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THE EFFECTS OF INTERNATIONAL TRADE LIBERALIZATION ON FOOD SECURITY AND COMPETITIVENESS IN THE AGRICULTURAL SECTOR OF BOTSWANA

by

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Declaration

I declare that this thesis I am submitting to the University of Pretoria for the degree of Ph.D. in Agricultural Economics represents my own work and has never been submitted by me to any other tertiary institution for any degree.

Howard Kgalemang Sigwele

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Abstract

The Effects of International Trade Liberalization on Food Security and Competitiveness in the Agricultural Sector of Botswana

by

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Degree: Ph D

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Access to adequate and nutritionally balanced food to achieve a productive and healthy life for all individuals, on a daily basis, has been an elusive challenge in several parts of the world. In many developing countries such as Botswana, increasing per capita food consumption has been hampered by poverty as well as poor access to marketable skills and employment opportunities. Experience and studies elsewhere indicate that international trade liberalization based on comparative cost advantage in the goods sectors, can greatly improve per capita food consumption through improved export market access and reduction in tariffs. The purpose of this study is to analyze the effects of international trade liberalization on food security/household welfare and the competitiveness of the agricultural sector in Botswana.

In undertaking this study basically two hypotheses were made. Firstly, it is hypothesized that trade liberalization within SACU through the reduction of agricultural tariffs on food commodities can improve per capita consumption by reducing domestic food prices. Currently, products like maize grain, beef, dairy and wheat grain attract an import duty which partly increases their

domestic prices within SACU. Poor households in Botswana, in particular, spend a disproportionate share of their disposable income on food most of which is imported. Secondly, this study also hypothesizes that improved market access of agricultural exports for Botswana based on WTO rules could generate additional foreign earnings that could be used to import more food. Globally, agricultural trade is characterized by distortions that restrict free commerce based on comparative advantage. Direct producer price and input subsidies together with export subsidies to farmers especially in major trade players like the EU, USA and Japan constitute barriers to trade and disadvantage developing countries like Botswana which have comparative advantage in several farm commodities. Subsidies by major industrialized countries create an artificial comparative advantage for their farmers as without direct farmer assistance, it is doubtful if some of them could invest in agriculture!

Secondary data on international trade and social accounting matrix (SAM) were used in this study. Trade data were used to conduct policy simulations in order to determine the effects of trade liberalization on food security and competitiveness of the agricultural sector in Botswana. SAM data for 1993/94 were modified and used to generate income and price multipliers to undertake policy simulations. Data from SAM captures the income and demand linkages in the economy.

Using partial equilibrium and economy-wide approach (SAM multiplier analysis), this study shows that Botswana can improve its household welfare or per capita food consumption through an increase in export earnings which in turn could be used to import more food at competitive prices. Except for meat products especially beef, Botswana is a net-importer of most food items. Based on a partial equilibrium agricultural trade policy model, this study found that the country's agricultural sector enjoys global comparative advantage in beef exports if there was global trade liberalization. The model advocates for the reduction of direct producer price, input and export subsidies in the agricultural sector by WTO members. Beef earnings including those from

other goods like textiles and minerals are used to purchase imported food to increase domestic supply.

Through a SAM income multiplier analysis, policy simulations on improved export market access for beef and textiles indicated that households, factors and activities gained from global trade liberalization. However, poor households without assets or factors such as capital and skills marginally benefited from improved export market access. This finding also indicates the potential negative income distributional effects which require policy support to benefit poor households during trade liberalization. Beef and textiles exports were chosen when undertaking policy simulations based on improved market access.

With a SAM price multiplier analysis, policy simulations based on SACU tariff reduction on maize grain, beef, powdered milk and wheat grain was made. Applied tariffs were used for policy simulations. A reduction in tariffs not only improves household welfare, factors and activities also benefit through lower domestic food costs/prices. This study found that SACU tariff reduction indeed contributed to welfare improvements among households in Botswana as their cost of living declined. Poor households, in particular, benefited most from tariff reduction in imported food commodities.

Factors including low-wage workers also gained from a reduction of import duties on selected food commodities. However, government loses tariff revenue when import duties are cut while producers of exports enjoying preferential markets such as the beef producers in Botswana lose when trade-distorting agricultural subsides are removed/reduced. Like government, consumers of imported food items are, in short term, adversely affected by an increase in food prices following the reduction of trade-distorting agricultural subsidies (producer price, input and export subsidies). The results of the SAM price multiplier analysis also indicated limited price/cost transmission in the economy following tariff reduction. Limited price transmission or circular flow of cost reduction in the economy imply weak competition in the market, poor information dissemination, institutional rigidities, etc hence the need for an

effective competition policy and law. An effective competition policy and authority minimizes unfair trading practices and provides consumers and the economy with choice and possibly maximum net-value for money.

In addition to improving welfare and reducing cost of living, etc, this study also found that when policy simulations/shocks were made, income and demand linkages in the economy were identified. In some simulations the linkages demonstrated a strong circular flow of income/price transmission while in others the multiplier effects were weak indicating limited economic integration/competition, a policy challenge that requires efforts for sustained diversification. Based on the results from SAM multiplier analysis, this study has provided Botswana with useful information to design policies that enhance economic integration and diversification.

To maximize her benefits from international trade liberalization, Botswana also needs to implement complementary policies to address supply-side constraints and improve infrastructure, competition, information technology, etc. Safeguard mechanisms are still necessary to protect the agricultural sector and the economy in Botswana from unfair trade practices including market failure.

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ACRONYMS/ABBREVIATIONS

ACP	African, Caribbean and Pacific
ATPSM	Agricultural Trade Policy Simulation Model
BIDPA	Botswana Institute for Development and Policy Analysis
BLNS	Botswana, Lesotho, Namibia and Swaziland
CSO	Central Statistics Office
EU	European Union
FAO	Food and Agriculture Organization
FAP	Financial Assistance Policy
FTA	Free Trade Area
HIES	Household Income and Expenditure Survey
HIV/AIDS	Human Immuno-deficiency Virus/Acquired Immune Deficiency Syndrome
IDASA	Institute for Development Alternatives in South Africa
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
MFDP	Ministry of Finance and Development Planning
OECD	Organization of Economic Cooperation and Development
SADC	Southern African Development Community
SAM	Social Accounting Matrix Theory
UNDP	United Nations Development Programme
US (A)	United States (of America)
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 The contribution of the agricultural sector to the macro-economy of Botswana

This chapter contains background information about Botswana's economy as well as its structural changes since independence. In addition, the Chapter attempts to define the food security problem in Botswana, as well as identifies the methodologies to be used in order to analyse how international trade liberalization and market access can contribute to improving food and income security as well as the competitiveness of the agricultural sector.

Botswana is a unitary state that has pursued free enterprise and an open economy since independence in 1966. Both public and private sectors participate fully in the economy, with the former concentrating on the provision of public goods (health, infrastructure, education, research, disease and pest control, the water supply, and so forth). Also, Botswana has generally maintained a stable macro-economic and political environment displaying very low inflation rates and almost regular budget surpluses.

Botswana's population consists of about 1.7 million people, half of whom live in the rural areas and subsist on extensive cattle, small stock and risky dry-land farming (National Development Plan 9, 2003). Hunting, gathering, harvesting of wild products and remittances constitute part of the income sources of several households. In general arable farming is very risky, owing to endemic drought.

At independence in 1966, the agricultural sector contributed about 40 percent of the country's Gross Domestic Product (GDP) while mining, construction, manufacturing and similar industries made only small contributions, except for

the service sector that accounted for 20 percent. The agricultural sector is still to date dominated by the export-based cattle industry. Table 1.1 shows the composition of the country's GDP by sector for selected years since independence, based on 1993/94 constant prices. It is very significant to note the structural changes that have occurred in Botswana's economy since the discovery of minerals, especially diamonds in the 1970's. From a zero contribution in 1966, the mining sector now accounts for about 32 percent of the country's GDP while agriculture has declined to a paltry 2.6 per cent in 2002/2003 (CSO, 2003).

Table 1.1: GDP by Economic Activity – Selected Years (Constant 1993/94 Prices) P million

	1966		1975/76		1985/86		2000/01		2002/03	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
Economic Activity		%		%		%		%		%
Agriculture	387.6	42.7	431.1	20.7	318.9	5.6	424.4	2.5	476.0	2.6
Mining & Quarrying	-	-	365.3	17.5	2, 790.8	48.9	6, 149.0	36.5	5, 853.0	31.7
Manufacturing	51.4	5.7	159.2	7.6	224.9	3.9	695.3	4.1	793.0	4.3
Water and Electricity	5.2	0.6	48.4	2.3	113.1	2.0	395.9	2.3	455.0	2.5
Construction	71.2	7.8	267.1	12.8	260.7	4.6	954.8	5.7	1, 076.0	5.8
Trade, Hotels & Restaurants	81.4	9.0	179.0	8.6	361.6	6.3	1, 706.8	10.1	3, 805.4	20.7
Transport	39.4	4.3	23.5	1.1	141.5	2.5	623.7	3.7	759.8	4.1
Banks, Insurance & Business Services	183.0	20.1	97.5	4.7	367.4	6.4	1, 756.8	10.4	2, 008.3	10.9
General Government	89.2	9.8	305.0	14.6	730.5	12.8	2, 640.6	15.6	3, 013.2	16.4
Social and Personal Services	-	-	57.8	2.8	145.4	2.5	653.6	3.9	777.3	4.2
+Adjustments items:										
Net Taxes on products/production	-	100	164.3	7.9	368.0	6.4	1, 397.8	8.3	-	
=GDP total at constant market prices	908.6	100	2, 083.5	100	5, 708.1	100	16, 865.8	100	18, 412.0	100
GDP Per Capita (Pula)	1, 682.5		2, 861.9		5, 175.0		9, 793.4		10, 508.0	

Source: Central Statistics Office, MFDP, Botswana, 2002.

Besides mining, only the trade, hotels and restaurants and general government sectors have generally and consistently experienced real growth at 1993/94 prices, while manufacturing, services, transport, communication and construction have in most cases declined since independence. In real terms, at 1993/94 prices, Botswana's economy has grown annually, on average at a rate of about 6.4 percent from 1966 to 2002/2003 (CSO, 2003). The mining sector, especially diamonds, has been responsible for this phenomenal growth. The growth in the country's GDP has also led to a 3.3

percent average growth rate in GDP per capita income over the same period. In fact, Botswana is now classified as a middle-income developing country (World Bank, 2002).

A relative decline in the contribution of agriculture to the country's GDP over time is expected in an economy as it undergoes structural transformation. As per capita incomes increase in real terms, real expenditure on agricultural goods also declines, which is consistent with Engel's law (Pyatt and Round, 1985). The decline in the food budget share as a proportion of total expenditure occurs because, in general, the income elasticity of the demand for agricultural products, including food commodities, is lower than that for manufactured goods such as cars and electronic equipment (Pyatt and Round, 1985; Ethier, 1995; Sadoulet and Janvry, 1995; Lipsey and Courant, 1996).

In a SAM-based study on the contribution of the cattle sub-sector to Botswana's economy, it was found that this activity evidences the largest full linkage effect compared to all sectors (Townsend and Sigwele, 1998). This signifies that the value added by this subsector and the income that the sub-sector generates induce the largest growth in other sectors of the economy. This sector, however, exhibits the lowest production linkages compared to the manufacturing sector but when the full circular flow of income-expenditure interrelationships is observed, it is clear that the cattle sub-sector is very important in stimulating growth in other sectors. Manufacturing/industry exhibits strong production multipliers because of high intermediate demand, while agriculture shows stronger multipliers based upon income-demand linkages (Sadoulet and de Janvry, 1995, p.201). The mining sector, while dominant in the country's GDP, does not demonstrate strong income/demand linkages with the rest of the economy (Fourth FAP Evaluation Report, BIDPA, 2000).

1.2 Objectives of the Study

Following international trade liberalization by means of the formation of the WTO in 1995, member countries are expected to introduce major reforms so as to improve market access to commodities and services previously barred or restricted by import levies, quotas and other discriminatory practices. The aim of this study is therefore to analyze the effects of trade liberalization and market access on food security and the agricultural economy of Botswana, in particular with regard to:

a) Food security/per capita food consumption
b) Household welfare and
c) Agricultural sector competitiveness in Botswana.

Stylized facts indicate that global trade liberalization and enhanced market access can improve per capita food consumption, household welfare, economic efficiency and competition (World Bank, 1985; FAO, 1995). This study likewise assumes that international trade liberalization and enhanced market access can improve food security and household welfare, and contribute towards a competitive and efficient agricultural sector as well as to the whole economy of Botswana.

1.3 Problem Statement

For the purpose of this study, the problem of food insecurity will specifically be confined to inadequate per capita food consumption and as well as an analysis of how trade liberalization and market access, in particular, can contribute towards improved food security. The main problem for Botswana is that the country is primarily a net food importer and faces widespread abject poverty, which in turn leads to low per capita food consumption. As a result of poverty, the high cost of food imports owing to SACU agricultural tariffs and limited domestic production and competition, many households cannot afford to access enough food to be able to enjoy a healthy and productive life (World Bank, 1985).

While Botswana has over the last three decades witnessed phenomenal growth in GDP, severe poverty still remains a major concern. The latest statistics show that about 23 percent of the population lives below the poverty datum line or subsists on less than US $ 1 per day (HIES 2002/03, CSO, 2004, p.26). If, however, a basic food consumption basket is used in calculations about 30 percent of the population is considered poor. Most of the impoverished households live in the rural areas and are dominated by female-headed families. The high incidence of HIV/AIDS is also expected to worsen poverty since scarce savings are diverted to health care. Currently the prevalence of HIV/AIDS is estimated at 39 percent among the 15-49 age groups (National Development Plan 9, 2003, p.321). It is estimated that if the current HIV/AIDS prevalence rates persist the proportion of households below the poverty datum line will increase while the "national income dependency ratio will rise from 5.4 to 6.4" (NDP 9, 2003, p.25).

Botswana is among the countries where the daily food per capita intake is below the recommended levels of carbohydrates, proteins, fats and vitamins. According to the World Health Organization, a minimum of 2500 calories per day is recommended for an adult person. As in most Sub-Saharan African countries, for the majority of people in Botswana, the per capita calorific intake is below the recommended daily intake (World Food Summit, FAO, 1996). Inadequate per capita daily food intake is also primarily a result of income poverty or limited access to assets, as well as of the lack of alternative but sustainable income and employment opportunities (Sen, 1981; HIES 1993/94, CSO, 1995; BIDPA, 1996; UNDP, 2002; HIES 2002/03, CSO, 2004).

Regarding assets, cattle ownership and access to urban land, in particular, can improve per capita food consumption by generating additional household income to purchase food. Ownership of cattle improves a household's income as well as providing draught power for crop production. Unfortunately cattle ownership, the single most important rural asset, is skewed in Botswana with almost 45 percent of farming households lacking cattle (Agricultural Statistics

Report, CSO, 2002). Access to urban land, another asset to generate alternative income, is also very limited. Access to urban land allows households to own property for the purposes of leasing, manufacturing, etc. According to Sen (1981) an individual/household can obtain food by means of their own production. Alternatively a household can access food through trade-based entitlement.

While asset ownership is also important in food security, access to employment can also improve household food security. Currently in Botswana, sustainable employment opportunities are becoming limited owing to regional and global competition, especially in “loose” industries such as textiles and clothing. In general, countries in Southeast Asia enjoy a comparative cost advantage in these industries. Loose industries are those that could easily be moved from one place/country to another with minimum delay. The unemployment rate in Botswana is estimated at 23 percent for the 15-64 age groups (Budget Speech, Botswana, 2005). The latest labour survey, however, shows that unemployment rate has dropped to about 18 percent, of whom the majority are young people (Labour Force Survey, CSO, 2006). Labour productivity has also been adversely affected by HIV/AIDS, as most of the time a number of workers are on sick leave in any particular enterprise.

While moderate protein-energy malnutrition of children under five years of age has declined from 15 percent in 1995 to about 7-9 percent during the 2000/2001 period, severe malnutrition has increased from just under 0.5 per cent to about 2 per cent over the same period (National Development Plan 9, 2003, p.316). Whilst efforts are being made to reduce child malnutrition by offering feeding programmes and fortified food, trade liberalization and improved market access could also contribute towards reducing this problem by enabling households to obtain cheaper food at competitive world prices, while at the same time additional income is expected from more extensive exports to the markets of industrialized countries. In a country well-known for meat surpluses and exports, it is ironic that there should be protein

malnutrition amongst children. It is evident, worldwide, that food security or access to nutritionally balanced food is not synonymous with food self-sufficiency (World Bank, 1985; World Food Summit, 1996 and 2001).

Finally, Botswana depends heavily on food imports. Almost 90 percent of her cereal requirements are dominated by white maize and wheat imports (see Annexes 1.1–1.5). Climatically, Botswana is not suited to a viable and sustainable crop production but, instead, possesses a comparative cost advantage in extensive beef production and wildlife (see Chapter 2). Except for white maize, which is normally obtained from South Africa, wheat is generally imported from outside the Southern African Customs Union (SACU). As a member of SACU, Botswana also levies duties/tariffs on imported food and agricultural goods and this practice increases the cost of food to many poor households. Until recently, SACU agricultural tariffs were very high since they were primarily designed to protect domestic industries as well as large-scale farmers in the SACU region (see Chapter 2). All SACU members administer a common external tariff in agricultural and industrial goods.

1.4 Hypotheses of the Study

To improve food security through per capita food consumption in Botswana, it is hypothesized that the introduction of trade liberalization within SACU by the reduction of agricultural tariffs, especially on so-called sensitive products, will reduce food prices and enhances household food security. A tariff is an added cost to a consumer; hence access to cheaper food at competitive prices following tariff reduction is expected to improve per capita food consumption and household food security. According to the Household Income and Expenditure Survey/HIES 2002/03, poor households spend about 36 percent of their disposable income on food (CSO, 2004). Most of this food comprises cereals, meat, vegetables, pulses and dairy products (HIES 2002/03, CSO, 2004, p.96). Except for meat products, most of the consumed food commodities are imported, hence the hypothesis that trade liberalization will improve access.

