Median	2 001 000	28 318	239 305
Maximum	3 130 000	534 005	1 336 401
Minimum	482 000	27	34 330
Std. Dev.	819 056	171 025	312 778
Skewness	-0.2835	1.3353	1.6889
Kurtosis	-3.7617	5.4036	4.0466
Jarque-Bera	9.9777	13.7264	11.1988
Probability	0.00510	0.000137	0.00235
Observations	21	21	21

The Jarque-Bera test is a test for normality in the variables and the probabilities show that all of the four variables are normally distributed. The Jarque-Bera test also is a goodness-of-fit measure of departure from normality, based on the sample kurtosis and skewness. The test

was used to test the null hypothesis that the data in each series of variables are from a normal distribution. In econometric modelling, the assumption is that data are normally distributed hence it is a necessary condition for the data to be normally distributed (Gujarati, 2003). The probabilities of the Jarque-Bera test shown in Table 5.1 above indicate that all the series are normally distributed at the 1% level of significance, hence satisfying the necessary condition for econometric modelling.

5.1.1 Correlation statistics of the variables

Correlation is a measure of relation between two or more variables. A value of -1.00 represents a perfect negative correlation, +1.00 represents a perfect positive correlation and 0.00 represents a lack of correlation (Eviews Manual, 2009). This therefore means that if the correlation coefficient is close to zero there is also no relationship between the variables. If the correlation coefficient is positive it means that as one variable gets larger the other gets larger also (Gujarati, 2003). If the correlation coefficient is negative, it means that as one variable gets larger, the other gets smaller (inverse correlation). Table 5.2 below shows a correlation matrix of the three variables under study.

Table 5.2: Correlation Matrix

	InCER	InFA	InIM
InCER	1.000	-0.496	-0.540
InFA	-0.496	1.000	0.682
InIM	-0.540	0.682	1.000

The correlations in Table 5.2 above report how the variables are related one to the other. Obviously, correlations between own variables is perfectly correlated, that is, equal to 1.00. It can be seen from the Table 5.2 above that food aid inflows (InFA) and total cereal food production (InCER) have a correlation measure of -0.496 which implies a negative relationship between these two variables. That is, if one of these two variables increases in quantity then the other is decreasing. Commercial imports (InIM) and total cereal production (InCER) also exhibit the same kind of relationship from their negative correlation measure of -0.540. On the other hand, food aid inflows (InFA) and commercial cereal imports (InIM) exhibit a positive correlation measure of 0.682 which suggests that as one of these two variables is increasing, the other is also moving in the same direction.

It is however important to note that these correlations do not necessarily imply causation but simply indicate the direction of relationship between variables (Eviews Manual, 2009). Tests like the Granger causality will have to be carried out to help to explain causation and this test will be presented in the sections that follow in the chapter.

5.2 Trend Analysis of the Variables

This section analyses the trends in the variables under study in the period 1988- 2008, which is the period of focus in this study. The graphical presentations for each variable are shown in the figures below.

5.2.1 Trends in cereal food production in Zimbabwe

The cereal food production includes quantities of the four main cereal food crops grown in Zimbabwe, which are, maize, wheat, millet and sorghum as already explained in section 1.5 of Chapter one. Figure 5.1 shows a bar graph of disaggregated quantities of cereal food production indicating the respective share that each of the four major cereals contributes to the total cereal production.

Figure 5.1 shows that maize which is the staple food crop in Zimbabwe, dominates the share of contribution to the total quantities of cereals produced in every year between 1988 and 2008. The second highest contributor to total cereals produced is wheat and this is true for every year from 1988 to 2007. For the other two crops, that is sorghum and millet, Figure 5.1 shows that the levels of output for the two crops have been varying between 1988 and 2008. From 1988 up to 1998, millet production has been on average higher than sorghum production. But after 1998 up to 2008, sorghum has contributed more compared to millet in terms of its share to total cereals produced in the country. Possible reasons to explain this trend in sorghum and millet are changes in taste and preference of the consumers of the food crop, with sorghum being preferred over millet. Also, it may be because sorghum has more uses compared to millet as it is also used in beer brewing for traditional ceremonies in the rural areas. Other reasons are that it may just be an indication of changes in area cultivated under the two crops, and lastly, it may be evidence that even though both are drought resistant crops, sorghum may be more drought resistant than millet hence more output and preference in cropping decision.

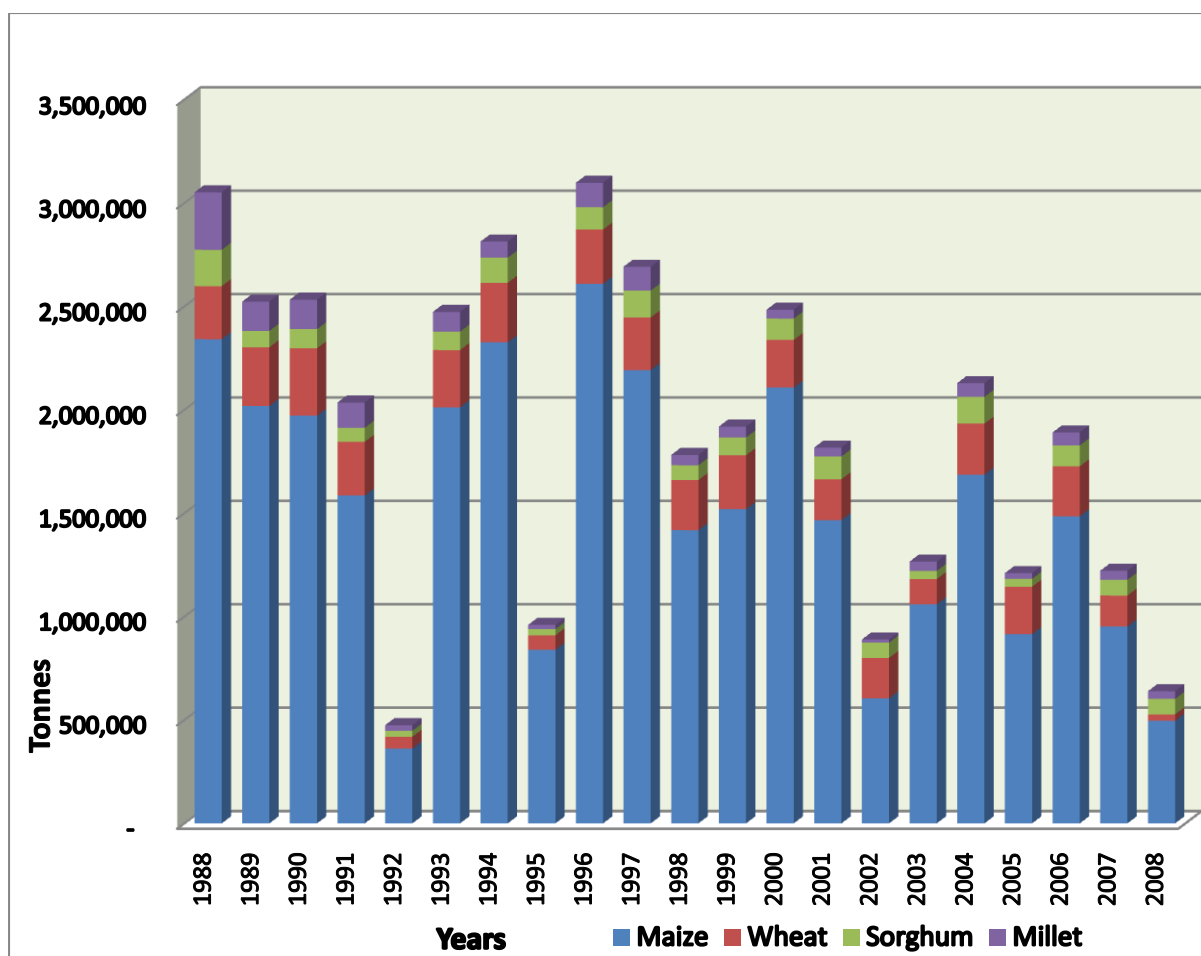


Figure 5.1: Cereals Production of Maize, Wheat, Sorghum and Millet in Zimbabwe

Source of data: (GoZ, 2009; FAOSTAT, 2011)

Figure 5.2 shows a graph of total cereal production and a trend analysis depicted by the linear trend line shown in the graph. The trend line for total cereal production indicates that cereal food production has been decreasing since 1988 up to 2008. Reasons for the fall in cereal production and the corresponding peaks in food aid receipts were macroeconomic instabilities in the country and land reform programme that were affecting production from the year 2000 and the devastating effects of natural disasters such as the Cyclone Eline in 1999/2000, as was noted in the literature review chapter and in the description of the study area chapter under the discussion of the agriculture sector.

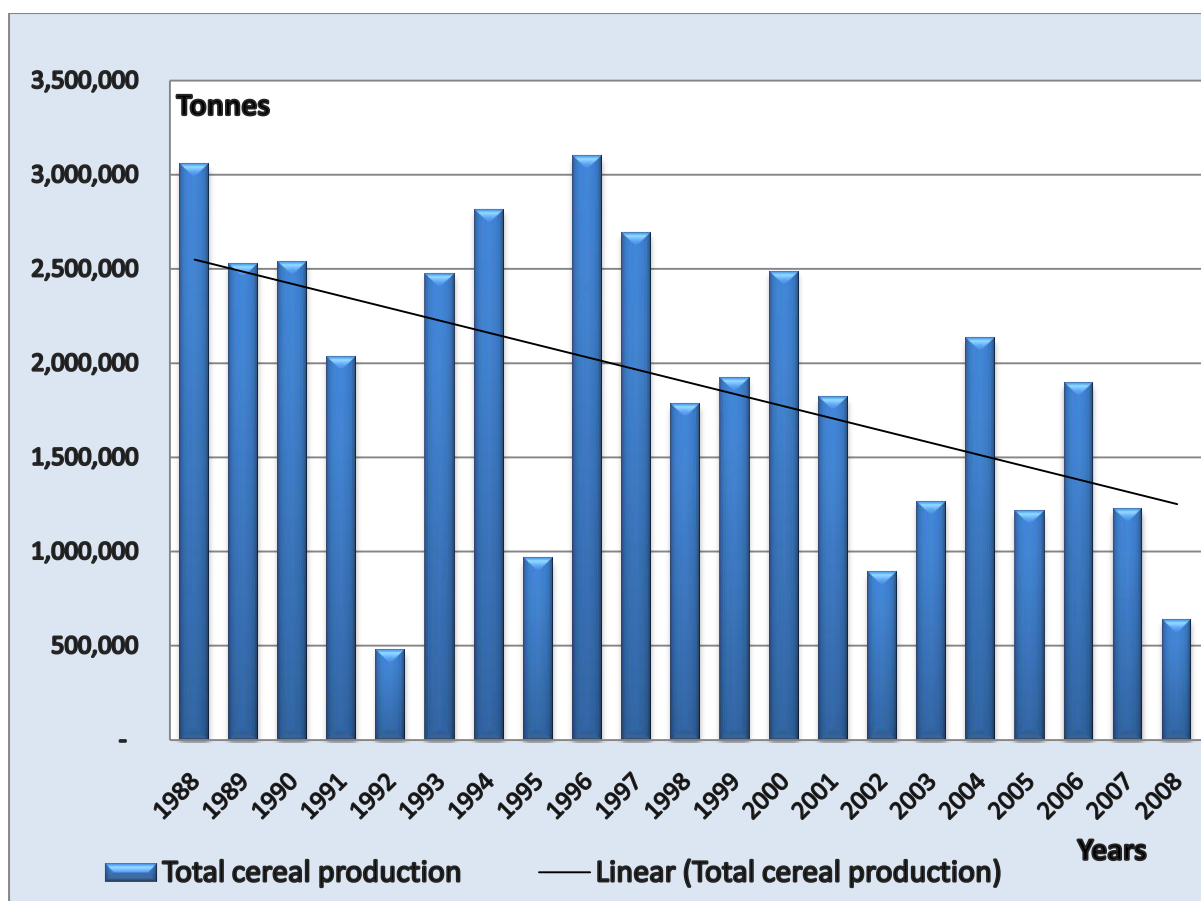


Figure 5.2: Cereal food production in Zimbabwe 1988-2008

Source of data: (GoZ, 2009; FAOSTAT, 2011)

5.2.2 Trends in food aid volumes into Zimbabwe

The graphs in Figure 5.3 show the volumes of the three categories of food aid that were received in Zimbabwe between 1988 and 2008. The graphs indicate that the emergency or relief food aid has been the dominant type of food aid given to Zimbabwe. Project food aid has remained at almost insignificant volumes throughout the whole 21 years. Programme food aid is only seen to have significant volumes in the years that correspond to the years that the country experienced drought. That is, in 1992/93, 1998/99 and 2001, that is when programme food aid type was given in relatively high amounts. As highlighted in section 2.2.1 of Chapter 2, the purpose of this type of food aid is to generate funds for the government from its sale on the local market to supplement government budget allocations for economic development. A possible reason therefore this type of food aid featuring mostly in drought years is that in these drought years the government of Zimbabwe was usually unable to cope as it had no strategic grain reserves and shortages of foreign currency meant it

could also not afford to commercially import food to meet the population's need hence it had to seek this food loan (programme aid).