Within SACU, beef, dairy products, maize, wheat and sugar are considered as sensitive products because of their strong inter-sectoral and intra-sectoral linkages in the economies of member states. Similar information from other SACU and SADC countries also demonstrates the strong direct and indirect links between these sensitive products and the rest of the economy. Given their strong linkages in the economy of SACU members higher duties are imposed on competing imports.

Furthermore, this study also hypothesizes that improved market access for Botswana's exports will increase foreign earnings, which in turn could be used to import those food commodities that the country is least suited to produce competitively and sustainably. An increase in foreign earnings is consistent with Sen's trade-based entitlement in which food access is improved through additional export revenue that is used to purchase imports and other inputs (Sen, 1981). Improved market access also offers a country the opportunity to generate additional earnings for development and consumption. Currently, their limited market access to industrialized countries costs the low-income countries about US$ 60 billion a year in lost export earnings (World Bank, 2002). In this study, it is assumed improved market access of beef and textiles exports can enhance food security/household welfare in Botswana.

In addition to improved market access, it is also hypothesized that a reduction of SACU tariffs on imported food commodities can improve food security and the competitiveness of the agricultural sector in Botswana. A tariff is a wedge between domestic and world prices. As an additional tax on imported goods, a tariff is a cost to households, industries and the economy. Through an economy-wide analysis, the study will examine the effects of the reduction of SACU agricultural tariffs on household welfare/food security and agricultural sectoral output as well as on other sectors of the economy. The evaluation of agricultural trade liberalization through SACU tariff reduction on imports will cover sensitive agricultural products (beef, maize, wheat and dairy products,

especially powdered milk). It is through SACU that import duties could be reduced as each member state is bound by one common external tariff.

There has generally been an ongoing concern, especially in Botswana, Lesotho, Namibia and Swaziland (BLNS), that some of the SACU agricultural tariffs are too high for consumers/businesses in these countries. BLNS countries are predominantly deficient in food even during years of relatively favourable rainfall. High SACU import tariffs were originally designed to protect South Africa's agriculture and industry during the years of political isolation and economic sanctions. As a result of the relatively high agricultural tariffs on certain sensitive products, BLNS countries have agreed with South Africa since the mid 1990's to import wheat grain and powdered milk at zero duty, provided the imports are solely for domestic consumption and that any excess is not re-exported to South Africa. Re-exports of duty-free wheat grain and powdered milk to South Africa could cause economic injury to local competing firms/goods in that country. This so-called *gentlemen's agreement* is still in force but sometimes leads to difficulties owing to alleged illegal exports to South Africa, as an incentive exists on both sides.

1.5 Research Methodology

In order to undertake this study, a SAM multiplier analysis will be used to examine the economy-wide effects of improved market access for exports and tariff reduction on food security and competitiveness in agriculture in Botswana. Data from the 1993/94 SAM was used and reorganized, so as to undertake an analysis with special reference to agriculture and allied industries. An economy-wide or SAM-based approach was chosen for the analysis: the assumption is that a policy change/shock, like a reduction in commodity tariff rates in a sector, not only affects the sector in question but that other activities, commodities, households, etc, are also likely to be influenced by the circular flow of income and expenditure relationships in the economy (Sarris, 1997).

The partial equilibrium framework is not able to capture the economy-wide effects of policy changes or shocks. Whereas in terms of partial equilibrium analysis, the reduction of import duties on agricultural commodities would change relative prices between and among tradables, signal potential profitability for certain farm enterprises, as well as influence substitution and consumption, etc, the welfare effects and the cost structure of certain economic activities/sectors and the like are not captured by this analysis (see Chapter 4 on partial equilibrium analysis).

Besides the SAM-based model to analyze the effects of trade liberalization and market access, a partial equilibrium analysis based on the tariff reduction formulas proposed by the United Nations Conference on Trade and Development (UNCTAD) for global agricultural liberalization will however be undertaken. The agricultural trade policy simulation model (ATPSM) is currently used by UNCTAD to analyze the effects of the reduction of tariffs regarding agricultural products and domestic support/subsidies on exports, imports, government revenue, producer and consumer welfare, by country. A brief description of the model is provided in Chapter 4. The use of partial equilibrium analysis in this study is intended to show whether there is any convergence between the two methods of analysis. The technique of partial equilibrium analysis of trade liberalization is widely used because it is relatively less data-intensive and therefore, unlike SAM-based models, also less costly. Further, UNCTAD has also for some time used ATPSM findings to advise developing countries, especially in preparation for and during multi-lateral trade negotiations under the WTO, how liberalized global agricultural trade could benefit them. The study strongly advocates the use of both partial equilibrium and economy-wide analyses of global trade liberalization to achieve complementarities, where possible.

1.6 Limitations of the Study

The study is based on secondary data and also assumes that the structure of the economy since 1993/94 has not changed sufficiently to influence the

results of a SAM-based model. The latest 2002/2003 sectoral contributions to GDP, however, shows very few structural changes in Botswana's economy, since mining, especially that of diamonds, still accounts for at least a third of total GDP. Sectors such as manufacturing, trade, hotels and banking services have not changed much since 1993/94 save for insignificant gains or losses of less than five percentage points in each of these areas.

The study is also based on the application of static SAM-based models which do not incorporate the dynamic changes brought about by improvements in technology and productivity.

1.7 Commodities Chosen for the Analysis

Maize, wheat, beef and dairy products have been chosen as commodities for analysis. In addition to agricultural products, other exports have been included in order to discuss increased benefits from improved market access for them. These non-agricultural exports, tourism and textiles, have been included because export earnings from agricultural exports alone cannot meet the country's total food import bill nor improve food security.

Maize and wheat have been selected for the study, as these are the main cereals consumed and are almost exclusively obtained through imports into the country (see the Food Balance Sheets which are annexed to this study). Sorghum is also an important cereal produced and consumed in the country, and in good, that is rainy years up to 50-70 percent of total consumption may be purchased from domestic producers. Beef has been selected because it is one of the country's main exports. Dairy products have also been selected because they account for one of the most extensively consumed, and yet imported, food commodities in the country. However, for the partial equilibrium analysis in Chapter 4, several agricultural products including beef, wheat, maize and dairy foods are covered in ATPSM. About 36 agricultural commodity groups are altogether covered in ATPSM.

Annexes 1.1 to 1.5 show the importance of the selected cereals in Botswana's food balance sheet. A food balance sheet is a table that illustrates at any given time a country's total food supply and consumption at the macro-level. As a member of SADC, Botswana is currently, like other most member countries, using a food balance sheet (FBS) that only covers cereals. Plans are underway to include meat, vegetables, and dairy products in the FBS.

As indicated in the thirteen-year food balance sheets for Botswana, maize is the largest source of calories, proteins and fats on a per capita basis. After maize, sorghum and wheat are the next most important consumed products in Botswana. However, if livestock products are included, the relative importance of consumed food commodities regarding the provision of calories, proteins and fats may alter.

As a food balance sheet only illustrates food availability and consumption at a national or macro-level, it suffers from the deficiencies that are associated with aggregate indicators like GDP per capita. Further, a food balance sheet does not indicate which areas, households by gender, age, etc are vulnerable or secure as regards food. Food supplies are often seasonal, a factor that a food balance sheet does not also take into account. It is for these reasons that extreme care should be exercised when interpreting food balance sheets as they only measure the national aggregate picture.

According to macro-economic indicators, Botswana experienced one of the highest per capita incomes (currently estimated at US $ 3500) among developing countries; yet poverty is a serious social concern. The latest HIES 2002/03 results indicate that about 30 percent of the population faces food insecurity as their disposable income is not sufficient to enable them to live a productive and healthy life (HIES 2002/03, CSO, 2004). Poverty is identified as one of the major factors responsible for food in insecurity and malnutrition.

CHAPTER 2

A REVIEW OF AGRICULTURAL POLICIES IN BOTSWANA AND SOUTH AFRICA

2.1 Introduction

This chapter mainly reviews the agricultural policy in Botswana since independence in 1966 and considers how the policy has contributed (or failed) to the attainment of the objectives of this sector. Despite its reduced contribution to the macro-economy (see Chapter 1), the agricultural sector in Botswana, as in many developing countries, still plays an important role especially in rural areas since it provides employment and income opportunities as well as food to many people. Besides, the beef industry continues to provide the country with scarce export earnings so that it can import food, inputs and machinery.

Furthermore, because Botswana and South Africa are both members of the five-country Southern African Customs Union (SACU),[1] this chapter also reviews the agricultural policy of South Africa in particular, as Botswana depends heavily on imported agricultural products from the latter. SACU administers a common external tariff in which all member countries apply a single duty on imported agricultural and industrial goods outside the customs area. This chapter will therefore also briefly describe SACU's agricultural trade and tariff policy in order to contextualize Botswana's agricultural policy and show how the SACU policies affect household food security in the latter country.

Finally, the chapter analyzes the recent institutional and trade tariff policy changes within SACU following the advent of global economic liberalization.

[1] The other SACU members are Lesotho, Namibia and Swaziland. SACU countries maintain a common external tariff for both agricultural and industrial products.

These changes have a direct bearing on the way in which import tariff reduction for sensitive SACU food products could improve food security and contribute to agricultural competitiveness, greater choice for consumers in Botswana, in particular, and the SACU economy in general. SACU agricultural trade liberalization through of tariff reduction and improved market access is analyzed in Chapter 7 so as to assess its effects on food security, agricultural competitiveness and the overall economy of Botswana.

While the aggregate economic contribution of the agricultural sector to the Gross Domestic Product (GDP) in the economies of Botswana and South Africa has been substantially reduced to less than 5 percent in both countries, the sector still possesses considerable potential to improve food security and employment creation, subject to the formulation and implementation of appropriate sectoral and macro-economic policies (Krueger *et al*., 1988; Sadoulet and de Janvry, 1995; Ingco and Nash, 2004). In fact studies carried out in many parts of the world indicate very strong forward and backward linkages between agriculture and the rest of an economy (Mellor, 1979; Vogel, 1984; Fenyes and Van Rooyen, 1985; Mellor, 1986; Van Zyl and Vink, 1988; Nieuwoudt, 1989; Townsend and McDonald, 1998). In particular, these studies indicate that real increases in farm incomes create a demand for commodities as well as services in and outside the agricultural sector.

One of the major reasons for the growth in demand for non-food items following real growth in per capita farm income, *ceteris paribus*, is that the proportion of food items in the household budget declines, and this provides additional disposable income for non-food commodities, including services (Engel's Law; Nieuwoudt, 1989; HIES, Botswana, 1993/94). Therefore in low-income countries, where the majority of people are still engaged in farming, public policies that discriminate against the real growth of agriculture and depress farm incomes will not benefit from the multiplier effects associated with sectoral linkages. Besides income and demand linkages, the agricultural sector in Botswana and South Africa provides raw materials for the manufacturing sector, investment capital and foreign exchange earnings in

order to purchase food and other inputs, including capital goods and technology (Botswana SAMs for 1993/94 and 1996/97; South Africa SAMs for 1993, 1998 and 1999).

The following sections review the agricultural policies of the two countries and examine the similarities in agricultural policies and the distortions in the respective economies. Similarities in such policies have led to macro-economic effects as well as food security implications. Before a review of the agricultural policies of the two countries is undertaken, it is important, first, to understand fully the relationship between Botswana's agricultural sector and SACU, in which South Africa has been a dominant player since the creation of the customs union in 1910.

2.2 Linkages between Botswana's Agricultural Sector, SACU and Agricultural Policies of South Africa

As pointed out earlier, it is important to understand these linkages. In order to introduce a brief analysis of the agricultural policies of Botswana and South Africa, it is essential to understand how Botswana's membership of the Customs Union has influenced her policies and development strategies.

2.2.1 External Tariff Policy for SACU

When SACU was renegotiated in 1969 following the political independence of Botswana, Lesotho and Swaziland, the contracting parties made a major legal and/or political "mistake" in the Customs agreement. This legal provision, as enshrined in Article 4 of the SACU agreement of 1969, gave absolute powers to South Africa to determine external tariffs for agriculture as well as industry on behalf of the other members. Namibia, then a territory under illegal occupation by South Africa, joined SACU as a sovereign state in 1990.

At the time when this provision was made and the agreement entered into, the smaller economies (Botswana, Lesotho and Swaziland) did not possess

sufficient resources to run their countries. As a result, customs revenue from tariffs levied was indeed very necessary for socio-economic transformation as well as for consolidating the newly acquired political independence. Apart from underdeveloped primary agricultural production and limited agro-processing in the smaller states, South Africa has developed more advanced agricultural and industrial sectors that would benefit significantly from tariff protection. In addition, the apartheid political system in South Africa made it difficult for this country to attract foreign investment. This in turn hardened the attitudes of both business and political leaders towards higher tariff protection and self-sufficiency in producing many goods including those in the agricultural sector (see table 2.3). It is no secret that the protection of high tariffs together with other discriminatory trade practices under Article 4 of the SACU agreement disproportionately favoured South Africa's agricultural and industrial sectors (Leith, 1994; McDonald and Walmsley, 2001).

Evidently, the granting of powers by the SACU states to South Africa to determine tariff levels on their behalf was *de facto* a surrendering of their fiscal mandate by the smaller BLNS economies. This later proved very costly for the smaller countries when they wished to industrialize, improve food security and develop competitive and sustainable farming. Although a compensation factor was built into the custom revenue formula, the smaller countries have consistently argued that it did not adequately cover their economic costs after they surrendered their sovereignty in fiscal policy. It is, however, gratifying that following the democratization of South Africa in 1994, SACU has renegotiated a new trade agreement, which came into force in 2002. The institutional and trade implications of the new agreement for food security and agriculture regarding Botswana, in particular, and SACU, in general, will be analyzed later in this chapter.

2.2.2 Agricultural Tariff Levels in SACU

For Botswana and other contracting parties, the high tariffs imposed on imported agricultural goods may have generated (in the short to medium term)

benefits such as increased government revenue from the customs union, protection of fledgling industries including the export-driven beef industry, limited employment creation and economic surpluses for rent-seeking groups in the livestock and other sectors. For livestock farmers, in particular, the domestic producer price was significantly higher than the world price owing to the SACU import tariff, which created a wedge between these prices. Of course, Botswana's membership of the Lome/Cotonou Agreement is also partly responsible for higher domestic beef producer prices. Through the Common Agricultural Policy (CAP) of the EU, members of the African, Caribbean and Pacific (ACP) group benefit from subsidized producer prices. The EU provides direct producer subsidies to farmers as well as export subsidies for agricultural products, most of which are also exported by ACP countries.

Table 2.1 describes the current bound and applied tariffs for selected agricultural products imported within SACU. Under SACU, beef, dairy, wheat and processed wheat products, maize and processed maize products and cane sugar are classified as sensitive products, which demonstrate very strong sectoral, household, income and employment linkages in SACU's regional economy. As a result, these products are considered extremely important for food security and for agricultural as well as rural development. To distinguish sensitive SACU agricultural products from other farm products, the former attract higher import duties and in some member countries, permits are required from importers.

Table 2.1: SACU Bound and Applied Tariffs for Selected Agricultural Products

	Bound Duty	Applied Tariffs		
		SADC	EU	Rest of the World
Boneless beef	160%	32%	40%	40%
Powdered milk	450c/kg	360c/kg	450c/kg	450c/kg
Wheat Grain	72%	16.4c/kg	19.6c/kg	19.6c/kg
Wheat Flour	99%	20%	20%+29.4c/kg	20%+29.4c/kg
Maize Grain	50%	6.7c/kg	6.7c/kg	6.7c/kg
Maize Flour	99%	10.1c/kg	10.1c/kg	10.1c/kg
Cane Sugar	105%	66.6c/kg	66.6c/kg	66.6c/kg

Source: SACU, 2005

Note: c stands for South African cents which is SACU's unit of accounting

SACU has stipulated bound tariffs for traded agricultural products as part of her commitment to trade liberalization under the World Trade Organization (WTO). Member countries to the WTO are obliged to submit proposals for bound or maximum import duties based on the value of the product, i.e. an *ad valorem* tax, in order to achieve a global trade system that is rules-based, transparent and consistent. Final bound tariffs, as approved by the WTO, constitute the base from which global trade liberalization through tariff reduction to improve market access is undertaken (WTO, 1995).

Except for maize grain, final bound tariffs for other primary and processed agricultural products, as may be observed in table 2.1, are generally far higher than 50 percent. Bound tariffs for boneless beef and cane sugar are indeed very high compared to other products. Higher bound tariffs for meat and sugar products are also common globally (Ingco and Nash, 2004, p. 69). Final bound *ad valorem* duties are the maximum allowable tariffs that a country may impose on agricultural imports from any source. This means that SACU can no longer impose additional duties on products indicated in table 2.1 over and above the final bound tariffs.

It is evident from the table that primary products like wheat and maize grain attract lower bound *ad valorem* duties compared to processed/value added products (beef, powdered milk, cereal flour and cane sugar). Increases in the tariff levels applied to primary goods and those applied to processed products constitute a common feature in global trade. The process of increasing tariffs from primary products to processed/finished goods is known as tariff escalation, which comprises one of the major world trade barriers, especially between developing countries and industrialized nations (Ingco and Nash, 2004, p.76; Watkins and Von Braun, 2003). Whereas primary agricultural exports from developing countries attract zero or nominal *ad valorem* tariffs, their processed products face very steep import duties in industrialized countries.

While countries or economic groupings like SACU lay down final bound tariffs approved by the WTO, in practice trade is generally based on applied tariffs. Before describing the different tariff schedules used by SACU in agricultural trade globally, it is important to observe special features of applied tariffs. Unlike bound *ad valorem* duties that are standardized and presented only in percentages, applied tariffs are generally very complex and compounded. In table 2.1 applied tariffs combine percentages and additional tariffs based upon the cost per unit of an imported quantity. For instance, the tariff for wheat flour under SADC is 20 percent while for the EU and the rest of the world, the *ad valorem* duty combines 20 percent and 29, 4 per kilogramme of the imported flour. For other agricultural products, the applied *ad valorem* duties are based upon the cost per unit of the imported product. Consequently, the use of applied tariffs in trade liberalization poses operational problems since several countries administer different combinations of *ad valorem* duties. It is for this reason that in terms of WTO's liberalization of tariffs all member states submits bound tariffs presented in standardized percentage form so as to facilitate transparent and consistent rules or conditions (WTO, 1995). Further, Table 2.1 indicates that bound *ad valorem* duties are higher than applied duties. For certain products like boneless beef and wheat flour, the difference between the bound *ad valorem*

duty and the applied rate is indeed very high. This difference, also known as "tariff overhang", is more pronounced in beef where the bound rate is 160 percent while the applied rates range between 32 percent and 40 percent, or just about 25 percent of the final bound rate. In countries whose final bound rates are very high and close to the applied rates, food insecurity could be adversely affected, as the cost of imported food may be prohibitive.

After briefly describing the features of the applied agricultural tariffs in SACU, one can now discuss the tariff schedule by trading region. Currently, SACU has divided its applied agricultural tariff rates into three groups. As indicated in table 2.1, SADC members are levied lower applied agricultural tariffs in boneless beef, powdered milk, wheat flour and frozen chicken. Agricultural imports from SADC into the SACU territories enjoy a certain amount of preferential treatment compared to similar goods from the EU and the rest of the world. Lower applied agricultural tariffs levied on non-SACU SADC imports are intended to promote regional trade and economic integration as part of the long-term objective of the SADC Trade Protocol.

The SADC Trade Protocol, crafted along the lines of the WTO framework, advocates freer trade within the region and the promotion of free movement of capital. The Protocol, which came into force in 2000, commits each member state, including SACU members, to further trade liberalization by 2008. By this date, SADC expects that up to 85 per cent of SADC intra-trade should be free and open to intra-regional competition (SADC Trade Protocol, 2000). In general, trade liberalization signifies unilateral reduction of tariffs, as well as non-tariff barriers like quotas and licences, by all member states in a transparent and consistent manner. To date, little progress has been made in the SADC Trade Protocol as some countries still *unilaterally* impose additional duties on imports from other member states while non-tariff barriers including the use of very stringent sanitary and phyto-sanitary measures are still applied to limit intra-regional trade. Currently, intra-SADC trade is less than 13 percent because of different tariff and customs policies, quality and technical standards, infrastructural constraints and other trade barriers (Lewis,

Robinson and Thierfelder, 2002). Processed agricultural products such as beef, wheat and maize flour, sugar, and etc attract higher import duties within SADC and this reduces intra-regional trade.

Apart from the preferential applied tariff rates for SADC countries, table 2.1 shows that SACU has tariffs for the EU and the rest of the world. The EU, SACU's largest trading partner in agricultural goods through the Cotonou Agreement, attracts identical applied tariff rates to the rest of the world. As indicated earlier, agricultural imports from the EU and the rest of the world attract higher *ad valorem* duties compared to SADC. If SADC countries did not face supply and infrastructural constraints and consistently produced competitive food and agricultural products, they could contribute to improved food security in the sub-region as transaction costs, especially those of transportation might be lower. The underdeveloped infrastructure in the SADC area is one of the causes of relatively high transportation costs. In fact, the emphasis on infrastructural development by SADC during its formative stages in the 1980s was partly intended to improve the movement of goods and services.

As both SACU and SADC move towards regional integration and commit themselves to global trade liberalization, both bound and applied tariffs for agricultural commodities will eventually decline, in order to promote access to cheaper and more competitive food and agricultural goods. However, almost all SACU/SADC countries are classified as developing or least-developed members of the WTO. While developing countries like Botswana, Zimbabwe and Namibia are expected to reduce tariffs slowly and over a longer period, the least-developed countries like Mozambique, Tanzania and Lesotho are not expected to open up their economies through tariff reduction in accordance with WTO provisions. According to the current WTO Agreement on Agriculture, developing countries are expected to reduce their bound tariffs by 24 percent over a period of ten years while developed countries reduce theirs by 36 percent over six years (WTO, 1995). South Africa, both a SACU and a SADC member, is classified as a developed country, which also poses

challenges as well as creating problems within the two organizations. This issue will be taken up later in this chapter. The implementation period for the tariff cuts should have begun in 1995 but very little progress has been made in terms of improving market access (Watkins and Von Braun, 2003; Ingco and Nash, 2004).

Since becoming a member of the WTO, SACU has reduced its applied agricultural tariffs. Table 2.1 shows the current agricultural tariffs within SACU. Prior to joining the WTO, there were no bound tariffs but only applied import duties. Applied tariffs for several commodities were very high. For instance, SACU tariffs for meat products ranged from 100 percent for chicken, 110 percent for both lamb and mutton, to 440 percent for boneless beef. With such high import tariffs as well as other discriminatory provisions (disease control etc.), it is no surprise that both livestock farmers in Botswana and South Africa enjoyed handsome economic rents. High domestic producer prices, owing to import tariffs, may have also contributed to heavy investment in the livestock sectors of the two countries.

Similarly, in the crop sector, the import tariff levels were similarly high. Tariff levels ranged from about 100 percent for maize grain to 225 percent for wheat grain in the 1980's. As noted earlier, processed/finished products attracted a higher import duty under the SACU agreement. Under these circumstances it was almost impossible for consumers in the SACU area to import processed food/industrial goods (maize meal, bread flour, etc.). Consequently, high import tariffs/duties adversely affected per capita food consumption among the low-income families while the large-scale surplus farmers benefited from high economic rents. For the poor, maize, in particular, is a staple food and supplies the largest source of calories, proteins and fats (see Annexes 1.2 to 1. 5 on Botswana's Food Balance Sheets, Ministry of Agriculture 1998-2001).

2.2.3 The Role of Agricultural Trade in Botswana's Food Security

Over 80 per cent of Botswana's food imports (maize, milk, vegetables, fruits, etc.) as well as live animals and plants are imported from South Africa (External Trade 1998-2003, CSO, Botswana, 2004). High import tariffs for non-SACU goods are also partly responsible for this trade relationship between the two countries. In terms of agricultural exports, South Africa is the second most important beef market for Botswana after the European Union.

Botswana, like the other smaller economies of SACU, *de facto* constitutes an extended domestic market for South Africa's economy and agriculture. For instance, since 1994 there has existed a major disagreement between South Africa and her smaller SACU partners concerning the levels of tariffs for certain agricultural commodities. The SACU external tariffs for wheat and dairy products are considered to be very high and this has made it difficult for BLNS countries to increase per capita food consumption.

Regarding wheat and dairy products for BLNS countries, South Africa agreed to allow them to import such products outside SACU at zero tariffs provided that the imports are specifically for domestic consumption and that no excess is exported to any of the SACU member states (Record of SACU meetings, 1996-2001). In particular, South Africa does not want the rebated products to be exported to her territory as this could disrupt her local industries. The special dispensation, by South Africa, to allow other SACU member states to import agricultural products at a zero tariff is a temporary measure pending an agreement on acceptable tariff levels.

Also with regard to trade relations with South Africa, another major trade development has taken place within SACU. South Africa and the European Union have entered into a reciprocal free trade agreement (FTA) since 2000. Other SACU members are not part of the FTA. Accordingly goods from each party, that is the EU and South Africa, will be allowed duty-free entry. Some goods, including agricultural products originating from the EU, will find free

entry into BLNS markets because of the common external tariff and free movement of goods within SACU. Unless the EU-SA FTA is monitored carefully, better-quality products might threaten some of the BLNS firms.

Evidently the EU-SA FTA provides opportunities for as well as threats to industries and service sectors within SACU, but stakeholders and governments will require objective analysis of the effects and implications of the FTA on their economies in order to make informed policy decisions. Opportunities include competitively-priced food and agricultural imports such as wheat, maize, barley, farm machinery, breeding animals, technology and fertilizers. As a food deficit country, Botswana could benefit from low-duty imports of cereals (wheat, maize), dairy products and meat products from the EU-SA FTA. The high cost of food caused by, *inter alia*, import duties has been identified as a major food security concern in the problem statement in Chapter 1. The expected high economic growth stemming from the foreign investment brought about by the EU-SA FTA could create a demand for agricultural and industrial goods from Botswana and other SACU and SADC countries.

However, threats to Botswana's agricultural sector and food security include the accidental importation of plant and animal diseases, economic injury to small industries owing to subsidized exports, and so forth. The EU is one of the largest users of export subsidies which cover SACU's most important and sensitive products (Ingco and Nash, 2004, p.54). Subsidized imports of beef, wheat and dairy products from the EU might adversely affect local competing industries, employment opportunities, etc unless provisions for the requisite safeguards are applied.

To minimize the potential adverse effects of the EU-SA FTA on the economies of developing SACU members such as Botswana, bilateral negotiations between the EU and BLNS countries are in progress. Some SACU countries have already ratified the EU-SA FTA but some have not yet done so, pending the outcome of comprehensive impact studies. Botswana

ratified the EU-SA FTA in 2003 on the assumption that economic growth, trade creation and household welfare, and the like would be fostered although the government's revenue from customs duties would be reduced owing to lower import duties for EU products (Lewis *et al*., 2002). While customs revenue accounts for about 15-20 percent of Botswana's total government income, for other SACU members tariff revenue contributes a minimum of 50 percent of public finance (WTO-SACU Document, 2002). Given the potential adverse effects on some SACU members, it is for this reason that the EU is holding meetings with the BLNS countries with a view to all SACU members possibly forming an EU-SACU FTA, as opposed to the current situation.

Besides the EU-SA FTA, South Africa is currently negotiating possible free trade agreements with countries such as Brazil, China and India. If these potential FTAs materialize, developing SACU countries such as Botswana could be affected both positively and negatively. Access to more competitive food and agricultural imports, including technology and investment stemming from some of the FTAs, could enhance Botswana's food security, increase per capita consumption of food and promote sustainable economic diversification. However, small local producers as well as agro-processing firms operating under economies of scale could in the short to medium term suffer or be forced to close if appropriate safeguards are not timeously applied. WTO-compliant measures include countervailing and anti-dumping laws (WTO, 1995), could be applied to protect infant industries.

2.3 A Review of the Agricultural Policy of Botswana

Until 1991, after almost 25 years of independence, Botswana had pursued an import substitution or inward-looking agricultural policy objective that was intended to replace imported basic cereals (sorghum and maize) by means of domestic production. Producer prices, especially for sorghum, were increased substantially above world prices so as to attain food self-sufficiency. Similarly, maize producer prices were increased in order to intensify domestic production in order to replace imports, mainly from South Africa.

Botswana's basic cereal prices are historically based on those of South Africa, as almost all food commodities are imported from this country. Both pan-territorial and pan-seasonal pricing practices, which were carried out for a long time irrespective of the market conditions, aggravated price distortions in Botswana. Pan-territorial pricing, that is maintaining the same prices across the country, increased the economic rent for producers who were distant from markets while at the same time worsening the welfare of consumers in these areas (Coulter, 1994). Consumers in deficit regions could also benefit from pan-territorial pricing as the local demand factors might dictate higher prices than what the pricing policy prescribes. Pan-seasonal pricing on the other hand means that the prices of both maize and sorghum were kept at the same level for the whole year irrespective of the prevailing demand and supply situations.

Other incentives such as subsidized credit and farm inputs, marketing infrastructure and import permit controls, regulated import licences and a monopoly over the sorghum trade were invoked over a period so as to attain food self-sufficiency in basic cereals. Unlike other countries that also controlled the marketing and price of farm produce through single channels or the agencies of agricultural boards, in Botswana, however, buyers and sellers were still free to negotiate a price in the domestic market. The Botswana Agricultural Marketing Board (BAMB), a parastatal organization responsible for the marketing of crop products and inputs, has basically been a residual buyer as most traded agricultural products go through the private sector.

For the beef sub-sector, producer prices are based closely on the highly distorted European Union prices under the Common Agricultural Policy (CAP). The EU beef producer prices are reported to be at least 30 percent above the world prices. As the beef industry in Botswana is primarily an export sector, the high domestic producer price may be largely responsible for the heavy investment and support services in this country as well as for the subsidies and tax concessions in this sub-sector.

As a result of tariff protection, some local producers benefited, since the domestic prices were higher than world prices for similar products. The presence of high tariffs (against competing beef imports) served as additional incentives to producers in the cattle industry, which in turn may have contributed to the over-exploitation of a common resource, i.e. rangeland. In the communal areas in Botswana, where about 85 percent of the cattle are raised, no defined property rights exist; hence access to grazing land is treated like a public good where exclusivity is not possible. The environmental costs of range degradation, soil erosion and other issues are not sufficiently internalized to reflect the social costs of livestock production (Vink & Kassier, 1987). In 1986, for instance, with the aid of an infrared photo mosaic map, it was estimated that 30 percent or 17.5 million hectares of Botswana's land surface was overgrazed and that the long-term production potential of this area was also adversely affected (Ringrose, 1986).

As in the grain sector, buyers and sellers of cattle/beef in Botswana are free to negotiate domestic prices. The Botswana Meat Commission (BMC), a parastatal responsible for beef exports and a price leader in this industry, still remains a residual buyer in the domestic market. At least 60 per cent of the cattle slaughtered annually in Botswana are handled by BMC, which exports almost 80 per cent of its throughput to the EU. However, this state-owned company still enjoys a monopoly on beef, veal and lamb/mutton exports. In addition, imports of these commodities are for all practical purposes not permitted. While the entry costs in beef manufacturing, marketing and maintaining high hygienic and quality standards for the export market are high for potential competitors to the BMC, it is, however, necessary to explore the possibilities of liberalizing this industry by identifying certain niche markets where other players may compete with BMC in the beef exports so as to improve efficiency. Government is planning to liberalize beef processing, which might improve efficiency and competition, provided that complementary policies which promote domestic competition are designed. Stiglitz (1998 and 2002), however, cautions against liberalization or privatization that is not

supported by policies or legislation governing competition, investment in public goods such as technology, infrastructure, and so on.

Botswana has been self-sufficient in beef, mutton and lamb for a long time, even during the colonial era, and yet malnutrition among five-year-old children has been at about 14 percent since 1986 (National Development Plan 9, 2003, p.316). In fact, as in many other countries, food self-sufficiency is equated with food security at the macro level, which unfortunately does not cover the household level (World Bank, 1986; World Food Summit, 1996 and 2001). In general, a food self-sufficiency policy objective discourages imports by means of either high tariffs or very limited import quotas. If imports of beef, lamb and mutton were allowed it is possible that the per capita protein consumption amongst low income households could increase, unlike the situation at present because of the pricing policy where the domestic price is higher than the world price. At present, a limited group of households in Botswana receive old-age pension funds to supplement their income. Preparations are, however, underway to design a national social security programme whose coverage is expected to be broader and this may, it is hoped, improve food security or per capita food consumption.

In 1988/89, Botswana undertook a comprehensive sectoral review to evaluate the impact of the government policy on food self-sufficiency and make proposals concerning the future direction of the sector vis-à-vis economic as well as environmental sustainability, efficiency etc. In addition, the review was designed to explore how best the agricultural sector could meet other socio-economic objectives such as income and employment opportunities. The results of this review recommended the abandonment of food self-sufficiency and adoption of food security as a policy objective. Given the country's endowment in terms of natural resources and an increasing competition for scarce resources, it was not possible for Botswana to achieve basic food self-sufficiency without causing serious economic as well as undesirable environmental consequences (Agricultural Sector Assessment, 1989).

Botswana is a semi-arid country with sandy soils that lack major crop nutrients, especially phosphorus. Drought is almost endemic in the country's agricultural production system. Despite the pursuit of a policy of basic food self-sufficiency, Botswana has never achieved this goal at macro-level, at least since 1966, mainly as a result of these factors. Table 2.2 indicates Botswana's food self-sufficiency ratios since 1985. The only products where food self-sufficiency has been achieved are beef, lamb and mutton, primarily because the country is basically suitable for extensive livestock farming. Quite recently substantial progress has been made in increasing the domestic production of chicken meat as well as eggs. Public financial assistance together with import restrictions has played a major role in the growth of the chicken industry.

Table 2.2: Average Food Self-Sufficiency Indices of Selected Farm Commodities

COMMODITY	**SSI**
	1985-05
	%
Maize	5
Wheat	1
Sorghum	34
Millet	100
Rice	0
Vegetables	20
Fruits*	20
Beef	150
Fresh Milk	20
Chicken Meat	98

Source: National Early Warning System, Ministry of Agriculture, Botswana (1985 – 2005)

SSI = self- sufficiency index, which is $\dfrac{\textit{Total production of commodity}}{\textit{Total consumption of commodity}} \times 100$

During the period 1985/91, the government of Botswana spent about P 253 million (in nominal terms) to achieve food self-sufficiency (Sigwele, 1993). The value of domestic production during this period, in nominal terms, was about P 144 million or 57 percent of the total expenditure. This expenditure is, in fact, an underestimate of the country's total social cost since commercial loans, salaries to public officers, cost of transport and fuel, land degradation and so on are excluded. In particular, the social and environmental costs of land clearing/debushing, soil erosion and overgrazing as well as subsequent land degradation were not taken into account. As a result, the costs of production did not reflect the social/environmental costs of raising crops (Agricultural Sector Assessment, 1989).

As a result of the Agricultural Sector Assessment in 1989, it was found that the domestic cost of producing maize under the import substitution strategy was twice the import parity price (Ministry of Agriculture, Botswana, 1989). The price of the locally produced maize was therefore not competitive compared to imported maize. Pursuing food self-sufficiency regarding maize in Botswana was found to be economically costly and unsustainable. Given the high economic and environmental costs of producing maize, in particular, it was also established that increasing the quantities of maize imported would be less costly to the country, and possibly benefit households as well as individual consumers.

Similarly, locally-produced sorghum was also more costly than competing imports and this partly led to its replacement by maize as the latter was imported more cheaply. The consumption of sorghum relative to maize declined primarily because of Botswana's import substitution strategy and protection from SACU external tariffs. Producer prices of sorghum were set deliberately above those of other crops, including white maize, in order to encourage domestic production to attain food self-sufficiency. As indicated earlier during the high cost of food partly due to SACU tariffs coupled with poverty cannot enhance household welfare (World Bank, 1986).