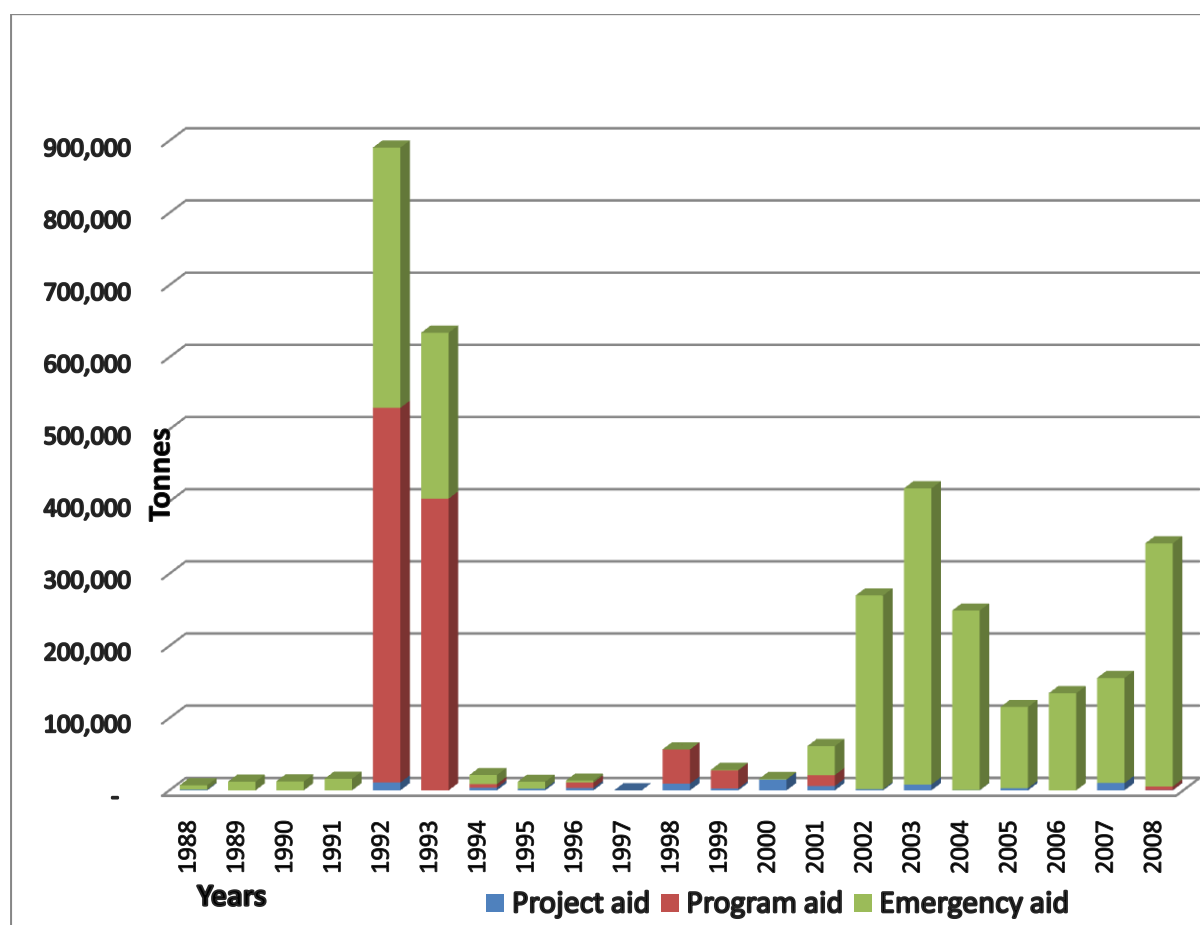


Figure 5.3: Food aid inflows into Zimbabwe by food aid type

Source of data: WFP (2010).

Figure 5.4 showcases the graphs of the total volumes of food aid received in Zimbabwe. These graphs have simply combined the various food aid quantities from each food aid type for each year from 1988 to 2008. The graphs show that in 1992, food aid received in Zimbabwe reached its peak of about 900 000 tonnes in the whole 21 years. The year 1993 also saw a high volume of food aid being received in the country. The reason as has been given already was the vulnerability and hunger caused by the severe drought that hit the Southern African region in 1992/93. The peak in food aid inflows also corresponds to a dip in the country's cereal food production output in 1992 as shown in Figure 5.2.

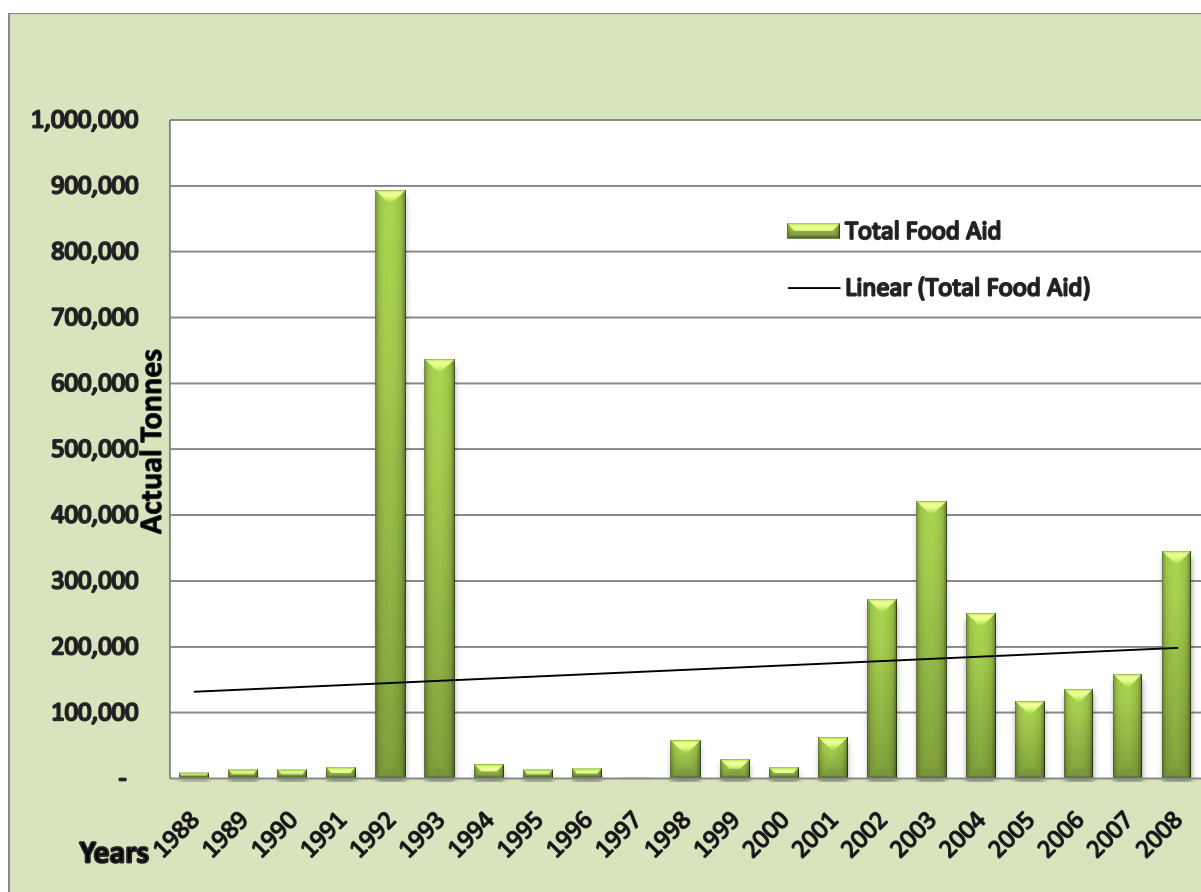


Figure 5.4: Total cereal food inflows to Zimbabwe (1988 to 2008)

Source of data: WFP (2010).

The linear trend line shown in Figure 5.4 above reveals that quantities of food aid received in the country have been increasing, and it can be seen from this figure that food aid inflows have actually been more dominant from the year 1998 right up to 2008. Also, from 1998 to 2008 is where the trend line seems to be steeper than the other period. The reasons can generally be given to be related to the afore-stated issues of unfavourable climatic, political and economic environment and also as possible consequences of the Fast Track Land Reform Programme in the country.

5.2.3 Trends in Commercial Cereal Food Imports in Zimbabwe

Figure 5.5 shows the graphs of cereal imports into Zimbabwe. These volumes of cereal imports in Figure 5.5 are inclusive of both commercial imports and food aid cereal imports. The volumes of cereals imported are classified according to the food commodity, either rice, maize or wheat imports to show the contribution of each commodity.

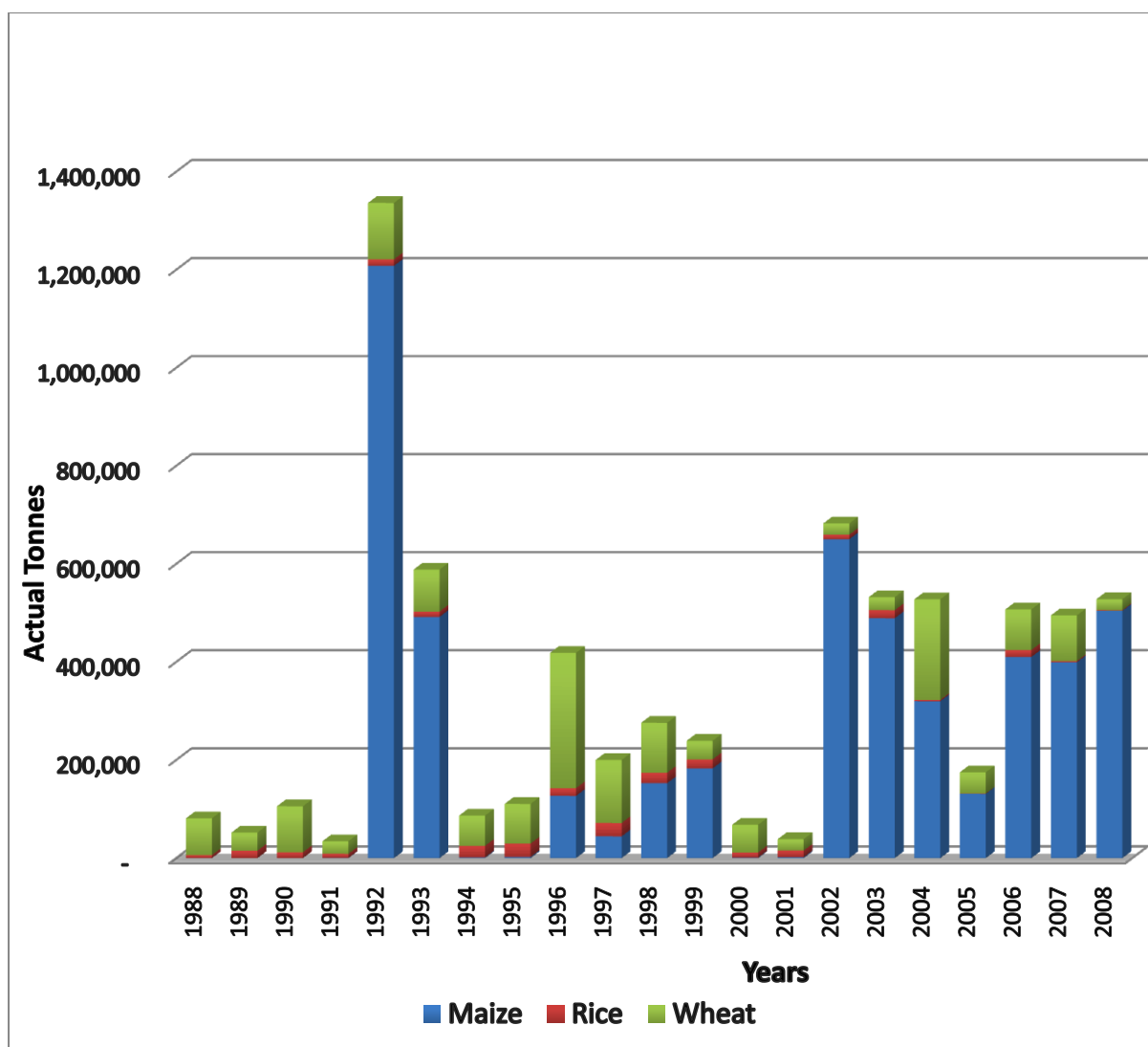


Figure 5.5: Cereal food imports of maize, wheat and rice in Zimbabwe (1988 to 2008)

Source of data: (GoZ, 2009; FAOSTAT, 2011)

Figure 5.5 shows that maize, as the staple food crop in Zimbabwe, has had a dominant share in contributing to the country's cereal imports. The graphs also show that prior to 1992, Zimbabwe was self-sufficient in terms of meeting its populations maize grain requirement hence there where no maize imports recorded. But as from 1992 to 2008, maize has remained a major import commodity and this means the country has not been self-sufficient in terms of meeting its populations maize grain requirement. Reasons for the country being unable to meet its domestic food requirement may be attributed to population growth, restrictive importations policies that existed, poor agricultural performance and economic constraints. Rice ranks as the second highest cereal crop that is imported into the country as seen in the graphs in Figure 5.5.

Figure 5.6 goes on to show the trends in commercial cereal imports. The columns in Figure 5.6 show volumes of total cereal commercial imports sourced into the country every year from 1988 to 2008. The trend line presented in Figure 5.6 shows that commercial cereal imports have been increasing over the 21 years.

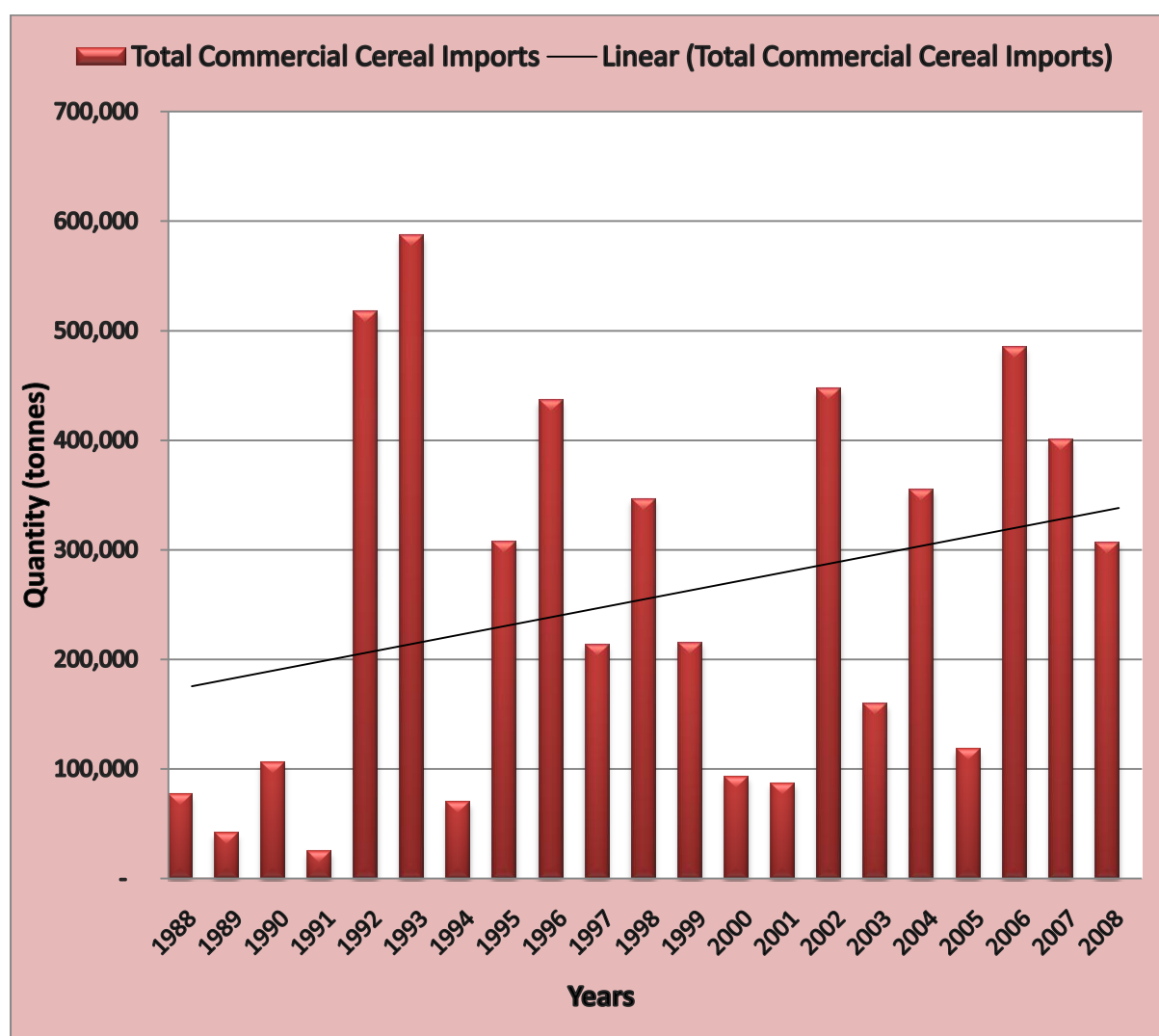


Figure 5.6: Commercial imports of cereals in Zimbabwe 1988 to 2008

Source of data: (GoZ, 2009 and FAOSTAT, 2011)

The last diagram presented in this chapter is Figure 5.7 which shows graphs comparing cereal food production, cereal food aid inflows and cereal commercial food imports in the country for every year from 1988 to 2008. From the graphs in Figure 5.7 there is evidence that, in comparison to cereal food production, the quantities of cereal food aid have been somewhat insignificant with quantities even less than 100 000 tonnes the period between the 1988 and 1991. Food aid volumes increased sharply during the 1992/93 drought period in Zimbabwe

where the larger share of the food aid constituted emergency food aid type to deal with the natural disaster. Thereafter, that is in the period from 1994 to 2000, the pattern of food aid volumes went back to its almost insignificant quantities.

However, from the year 2001 up to 2008, food aid as well as commercial cereal import volumes in Zimbabwe have been increasing steadily and various factors have been attributed by literature to be the cause of this trend. These include factors such as the poorly managed land reform programme which saw the displacement of the major food producers hence the need to import more food and seek food aid assistance from donor countries and organisations. Factors also such as the political, economic and social instabilities in the country at that period were not conducive for and did not promote both effective production and investment in the country. Also undoubtedly, there were the persistent droughts, dry spells and even floods in other parts of the country that did not naturally promote food production in Zimbabwe during that period of time also.

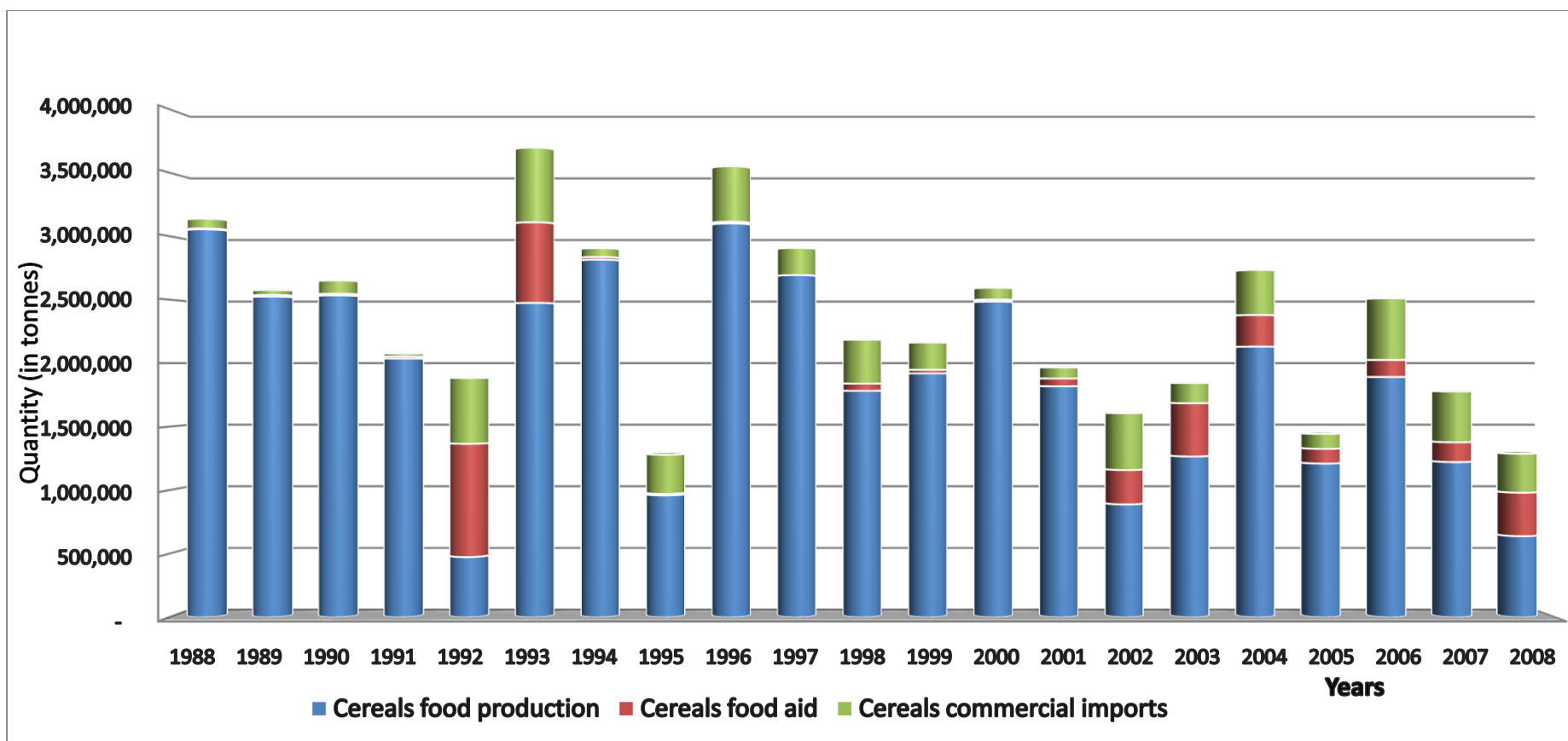


Figure 5.7: Share of production, food aid and commercial imports in Zimbabwe’s cereal food supply

Source of data: (GoZ, 2009; WFP, 2010; FAOSTAT, 2011)

5.3 Testing for structural break in the data

According to the theory, the results obtained by the regression will be different if the underlying data have been subject to structural change of one type or another. It is often necessary to perform the test to identify the existence of a structural break prior to carrying out the unit root test since the existence of a structural break may lead to an erroneous conclusion of a unit root when in fact there is none (Perron, 1989; Obi, 2006). The assumption of prior knowledge of break dates is made in this case.