The Government of Botswana adopted food security as a policy objective instead of food self-sufficiency, following the Agricultural Sector Assessment (Government White Paper No. 1, 1991). In particular, whereas food self-sufficiency is basically anti-trade, a food security strategy promotes efficient and competitive domestic production on the basis of comparative cost advantages for those commodities where the country does not enjoy this advantage, commercial imports should meet the shortfall in order to satisfy a country's total consumption requirements. For Botswana, commodities such as maize and wheat cannot be produced efficiently and competitively because of the unfavourable natural resource base and the high economic and social costs.

After the adoption of the food security policy objective in 1991, agricultural trade has been relatively liberalized. While import permits are still required for several food commodities, in essence very few quantitative restrictions are imposed on imported commodities, except for maize meal and bread flour where licensed traders are only allowed to import 50 percent of their total requirements, while the remainder is sourced internally to support the local food processing industry. Even in terms of the 50 percent local purchase policy, government has not, in practice, enforced this requirement. For other commodities, by and large, importers are free to purchase their requirements without imposing quotas.

The monopoly on sorghum imports that BAMB enjoyed in the 1980's has since been removed. During the mid-1980's, BAMB imported sorghum from Thailand, as the region including Botswana did not have sufficient quantities owing to drought. Upon arrival, it was realized that the imported sorghum was not suitable for human consumption but only for livestock. Consumers rejected the sorghum and as a result BAMB was forced to sell it at a loss. In order to help BAMB recoup these losses, government regrettably, decided to grant the organization a monopoly over sorghum imports. All commercial imports of sorghum were purchased by BAMB. Sorghum millers and other

users of sorghum were forced to acquire their grain through BAMB. This monopoly continued until 1992 when the government lifted the ban on sorghum imports. Whilst the ban on such imports prevailed, several consumers of the grain expressed concern to the government over the monopoly. In fact it is very likely that some of the small millers went out of business because of the high cost of grain obtained from BAMB. As indicated earlier, the substitution of maize products for sorghum also intensified during the ban.

Further to the adoption of a policy regarding food security, the pricing policy for a tradable agricultural commodity is now based on import and export parity. In particular, for exports such as beef, lamb, oilseeds (sunflower, groundnuts), the producer prices are based on the world/border price less marketing, transport, handling, insurance costs (f.o.b. pricing). For imported competing products like maize and sorghum the producer prices are also based on import prices or cost, inclusive of carriage, insurance and freight costs (c.i.f. pricing). It is assumed that the adoption of a parity pricing policy for agricultural products will not only promote efficiency and competitiveness, but also signal to both producers and consumers the country's economic resource or opportunity cost in the production and consumption of these commodities.

In short, the agricultural pricing policy for Botswana is now largely aligned with and integrated into the world economy.

Besides the adoption of food security and parity pricing as policy strategies, Botswana has also endeavoured to diversify the agricultural production base. The policy decision to do so was in response to the limited supply of commodities that government had induced by means of high, distorting, producer prices and other incentives. This exposed farmers to several risks, especially in a drought-prone country such as Botswana.

Whilst the trend in cereal consumption has witnessed an increase in white maize and wheat consumption per capita, as mentioned above sorghum, in particular, enjoyed higher producer prices for the purpose of attaining food self-sufficiency until 1991, when this policy strategy was abandoned. Other potential crops such as cowpeas, sunflower, groundnuts and cotton were not promoted by means of price support, unlike sorghum. Such a policy could have raised farm incomes and spread risks more widely. Admittedly, while diversification may act as a risk management strategy or production insurance, especially among low-income countries such as Botswana, studies by Quiroz and Valdes (1995) indicate that movements in world prices show that 22 of the 28 correlations in prices were positive for the most important internationally traded commodities (white maize, rice, wheat, cotton, coffee, cocoa etc.). It is therefore important that diversification minimizes correlation in prices among agricultural products to reduce risks in income losses.

The results of these studies, which covered the period 1970-1991, caution against high expectations of large gains from diversification, since world prices for major commodities tend to be positively correlated. This positive correlation, in essence, means that these prices go up or decrease together with each other. This may make it difficult for countries or households to stabilize farm incomes and hence improve household food security. The results also raise concern over the viability of diversification in the face of positive correlations of world prices. Of course, it is acknowledged that trade liberalization and diversification are complementary, as long as the latter strategy promotes viable enterprises as well as potential tradables (Delgado, 1995). Diversification, as much as possible, should be market-driven and based on economic and environmental sustainability.

2.4 A Review of the Agricultural Policies in South Africa

Like Botswana, South Africa has been aggressively pursuing a food self-sufficiency policy objective, for both political and economic reasons. In particular, international isolation coupled with the imposition of sanctions on

investment and trade gave “legitimacy” to an inward looking agricultural strategy. In fact, “agricultural policies were aimed at assuring national self-sufficiency in basic agricultural commodities, while ensuring a price structure that guarantee the profitability of the large-scale farming enterprises. These policies were supported by public expenditures that resulted in significant subsidies to large-scale agriculture in order to insure its financial success” (World Bank, 1994, p150). In fact up until the democratization of South Africa in 1994, agricultural policies were closely intertwined with general economic, social and political policies which created serious macro-economic and sectoral distortions and imbalances in the country, while marginalizing the poor African farmers (the majority) at the expense of white farmers who operated on a large scale.

Since the 1980’s up to the present, South African agriculture has witnessed major policy changes culminating in the removal of market and price controls, in trade and economic liberalization as part of the WTO obligations, as well as in addressing land and other equity issues in favour of African farmers. Insofar as land and equity are concerned, the implementation of the Restitution of Land Rights Act of 1994, the Land Rights Act of 1996 and land re-distribution under the settlement/land acquisition policies in South Africa have improved their access to agricultural land for citizens previously disadvantaged under the racially discriminatory Land Act of 1913 (Lyne and Darroch, 2003). Furthermore, other institutions such as the Land Bank, the Agricultural Research Council, Development Corporations and the like, which provided assistance to commercial agriculture before 1994 and therefore excluded the majority of citizens engaged in farming, have since been restructured to comply with the new political and economic order (Vink and Kirsten, 2003). It is partly because of these institutional reforms that the current Strategic Plan of South Africa’s agricultural sector envisages a united and prosperous industry for the benefit of all (Strategic Plan for the Department of Agriculture, 2005).

As a result of these import substitution agricultural policies pursued by South Africa, basic food self-sufficiency has been reached in many commodities (see Table 2.3) although at a high social, economic and environmental cost (Van Zyl, 1989). In particular, large-scale white commercial producers benefited from these policies while the welfare of the majority of consumers and marginal black farmers suffered (Van Zyl, 1989; Kirsten and Van Zyl, 1996). It is in fact estimated that more than 2 million people in South Africa go hungry every day despite the high food self-sufficiency ratio. Available statistics also indicate that about 11 million to 17 million people in South Africa are poor and food insecure (Reconstruction and Development Programme/RDP, 1995). These statistics show that almost 40 percent of the population lives in poverty and therefore faces food insecurity (RDP, 1995). In short, the food security of many people in South Africa has been adversely affected by narrow-minded agricultural policies that essentially benefited a small minority.

Ironically, South Africa's agricultural policy made a very strong commitment to improving food security and tied this to political stability by proclaiming that "for any country, the provision of sufficient food for its people is a vital priority and for this reason it is regarded as one of the primary objectives of agricultural policy. Adequate provision in this basic need is also an essential prerequisite for an acceptable economic, political and social order and for stability" (White Paper on Agricultural Policy, RSA, 1984: pp 8 - 9). Since 1994, South Africa's agricultural policy has changed from pro-food self-sufficiency to food security, trade, and nutrition in order to improve access and increase per capita consumption. Programmes to broaden production among small farmers are being implemented while access to productive inputs such as land and credit is being improved so as to increase income and employment opportunities for the poor. Trade liberalization also aids a country to import food commodities at competitive prices.

Table 2.3 Average Food Self-Sufficiency Indices for Selected Commodities and Years in South Africa

Commodity	1985-95	1991-95	1999	2002	2005
Wheat	98.76	89.31	68.9	81.9	68.2
Maize (white & yellow)	124.6	107.18	97.0	121.4	139.6
Potatoes	100.61	100.69	101.7	101.8	92.3
Vegetables	101.15	101.1	87.2	85.1	87.5
Sugar	184.96	188.86	156.4	172.7	163.8
Beef	92.06	92.32	95.4	98.7	94.0
Mutton, goat's meat & lamb	87.76	80.9	68.9	76.1	50.5
Pork	97.58	94.9	92.2	91.5	105.9
Chicken	98.32	97.5	91.9	90.6	100.7
Eggs	101.54	101.64	101.0	103.2	99.5
Deciduous and subtropical fruit	153.58	157.07	127.8	127.5	130.2
Citrus fruits	205.64	198.52	215.1	213.9	107.2
Dairy products:					
Condensed milk & powdered milk	110.49	120.66	119.5	102.3	108.9
Fresh milk	100	100	100.4	100.3	100.3
Cheese	100.24	100	103.8	98.8	96.5
Sunflower seed oil	59.97	53.31	68.4	104.8	80.9

Source: Food Balance Sheets, Directorate of Agricultural Statistics and Management Information, Department of Agriculture, South Africa. (1985-2005)

Scarce domestic resources were used in South Africa to produce cereals such as maize, in marginal areas (Brand *et al.*, 1992). Favourable commodity, factor and technology policies (Marketing Act of 1937; Land Acts of 1913 and 1937; Land Bank Act of 1912) largely contributed to the profitability of maize in marginal areas (Brand *et al*., 1992). According to Schoeman and Scotney (1987), only about 14 percent of South Africa is suitable for arable farming while the rest could be utilized for extensive livestock production, tourism and wildlife.

Cowling (1991) underscores this observation regarding South Africa's agriculture by warning that the "indications are that, certainly in the longer term, much of commercial agriculture in South Africa is neither economically nor ecologically sustainable". It can be safely concluded that the pursuit of the food self-sufficiency policy objective also promoted the adoption of

economically and environmentally unsustainable farming practices (Kirsten and Van Zyl, 1996). It is estimated that in 1992/93, the total social cost of land resource degradation (soil crusting, increased soil acidity, Stalinization and waterlogging, rangeland overgrazing, sedimentation of dams, etc) was R 672.6 million (Van Rooyen *et al.*, 1996). The high social as well as environmental costs comprised agricultural policy distortions (food self-sufficiency, untargeted and financially expensive public subsidies) and racially based development programmes. The annual cost of land degradation was also estimated at about R 373 million in 1992/93 (Van Rooyen, *et al*., 1996).

Further, not only did the policy of import substitution lead to frequent financial relief being provided to farmers because of almost continual crop failures due to drought, disasters and regular export losses, especially for maize (Kirsten and Van Zyl, 1996), the distorted price structure also "artificially" inflated land values for loan and mortgage purposes. It is also reported that between 1980 and 1991 agricultural subsidies to farmers for maize alone averaged about R 293 million per year (Kirsten and Van Zyl, 1996). Further, high import tariffs, monopolistic marketing practices, the developed infrastructure and technology, *inter alia*, also supported the food self-sufficiency strategy.

As in the case of Botswana, the majority of the people, especially consumers, small-scale farmers, the landless and impoverished rural and urban households did not benefit from the food self-sufficiency strategy. The small-scale farmers in the rural areas were basically neglected in this initiative, even though they constitute the majority of the farming community. In South Africa, In any case, the incidence of both poverty and malnutrition, especially in the rural areas, is very high, despite food self-sufficiency strategies (Kirsten and Van Zyl, 1996).

Besides domestic reforms, South Africa, as a developed economy, is obliged to improve market access in conformity with the provisions of the World Trade Organization of which she is a founder member and signatory. Members of the WTO subscribe to the policy of liberalized trade and accept competition in

the international economy (WTO, 1994). As part of their WTO obligations, member states commit themselves to reducing tariffs as well as removing trade-distorting measures. According to the WTO Agreement on Agriculture, developed countries like South Africa are expected to reduce bound agricultural tariffs by 36 percent in six years beginning in 1995 while direct trade-distortions such as producer subsidies are also expected to be reduced. Unfortunately progress among developed countries in improving market access to exports from developing countries by means of tariff reduction and subsidy reduction has been very slow and limited (WTO, 2003).

In compliance with the WTO provisions, South Africa as a developed country has already implemented some of them as a part of trade liberalization in order to promote global competition. Quotas have been replaced by tariffs, while direct trade-distorting measures such as producer price and input and export subsidies have been drastically reduced or removed (Vink *et al*., 2002; Vink and Kirsten, 2003). Monopolistic agricultural state-owned enterprises have been abolished while exchange and price control instruments have also been phased out.

As indicated earlier, South Africa is a developed country yet is also a member of SACU. Except for Lesotho, the other three members of SACU are developing countries. As such countries, Botswana, Namibia and Swaziland are to liberalize their economies by reducing trade barriers over a longer period than developed countries (WTO, 1995). Developed countries such as South Africa are expected to reduce their tariff barriers and other trade-distorting measures (e.g., subsidies) in six years while developing countries are expected to reduce their bound agricultural tariffs by 24 percent over ten years, beginning in 1995. Developing countries are given a longer period to liberalize because of poverty and underdevelopment. Lesotho as a least-developed country is not expected to open up her economy.

Given this heterogeneity within SACU, agricultural trade liberalization is indeed very complex and requires careful implementation so as to minimize

high social costs and sectoral dislocation. Poorer members of SACU depend heavily on tariff revenue and have very limited alternative public sources of revenue, hence liberalization of trade by South Africa may have both positive and negative effects on other SACU members. For instance, South Africa has entered into a free trade area (FTA) with the EU, one of the largest global trade players. Through the EU-RSA FTA, the two contracting parties have agreed to trade in agricultural products under preferential terms. While a South African-EU FTA could provide other SACU members with opportunities such as alternative sources of food imports, technology, foreign investment, and so on, small farmers and firms in the latter countries may collapse from the effects of competing imports which are subsidized by the EU, leading to reduced tariff revenue.

2.5 SACU's New Agreement and its Implications for Botswana's Food Security

SACU ratified a new customs agreement in 2002. Some of the main objectives of the agreement are:

- To create effective, transparent and democratic institutions to ensure equitable trade benefits to all members;
- To increase investment opportunities in the customs area;
- To enhance economic development, diversification, industrialization and competitiveness;
- To facilitate the development of common policies and strategies; and
- To promote fair competition in the customs area (Article 2, SACU Agreement, 2002).

Based on the aforementioned objectives, the new customs agreement is a major departure from that of 1969. For the first time, industrial, agricultural and trade tariff policies will be approved democratically by a Council of Ministers representing all SACU members. Previously, the Board of Tariffs and Trade (BTT), a South African Parastatal body, provided technical advice

on tariff levels, presumably for the benefit of all members. Evidently, the tariff policy formation process was undemocratic, lacked transparency and was biased towards benefiting the already developed sectors in South Africa. Under the new SACU agreement a tariff tribunal has been set up to advise member governments about appropriate tariff policies and levels, by sector and commodity, to promote efficiency, competitiveness, comparative advantage and sustainability while taking into account the developmental challenges facing the sub-region.

The SACU tariff policy, which complies with the WTO provisions, can still be used by low-income countries for food security and agricultural development as well as poverty reduction. For instance, developing countries can invoke special differential treatment (SDT) provisions to safeguard their sensitive sectors and commodities (WTO, 2003). Some of these SDT provisions include lower tariff reduction commitments over longer periods, increased market access in developed countries, provision of technical assistance and support to build capacity, etc. (WTO-Doha Declaration, 2001). Botswana as a developing country is also (by means of Article 9 of the WTO Agreement on Agriculture) granted a special provision to subsidize the internal transport, freight and marketing costs of agricultural exports (WTO Agreement on Agriculture, 1995). In addition, in terms of the ongoing WTO negotiations on Agriculture, the proposal has been made that for developing countries import quotas/volumes of sensitive products should not be increased (WTO, 2003). For SACU this covers beef, wheat, maize, dairy and sugar. If this proposal is accepted for developing countries, it could constitute an important additional SDT provision which might strategically assist to develop potential domestic industries. The application of WTO-compliant SDT provisions is critical for Botswana's agriculture and food security.

Besides the creation of structures for making policy decisions within SACU, the new agreement has adopted common development policies in the agricultural and industrial sectors in order to reduce poverty, among other social problems. Recognizing the different levels of development within

SACU, the agricultural policy will improve food security, foster competitive domestic production and also create trade through encouraging the importation of commodities where the sub-region does not enjoy a comparative cost advantage in producing them. Consequently, the SACU tariff policy is expected to facilitate sustainable domestic and sub-regional agricultural and industrial development, but also to promote import trade by means of lower applied *ad valorem* duties (see table 2.1). As the agricultural sector is obviously very critical for food security because of its linkages with income and demand, WTO-compliant SDT provisions can be administered to protect small farmers and agro-processing industries within SACU in order to reduce poverty. For sensitive products such as beef, wheat, maize, dairy and sugar, SACU can administer safeguarding measures such as countervailing duties if subsidized imports injure domestic industries.

Furthermore, a Secretariat has been established to administer the new SACU agreement transparently and equitably. This Secretariat together with a Committee of senior officials from all member states will serve the Council of Ministers. In order to improve food security, especially among countries like Botswana which experience food deficits, the Secretariat is expected to implement the SACU agricultural, tariff and industrial policies in order to increase per capita food consumption, improve trade competitiveness and regional and global integration. The Secretariat is based in Windhoek, Namibia. At least together with the new SACU agreement and a democratic South Africa it is hoped trade relations in the customs area will be improved for the benefit of all members. It is also expected that all SACU members will contribute adequate human, technical and financial resources for the Secretariat to be able to implement the new agreement so as to improve living standards and reduce the abject poverty currently affecting at least 40 percent of SACU's population (IFAD, 2001; World Bank, 2002).

2.6 Summary

In summary, this review of the agricultural policy of Botswana, in particular and that of South Africa indicates a commitment towards farm production based upon economic and environmental sustainability, while promoting trade to meet domestic shortfalls. Of course, it is assumed that trade will not unfairly displace domestic production as a result of subsidies and other similar distorting and unfair farm and business practices. Previous market, price and public investment distortions in agriculture in order to protect inefficiency will no longer form the basis of agricultural policy in Botswana nor in other SACU member country. While the new SACU agreement is developed along the lines of the WTO framework to encourage efficiency, competitiveness and sustainability, in order to improve food security and increase per capita food consumption, the special development needs of developing countries should be borne in mind.