The most significant event in the economic history of Zimbabwe is probably associated with the fast-track land reform programme which took place in 2000 onwards. One criticism of the test of structural breaks that assumes a known break point is that the effect of a policy may not necessarily manifest in the year of introduction of the policy. So, inserting the precise year of the policy in the model would not pick up the variation in the data that would confirm a structural break. It is argued that the effect of any policy takes some time to work itself through the economy and the interval between the introduction of the policy and when its effect becomes manifest would normally vary according to the nature of the policy (Obi, 2006). In this study, it is assumed that it took at least about 1-2 years for the effects of the land reform programme to be felt as according to the agricultural production season which is at least a 1 year cycle. This suggests that actual effects of the fast-track land reform policies introduced in the 1999/2000 period may have become manifest from 2001 onwards. Based on the forgoing argument, the year 2001 was therefore opted for use as the breakpoint year to allow for effect of the land reform policy.

Table 5.3 presents the results of the Chow test on the data which divided the series into two sub-samples as follows: 1988 to 2000 and 2001 to 2008. The structural break is expected to exist based on the facts that the first period, that is from 1988 to 2000, indicated an era before the Fast Tract Land Reform Programme (FTLRP) in Zimbabwe, relative political and economic stability in the country, relative market liberalization for the major food grains and the country was still a relative net exporter and breadbasket of the Southern African region. The second period that is, 2001 to 2008 indicated an era when the grain market and pricing system was controlled by the government through controlled pricing, also an era when the FTLRP and land redistribution policies were taking shape and the consequences thereof, economic meltdown and political instabilities. Tables 5.3 and Table 5.4 therefore test the hypothesis that the current era of fast-track land reform and redistribution did not influence

the values of the relevant coefficients of the estimated equation. The Chow Breakpoint Test was applied on the data for all the years between 1988 and 2008 to detect a single year that could be considered the major turning point in terms of policy effects. The results in Table 5.3 and Table 5.4 refer to a single breakpoint in 2001. Two tests of the Chow's breakpoint test had to be carried out as there were two different estimated equations involved. One equation had the variable cereal food production as the dependant variable whereas the other equation was estimated with the variable commercial food imports as the dependant variable. Both equations had the variable food aid inflows as a common explanatory variable, as the intention in the equations was to estimate the effect of food aid on both cereal food production and on commercial food imports.

Table 5.3: Chow breakpoint test assuming a single breakpoint

Chow Breakpoint Test: 2001 Null Hypothesis: No breaks at specified breakpoints Varying regressors: All equation variables Equation Sample: 1988-2008			
F-statistic	0.850062	Prob. F(3,15)	0.4880
Log likelihood ratio	3.297302	Prob. Chi-Square(3)	0.3480
Wald Statistic	2.550186	Prob. Chi-Square(3)	0.4663

The results in Table 5.3 show that it is possible to accept the null hypothesis and reject the alternate that the era of land redistribution or land reform in Zimbabwe has had some influence on the parameters estimated. Hence this indicates that the coefficients in the cereal food production equation are stable across regimes.

Table 5.4: Chow breakpoint test assuming a single breakpoint

Chow Breakpoint Test: 2001 Null Hypothesis: No breaks at specified breakpoints Varying regressors: All equation variables Equation Sample: 1988-2008			
F-statistic	0.414953	Prob. F(3,15)	0.7448
Log likelihood ratio	1.674254	Prob. Chi-Square(3)	0.6427
Wald Statistic	1.244860	Prob. Chi-Square(3)	0.7423

The results of the Chow's breakpoint test presented in Table 5.4 also shows interesting results which suggest that in the commercial imports equation the breakpoint test fails to reject the null hypothesis that there is no breaks at the specified 2001 breakpoint. The results are interesting in the sense that for both equations the likely expectation would have been that there would be significant differences in the estimation of each equation, significant differences which would have inferred a structural change in the relationship of the variables between the two regimes of before and after FTLRP and land redistribution eras.

5.4 Testing for stationarity in the variables

The formal method for testing the stationarity of a series is the unit root test. Table 5.5 shows the statistical properties of variables and results of Augmented Dickey-Fuller (ADF) Unit Root Test. The test for a unit root can be done in the level, first difference or second difference of the series. For the Augmented Dickey-Fuller test, the test statistic is the t-statistic for the lagged dependent variable in the test regression. The null hypothesis for this ADF test is the presence of a unit root and this null hypothesis of a unit root is rejected against a one-sided alternative if the t-statistic is less than (lies to the left of) the critical value.

Table 5.5: Unit Root Tests for Variables (ADF Test)

Variable	Test for Unit Root in:	ADF t-statistic	Probability	Durbin Watson statistic	Adjusted R ² value	Conclusion on Test for Stationarity
InCER	2 nd diff	-8.7809	0.0006	2.2988	0.8843	Non-stationary
InFA	2 nd diff	-4.8794	0.0002	2.4037	0.8095	Non-stationary
InIM	2 nd diff	-5.3254	0.0001	1.9694	0.7840	Non-stationary

From Table 5.5, all of the three series of data failed to reject the null hypothesis at the significant levels given, therefore these three series each contained a unit root hence they were non-stationary series. A series is said to be stationary if the mean and auto co-variances of the series do not depend on time. Any series that is not stationary is said to be non-stationary meaning that the mean and co-variances of that series are dependent on time. As has been highlighted in the method chapter, Chapter 4, checking for stationarity is a

necessary step to building a Vector Autoregression (VAR) model. This step has taken us one step closer to estimating our model. The next step after getting non-stationary variables will be to go for co-integration analysis, which will be dealt with in the next chapter.

5.5 Conclusion

The results presented in this chapter have managed to give a general description of the variables that were being examined and the trends also in the variables. The variable food aid receipts showed a slightly increasing trend since 1988 up to 2008 while the level of cereal production was seen to be decreasing, with a very erratic pattern in the same period. The commercial import volumes of cereals over the same period were seen to exhibit an almost similar trend and to follow an almost similar pattern to the volumes of cereal food aid inflows into Zimbabwe. These trends in the variables support the finding from the correlation test which revealed that the variable cereal production is negatively correlated to both the variables food aid inflows and commercial cereal imports. The correlation test also showed that the variables food aid inflows and commercial cereal imports were positively correlated, which explains their almost similar trends.

The results of the Chow's breakpoint test, a test for structural breaks and change in the data showed interesting results which suggested that in the commercial imports and the cereal food production equations, the breakpoint test failed to reject the null hypothesis that there is no breaks at the specified 2001 breakpoint. The expectation was that there would be significant differences in the estimation of each equation, significant differences which would have inferred a structural change in the relationship of the variables between the two regimes of before FTLRP and after FTLRP land redistribution eras. This therefore means that the land reform policy of 2000, that is, the Fast Track Land Reform Programme, had no significant bearing or influence on the estimated parameters for the variables under study.

Lastly, the Augmented Dickey-Fuller (ADF) unit root test concluded that all the three variables under study each contained a unit root at 2nd difference testing. The conclusion there was that all the three variables were non-stationary, meaning that the means and co-variances of each series was dependant on time, which usually is the case with most time series data. Since the variables were found to be non-stationary, the variables therefore had to be converted to stationary to be able to estimate a Vector Autocorrelation Regression (VAR) model which is presented in the next chapter.

CHAPTER SIX: ESTIMATION OF THE SHORT AND LONG-TERM RELATIONSHIPS AMONG THE VARIABLES

6.0 Introduction

Having established the general relationship among the three variables using the correlation test and the nature of the variables whether they are stationary or non-stationary in the preceding chapter, the next step now is to determine whether there exist any short and long-term causal relationships amongst the three variables, which is the core of this study and what this chapter addresses. The chapter begins with the co-integration analysis, which then leads to the estimation of the VAR model, then the test for causality and lastly, an estimation of the impulse response functions is presented before concluding the chapter.

6.1 Co-integration Analysis

Co-integration tells us about the presence of long run relation among two or more variables (Pesaran and Pesaran, 1997). In running a co-integration analysis, the assumptions are that, firstly, the variables are non-stationary and secondly that they are all integrated of the same order. A series is said to be co-integrated if it is a non-stationary series, meaning it has a unit root(s) (Granger, 2004). Time series data often may contain a unit root, thus the need for this non-stationary time series analysis using this model which corrects for the effect of having a non-stationary series to be analysed as stationary that is, making the mean and the autocovariance of the series not dependent on time.

The unit root test presented in section 5.4 of the previous chapter confirmed that all the variables are non-stationary and all integrated of order two hence the assumption for co-integration analysis has been fulfilled. The results of the Johansen co-integration test are presented in Table 6.1.

Table 6.1 shows the test for the number of cointegrating relations. The first row in the table tests the hypothesis of no co-integration (None) and the second row tests the hypothesis of one co-integrating relations (At most 1). The third row tests the hypothesis of two co-integrating relations (At most 2).

Table 6.1: Johansen Co-integration Test Results

Sample 1988-2008

Test Assumption: Linear deterministic trend in data

Eigen Value	Likelihood Ratio	5%Percent Critical value	1%Percent Critical Value	Hypothesized No. of CE(s)
0.6346	33.1946	29.68	35.65	None*
0.2135	4.5626	3.76	6.65	At most 1*
0.3935	14.0644	15.41	20.04	At most 2

*(**) denotes rejection of the hypothesis at 5% (1%) significance level

L.R. (Likelihood Ratio) test indicates 1 co-integrating equation(s) at 5% significance level

All hypotheses are tested against the alternative hypothesis of full rank, that is, all series in the VAR are stationary. The maximum number of co-integrating relations is equal to the number of variables minus one, so in this case the maximum number of co-integrating relations or equations that could be obtained is three (At most 3). The L.R. test results indicated that two co-integrating equations were present in the series at the 5% significance level. This therefore means that the stated hypothesis of the presence of any long run relation among the variables has been confirmed. Since the possibility of any existing long relation between the variables has been confirmed, what is now left is to determine the specific types of relationships that exist between the particular variables.

For the estimation of the relationships that exist among the variables, a Vector Autoregression (VAR) model is employed. Now, an unrestricted VAR does not assume the presence of co-integration and to be able to impose co-integrating restrictions among the variables in the VAR, we use the Vector Error Correction (VEC) model. VEC is a restricted VAR that has co-integrated restrictions built into its specification hence it applies to co-integrated series.

6.2 Vector Error Correction Model

The VEC specification restricts the long-run behaviour of the endogenous variables to converge to their co-integrating relationships while allowing a wide range of short-run dynamics to be observed (Obi, 2006).

Table 6.2: Results of the Restricted Vector Autoregression Analysis

Regressors	Production equation (CER)	Food aid equation (FA)	Imports Equation (IM)
CER_(t-1)	0.0021* [0.2904] (0.0074)	-3.7288** [2.0821] (1.7908)	-2.1693** [0.6987] (3.1049)
CER_(t-2)	-0.5722** [0.2542] (2.2502)	-0.1371* [1.8235] (0.0752)	-0.9770** [0.6118] (1.5967)
FA_(t-1)	0.1109* [0.0590] (1.8784)	-0.8488** [0.4234] (2.0047)	-0.3025* [0.1421] (2.1291)
FA_(t-2)	0.0720* 0.0480] (1.5006)	-0.3615* [0.3442] (1.0503)	-0.2034* [0.1155] (1.7606)
IM_(t-1)	-0.6526** [0.2691] (2.4255)	0.8293** [1.9296] (0.4298)	0.0803 [0.6475] (0.1239)
IM_(t-2)	-0.4130** [0.1804] (2.2889)	1.4323** [1.2939] (1.1071)	0.4659* [0.4342] (1.0732)
Constant (C)	-0.0025* [0.1160] (1.0214)	-0.0144* [0.8319] (1.0173)	0.0047* [0.2792] (1.0169)
R²	0.8963	0.7557	0.8450
Adjusted R²	0.7837	0.6936	0.7965
Akaike AIC	1.3578	2.4980	1.5140
Schwarz SC	1.7536	2.8937	1.9098
Mean dependent	-0.0771	0.1846	0.0893
S.D. dependent	0.7707	1.6223	1.4049

Notes: The numbers in parentheses, [] and () are standard errors and absolute t-values respectively. The * and ** indicate statistical significance of the parameter estimates at the 0.05 and 0.01 level respectively.

The numbers in each column in the table above represent the standard regression statistics for each estimated equation. Akaike Information Criteria and Schwarz Criteria are the regression statistics for the VAR system, the smaller the value of the information criteria, the “better” the model (Eviews Manual, 1997).

In Table 6.2, each column represents an individual equation where each endogenous (dependent) variable is regressed against lagged values of its own variable as well as lagged values of the other endogenous variables. The values were lagged up to the second lag order which was found to be the maximum lag order which minimised the Akaike information criteria (AIC) according to the analysis done in Eviews.

The estimated regression equation for food production (CER) shows a R^2 value of 0.8963 and an adjusted R^2 value of 0.7837, meaning that 78.3% of the lagged values of the variables that were regressed on food production (CER) explain for the variation in total cereal food production in Zimbabwe over time.

The estimated regression equation for food aid (FA) had a R^2 value of 0.7557 and an adjusted R^2 value of 0.6936, that is to say 69.3% of the regressed lagged variables explain for the variation in the current value of the total food aid inflows into Zimbabwe over time.

Lastly, the estimated regression equation for commercial food imports (IM) had a R^2 value of 0.8450 and an adjusted R^2 value of 0.7965, that is to say 79.6% of the regressed lagged variables explain for the current value of the commercial food imports purchased by the Zimbabwean government over the specified time of study.

6.3 Vector Error Correction model parameter estimates

Table 6.2 has shown the parameter estimates for the restricted VAR model which is the Vector Error Correction model. As shown by the standard errors and t-statistic values in parentheses, and the asterisks indicating degrees of significance, the majority are statistically significant at the 0.05 or 0.01 level. The signs of some of the parameters may be counter-intuitive; however, according to Lowder (2004), the majority of articles treating this subject matter focus more on hypothesis testing than they do interpretation of parameter estimates. Discussions on the parameter estimates of the three equations (production, food aid and imports equations) are thus presented below.

The production equation shows parameters associated with lagged differences of production as positive in the first lag and negative in the second lag. The second year lag which is negative and statistically significant is consistent with the evidence of the year to year decline in national level food production shown previously in Figure 5.2. Increased imports seem to result in decreased production since the parameters for imports in the production equation are negative values; this indicates that as imports increase, the incentive to produce decreases or possibly that the level of national level investment in national food production decreases as more focus in terms of resources is paid to the commercial food import option. Parameters associated with lagged differences of food aid inflows in the food production equation are shown to be positive. That is to say, increased food aid inflows seem to result in increased food production since the parameters for food aid in the production equation are positive values. This reflects that food production in the country increases when situations of food unavailability are threatening from previous years where increased food aid inflows is used as an indicator of a widening gap in food availability and stability. It is also possible to assume, *ceteris paribus*, that previous year's evidence of increased food aid inflows in the country would have resulted in the formulation and introduction of policies by the government to boost local food production and food availability and hence resulting in increased food production in the current year. This assumption will hold true given that there will be no vagaries of nature like drought, dry spells and floods in the particular year to affect production.

Having said all the above, it is however important to note that the inspection of the relative magnitudes of the variables in the model may shed light on the difference in the effect of food aid on food production and on commercial imports as highlighted in the preceding discussion of the parameter estimates in the production equation. Food aid as a percentage of food production in Zimbabwe is much smaller than food aid as a percentage of commercial food imports (imports) in the country. Since food aid is so small compared to food production, it may be difficult to isolate its effect on that variable than it would to detect its impact or effect on commercial food imports to which it is of a much larger magnitude.

The food aid equation shows that parameters associated with lagged values of food production in the food aid equation are negative, suggesting that increased cereal food production would lead to the allocation of smaller amounts of food aid to Zimbabwe (i.e. food aid inflows into the country will fall or decrease). Parameters for lagged differences of

food aid in the food aid equation are all negative and statistically significant, indicating that in the two year lagged time period food aid will be declining; and since dependency on food aid is considered undesirable, this decline in food aid is a good sign. The decline could also be a simple indication that the population requiring food aid is increasing faster than the food aid volumes received in the country are increasing. Hence by ratio it would mean a higher food aid requirement versus a seemingly smaller food aid volume. According to Lowder (2004), this preceding assumption is not implausible given that food aid distributed in many poor countries that are in the midst of demographic transition, political, economic, social, and environmental instabilities, characteristics which identify with Zimbabwe. Parameters of lagged differences of commercial food imports in the food aid equation are positive and statistically significant. This suggests that as commercial food imports are increasing, most likely due to food unavailability situations in the country, food aid inflows are also increasing as it is a complementary measure used to stabilise food availability in the country.

The commercial food imports or simply, the imports equation shows parameters associated with lagged values of food production in the commercial food imports equation to be negative and statistically significant suggesting that as food production increases, the volumes of commercial food imports falls. This is quite logical as it means that local production will now be able to meet local food demand and hence food import requirements decrease. This means that increased local food production therefore replaces commercial food imports as should be the case. Parameters associated with lagged values of food aid in the commercial food imports equation are negative and also statistically significant. The indication there is that increased food aid inflows seem to result in decreased commercial food imports since the parameters for food aid in the import equation are negative values. This is to suggest that food aid displaces commercial food imports. Parameters associated with lagged values of imports in the import equation are positive and statistically significant suggesting that commercial food imports in Zimbabwe have been increasing over time, specifically in the period of study i.e. from 1988 to 2008.

The empirical results presented in the foregoing discussion indicate that food aid encourages food production but not very significantly, where in the food production equation a hypothetical 10% increase or shock in the volumes of food aid would on average encourage at most a mere 1% increase in food production from the parameter estimates. So from these results it can be concluded that food aid encourages food production very slightly, and such

findings of food aid encouraging food production are consistent with some of the prevailing empirical literature on food aid regardless of the magnitude with which it does so.

The empirical results also indicate that in terms of the relationship between commercial imports and food aid in the imports equation where commercial imports are the dependant variable, the results indicate that food aid displaces commercial imports as increasing volumes of food aid reduces commercial imports in the country. The results also show that on average for the two lags, a hypothetical 10% increase in food aid in the country would reduce or discourage commercial food imports in the country by 2.5%, suggesting therefore that food aid inflows displace commercial food imports in the country.

6.4 Granger Causality

According to Granger (1988), when the dependent and explanatory variables are cointegrated, there must be some Granger Causality in at least one direction. The foregoing estimations and discussions have shown conclusively that some co-integration relationships exist in both in the long run equilibrium estimates and in the error correction estimation.

According to Schimmelpfening and Thirtle (1994), the co-integration theory in and of itself provides no guidance on the direction of the causal relationship between variables which have been established to be cointegrated. The only thing it says is that there must be Granger Causality in at least one direction. The focus of the Granger Causality tests is on whether or not there is a linkage in at least one direction that establishes causation, not just a relationship (Gupta and Mueller, 1982; Granger, 1988; Granger and Lin, 1995; Granger, 2004).

According to Granger (2004), the term “causality” in this Granger-Causality Test is used to show that one variable precedes the other in a co-integrating relationship and that one variable contains sufficient information to explain variations in another variable. Granger Causality is concerned with short-run forecastability (Maddala and Kim, 1998). This is one reason it is usually tested to reinforce results obtained from the error correction model which explains the short-run dynamic relationships among a set of cointegrated variables (Obi, 2006).

Tests of granger causality are based on the concept of incremental forecasting value. A variable X “Granger causes” a variable Y if Y can be better predicted from past values of X and Y together than from past values of Y alone (Cornwell, 2009). In the pair of regressions

of the granger causality tests, the null hypothesis is therefore that X does not Granger- cause Y in the first regression and that Y does not Granger-cause X in the second regression. For the regressions that will be statistically significant the null hypothesis is rejected and the alternative hypothesis is accepted.

Table 6.3 presents the results of the Granger Causality Tests carried out on the long run model. The Granger-Causality test suggests that there is bidirectional causality between food aid inflows and cereal food production and this result is in line with the findings by Abdulai *et al.* (2005).

Table 6.3: Granger causality Relationships

Pair wise Granger Causality Tests			
Sample: 1988 2008 Lags: 2			
Null Hypothesis:	Obs.	F-Statistic	Probability
LNFA does not Granger Cause LNCER	19	3.4713	0.0677
LNCER does not Granger Cause LNFA		3.2048	0.0715
LNIM does not Granger Cause LNCER	19	0.5831	0.5712
LNCER does not Granger Cause LNIM		3.3940	0.0628
LNIM does not Granger Cause LNFA	19	0.2001	0.8210
LNFA does not Granger Cause LNIM		4.3098	0.0413

In the Table 6.3, the regressions of food aid (FA) and cereal food production (CER) have probability values that are statistically significant at 10% level of significance and hence the null hypothesis of no Granger Causality between the two variables is rejected. The interpretation therefore of this granger-causality suggestion for food aid and cereal food production is that lagged values of food aid volumes help to predict the subsequent year's cereal food production level at 10% level of significance, and also that lagged values of the volumes of cereal food production help to predict the subsequent year's food aid inflows into the country at the 10% significance level also.

The test also suggests a unidirectional causal relationship between cereal food production and commercial food imports in the country. This is to say, lagged values of the variable cereal food production help to predict the subsequent year's volumes of commercial food imports in the country, that is, the volume of commercial food imports is dependent on cereal food production volumes in previous year(s).

The other unidirectional causal relationship suggested by the Granger-Causality Test is the one between food aid volumes and commercial food imports volumes in the country. This causal relationship suggests that the previous years' values of food aid volumes do help to predict the subsequent year's volumes of commercial food imports in the country.