The previous agricultural policy in Botswana (including that of South Africa) did not improve per capita food consumption nor did it contribute to food security as malnutrition and poverty still persist (NDP 9, 2003; HIES 2002/03, CSO, 2004). About 30 percent of households or 23 percent of Botswana's population live below the poverty datum line. In South Africa, while the country is food-secure at the national or macro-level, at the household level many people still face food insecurity. According to the country's Integrated Food Security Strategy (IFSS), "currently about 35 per cent of the population or 14.3 million South Africans are vulnerable to food insecurity. Among these, women, children and the elderly are particularly more vulnerable" (IFSS, 2003, p.22). In both countries, agricultural policies have not yet improved household food security, owing primarily to income and asset poverty. Clearly, poverty is a structural phenomenon that requires both macro-economic and sectoral approaches and strategies.

Finally, as in the previous SACU agreement, the importance of the agricultural sector in social and economic transformation is acknowledged. The agricultural sector in Botswana exhibits strong direct and indirect linkages with the economy: hence the need to set in place relatively efficient but sustainable resource allocation in this industry in order to achieve other broad social objectives (see Chapters 6, 7 and 8).

CHAPTER 3

THE THEORY OF INTERNATIONAL TRADE AND CUSTOMS UNIONS

3.1 Introduction

This chapter focuses mainly on the economic theory of international trade or comparative cost advantage, the theory of Customs Unions and the political economy of regional trading blocs. Because Botswana belongs to a customs union (SACU) as well as a regional economic and trading bloc (SADC), theories concerning the two trade formations are essential for one to understand how the benefits stemming from trade liberalization and regional integration can be maximized while costs are minimized. International trade liberalization and regional integration are considered as potential ways of improving per capita food consumption, household food security, foreign income and earnings, etc (Sarris, 1997; Yeats, 2000; Lewis, 2001; Lewis, Robinson & Thierfelder, 2002). Since both SACU and SADC are liberalizing their economies as well as working towards trade integration, the theories of comparative advantage as well as those regarding customs unions and regional economic blocs are useful in establishing how to promote sustainable development. Further, it is also expected that Botswana as a member of SACU is likely to enter into a free trade agreement with the EU as well as the US. The envisioned SACU-EU FTA will represent an expansion of the current South African-EU trade arrangement while negotiations on the future SACU-US FTA are ongoing. The proposed FTAs with SACU are expected to provide opportunities for Botswana, while also exposing her least competitive industries to more risks/threats.

Before considering the theories of international trade economics, it is worth understanding from the outset why nations trade in the first place. A working knowledge of this matter is helpful in appreciating the justification for further trade liberalization whilst also being cognizant of the reluctance by other

countries, including regional trade groupings or customs unions, to improve market access (WTO, 1999). The creation of the General Agreement on Tariffs and Trade (GATT) after World War II and subsequently the present WTO was intended to improve human welfare by fostering, *inter alia*, international trade based upon comparative advantage and global competition.

Botswana as an open economy and a member of WTO argues for improved market access for her exports, given the small size of the domestic market, while at the same time subscribing to import liberalization by means of reduced tariffs in order to meet the country's food requirements. As Botswana is a food deficit country, it is desirable that more competitive regional and global sources of food and other inputs for agro-business and industrialization are identified, so as to enhance household food security. The implementation of global trade liberalization based on comparative advantage, as currently promoted by the WTO and consistent with theory of international trade, can partly benefit small economies like that of Botswana. The tools used in this study (see Chapters 4, 5, 7 and 8) to analyze the effects of trade liberalization on household food security and agricultural competitiveness in Botswana assume an understanding of international trade theory hence the present Chapter.

Further, an understanding and application of theories of international trade and customs unions provides a context within which to appreciate the likely effects of global trade liberalization on Botswana's food and agricultural sectors. As indicated earlier, Botswana is a member of a customs union and as a price-taker in world trade, improved market access by means of liberalized global commerce is very important for her food security, agricultural sector and industrialization (NDP 9, 2003).

3.2 Gains from International Trade

In general, nations trade to improve welfare, widen choices for consumers; maximize net social returns/profit through the efficient allocation of scarce resources to more productive areas of the economy, and increase both national output/gross domestic product (GDP) and world output (Sodersten & Reed, 1994; Ethier, 1995). The benefits of trade are largely seen in terms of earlier studies by classical economists, namely Smith (1776) and Ricardo (1815-17), whose work concluded that gains from trade can be maximized if based mainly on the theory of comparative cost advantage between and among nations.

Subsequent empirical studies by MacDouglas (1952) and Stern (1962) also confirmed, in general, that international trade based on comparative cost advantage can benefit nations. The assumptions of international trade and the elaboration of the theory of comparative advantage or comparative costs (Sodersten and Reed, 1994, p.3) are discussed later in this chapter. Suffice it to say here that, by and large, countries trade to maximize social welfare or improve their standard of living, and also allocate resources to those productive activities where the country can also increase its net returns from investments.

Figures 3.1 and 3.2 illustrate how social welfare and resource efficiency can be maximized under free trade while under autarky (no trade) conditions this situation cannot be realized. In essence, autarky conditions are similar to food self-sufficiency or complete import substitution (see Chapter 2) where a country decides to consume only what it produces.

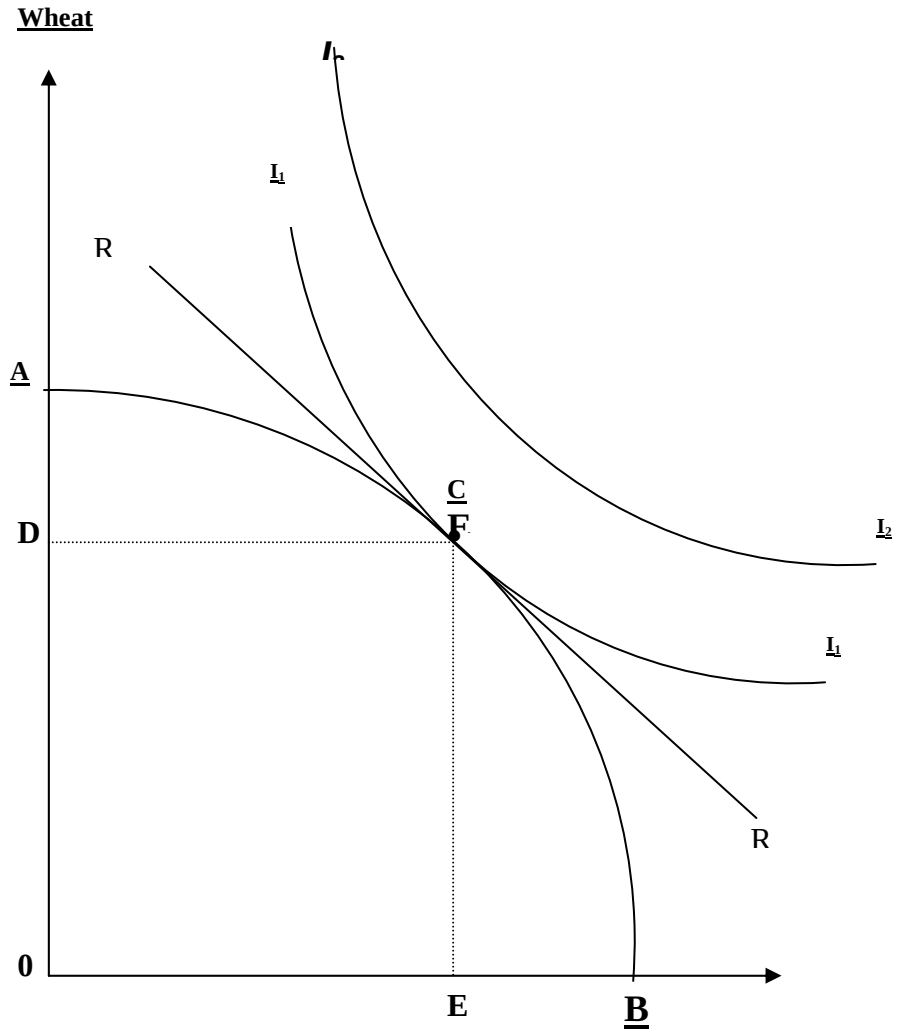

Figure 3.1: Equilibrium under Autarky

According to Figure 3.1, assuming a small country model,[2] if autarky conditions prevail, the country's production possibility curve (PPC) of two commodities, namely wheat and beef, is given by AB while the budget line or price ratio is RR. Point C represents the equilibrium where the opportunity cost of production domestically is equal to the marginal rate of substitution in consumption.

[2] A small country model assumes a country the size of whose economy is too insignificant to influence global commodity prices or volumes. Botswana fits this model.

In short, at point C the marginal rate of transformation in production is equal to the marginal rate of substitution in consumption as well as the budget line/price ratio. Since there is no trade in this country, point C indicates the equilibrium for both domestic production and consumption. This country consumes only what it has produced. The indifference curve, I_1, illustrates the country's consumption/utility possibilities. The country's utility is also maximized at point C. Factor and product prices are also domestically determined because there is no trade. Similarly, consumers only purchase at prices determined by the local market, as international prices are not applicable under conditions of autarky. Consumers do not have much choice since they are only allowed to purchase locally produced goods.

If the small country is allowed to trade freely as advocated by Smith (1776), Ricardo (1817) and other classical economists, the equilibrium point for both production and consumption changes. The price/budget line also changes because of the influence of the international prices on both the factor and product markets. The country is relatively free to produce according to its comparative cost advantage, and in this way maximizes social returns by specializing in those commodities which it can produce more cheaply.

Figure 3.2 illustrates the equilibrium conditions for the small country under free market arrangements. The curves AB still represents the production possibility curve, while the new point, D, shows the optimum point of production, with line TT representing the terms of trade following the opening up of the country's economy to world competition.

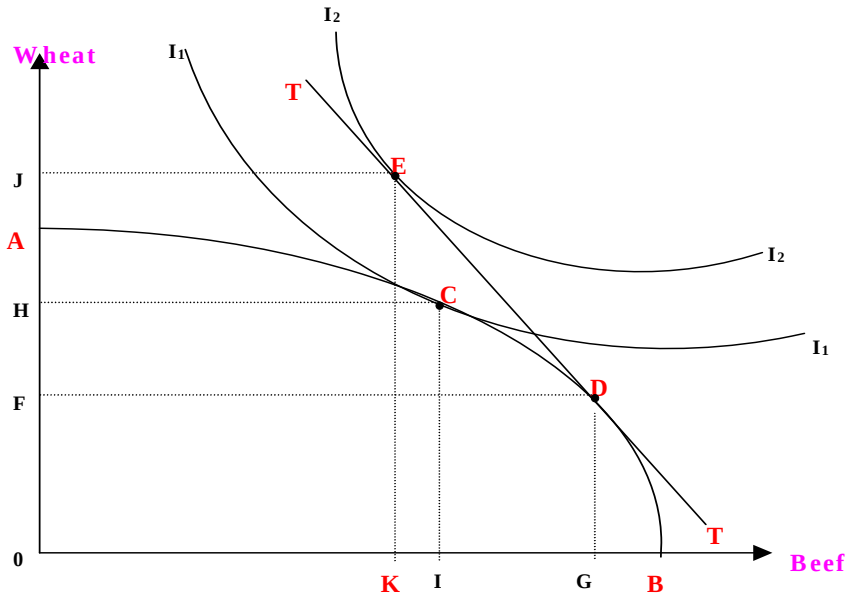

Figure 3.2: Equilibrium under Free Trade

While under autarky, the equilibrium of production is at point C, through free trade, the optimal production point moves to D, with an increase in the domestic production of beef from OI under autarky conditions to OG when free trade conditions prevail. The movement of the optimal production point from C to D under free trade conditions results from the anticipated higher profits of international trade (Field, 1997, p.90). Through free trade only OK beef is consumed, as the equilibrium social/community welfare point is E on indifference curve I_2, which is evidently superior to I_1 or point C. The balance of KG beef is exported.

As far as wheat is concerned, under free trade conditions, domestic production declines from OH under autarky to OF. As the equilibrium point of social consumption is E on indifference curve I_2, to satisfy the demand an amount of JF of wheat is imported.

According to Figure 3.2, this country enjoys a comparative cost advantage in the production of beef while wheat is less suitable given the country's factor endowment. As defined by Ethier (1995, p.123) factor endowments "are the productive ingredients available to an economy: land, labour, capital, natural resources, skills, and so on".

Whereas under autarky conditions the country produced less beef and consumed less, for both commodities (see point C on I_1), through free trade domestic production shifted to the commodity (beef) which intensively uses the factor(s) that this country possesses in relative abundance (which in this case are labour and land). Overall consumption, as indicated in Figure 3.2, also increased under free trade conditions to point E. Free trade has therefore benefited the country by allocating scarce resources to areas where net social returns can be maximized while at the same time providing a higher social consumption level (point E on I_2 is greater than point C on 1_1). Technology is also a factor that can influence a country's comparative cost advantage. Below we describe one of the trade theories in modern international economics, which elaborates the comparative advantage theorem.

3.3 Theory of Comparative Advantage: The Hecksher-Ohlin-Samuelson Model

Since Ricardo's theory of comparative advantage around 1817, other neoclassical and modern economists have developed this model further and carried out empirical studies to verify its validity. The theory of comparative advantage, sometimes also referred to as factor endowment/proportions theory (Ethier; 1995, p.125; Field, 1997, p.128; Krugman and Obstfeld, 2000, p.66), has been elaborated and refined many times. Quite prominent in international economics literature on comparative advantage is the Hecksher-Ohlin-Samuelson (HOS) model. In essence the standard HOS model is based on the comparative cost advantage of factor endowments (labour, capital) between and among nations.

It is often indicated that trade takes place between nations because of different relative factor prices (Sodersten and Reed, 1994; Ethier, 1995; Field, 1997; Krugman and Obstfeld, 2000). According to the HOS theorem, a country "has a comparative advantage in the good that makes relatively intensive use of the country's relatively abundant factor" (Ethier, 1995, p.130).

Figure 3.3 illustrates that if one country enjoys a relative abundance of labour while another is relatively more endowed with capital, *ceteris paribus*, the former will produce goods that are labour-intensive while the latter possesses a comparative advantage in capital-intensive goods. In fact Figure 3.3 shows how the theory of comparative advantage between two "small economy" model countries functions in terms of a standard HOS model. Country A's production possibility curve is given by MM while that for country B is NN.

Assuming country A has relatively abundant labour while country B has a better factor endowment in physical capital, according to the Hecksher-Ohlin-Samuelson theorem/model each country will specialize in the production system that makes an intensive use of its relatively abundant resource. Commodity X produced by country A on MM possibility curve is relatively labour intensive, hence the optimal production at point S, while for commodity Y produced by country B the optimal point of production is R on NN. Commodity Y is relatively capital intensive. Algebraically a labour intensive good in country A means the ratio L/K is higher there than in country B, while for a capital-intensive good the K/L ratio is higher in one country than the other. L and K, as expected, represent labour and capital respectively.

Figure 3.3 therefore shows that country A will produce goods that are labour intensive like X, while for country B capital-intensive goods like Y will be produced and exported.

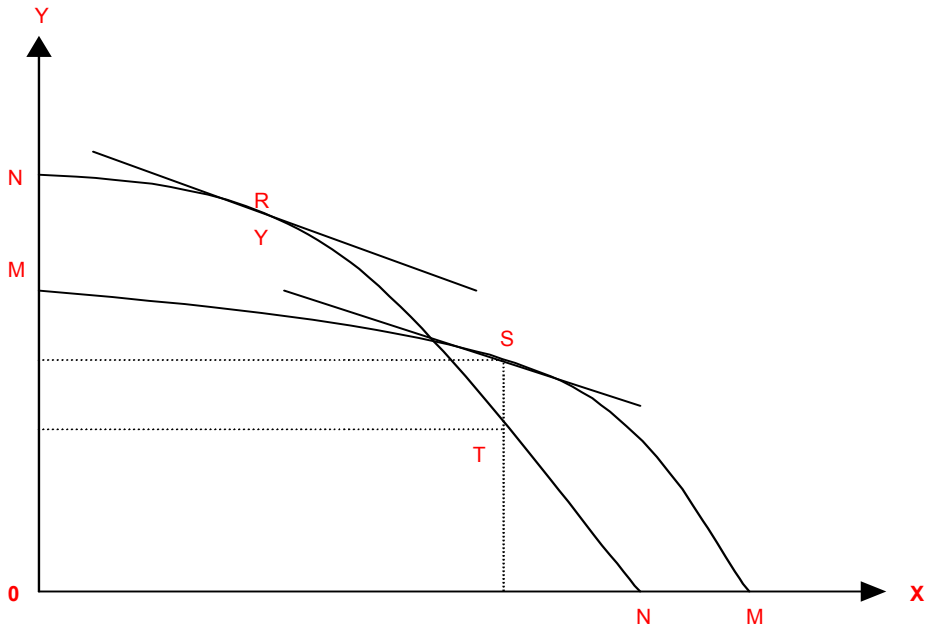

Figure 3.3: The Production Possibility Curves for two countries with different capital and labour factor endowments

3.3.1 Hecksher-Ohlin-Samuelson (HOS) Assumptions

Before considering some of the empirical findings of the HOS theory, it is also necessary to understand briefly the standard assumptions of this model or theorem:

(1) There are no transport costs or impediments to trade;
(2) All production functions between the trading countries are subject to constant returns to scale;
(3) Labour and capital within the same country are perfectly mobile between industries/sectors but these two factor endowments are not mobile between trading countries;
(4) The production functions of the commodities exhibit different factor endowment uses/intensities at any given factor price ratio;
(5) Technologies in the trading countries are identical;

(6) There is perfect competition, in both trading countries, in the factor and product markets; and

(7) Trading countries display similar/homothetic tastes.

Samuelson's inclusion of assumption (7) in the standard Hecksher-Ohlin framework has led to the theorem being known as the Hecksher-Ohlin-Samuelson model. In fact, according to the HOS model, the low-income countries, which possess relatively abundant labour, and by definition cheaper labour vis-à-vis the high-income countries, will generally produce, and trade in, commodities that are intensive in the use of this resource. Specifically, low-income countries trade in labour-intensive goods such as agricultural commodities while the high-income countries dominate in capital-intensive traded commodities such as machinery, chemicals, motor vehicles and electronics.

As high-income countries have access to relatively more capital per man-hour than low-income countries, the former therefore exhibit a higher K/L ratio compared to low-income nations. This means that current international trade between the two groups is based on comparative factor cost advantage. The trade between the two income group countries is primarily inter-industry trade (Sodersten & Reed, 1994; Ethier, 1995).

While the EU exports capital-intensive goods such as heavy equipment, computers, vehicles and aircraft, the ACP countries produce and export relatively labour-intensive products: cotton, sugar, grains, vegetables, tea, timber, and the like. The Cotonou Convention, as a trade agreement between ACP and EU countries, is the successor to the Lome Convention of 1975. The agreement is valid for twenty years but some of its discriminatory provisions like the banana and beef protocols are the subject of dispute amongst other WTO members. According to the WTO provisions, market access should be non-discriminatory unless in the case of the least-developed countries (WTO, 1994). Non-ACP countries do not enjoy preferential market access to the premium EU market. For several agricultural products, ACP exporters receive

prices above world prices. ACP countries are reluctant to lose preferential market access in compliance with WTO because of the likely reduction in producer prices and subsequently in incomes.

3.3.2 Income Distribution and the HOS Model: The Stopler-Samuelson Theorem

As part of the gains from trade, relatively abundant factors that are reallocated to an industry based upon comparative cost advantage can increase domestic production and improve overall community welfare (see Figure 3.2 where the equilibrium production point moves from point C to D after free trade is undertaken). The increased domestic production is exported in order to import (assuming no tariff barriers) low-cost goods.

However, while free trade is beneficial to a society, there are associated costs, especially in the short to medium term. These costs include, among others, the unequal distribution of income. In particular, "the owners of the factor of production used intensively in the export industry will gain relatively by the move to free trade, while owners of the factor of production used intensively in the import-competing industry will lose relatively" (Sodersten and Reed, 1994, p.65).

The movement from point C to D after free trade in Figure 3.2 means that as long as domestic production of beef, an export industry, increases, owners (whether households or firms) of the relatively abundant labour will gain while those in wheat production will lose. The growth in the export beef industry also leads to an increase in the price of the factor that is intensively used, which in this case is labour. The owners of capital in the less efficient and competitive wheat industry lose (Sodersten and Reed, 1994; Ethier, 1995; Field, 1997). The general conclusion arrived at regarding the relationship between free trade and income distribution according to the standard HOS theorem/model is that, "owners of the country's abundant factors gain from

trade, but owners of a country's scarce factors lose" (Krugman & Obstfeld, 2000, p.76).

The relationship between free trade and income distribution according to the HOS model is known as the Stopler-Samuelson theorem, according to which, "an increase in the relative price of the labour-intensive good will increase the wage rate relative to both commodity prices and reduce the rent relative to both commodity prices" (Ethier, 1995, p.134).

In Figure 3.2 the growth in the demand for beef, a labour-intensive industry, *ceteris paribus*, leads to a relative increase in the wage rate, while the relative price of capital or rent reduces, owing to the decline in domestic demand following the alignment of relative factor prices with international terms of trade. This means that owners of labour, whose "price" (their wages) increases relative to rent, in general, should improve their household income.

3.4 Empirical Validity of HOS Model

Empirically, however, based upon US trade data, it has been found that income inequalities are not necessarily caused by trade but rather by other factors such as technological differences (Field, 1997). Such inequalities do occur even in non-traded industries. For trade between the industrialized countries and low-income countries, or the north-south trade, income inequalities are related to trade because the first-mentioned countries export skill and capital goods while the others export unskilled and semi-skilled labour intensive products (Krugman and Obstfeld, 2000). Capital goods require advanced technology unlike exports from low-income countries.

A loss of income after free trade is instituted may, in the short to medium term, require some public compensation (Ethier, 1995; Field, 1997) for affected industries to be able to adjust. For instance, since 1962, the US government has established a trade adjustment assistance programme to

help industries adjust to further tariff reductions as part of worldwide trade liberalization (Field, 1997, p.99).

Besides the unequal distribution of income after the introduction of free trade, there might be other private and social costs that require consideration/analysis. According to Field (1997), the movement from autarky to free trade (point C to D in Figure 3.2) may require that some workers be retrained to fit into the export-led industries. Similarly, additional environmental investment and monitoring may be required to ensure sustainable development in the export industry. The WTO has observed poor adherence to sustainable economic transformation by export-led industries that in turn has caused some serious environmental costs (WTO, 1994).

Among the several economists who have attempted to evaluate the HOS model empirically is Leontief (1953). According to the Leontief model, the US economy should specialize in capital-intensive exports as the country possesses relatively abundant physical capital. In his input-output study, Leontief found that instead the US exports were labour-intensive (i.e. the labour-capital ratio, or l/k was higher for exports than imports).

As a result of this paradox, some additional empirical work has been undertaken to explain the puzzle of the HOS theorem. In a multi-country and multi-factor study by Bowen, Leamer and Sveikauskas (1987), it was established that a modified HOS theorem including more goods and factors in trade between nations “can be explained in terms of an interaction between factor input requirements and factor endowments” (Bowen, *et al.*, 1987, pp. 804-805). While the result of the multi-country and multi-factor study did not strongly vindicate the conventional HOS model, there is, however, some evidence that different factor endowment does influence trade between countries.

Insofar as the Leontief paradox is concerned, US exports were found to be relatively skill-intensive (Field, 1997), which was one of the relatively

abundant factors in this economy. The standard HOS model assumes two factors, labour and capital, as well as two tradable goods. The labour factor in the HOS model is assumed to be homogeneous, although some labour is highly skilled and some is not. If skilled labour is treated as a separate and independent factor in its own right, then the HOS model is validated (Ethier, 1995, p.123; Field, 1997, p.160)

3.5 Limitations of the HOS Theorem

Besides empirical studies by Leontief regarding the standard HOS theorem, this framework has also been found to be deficient in explaining intra-industry trade that is a dominant feature in the relationship between industrial countries, the development of increasing economies of scale, imperfect competition and the growth of trading blocs, which tend to prevent free trade.

Indeed a recent article in the *Economist* entitled “Finding your Niche” argues that modern trade developments defy the HOS model based upon Ricardo’s theory of comparative advantage (March 1, 2003). The article observes that since capital is mobile, entrepreneurs identify niche markets not necessarily based upon the theory of comparative advantage. Further, the article notes that success in industry is based upon “trial and error” as opposed to comparative advantage. Neither the HOS nor the Ricardo models capture the development of market imperfections in industries, a common feature in modern economies. New trade theory also identifies the deficiencies of the two models by indicating the following limitations (Robinson & Thierfelder, 1999; Brown, 2002).

3.5.1 Intra- Industry Trade

Conventional trade theory as well as the standard HOS model is based on inter-industry trade, where products are assumed to be homogeneous. When trade between countries takes place in products falling in the same classification category, such as cars or television sets, the factor endowment

approach becomes very deficient. Hence, over the years, the HOS model has been found to be deficient in explaining trade between high-income countries that is characterized by intra-industry transactions.

If there are few or minimal comparative cost differences between countries, which exhibit similar tastes, similar technology and comparable income levels, such countries generally concentrate on intra-industry trade independent of comparative cost advantage (Sodersten & Reed, 1994; Ethier, 1995; Field, 1997; Krugman & Obstfeld, 2000). Products such as motor vehicles or specialized and sophisticated equipment are a common feature in trade between high-income countries. Intra-industry trade is strongly characterized by product differentiation or the availability of various brands of the same product class. The application of tariff and non-tariff barriers may, however, reduce intra-industry trade among these countries. In contrast, intra-industry trade among low-income countries is unarguably very limited.

Whereas intra-industry trade is very strong (about 64 per cent), among the developed market economies (DMEs) themselves, the same cannot be said for low-income countries (LICs) whose intra-industry trade runs at about 22 per cent or a third of that of the DMEs (Sodersten & Reed, 1995). Further, unlike labour-intensive primary goods from low-income countries, manufactured goods from DMEs are characterized by highly intensive skills and technology (Sodersten & Reed, 1995). In addition, such products generally demonstrate higher income elasticity because of greater added value.

3.5.2 Increasing Returns to Scale

The HOS model assumes constant returns to scale, which means that when inputs are increased by a certain amount, output will also increase by the same amount. In the perfectly competitive market that the HOS model assumes, if firms operated under constant returns to scale, none of them would influence either the cost of inputs or the prices of outputs (Ethier, 1995).

Whilst it is possible to observe constant returns to scale in small and spatially dispersed sectors or activities such as agriculture, with regard to the production of manufactures such as motor vehicles, highly specialized equipment, electronic gadgets and the like, available evidence shows that production is most efficient when conducted under economies of scale or increasing returns to scale.

Economies of scale here mean that as output increases, the unit costs decline owing to improved productivity/efficiency. For increasing returns to scale, an equal percentage increase in factor inputs leads to a higher percentage growth in output. The economies of scale, unlike constant returns to scale, are common in intra-industry trade (Ethier, 1995; Field; 1997; Krugman & Obstfeld, 2000). The HOS model assumes constant returns to scale and also that none of the firms/countries involved should influence factor and commodity prices since both production and trade operate under perfectly competitive conditions. Empirically, Balassa (1986) found that intra-industry trade was dominant when trading countries exhibited generally similar per capita income, tastes, open economies and including technologies.

3.5.3 Imperfect Competition

The classical comparative cost advantage as indicated in the HOS model assumes perfect competition in both input and output markets. Insofar as trade among highly industrialized countries is concerned, however, imperfect competition in markets is the norm. In imperfect competition, a firm may influence prices whereas in perfect competition all firms or producers are price-takers. Industries such as aircraft, motor and petroleum producers, as well as those manufacturing highly capital- and skill-intensive goods such as specialized equipment (computers, television sets etc.), are dominated by oligopolistic firms in Europe, Asia and America (Ethier, 1995; Field, 1997; Krugman & Obstfeld, 2000).

A few oligopolistic firms, including the highly technology-intensive Swiss watch sector, also dominate the watch industry. The growing concentration of production by firms in the industrialized countries has indeed weakened the HOS model, as in some cases tradables are dominated by a few firms or multinational corporations. Multinational companies account for about 25 per cent of world income (Ethier, 1995, p.314). Given their size and market influence, these corporations can affect commodity prices.

3.5.4 No Barrier to Trade: Zero Transport Costs

It is also argued that accessibility by means of lower transport costs and the latest developments in information technology among industrial countries have further contributed to intra-industry trade. In many low-income countries, lack of infrastructure and technology may adversely affect productivity, transport costs and other transaction costs. Access to technology and electronic commerce could improve the competitiveness of low-income countries, as well as help to close the gap with industrialized nations (WTO, 1999). In fact, productivity gains in the high-income countries of Southeast Asia are partly attributable to greater access to infrastructure and investment in technology (Stiglitz, 1998).

The HOS model assumes that transport costs offer no barrier to trade, but in a study by Ahmed and Rustagi (1987), it was found that 40 percent of the difference in marketing costs of traded goods between Africa and Asia was owing to high transport costs in the former. Besides a poor and underdeveloped physical infrastructure in most African countries, there has been a tendency to concentrate this important input in urban areas, hence exacerbating producer-consumer-marketing margins.

3.5.5 Factor Price Equalization Theorem

According to the HOS model, factors are allowed to be mobile within industries in the same country. Ideally this means that labour and capital can

move freely from industry to agriculture, services, and vice versa as long as this movement takes place within a single country's economy. Factors are not allowed to move freely from one country to the other even when free trade is allowed to take place between countries. It is only goods/commodities that are allowed to move freely between nations.

With the advent of free trade between two countries this will. "cause factor prices in the countries to become more equal. If both countries continue to produce both goods, their factor prices will actually be equal" (Ether, 1995, p.132.

Assuming that labour and capital are the two factors used in the two countries, and that the countries face perfect competition, exhibit the same relative commodity prices (of, say, beef and wheat), and apply the same technology (see Figure 3.2), the Factor Price Equalization Theorem states that in equilibrium, relative factor prices will be equalized between the two countries (Sodersten and Reed, 1994; Ethier, 1995; Field, 1997; Krugman and Obstfeld, 2000). However, the equalization of relative factor prices assumes that neither country specializes completely, as this will violate the one factor-one product relationship as well as the different relative prices assumed by the HOS model.

As the HOS model does not allow for the free movement of factors, free trade provides a proxy for this movement through the free mobility of goods. Traded goods embody relatively abundant factors in each country (Krugman and Obstfeld, 2000, p.77).

3.6 The Rybczynski Theorem

This theorem states that where prices are adjusted for inflation or constant prices, an increase in one factor endowment, say labour, will increase, by a greater proportion, the output of the good which is intensive in that factor; but

reduce the output of the good to which this factor is not intensively applied (Ethier, 1995, p.135).

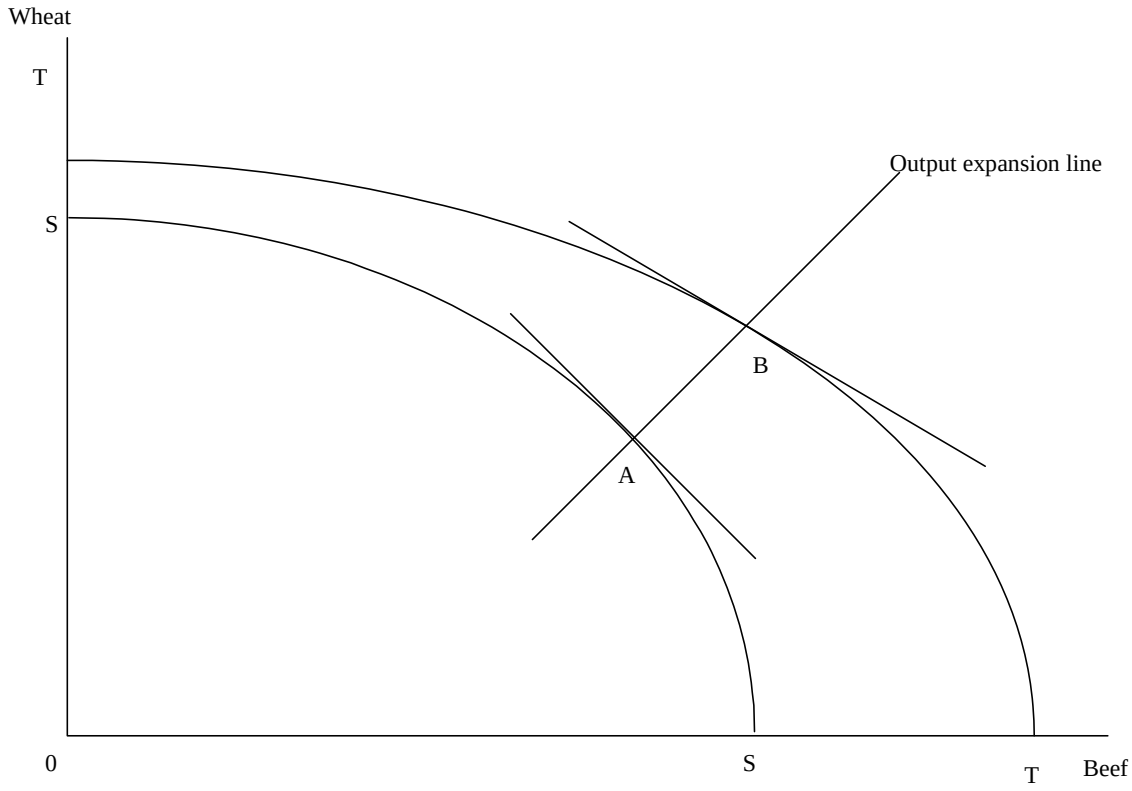

Figure 3.4: Illustration of Rybczynski Theorem

According to Figure 3.4, at constant prices, an increase in labour has increased the output of the labour-intensive good, beef, but reduced the output of the capital-intensive product (wheat). The increase in beef output, which is labour-intensive in terms of the Stopler-Samuelson theorem, has increased the incomes of owners of this labour-intensive product. The shift in the production possibility frontier, SS, according to the Rybczynski Theorem, to TT at point B, has increased by a greater proportion the output of beef compared to wheat. This in turn will cause beef producers to earn more income relative to wheat farmers.

3.7 The Theory of Customs Unions or Regional Free Trade Zones

Whereas standard trade theory assumes free trade between and among countries, since World War II, there has been an increase in the number of customs unions or regional free trading blocs. A customs union exists when a group of countries, normally geographically close to each other, apply a common external tariff to goods originating from third parties/non-members, while goods from members move freely within the union's territory (Krugman and Obstfeld, 2000). In a customs union all members establish a uniform tariff administrative structure to ensure compliance.

Unlike a customs union, in a free trade area, member countries agree to trade freely together but still exercise sovereignty in maintaining different tariff rates for third parties. In essence, in a free trade area each country sets its own tariff rates for the rest of the world. Some customs unions in the world include the former European Economic Community Union, the Southern African Customs Union, the now resurrected East African Community, the Caribbean Community and the Common Market, while the European Free Trade Association and the North American Free Trade Agreement are preferential free trade areas where member countries still independently maintain their own tariff rates. SACU is among the oldest customs unions in the world.

The most advanced form of economic and trade integration is an economic union where the monetary and fiscal policies of member states are standardized and a common currency is adopted (Sodersten and Reed, 1994; Field, 1997; Krugman and Obstfeld, 2000). The present European Union is almost an economic union since economic policies are being harmonized while a single common currency, the Euro, has been adopted. However, certain EU members still express reservations about the loss of sovereignty in economic policy decisions and management as well as about the sustainability of the Euro-based economy. While a major motivation for creating customs unions or regional trading blocs is to influence common

political interests, the economic, trade and investment reasons for members to work together are also paramount.