6.5 Impulse Response Functions

According to Abdulai *et al.* (2005), in order to make the food aid's net dynamic effect clearer, impulse response functions need to be computed, and in this study, the impulse response functions were computed to depict the time path of cereal food production and commercial food import responses to a year increase of one tonne in food aid inflows. Figure 6.1 depicts the impulse response functions of both food production and commercial food imports to a 1 tonne food aid shock over the ten year period in Zimbabwe. The main focus of this impulse response function is on the effect of this one standard deviation (or impulse) in food aid volumes on cereal food production and commercial food import volumes (which are the response variables). Figure 6.1 shows bar graphs of these impulse response functions for the two variables; cereal food production and commercial food imports.

Impulse Response Functions (IRFs) identify the predicted time-path of responses to a once-off increase in food aid quantities of one tonne and Figure 6.1 indicates that the effects of a one standard deviation in food aid inflows on food production levels are negative over the whole 10 year estimated period. The observed persistent and perpetual negative effects of a food aid shock on domestic food production seems to support the notion of food aid inflows in Zimbabwe exhibiting disincentive effects on current and future values of domestic food production. In the first year since the food aid shock, the bar graph indicates that there is zero response by cereal food production to a one tonne shock in the food aid system.

The Impulse Response Functions were estimated on data that had been converted into natural logarithms for analysis purposes. Therefore, the focus in interpreting IRFs should be on the direction of the effect that a shock (impulse) in food aid volumes would gather or have on the variables cereal food production and commercial cereal food imports.

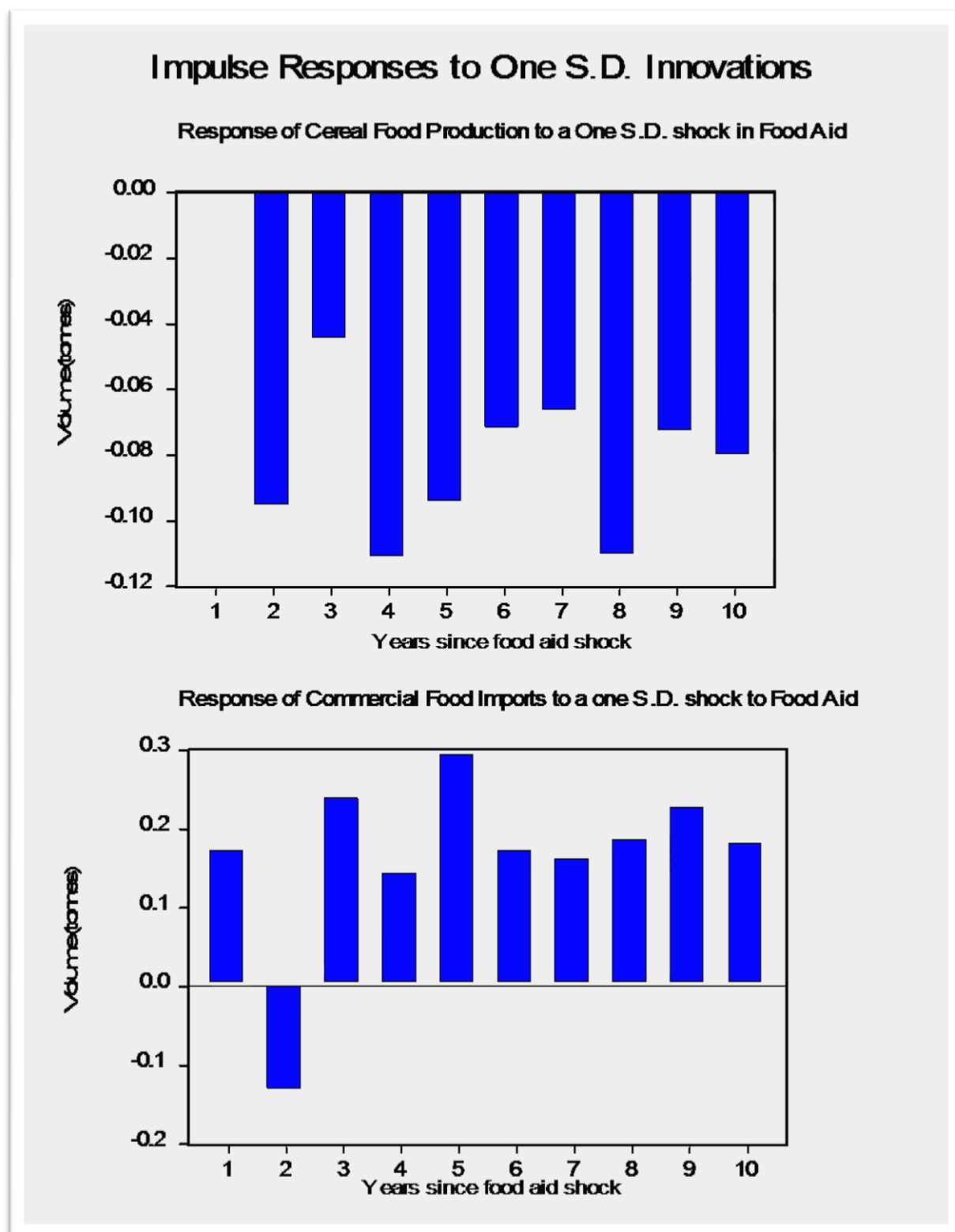


Figure 6.1: Graphs of Estimated Impulse Response Functions for food production and imports.

The predicted time-path responses of commercial cereal food imports to a one tonne increase in food aid volumes shows a scenario different to that for cereal food production. The bar

graph for the impulse response for commercial food imports to a food aid shock in Figure 6.1 indicates that the responses over the ten year period are positive except only in the second year after the food aid shock. These time-path responses predict that a one tonne shock in food aid volumes will have a positive effect on commercial food import volumes in the country as the quantities of food imported commercially will be stimulated over a ten year period.

6.6 Conclusion

As the objective of this study imposed the obligation to confirm or refute any long-term relationship(s) among the variables that could explain the observed variations in cereal food production and commercial food imports in the country, the co-integration analysis was particularly important. The Johansen co-integration test confirmed the presence of long-run relationships among the variables. In this analysis of food aid and its influence on food production and on commercial food imports in the country, the existence of such co-integrating relationships suggests that there are long-term and stable relationships among the variables in the model. Also it meant that it was therefore possible to predict the pattern of the variables' short-term relationships.

After having confirmed the existence of cointegrating relationships, the study proceeded to a second stage to define the error correction model which communicates the deviations from long-run equilibrium and links both short-term and long-run information contained in the variables. A vector error correction model was therefore fitted to the data to provide estimates of the short-run relationships and the model also constitutes the convergence of estimates to their long-run equilibrium.

From the vector error correction model, the parameter estimates showed that in the food production equation increased imports result in decreased food production, that is, as commercial food imports increase, the incentive to produce food locally is decreasing in the short-term. In the same food production equation, food aid inflows were observed to be positively related to food production, suggesting that increased food aid inflows result in increased food production in the country; however the increase in food production resulting from increased food aid inflows is not highly significant from the magnitude of the parameter estimate. In the commercial food imports equation, from the parameter estimates, the relationship between commercial imports and food production is negative meaning that as

food production increases, the volumes of commercial imports are falling and this indeed is as expected. In the same equation also, food aid inflows and commercial food imports were reported to have a negative relationship in the short-term. That is, increased food aid inflows result in decreased commercial food imports, suggesting that in the short-term, food aid in the country displaces commercial food imports.

According to Granger (1988), if two variables X_t and Y_t are cointegrated, then there must be Granger Causality in at least one direction. Therefore after the error correction model was estimated, a Granger Causality test was run on the data to reinforce results obtained from the error correction model which explains the short-run dynamic relationships among a set of cointegrated variables. Results of the Granger Causality test managed to confirm the following: that there was a bidirectional causal relationship between the variables food aid inflows and cereal food production in the country; that there was a unidirectional causal relationship between cereal food production and commercial food imports and lastly that there was also a unidirectional causal relationship between food aid inflows and commercial food imports.

This chapter ends by estimating the impulse response functions for the variables cereal food production and commercial food imports so as to identify the predicted time-path of responses to a one-off one tonne increase in food aid shipments. Results show that there would be a persistent and perpetual negative response of cereal food production in the country to a one tonne shock in food aid volumes over the ten year time path. For commercial food imports, the impulse response function predicts that a one tonne shock in the food aid supply would induce a positive response for almost every year in the estimated ten-year time path. The impulse response functions try to give a clearer picture of the relationship between food aid inflows and the two variables; cereal food production and commercial food imports, in light of the foregoing results presented from the vector error correction parameter estimates and the Granger Causality test.

CHAPTER SEVEN: SUMMARY AND RECOMMENDATIONS

7.0 Introduction

The study reported in this thesis had the central purpose of modelling an analysis of the relationships among cereal food aid volumes, cereal food production and commercial food imports in Zimbabwe. Before this study, there has not been any known study done in Zimbabwe specific to the effect of food aid on domestic food production and on commercial food imports. The study analyzed the influence of food aid on these two variables; food production and commercial food imports in the country. The past research conducted and literature on the subject of food aid and its effect on domestic food production and commercial food imports internationally were extensively reviewed, attention being focused also on the methods used. The study then went on to conduct empirical assessments and fit the relevant models based on the co-integration theory that allowed for the convenient handling of non-stationary time series data and the establishment of relationships among the variables. The next sections will attempt to summarize the key sections of the thesis.

7.1 Summary

The sections that follow summarise the findings that were brought forth in this study according to the hypotheses that were being investigated.

7.1.1 Food aid, food production and commercial food imports in Zimbabwe

Food aid and food production capacities in Zimbabwe have been compromised by the poor performance in Zimbabwe's agricultural sector which has necessitated an increase in and continual need for humanitarian assistance over the past decade. Various factors have been attributed to this poor performance of the agriculture sector chief among them being the economic, political and persistent climatic instabilities experienced in the country. The persistent droughts, poor producer prices for the main food crops and the government's lack of foreign currency to import production inputs have also played a significant role in negatively affecting the level of food production and food availability thereby increasing vulnerability in the country. Various Non-Governmental Organizations have been working together with the local government in programme aimed at boosting agricultural production and ensuring food security in Zimbabwe. An example, from the discussed literature is the

FAO Emergency Coordination Unit which has been actively involved in implementing these programmes.

Zimbabwe's commercial cereal import capacity has been greatly affected by the poor performance of the agriculture sector and the shortage of foreign currency which have not made it easier in the last decade (from 2000) for the sole purchaser of grain imports GMB to perform its duty successfully of meeting the nation's food import requirements. Literature revealed that the import capacity in Zimbabwe is determined by the ability of the government to import, and the willingness to import food by rearranging its priorities for food imports vis-à-vis other necessary imports such as fuel, electricity among others (FAO, 2010). However, since January 2009, the grain market has been liberalized allowing the private sector to be involved in the importation of food in Zimbabwe relieving the GMB from being the sole importer of food grain. The expectation of this policy move has been and continues to be that it will yield positive outcomes as far as food availability in the country is concerned, thereby reducing vulnerability even in times of disasters.

The trend analysis of the variables showed that cereal food aid inflows to Zimbabwe have been generally increasing between 1988 and 2008. The highest peaks in food aid volumes were experienced in 1992 and 1993 as a result of a severe drought that occurred in the country which necessitated a massive need for humanitarian and food aid assistance in the country. The graph of food aid inflows to Zimbabwe also revealed that besides 1992 and 1993, the yearly volumes of food aid were below 100 000 tonnes, but from 2002 to 2008 the volumes of food aid averaged a value of 250 000 tonnes per year. One would assume that this is a likely result of structural change in the two eras, the 1988 to 2001 characterizing a pre-fast track land reform era and 2002 to 2008 characterizing a post-fast track land reform era. However, the Chow's breakpoint test which was used to fit the estimated equations for the three variables food aid, food production and commercial imports to each subsample from each of the two eras (1988-2001 and 2002-2008) showed that there were no significant differences in the estimated equations and hence indicating that there was no structural change in the relationships amongst the variables and thus it was concluded that the coefficients are stable across the two regimes. This means that the fast-track land reform programme was found not to have any significant influence on the variables under study. Therefore other factors such as political, environmental and economic instabilities may have influenced the differences in volumes of food aid in the two eras.