The joint decision to cooperate as an economic and trade grouping is intended to pool resources in order to maximize the benefits to members, at the expense of third parties (Sodersten and Reed, 1994). Some of these benefits include a better regional physical infrastructure, access to a bigger and protected market, industrial development, free movement of goods, improved educational facilities, etc. In general, a regional trade arrangement is not supported by the WTO as this could undermine trade liberalization by reinstating barriers between states and trading blocs, and lead to a proliferation of preferential as well as discriminatory practices (WTO, 1994; Krugman and Obstfeld, 2000, p.241). The current WTO provisions and obligations do not favour differential trade arrangements that discriminate against other countries, as market access to and by all member countries forms one of the main tenets of the global trade agreement.

One of the main aspects that the theory of customs unions attempts to address is whether trading blocks create trade or divert it. According to standard trade theory as advocated by Ricardo, HOS models, etc., free trade improves social welfare, leads to the optimal allocation of resources and provides consumers with a wider choice. The different relative prices in factors and products contribute to the overall increase in free trade. However, the creation of customs unions has over the years led to concerns being raised over the efficiency and welfare gains derived from this form of economic integration. If a small country model is adopted, trade creation, according to the theory of customs unions, occurs when imports from a low-cost producer(s) in the partner country replace imports from a high-cost and inefficient domestic producer (Sodersten and Reed, 1994, p.324; Field, 1997, p.356; Krugman and Obstfeld, 2000, p.243).

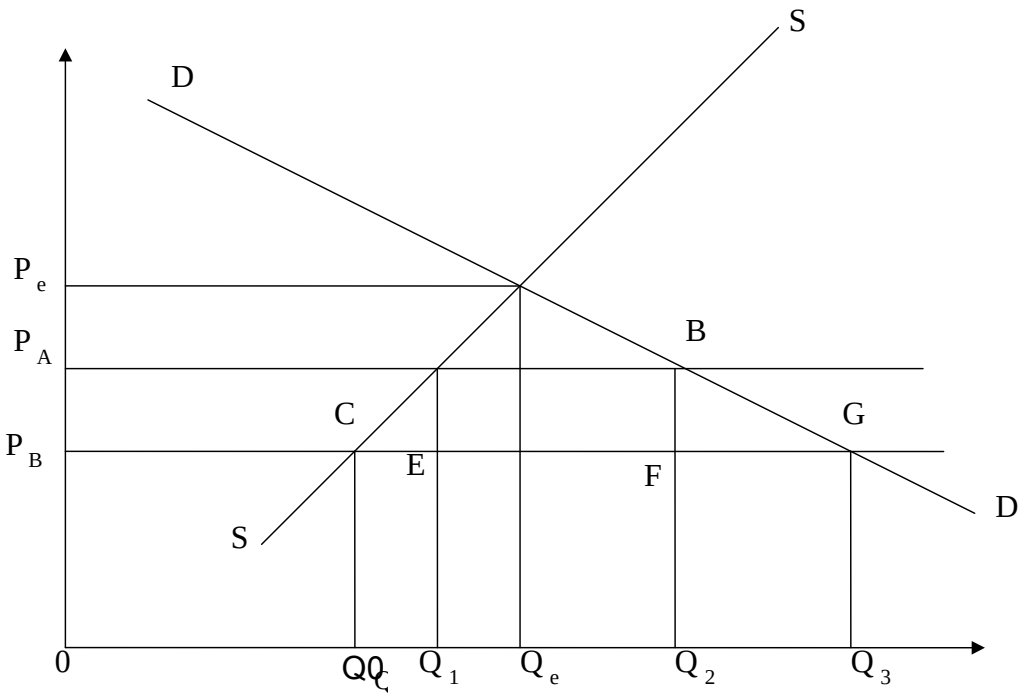

Figure 3.5 Trade Creation

For trade *creation* to take place in a customs union, the following must take place: before the union, country A obtained quantity $0Q_1$ of good X from its domestic producers at the protected domestic price, P_A, and also imported quantity Q_1 Q_2 from country B at price P_B to meet her total consumption requirements, $0Q_2$. The difference between country A's price, P_A, and that of country B, P_B is due to the tariff imposed by the former to protect local producers. When the two countries form a customs union, the tariff is removed and therefore country A can now purchase good X at a lower price, i.e. P_B After the union or economic integration, it is expected that the domestic price for good X in country A will be equal to P_B, which means that the domestic production of good X will now drop to OQ_0, while total consumption is OQ_3. With the formation of the union, country A now imports more from country B i.e. Q_0 Q_3 as opposed to the pre-union quantity, Q_1Q_2. Under these conditions, it is said that the formation of the customs union has been trade-creating between countries A and B because more of good X has been imported from a low cost/cheaper partner country, B.

The importation of a cheaper good X from country B by country A into its territory enhances welfare and provides consumers with a choice, and country A could re-allocate resources, previously tied to the production of X, to more efficient uses. In fact Sodersten and Reed (1994, p.329) underscore the value of this type of economic integration by observing that, "production gains associated with trade creation arise as resources are reallocated from industries where costs are high at the margin to other industries where costs compare favourably with those of world suppliers". It is hoped that the envisioned SADC regional integration, and the entering of FTAs with the EU and US by SACU, will enable Botswana to access food, agricultural and other imports from cheaper and more competitive world suppliers. Studies on trade liberalization in SACU and the rest of Southern Africa/SADC by Masters, Davies and Hertel (1999), Lewis (2001) and Lewis, Robinson and Thierfelder (2002), based on economy-wide analysis, indicate that overall there will be trade creation especially with the EU. Specifically, SACU experiences an increase in agricultural imports from the EU some of which could benefit food deficit countries such as Botswana due to limited natural resource base.

Trade *diversion*, however, takes place when a member of the customs union decides to import from a high-cost and inefficient partner country, although a source outside the union could supply good X more cheaply if there were no common external tariff. Trade diversion reduces welfare, since consumers in the union pay a higher price; whereas if there were no common external tariff, good X could be supplied by a third party – more cheaply. Trade diversion can also contribute to misallocation of resources because high cost and inefficient domestic producers in the union are protected from external competition by the common external tariff. Of course, it should be acknowledged that any support for high-cost producers among Customs Union members could be aimed at realizing other benefits such as political solidarity, employment security and social stability.

Whereas studies cited above indicated trade creation, Masters, Davies and Hertel (1999) also pointed out that if EU-SACU trade relations including the

rest of Southern Africa did not cover liberalization in the agricultural industry including the food industry, economic losses to SACU etc could be experienced as more costly imports could be sourced from Europe as opposed to cheaper ones from elsewhere. Under these circumstances trade diversion could occur to the detriment of the region. The study therefore advocates for trade negotiations/agreement with the EU, in particular, that include agricultural products so that those countries in the sub-region with comparative cost advantage benefit from trade liberalization/integration

3.8 Economies of Scale and the Customs Unions

Standard trade theory assumes a small country model whose system of production does not affect the factor costs because several producers exist in it. However, the possibility exists that certain goods (electricity, motor cars, and so on) may be produced under economies of scale. This might lead to the reduction of marginal costs as the level of output increases. In fact a firm/producer in the union may establish a bigger plant to produce certain goods more cheaply because of the size of the protected market. Prior to the formation of a union, the development of a plant so as to benefit from increasing returns to scale might not have been viable, given the size of the domestic market. Already within SADC opportunities exist to supply electricity to other countries, as larger energy producers like Mozambique and South Africa enjoy economies of scale. Access to low-cost energy is very important for regional integration and conservation of forest resources.

Corden (1972) observes that even with a protected market in a customs union, very few firms may benefit, as some might lose business owing to competition from within the union by efficient big plant operators. It is also possible that both trade creation and diversion could take place in the customs union even while certain producers enjoy economies of scale (Sodersten & Reed, 1994, p.341). For those countries that, prior to joining the union, faced high domestic costs of production but upon gaining membership are able to import goods from low-cost partner members, trade creation will

improve efficiency and welfare. However, if the high-cost countries/firms in the customs union displace low-cost and competitive world suppliers after becoming members, efficiency and welfare will be affected adversely.

3.9 Intra-Industry Trade and the Customs Union

As indicated earlier, a customs union also provides an opportunity to benefit from increasing returns to scale. The traditional theory of trade assumes constant returns to scale and perfect competition in factor and product markets. Trading countries within a standard trade framework are price-takers and therefore cannot influence prices or traded volumes. For increasing returns to scale, marginal costs reduce as the level of output increases.

Differentiated products such as cars and television sets can benefit from increasing returns to scale and promote intra-industry trade among members of the union. One member of the union may specialize in the low-cost production of a certain brand of car, for instance, and export it to high-cost members of the union more cheaply because of the absence of tariffs for members. Similarly, other union members could also export different brands or varieties of the same product as long as these brands are not perfect substitutes for one another (Sodersten and Reed, 1994, p.341). Intra-industry trade in goods such as cars, beer and electronic goods is very prevalent in the EU and NAFTA. Further, it is also assumed that the intra-industry trade undertaken by union members is based on competitive international costs and that trade diversion does not take place.

3.10 Terms of Trade and the Customs Union

The phrase terms of trade refers to “the number of units of imports of a country can obtain for each unit of exports” (Ethier, 1995, p.18).

An improvement in the terms of trade means that a unit of exports purchases more imports than previously whereas deterioration in these terms means that

a country gives up more exports to buy the same unit of imports. For small economies, the terms of trade or the price of export/price of import ratio is given, as these countries are price-takers in the world trade economy.

For a regional economic grouping like the European Union or free trade area like the North American Free Trade Association (NAFTA), these trading blocs can alter the terms of trade concerning goods and services, from both the supply and demand perspectives. Specifically, large trading blocs or customs unions like the EU and NAFTA can shift the demand and supply curves to their benefit, which in turn could have significant effects on export-import price relations. The EU is the largest trading bloc in the world and therefore can influence the terms of goods that it exports and imports, including agricultural products such as grains, meat and dairy (WTO, 1999).

The relatively high self-sufficiency ratios achieved by the EU in farm products since the 1970's occur mainly because of subsidies in terms of the Common Agricultural Policy (Anderson & Tyers, 1990). For a large customs union like the EU, influencing terms of trade that can raise or reduce world commodity prices especially for non-members, the welfare and efficiency effects for the latter may be worse or improve (Sodersten & Reed, 1994, p.343). Improving the terms of trade for EU members implies a deterioration of terms of trade for third party countries, as import prices will increase.

3.11 Non-tariff Barriers to Trade and the Customs Union

Besides tariff barriers, members of a customs union as well as of free trade areas also impose non-tariff barriers to trade, in order to protect their industries further. Some of the frequent restrictions imposed by customs unions are the use of quotas, rules of origin, licences, import permits, voluntary export restraints and subsidies to member country producers. In agriculture, additional non-tariff measures such as sanitary and phyto-sanitary (SPS) instruments may be imposed. SPS measures are basically intended to

ensure that imported agricultural products are disease-free and safe for human consumption (WTO, 1994).

Empirically, the welfare and efficiency gains of customs unions are still subject to controversy and major disagreement. While pre-union trade among EU states might have been limited because of high tariffs, various studies indicate that intra-union and intra-industry trade has increased because of the reduction in tariffs and free movement of goods in the customs union area (Truman, 1969; Balassa *et al.*, 1975; Hine, 1985). These studies indicate growth in trade creation and diversion. In general, trade creation enhances welfare whilst diversion reduces welfare and promotes inefficiency in production.

3.12 Rent Seeking and the Customs Union

As part of the political economy on protection, industries and pressure groups exist that argue for continued use of tariffs and other measures to maintain benefits even if this may reduce both economic efficiency and the welfare of the country (Krueger, 1974; Baldwin, 1976; Bhagwati, 1982; Sodersten and Reed, 1994; Field, 1997). Practices employed by pressure or interest groups such as farmers, industrialists and trade unions to resist foreign competition that could threaten or erode their benefits are also present in a customs union. In a union, tariffs and non-tariff barriers are imposed to protect industries as well as the interests of various players such as investors, farmers, workers and politicians.

Baldwin (1986) shows how politicians in the US argue for industry protection in exchange for votes. In fact the political support for the protection of the tomato industry in Florida against cheaper imports from Mexico is testimony to how various interest groups (farmers, workers, politicians) can collaborate in order to maximize economic rents. Economic rents exist when the domestic price of a commodity by means of tariff protection or other barriers is kept higher than the world price for the same product. As a result of restricted

competition and industry protection coupled with government or customs union support, economic rents are gained by those in the protected industries, including workers and manufacturers.

In addition, where a government in a customs union grants licences to certain individuals/companies to import specific goods in terms of quotas, owners of such licences will gain more while consumers and those who are not allowed to obtain licences are likely to be disadvantaged by paying higher prices because of quantitative restrictions. The welfare or cost of living of those not licensed to import is likely to worsen when such restrictions are imposed. Similarly, total prohibition of imports in a customs union will benefit domestic industries that are insulated by tariffs, quotas or any other policy measure which limits competition or an increase in aggregate supply so as to influence price. Pressure or interest groups enjoying protection, restricted or monopoly import licences and such like, are likely to lobby for more government intervention in the economy in order to safeguard their economic interests, at the expense of the efficient and equitable allocation of scarce resources to more sustainable and productive activities (Bhagwati, 1982).

At price P_A, Figure 3.5 above shows the likely efficiency, welfare and distributional effects following the imposition of trade restrictions (in terms of a tariff/quota) by country/union A to protect producers of good X. Besides the country/union producing the good more expensively ($P_A > P_B$), per capita consumption of this commodity is significantly reduced whilst the rent-seeking groups benefit. Producers of good X in the union benefit from higher domestic prices like P_A, while consumers are penalized. If, however, trade creation is advocated in the union then more effective allocation of resources and welfare gains could be achieved.

3.13 Real Exchange Rate

This is the relative price of a non-traded good to that of a traded good. If the price of a non-traded good, like wood, is P_n while that for a traded good like

wheat is P_t, the ratio P_n / P_t gives the real exchange rate. The relationship created between a non-traded good/sector and traded good/sector through relative changes in prices can be explained as follows. If labour is assumed to be a fixed and yet a mobile factor in a small economy model, and there is a booming traded sector like diamond production, the booming sector can cause the wage rate to increase. An increase in the wage rate not only affects the sector where the good is traded but also other traded and non-traded sectors in the economy. Other traded sectors may include textile and beef production while non-trading sectors could cover construction, wood gathering, repairs, and so on. The increase in the wage rate also increases production costs for all sectors of the economy.

Since traded sectors in a small economy cannot change the terms of trade of their goods and yet are forced to absorb additional costs due to a high wage rate, these sectors cannot pass on the additional production costs to consumers since they are competing internationally. Unlike the booming diamond industry, other traded sectors are forced to contract or decline in size. The non-traded sectors (construction, wood gathering, etc.) could, however, pass some of the additional costs on to domestic consumers as they do not face any import competition (Sodersten & Reed, 1994, p.284). The net result of the booming diamond industry is the decline in the relative growth/size of the other traded sectors owing to the additional costs arising from high wages. The non-traded good sectors like construction and wood gathering will experience relative growth compared to the contracting non-diamond-producing traded industries.

In short, the potential comparative cost advantage of the declining but traded sectors will be adversely affected by the booming diamond industry. As the non-traded good sectors relatively prosper, this means that the real exchange rate, P_n/ P_t, goes up or simply appreciates (i.e. $P_n > P_t$). Specifically, the relative price in the non-traded good sector, P_n, has increased vis-à-vis P_t, for the non-booming traded sectors such as textiles. The decline of sectors which

had previously been exported, owing to the effects of the booming sector, is commonly known as the “Dutch disease”.

Botswana, like other mineral/petroleum-based economies, is experiencing the “Dutch disease” caused by the booming diamond industry that has increased the relative prices of the factor costs of labour. Other tradable sectors such as agriculture and textiles are forced to absorb additional production costs owing to this boom, which causes these sectors to decline and become uncompetitive. It is currently difficult to retain labour for farming and other trading sectors because of the high expectations by unskilled and semi-skilled workers that they will receive a higher wage, induced by the diamond mining and allied industries in the country. For instance, the request sometimes made to government by farmers and manufacturing industries to be allowed to import unskilled and semi-skilled workers from neighbouring countries is partly due to the effects of the Dutch disease, as local workers have become relatively more costly.

3.14 Summary

In summary, this chapter has described the theory of international trade based upon the neoclassical model proposed by Ricardo and later developed by HOS. The chapter has also identified deficiencies in the neo-classical trade theory and indicated some of the challenges to it based upon the new trade theory. While recognizing the limitations of the HOS model, this chapter still shows the relevance of comparative advantage between and among trading countries. In fact one of the main objectives of the WTO is to improve social welfare and reduce poverty, partly by means of encouraging global trade based upon the HOS model.

For Botswana, this chapter indicates how extensive beef production as opposed to wheat production is relatively more suitable, competitive and export-driven, owing primarily to favourable factor/natural resource endowment as well as to world producer prices. Climate and land are some of

the positive factors promoting relatively viable livestock farming. Available empirical evidence shows that the failure and costly nature of several food self-sufficiency initiatives in Botswana and elsewhere in the world are partly due to ignoring the virtues of the HOS theory/model. Agriculture is primarily a biological activity and therefore optimal climatic and physical conditions are necessary for both plant and animal growth and development. Unfortunately, for Botswana the climatic conditions are not conducive to viable crop production as a result of erratic rainfall and a semi-desert environment. Botswana can therefore benefit from trade creation if market access to more competitive food and agricultural imports from many parts of the world, based upon the HOS model, is achieved. Poor households in Botswana, as in many low-income countries, spend over 30 per cent of their disposable income on food. Some of the food is produced locally at high cost while the imported food is also made expensive because of tariffs used by government as revenue (Weber, *et al.* 1988; Lewis, Robinson and Thierfelder, 2002).