The trend analysis for food production revealed that cereal food production in the country has been declining throughout the period between 1988 and 2008. The trend analysis for commercial cereal food imports revealed a trend which mapped an almost similar trend as that of food aid volumes in the country. The trend analysis showed that commercial cereal food imports have been rising between 1988 and 2008 and the highest volumes were also recorded in the years 1992 and 1993. This trend analysis has therefore been able to confirm the stated hypotheses of the trends in the variables under study where the hypothesis of cereal food production having an overall downward trend was confirmed and the hypotheses that the volumes of food aid and commercial cereal food imports have been on the rise since 1988 to 2008 was also confirmed.

7.1.2 The short-and long-term effects of food aid on food production and on commercial food imports

The model specified to investigate the short-and long-term effects of food aid on food production and on commercial food imports was estimated by means of co-integrating techniques. The study established co-integrating relationships among the variables (commercial cereal food imports, cereal food production) and food aid inflows. Having thus confirmed the existence of long-run relationships, the short-run equation was fitted by the vector error correction model. The evidence from the results showed positive relationship between food production and food aid; however the relationship was not highly statistically significant. However it is important to note and take into consideration also the fact that an inspection of the relative magnitudes of the variables in the model may shed light on the difference in the effect of food aid on food production and on commercial imports. Food aid as a percentage of cereal food production in Zimbabwe is much smaller than food aid as a percentage of commercial cereal food imports in the country. Since food aid is so small compared to food production, it may be difficult to isolate its effect on that variable than it would to detect its impact or effect on commercial food imports to which it is of a much larger magnitude.

Results also showed that commercial food imports and food aid volumes had a negative relationship, indicating that as food aid volumes increase, the volume of commercial cereal food imported falls. This thereby suggested that food aid in the country had a displacement effect on commercial cereal food imports in the short-term.

The direction of causal relationships among the variables was determined through the estimation of the Granger Causality test which is usually tested to reinforce results obtained from error correction model. Results of the test showed that there was bidirectional causal relationship between the variables food aid and food production significant at the 10% level. The bidirectional causal relationship suggests that food aid granger causes food production and that food production also granger causes food aid. In the relationship that food aid granger causing food production, this means that lagged values of food aid contained sufficient information to explain variation in the variable food production in the country. The test suggests that past (lagged) values of food aid and own lagged values of food production help to predict food production volumes in the subsequent year. The result that food production granger causes food aid is interpreted in the same manner, where the test suggests that lagged values of food production and own lagged values of food aid also help to predict the volumes of food aid into the country in the subsequent year.

The variables food production and commercial food imports were found to have a unidirectional causal relationship between them. Specifically, the test suggested that cereal food production granger causes commercial cereal food imports, that is to say, lagged values of cereal food production together with own lagged values of cereal food production were found to be helping to predict volumes of commercial cereal food imported into the country in the subsequent year. Causal relationship in the other direction for the variables (that is whether cereal imports granger cause cereal food production) could not be confirmed as the values were not statistically significant.

The last causal relationship suggested by the test was that of a unidirectional causal relationship between food aid and commercial food imports where food aid was found to granger cause commercial food imports. This means that past values of the variable food aid together with own lagged values of commercial food imports were found to be helping to predict the volumes of commercial food imports received in the country in the subsequent year. Now in light of the following hypotheses that were postulated at the beginning of the study that:

- Food aid in Zimbabwe has had no effect on domestic food production in the short term (inelastic domestic food supply), but discourages domestic food production in the long term,

- Food aid in Zimbabwe has in the short term caused a reduction in commercial cereal food imports, but in the long term stimulates commercial imports;

The results of the study reject the hypothesis that food aid in Zimbabwe has had no short-term effect on domestic food production. The parameter estimates of the vector error correction model confirm that food aid does have a positive influence or relationship on cereal food production however small and not highly significant it may be. The Granger Causality test also confirmed a causal relationship between the two variables where it was established that food aid does granger cause food production in the country. This means that lagged values of food aid volumes in the country were found to be helpful in predicting current and future values of cereal production in Zimbabwe. Besides the confirmation of the long-run relationship between food aid and food production in the co-integration analysis, results based on the impulse response functions predicts that the long-term time path response of food production in the country to an increase in food aid volumes is negative. Meaning to say, in the long-term, food aid is predicted to discourage food production in the country. So the results of the study do indeed confirm the part of the hypothesis that states that food aid in Zimbabwe discourages food production in the long-term.

The results obtained from the study failed to reject the other hypothesis which states that food aid in Zimbabwe has in the short term caused a reduction in commercial cereal food imports, but in the long term stimulates commercial imports. From the parameter estimates of the vector error correction model and from the results of the Granger Causality test, the results confirm that food aid is negatively related to and granger causes commercial food imports in Zimbabwe. The impulse response functions also predicted that a shock in the volumes of food aid would stimulate a positive response in the volumes of commercial food imported into the country according to the response in the 10 year time path. These results also fail to reject but rather confirm the part of the hypothesis that states that in the long-term food aid stimulates commercial food imports in Zimbabwe.

7.2 Policy Insights from the research

Food aid, as has been established from this study has some positive influence and not disincentive effects on domestic production in the short-term. This shows how critical food aid is for emergency and potentially for safety nets seeing how emergencies are short-term and do not last forever. The study has also showed that the severity of resource constraints in

the event of emergencies (such as droughts or instabilities) in a country means that even a resource considered and argued by other authors to be an inefficient resource, can have favourable impacts on domestic food production and in helping to stimulate commercial food imports in the country as highlighted in the study.

Now in terms of policy development, the results give insights that the positive influence of food aid on domestic food production in the short-term can be used to the advantage of the country's development goals and objectives centred on achieving national food security. This can be achieved if food aid programme planning, targeting and food aid distribution are to be effectively accompanied and complemented with government, public and private sector involvement to boost agricultural food production especially in the smallholder farming communities who also account for the majority of food aid recipients in the country.

Joint involvement by the various stakeholders could be through investment in provision of more and better extension services to the producers as they receive food aid to ensure that at the end of the day the farmers are empowered and become sustainable. Investment can also be through government subsidies, provision of farming inputs and better producer prices for the staple food crops. These type of investments in the production sector will help to complement food distribution efforts which in essence should and usually last for only a few months in a year, so these complementary efforts by other sectors other than the Non-Governmental Organizations who are the major food aid providers, would also help food aid recipients not to develop food aid dependency syndrome. Food aid dependency syndrome discourages food production in the long run in the smallholder sector.

At the same time, the efforts by the government of Zimbabwe can be commended where at the beginning of the year 2009; the government relieved the Grain Marketing Board of its duty of being the sole importer, buyer and seller of food grains in the country. This is a step which should be yielding positive influence on the country's ability to create strategic grain reserves and better food availability in the country as it has allowed for the involvement of the private sector in the importation of food and thereby helping the country to be better able to withstand in the event of emergencies and food crises and not run for the food aid option. In the literature review, GMB monopoly was listed as one of the factors that influenced the levels of commercial food imports in the country, so the assumption is that now the level of commercial food imports in the country should be improving hence moving towards a

situation whereby the country becomes less and less dependent on food aid inflows in times of crises.

7.3 Recommendations

As has been highlighted in the foregoing discussion of policy insights, the government of Zimbabwe, the public and private institutions and Non-Governmental Organizations are recommended to work together in defining the criteria for vulnerability assessment, food aid targeting, food aid distribution and the implementation of strategies for ensuring national food availability. Such strategies which can also be directions for additional or further research should include the following components:

- Review existing food aid regulations and policies in the country governing targeting and distribution of food aid. These policies most likely influence domestic food production and level of commercial cereal food imports.
- An investigation of the use of food aid versus cash aid in the country, programme management in cash aid and a review of how both cash and food aid compare in terms of their influence on domestic food production and on commercial food imports.
- An assessment of how the invitation and involvement of the private sector in investing in the buying, selling and importing of food in the country has contributed to food availability and the implications that it has had on both food aid and commercial food import volumes from 2010.

From the discussion of the agriculture sector in the description of the study area in Chapter 4, many general problems and challenges were identified to be constraining and contributing to the poor performance of the agriculture sector, which is to a large extent remains an engine or backbone of the economy of Zimbabwe. Below are some recommendations in line with some of the problems that were identified. Addressing problems in the agriculture sector indirectly or directly addresses food aid and commercial food import problems because of their linkages that have been revealed in this study.

7.3.1 Strengthening Institutional Coordination

Just after independence in 1980, there was a quantum leap in the production of maize and other crops by the smallholder farmers before the decline in production started. One of the reasons for this was the presence of well-developed institutions with direct relevance to

agriculture. These institutions were well coordinated and also played a significant role in policy lobbying. But since the mid-1990's, the institutions have been weakening due to unfavourable political environment. However, their physical infrastructure has been maintained and is still intact. There is therefore real potential in reviving agricultural production to its former glory, provided the right policy environment is created. There is therefore an urgent need to:

- Formulate appropriate policies to promote enhanced agricultural production
- Revitalize and strengthen the institutions.
- Strengthen the linkages between the various stakeholders.
- Strengthen the linkages between various sectors of the economy to promote the backward and forward linkages that exist between them.
- Create and support management frameworks for the linkages.
- Involve the private sector and donor agencies in supporting institutional coordination.
- Allow the government to invest in agricultural infrastructure, for example in irrigation.

7.3.2 Capacitate new land owners on efficient production and sustainable use of land

The recently accomplished agrarian land reform exercise in Zimbabwe distributed commercial farms to landless rural people and other players. The resettled farmers were not given any training and/or information on proper and sustainable management of natural resources. The result of this short-sightedness was a rampant felling of trees and clearing of natural vegetation, poor agronomy practises, siltation of waterways, overgrazing and soil erosion. There is therefore an urgent need to improve the compatibility of agriculture and the environment through an efficient and sustainable utilization of natural resources. There is also a need to enforce the effective management and conservation of natural resources and to capacitate these new land owners to produce efficiently and conservatively.

7.3.3 Use of Proven Technologies

The future strategies to enhance the use of technologies by smallholder farmers include:

- In-service training for extension agents on the use of new agricultural technologies and dissemination to farmers.
- Promoting and strengthening researcher-extension-farmer linkages.

- Demand-driven research, linked to the needs of the farmers, extension workers and researchers.
- Linkages with regional and international research institutes and extension organizations to keep abreast with regional and world technology developments.

7.3.4 Land Tenure Security

There is need to secure tenure in resettlement areas and A1 and A2 farms. Tenure security on land acquired by government for redistribution should be secured by adoption of one of the following options:

- Leases with option to purchase
- Long leases of up to 99 years

Also, land leased with option for a title deed and land held under title deed is currently found in the small-scale and large-scale farming areas. This type of tenure system should remain but measures should be put in place that the land should be utilized fully and efficiently. A land tax based on the potential of the land should be instituted to encourage full utilization of the land.

Land held by the state should continue to exist but there is a need for major reforms that include the administration of state land and transparent leasing out of the land to individuals. The reforms should include farmer selection criteria, procedures to follow and local land boards at district and provincial levels to provide advisory services on all land matters. Land audits should also be done to ensure that there is transparency in all these reforms.

7.3.5 Strengthening Agricultural Input and Output Markets

Most of the inputs for agricultural activities are now being sourced from outside the country. This requires foreign exchange, which the government of Zimbabwe is struggling to raise. The following strategies should be adopted in the policy formulation to increase the availability of the inputs:

Making Foreign Currency Available to Input Firms by:

- Allowing input firms to participate in export crop contracting.
- Setting aside foreign currency for input production support.
- Allowing input firms export quotas to cover import needs.

Ensuring Input Firm Profitability in Order to Encourage Investment by:

- Agreeing on a pricing formula that ensures allowable margins that at least equals returns from alternative risk-free investment.
- Letting firms adjust prices when needed but informing and providing justification of adjustment to government pricing authorities after implementation.
- Setting a pricing formula for rural input dealers including subsidized fuel allocation to ensure profitable rural trading and affordable inputs.

Regarding the improvement of marketing of farm produce by smallholder farmers, the agricultural policy should include the following strategies:

- Developing and rehabilitating market infrastructure.
- Establishing products marketing information systems.
- Facilitate the establishment of strong commodity organizations.
- Promote value addition at farm level

Last but not least, there is also need to strengthen agricultural research and development and extension in the country and this can be achieved through the following ways:

- Policy makers being made to understand and appreciate the role of research and development so that they can allocate adequate resources to support research and development.
- Government should commit finances towards research and development in line with the regional trends.
- The contribution from government should be complimented by funds generated through other alternative and innovative funding mechanisms, for example, levies, taxes, donor funds and private sector contributions.
- Interfacing and collaborative linkages especially between research and extension and related institutions should be established and supported.
- Improve working conditions to retain and attract staff.
- Stakeholders should contribute towards funding the extension services.
- There must be a policy of cost recovery for the services rendered.
- Coordination of extension services in the field needs to be improved.
- Farmers in the country should also be encouraged through extension services to produce drought resistant crop and the use of indigenous knowledge in crop production.

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APPENDICES

APPENDIX A: Zimbabwe's Cereal Food Production Quantities in tonnes (Maize, Wheat, Sorghum & Millet)

Year	Maize	Wheat	Sorghum	Millet	Total Cereals Production
1988	2,341,210	256,910	175,614	278,000	3,051,734
1989	2,018,540	283,835	79,189	141,712	2,523,276
1990	1,971,540	325,983	92,673	142,710	2,532,906
1991	1,585,760	259,213	68,080	122,240	2,035,293
1992	361,900	57,000	29,000	27,000	474,900
1993	2,011,850	277,000	89,510	95,170	2,473,530
1994	2,326,200	288,000	121,720	77,800	2,813,720
1995	839,600	70,000	29,478	21,155	960,233
1996	2,609,000	263,134	107,520	118,390	3,098,044
1997	2,192,170	254,772	130,068	115,000	2,692,010
1998	1,418,000	242,121	71,790	49,900	1,781,811
1999	1,519,560	260,909	85,600	53,000	1,919,069
2000	2,108,110	229,775	103,329	42,890	2,484,104
2001	1,466,750	197,526	110,300	43,041	1,817,617
2002	605,000	195,000	74,546	14,648	889,194
2003	1,059,000	122,427	39,560	44,837	1,265,824
2004	1,686,150	247,048	129,391	66,703	2,129,292
2005	915,366	229,089	38,087	27,710	1,210,252
2006	1,484,840	241,924	101,248	62,612	1,890,624
2007	952,600	149,110	76,200	43,800	1,221,710
2008	496,000	31,000	75,000	37,000	639,000

Source: Grain Marketing Board (GMB) published in GoZ (2009); FAOSTAT (2011)

APPENDIX B: Food Aid Inflows to Zimbabwe (in actual tonnes)

Year	Project	Programme	Emergency	Total Food Aid
1988	1,000	-	6,056	7,056
1989	-	-	11,947	11,947
1990	-	-	12,333	12,333
1991	-	-	16,017	16,017
1992	10,838	519,155	360,516	890,509
1993	-	404,155	229,850	634,005
1994	3,638	5,000	12,527	21,165
1995	2,401	-	9,460	11,861
1996	3,310	7,480	2,711	13,501
1997	62	-	-	62
1998	9,306	47,344	-	56,650
1999	2,718	25,000	600	28,318
2000	14,809	-	990	15,799
2001	6,038	15,000	40,199	61,237
2002	1,496	-	268,500	269,996
2003	8,000	-	410,345	418,345
2004	259	-	248,795	249,054
2005	3,009	-	112,400	115,409
2006	-	-	134,487	134,487
2007	10,130	-	145,523	155,653
2008	263	5,000	336,950	342,213

Source: WFP INTERFAIS (2011)

APPENDIX C: Commercial Cereal Imports in Zimbabwe (Maize, Rice & Wheat) in tonnes

Year	Maize	Rice	Wheat	Total Commercial Cereal Imports
1988	-	6,000	75,000	76,944
1989	-	15,000	37,000	40,879
1990	58	11,779	93,910	105,315
1991	340	8,395	25,595	24,770
1992	1,208,060	13,341	115,000	517,926
1993	492,000	10,782	85,618	587,049
1994	1,409	23,584	61,660	69,565
1995	2,266	27,293	80,890	307,684
1996	126,867	15,763	276,070	436,558
1997	44,350	27,189	128,563	213,834
1998	152,742	21,212	101,987	346,531
1999	183,000	18,349	37,956	215,463
2000	1,121	10,239	56,571	92,881
2001	1,804	13,601	23,206	86,990
2002	650,385	9,157	23,000	447,258
2003	489,253	16,418	26,578	159,063
2004	319,974	2,609	205,214	354,468
2005	131,092	757	43,106	117,753
2006	410,171	13,981	83,020	484,837
2007	399,400	2,410	93,200	400,320
2008	504,307	1,336	22,419	306,758

Source: GoZ (2009)

APPENDIX D: All cereals imported into Zimbabwe (in Tonnes) Sheet 1 of 2

Year	Barley	Buckwheat	Canary seed	Cereals, nes	Flour of Wheat	Maize	Millet	Oats	Rice Broken
1980	0	0	0	196	0	145045	183	1387	0
1981	0	0	0	0	2200	125	0	607	0
1982	0	0	0	0	72	2	14	803	0
1983	0	0	0	0	73	0	31	0	0
1984	0	0	0	36	201	271942	197	81	0
1985	7400	0	0	0	19	1	81	170	0
1986	0	0	0	0	2	15	21	0	0
1987	0	0	0	0	2	39	22	0	0
1988	0	0	0	0	0	0	0	3000	0
1989	0	0	0	0	0	0	0	0	0
1990	11876	0	0	0	0	58	20	0	0
1991	6425	0	0	0	29	340	0	0	0
1992	21465	0	0	11	18	1208060	489	0	48
1993	5847	0	0	0	61	492000	337	0	61
1994	0	0	0	1	1637	1409	0	0	1941
1995	175	0	0	1	3863	2266	692	2	1657
1996	17380	0	3	0	10092	126867	52	412	1182
1997	6797	0	0	2	723	44350	6	247	5682
1998	13200	0	0	0	863	152742	23	178	12855
1999	0	0	0	0	203	183000	86	35	3828
2000	22873	0	0	1	973	11211	0	272	6203
2001	5882	0	2	1	199	1804	0	2	3421
2002	0	0	0	0	16000	650385	202	2	16779
2003	16439	0	0	244	6778	489253	542	614	464
2004	0	0	0	0	22265	319974	144	327	12912
2005	0	0	0	0	3780	131092	144	3	29141

2006	0	0	4	4	9473	410171	49	187	28332
2007	0	0	1	6	6402	399400	231	3	28000
2008	332	8786	1	7	9798	504307	187	7	28000
2009	332	7276	2	24	65612	821246	1	8	27498

APPENDIX D: All Cereals Imported into Zimbabwe (Tonnes) Sheet 2 of 2

	Rice Husked	Rice Milled	Rice, paddy	Rye	Sorghum	Wheat	Total Cereals Imported
1980	0	6080	0	0	0	2625	157496
1981	0	4823	0	0	4	19857	29597
1982	0	2430	0	0	0	8000	13303
1983	0	19908	0	0	0	54759	76754
1984	2	15228	0	0	8927	74174	372772
1985	4	5951	0	0	2	139289	154902
1986	4	5765	0	0	728	47769	56290
1987	1	15832	0	0	2	31262	49147
1988	0	6000	0	0	0	75000	85988
1989	0	15000	0	0	0	37000	53989
1990	3	11779	0	0	2	93910	119638
1991	1	8395	0	0	2	25595	42778
1992	3	13341	0	0	50000	115000	1410427
1993	3	10782	0	0	1376	85618	598078
1994	1	23584	195	0	302	61660	92724
1995	33	27293	96	0	2577	80890	121540
1996	3	15763	0	0	2234	276070	452054
1997	99	27189	200	0	38	128563	215893
1998	26	21212	60	2	36	101987	305182
1999	3	18349	210	0	111	37956	245780
2000	2	10239	310	0	25	56571	110680
2001	25	13601	42	0	42	23206	50228
2002	0	9157	8	0	1721	23000	719256
2003	0	16418	222	0	19856	26578	579411
2004	1	2609	6	0	40069	205214	605525

2005	0	757	139	0	25000	43106	235167
2006	1	13981	37	0	74065	83020	621330
2007	41	2410	36	0	26243	93200	557980
2008	126	1336	1181	0	72483	22419	650978
2009	39	5257	4549	0	77830	243139	1254822

APPENDIX E: Total cereals produced in Zimbabwe by year (tonnes)

Year	Barley	Cereals, nes	Maize	Millet	Oats	Rice, paddy	Sorghum	Wheat	Total Cereals produced
1980	23672	2500	1510740	180000	760	350	82299	191234	1991555
1981	33001	2500	2833400	137710	750	374	125131	183516	3316382
1982	38538	2500	1808380	97999	800	97	67355	191880	2207549
1983	12854	2500	909786	100000	600	122	51536	124250	1201648
1984	8995	2500	1132800	120000	300	719	55511	99000	1419825
1985	25200	2500	2828000	224000	500	143	133000	207200	3420543
1986	28800	2500	2545600	141000	400	291	131200	248346	3098137
1987	22015	2500	1130840	81000	250	595	55698	214548	1507446
1988	27433	2500	2341210	278000	263	520	175614	256910	3082450
1989	28621	2500	2018540	141712	679	545	79189	283835	2555621
1990	26474	1500	1971540	142710	391	468	92673	325983	2561739
1991	32000	1500	1585760	122240	690	450	68080	259213	2069933
1992	5000	1500	361900	27000	369	400	29000	57000	482169
1993	33000	1500	2011850	95170	500	500	89510	277000	2509030
1994	33000	1500	2326200	77800	568	568	121720	288000	2849356
1995	12500	1700	839600	21155	400	400	29478	70000	975233
1996	30000	1700	2609000	118390	483	437	107520	263134	3130664
1997	45600	1700	2192170	115000	446	419	130068	254772	2740175
1998	57234	1700	1418000	49900	400	400	71790	242121	1841545
1999	16671	1700	1519560	53000	421	421	85600	260909	1938282
2000	32200	2000	2108110	42890	547	500	103329	229775	2519351
2001	25000	2000	1466750	43041	550	600	110300	197526	1845767
2002	16500	2000	605000	14648	650	601	74546	195000	908945
2003	60000	2000	1059000	44837	680	700	39560	122427	1329204
2004	36000	2000	1686150	66703	768	724	129391	247048	2168784

2005	43000	2000	915366	27710	700	804	38087	229089	1256756
2006	54000	2250	1484840	62612	713	600	101248	241924	1948187
2007	48000	2250	952600	43800	800	392	76200	149110	1273152
2008	50000	1563	496000	37000	700	406	75000	31000	691669
2009	66197	1956	700000	40000	650	415	70000	40000	919218

Source: FAOSTAT (2011)