In addition, this chapter has also described the theory of customs unions or regional blocs as well as identifying potential benefits and costs associated with these systems. As a member of both the customs union (SACU) and a regional economic and trading bloc (SADC), Botswana can benefit from the applications of the theory of customs unions or regional trading blocs if trade is, as far as possible, based on comparative advantage, taking into account the different development challenges of member countries, which are also supported by WTO provisions such as special differential treatment (SDT) for developing countries, safeguarding mechanisms, etc. (WTO, 1995). The theory of customs unions is very relevant to Botswana and indeed other SADC countries, especially since the sub-region is moving towards economic integration as well as the formation of FTAs with large economies. The sub-region should, unless there is deliberate dumping, guard against trade diversion and rent-seeking, as these developments could negate the achievement of improved food security, social welfare and optimal use of scarce resources.

For the purpose of this study, fundamental issues have been raised in this chapter that will be investigated in detail for Botswana. In particular, can the application of the theory of international trade based on the comparative advantage/HOS model contribute to improved food security, greater household consumption and increased competitiveness of the agricultural sector in Botswana, unlike the system of food self-sufficiency covered in Chapter 2. The HOS model shows that food security or household consumption in Botswana could be enhanced by increasing domestic supply, in terms of encouraging both efficient and competitive domestic production and imports. Chapter 4 will apply partial equilibrium analysis to assess the likely effects of global trade liberalization on Botswana‘s food security and agricultural sector. Botswana, like many WTO members, advocates global trade based upon the HOS model while taking into account the level of development of each country.

As Botswana is a member of a customs union (SACU), this chapter has also shown that in the event that global trade liberalization creates trade by replacing high-cost SACU agricultural products with cheaper but comparable and competitive imported food and other agricultural products, this could also improve household food security and possibly per capita consumption. Trade is created within a customs area when imports from cheaper and more competitive producers are allowed in order to satisfy domestic consumption (unlike the situation under conditions of autarky or food self-sufficiency).

In general, certain countries or producers in a customs union usually resist the reduction of tariffs as this reduces domestic producer prices, which in turn negatively affects business profits. Tariffs are used to protect domestic producers and industries against foreign competition by increasing domestic producer prices. If after tariff reduction Botswana is able to obtain cheaper and more competitive imported cereals (wheat, maize, rice, barley, and the like), dairy and sugar products this could enhance household security, especially among poor families and workers. As a member of SACU, will trade creation enhance food security? What complementary policies are required

which could enhance household food security in a customs area when tariffs and other barriers to trade are reduced? While Chapter 8 will further examine the effects on food security in Botswana of the reduction of SACU tariffs in selected traded products, chapter 7 will investigate the effects of improved market access for the country's exports in terms of generating additional foreign earnings so as to import food and other goods. Improved market access for Botswana's exports also assumes reduction of tariffs and other trade barriers in pursuance of global trade based on the HOS model.

CHAPTER 4

PARTIAL EQUILIBRIUM ANALYSIS IN AGRICULTURAL TRADE LIBERALIZATION

4.1 Introduction

This chapter describes the partial equilibrium analysis approach in agricultural trade liberalization as well as its limitations, and then empirically examines the effects of the tariff reduction formulas proposed by the WTO on Botswana's agricultural sector, producer and consumer welfare, government and export revenue by applying partial equilibrium analysis. Tariff reduction is one of the major areas of global trade liberalization. The Agricultural Trade Policy and Simulation Model (ATPSM) developed by UNCTAD will be used to analyze the effects of such reduction on Botswana's agricultural sector and food security. The chapter concludes by indicating the merits and demerits of partial equilibrium policy analysis as regards trade liberalization policy.

The partial equilibrium analysis approach assumes that the sector/industry under investigation "should not have important linkages with other sectors of the economy or, if it has, the tariff change being considered should be small. Equally, partial equilibrium analysis is not really applicable when we are considering the effects of simultaneous changes in many tariffs (as might be the case when countries form a free trade area or custom union)" (Sodersten and Reed, 1994, p.438). Specifically, partial equilibrium analysis focuses on commodities or a sector. This assumes that the introduction of external shocks like tariff changes in the sector through the application of a partial equilibrium analysis has a minimal impact on the rest of the economy. Based on this assumption, income distribution and welfare effects in the economy, inter- and intra-sectoral linkages cannot be captured using a partial equilibrium model. This is why Chapters 5-8 will demonstrate the existence of sectoral linkages in the economy following external shocks. As agriculture is

an important sector in Botswana and also exhibits relatively strong sectoral income and demand linkages in the economy, an economy-wide SAM-based analysis will be used to demonstrate these inter-relationships.

4.2 Experiences with Partial Equilibrium Analysis in Agricultural Trade Liberalization

Before an examination of the available evidence on trade liberalization based upon partial equilibrium analysis is undertaken, a brief background for the rationale for economic and trade liberalization, especially among low-income countries. Up until the late 1970's many economies of such countries experienced poor performance stemming from, *inter alia*, inappropriate macro-economic and sectoral policies and very costly import substitution strategies. Beginning in the 1980's, several low-income countries therefore witnessed the promotion of export-led development strategies owing partly to disastrous import-substitution strategies, including that of food self-sufficiency (Bhagwati, 1990).

Consistent with the HOS model of comparative cost advantage (see Chapter 3), although traded sectors like agriculture were expected in the 1970's (and even currently) to generate scarce foreign earnings, as well as to contribute to food security and the overall economy in several low-income countries, this was no longer the case, partly because of costly import substitution and inappropriate policies. The strong advocacy of export-led economies was intended to correct this negative trend among developing countries. The majority of these countries are in Sub-Saharan Africa. However, despite economic and trade reforms introduced by most low-income countries, improved market access to industrialized countries still remains a major challenge for most low-income countries.

According to the IMF (2000) and the World Bank (2000) not only did these import substitution strategies reduce the export/GDP ratio for several low-income countries, including most of Sub-Saharan Africa, but serious macro-

economic balances were also experienced. High and chronic budget deficits persisted owing to untargeted subsidies, growing public expenditure as well as overvalued currencies, which penalized the growth of traded good sectors like agriculture. High and runaway inflation as well as unemployment rates became a common feature in several low-income countries.

The provision of public goods was also extremely limited because of chronic budget deficits. As indicated by several annual World Development Reports from the World Bank, as well as reports from the Food Summit (1996, 2001), abject poverty and household food insecurity did not improve during the years of inappropriate policies and import substitution. In fact the number of people living below an income of US $ 1 per day, especially in Sub-Saharan Africa, has been increasing while income distribution has further worsened (World Bank, 2002).

Since the mid-1980's, most low-income countries have experienced relatively high export/GDP growth, mainly because of trade liberalization in factor and product markets. Over-valued currencies have also been aligned with market forces while exchange and price controls have been phased out in many countries. The removals of controls and currency devaluation have partly benefited traded sectors like agriculture, since previous policies penalized exports. In addition the phasing out of monopolistic state-owned parastatal organizations has also enhanced competition as well as private sector participation in the factor and product markets. As expected, almost all the economic and trade reforms in Africa have been imposed by the IMF and World Bank through the so- called structural adjustment policies/programmes.

In order to improve the positive impact of economic and trade reforms on the macro-economy, sectoral performance, food security, etc, two approaches have been adopted to measure and monitor the desired effects. Partial equilibrium and economy-wide (general equilibrium) approaches have been used to analyze the effects of the reforms and assist informed policy decisions. Below follows a brief account of empirical studies on agricultural

trade liberalization, based upon the partial equilibrium approach in both low-income and industrialized countries.

Using a partial equilibrium analysis of agricultural trade liberalization by both industrialized and developing countries, Tyers and Anderson (1990) found that world commodity prices would increase by about 12 percent as a result of the removal of subsidies, tariffs, quotas, exchange and price controls. While in 1983 the food self-sufficiency indices (SSI) were 109 per cent in the industrial countries and 92 percent in developing nations, after worldwide trade liberalization in all sectors of the economy, it is estimated that the SSI for industrial and low-income countries will be 74 per cent and 118 per cent respectively (Anderson and Tyers, 1990).

The decline in the SSI for industrial countries is partly caused by the reduction in subsidies and tariffs, while the increase in food self-sufficiency in low-income countries could be attributable to higher producer prices and technological innovations. The results of the study by Anderson and Tyers assume complete price transmission in the economy, without restrictions. In essence prices should be determined in a free market without restrictions being placed on information by public policy or imperfect market conditions.

In addition, the study by Anderson and Tyers also anticipates higher commodity price increases in wheat, dairy products, meat and sugar. According to the study, the weighted average increase in world prices for these commodities, after global trade, and macroeconomic, liberalization, will be 12 percent. Another study indicates that with completely free agricultural trade in the European Union, grain prices would increase by about 13 per cent (Lingard and Hubbard, 1991).

It is also reported in partial equilibrium models that price variability will reduce (Sarris & Freebairn, 1991). Whereas before world trade liberalization, the instability in food prices measured by the weighted average of the coefficient of variation is estimated at 34 per cent, Anderson and Tyers (1990) indicate

that when industrial countries and low income nations liberalize their economies fully, the weighted coefficient of variation will drop to about 11 per cent.

Empirical results stemming from these models indicate a very high decline in food price variability for cereals (wheat, coarse grain, and rice), ruminant meat (beef), dairy products and sugar. Cereals constitute the bulk of calories for people in low-income countries; hence a decline in their price variability could increase per capita food consumption (World Food Summit, FAO, 1996; 2001). Part of the reason for the decline of price variability in these commodities is the reduction in protection and subsidies previously offered by industrial countries. High tariffs as well as export subsidies and domestic support measures by industrialized countries have played a major role in distorting trade.

In their paper on measuring the sectoral and economy-wide effects of agricultural incentives in developing countries, Krueger *et al. (1988)*, using partial equilibrium analysis based on data from eighteen (18) developing countries, established that producers of export commodities were more discriminated against and heavily taxed than those who produced import competing goods. In fact Krueger, *et al*. (1988), found that between 1975 and 1984, direct protection rates for primary exports were negative in almost all the surveyed countries. Direct nominal protection here does not take into account the social opportunity cost of a country's exchange rate, a macro-economic price. In many countries official and fixed exchange rates have been applied to conduct trade. Based on direct nominal protection, export producers in the surveyed countries received a lower net producer price than the world export price/ border price after transport, marketing and costs were taken into account. Consequently, the direct intervention by governments in most of the surveyed countries actually taxed and discriminated against export producers. For countries like Argentina, Egypt, Cote d'Ivoire, Malaysia, Sri Lanka and Thailand, their direct nominal protection rates for their primary exports were at least 25 per cent negative.

Besides direct nominal protection, Krueger *et al.* (1988) also measured the indirect macro-economic effects of exchange rate policy on agricultural trade in the countries surveyed. The indirect macro-economic effects on the exchange rate assume the use of the opportunity cost of a country's exchange rate. The results found that between 1975 and 1984, indirect nominal protection rates were higher than direct protection rates in almost all these countries. For countries like Ghana (cocoa) and Zambia (tobacco), the indirect protection rates resulting from overvalued exchange rates were at least 50 per cent negative.

Surprisingly and interestingly when Krueger *et al.* (1988) undertook a similar study on importables, they found that imported products in most of the surveyed countries enjoyed more positive direct protection rates than those domestically produced and yet competing against them. Imported agricultural goods covered in this study included wheat, rice and maize (Krueger, *et al*., 1988, p.263). For instance in Ghana, Malaysia and the Dominican Republic, rice enjoyed a positive direct protection rate while for wheat this was more prominent in Brazil and Turkey, where the protection rate was above 20 percent. For maize, Zambia exhibited a negative direct protection rate while the Philippines provided a positive protection rate for this commodity. When the indirect protection and direct measures were combined during the period 1975 through 1984, in almost all countries importables faced negative protection, as was the case with agricultural exportables (Krueger *et al*., 1988, p.264).

On the basis of studies by Krueger *et al.* as well as similar ones on agricultural pricing policies, several concerns regarding equity, welfare and efficiency, and the like could be raised. It is evident that indirect macro-economic policies, such as the exchange rate, import duties, and the inflation rate, tax agriculture more heavily than direct government interventions. Ironically, farmers/producers tend to be preoccupied with direct public intervention and yet empirical evidence shows that indirect protection policies

are crucial to improving real farm incomes. In short, empirical evidence shows that the "economy wide interventions generally dominate the direct effect" in agriculture more extensively than is normally perceived (Krueger *et al*., 1988, p.266).

Secondly, if exportables are taxed more than importables, as has occurred in many countries over a long period, the effect is that producers of farm exports are penalized and taxed while importers and consumers are subsidized by government intervention price policies. The tendency by governments to protect importables as opposed to exportables has over the years partly discouraged the growth of and investment in the farm export industry, hence the decline, in part, of several economies. This latter policy development has also heavily influenced the implementation of structural adjustment and trade liberalization policies by the World Bank and the International Monetary Fund in order to generate overall economic growth in many developing countries, including those in Sub-Saharan Africa.

Thirdly, government intervention in food price policies has tended to protect imported commodities, while domestic agricultural producers were taxed. The case of wheat, rice and maize in the countries surveyed underscores this finding. Depending on the domestic fiscal and market policies in each country, by and large, the beneficiaries of the positive and direct protection of imported food commodities are traders, millers and consumers. Government policies aimed at domestic food self-sufficiency may normally fail when importables are accorded higher and more positive protection rates than locally produced commodities.

Jean and Matthews (2005) in their analysis of the consequences of agricultural trade liberalization for developing countries observe that whilst most of these nations enjoy comparative advantage in agricultural products, estimates for their welfare gains might be exaggerated. Part of the reason for the potential low gains is, according to the study, due to aggregating developing countries as if they are homogeneous in resource endowment,

etc. Further, the study indicates that estimates for welfare gains by developing countries were based on incomplete tariff data. Most of the developing countries currently export to preferential markets, duty-free or at low tariff rates. As a result models that base their welfare gains for developing countries on tariff reduction could be over-estimating the potential benefits. According to their study, market access for developing countries is constrained more by supply-side measures and non-tariff barriers, especially sanitary and phyto-sanitary (SPS) standards. The strict and costly SPS requirements by the EU and US export markets on agricultural products are a case in point. Further, the removal of trade preferences in markets such as the EU through the Common Agricultural Policy and the US under the African Growth Opportunity Act in compliance with the WTO, will adversely affect African countries as they enjoy zero to low- duty market conditions. In addition, the removal of preferences and other trade distortions could intensify competition between African countries, in particular, with Brazil, India, Australia, and China in agricultural and textiles products. The study therefore cautions against optimistic welfare gains for developing countries.

In a study by the US Congressional Budget Office (2006) on agricultural trade liberalization, the investigation found that overall global welfare would increase by between US $ 50 billion and US $ 185 billion if trade distortions in the sector were reduced or removed. These distortions cover domestic support (producer price and input subsidies for farmers), export subsidies and tariffs including other non-tariff barriers that restrict market access. The removal of the trade-distorting measures will also improve resource allocation and efficiency. Most of the gains are to be derived from tariff reduction and other non-tariff barriers like standards, quotas, licenses, sanitary and phyto-sanitary measures. Trade barriers in agriculture are, higher than those of manufactured goods. The study advocates for agricultural liberalization by both developed and developing countries subject to retaining sensitive/special products for food security and other economic reasons. Whilst the retention of sensitive products is recognized, this could work against developing countries, in particular, if industrialized nations identify products of export interest to the

former, i.e. developing countries, as sensitive/special. If this were to occur, potential agricultural exports from developing countries could be adversely affected. It is therefore critical that a thorough examination be made to determine how a product qualifies to be sensitive whilst taking into account factors such as comparative advantage. The study also supports that developing countries be accorded special and differential treatment (SDT) during agricultural trade liberalization. SDT provisions include a longer period to reduce trade distorting measures as well as accessing technical assistance to improve domestic capacity.

Hodge and Charman (2006) in their analysis of the potential impact of the current WTO agricultural negotiations on government strategies in the SADC region conclude that the Swiss formula unlike the Uruguay approach would impose negative welfare effects on members. The Swiss formula advocates for deep cuts in applied tariffs with a maximum of 25 percent while domestic support is also drastically reduced. It should be borne in mind that for most developing countries tariff revenue is a major source of government budget hence major cuts in tariffs could have major socio-economic adverse effects unless there are compensatory mechanisms. The Uruguay formula is conservative and advocates for a reduction of bound tariffs. According to this study, the Uruguay formula provides SADC countries with a policy space to pursue food security objectives whereas the Swiss formula does not. However, as day-to-day international agricultural trade is based on applied tariffs, it is also doubtful if the Uruguay formula could promote both intra and inter-regional trade if applied tariffs are not changed. In this Chapter, the two formulas are also applied to the Botswana situation. The two formulas form part of the tariff reduction approaches in the ongoing WTO negotiations on agriculture.

Before calculating import volumes, tariff revenue and other data such as consumer and producer surplus for selected agricultural products in Botswana using ATPSM, it is also important to show graphically how consumer and producer surplus as well as government revenue are affected when a tariff is

imposed on an agricultural product in order to achieve several social objectives including food self-sufficiency, protecting domestic producers/industries and raising public revenue (Josling, 1969; Josling and Tangermann, 1988; Goldin and Knudsen, 1990). Figure 4.1 shows how demand and supply are affected following the imposition of an import duty/tariff. The border price or efficiency price is used here as a basis for determining the opportunity cost of the country.

4.3 Border price and Producer and Consumer Surplus/Welfare

A "border price represents the cost to the economy of producing a good and enables the analyst to determine if the country is an efficient producer of that commodity. According to the logic of the border price paradigm, it is a waste of a country's resources to produce a good for which it has little or no cost advantage" (Tsakok, 1990, p.27).

Algebraically, the border price, P_b, is defined as

$P_b = e\ P$

where e represents the exchange rate. The exchange rate reflects the opportunity cost of a unit of foreign currency to the domestic economy. The exchange rate is important especially where the official exchange rate is overvalued. The exchange rate employed to calculate the border price should reflect the real economic cost of the domestic currency. It is important to capture both the direct and indirect rates of protection, including macro-economic prices such as exchange rates (Krueger *et al*., 1988). Economy-wide price interventions such as exchange rate policies have been partly responsible for penalizing the growth of an agricultural-led development strategy (Krueger *et al*., 1988). P stands for the world price in a foreign currency such as the US dollar.

To calculate the border price, P_b, also referred to as the efficiency price/reference price, P_w, it is important to use a long-term trend in order to minimize the effects of short-run price movements. Depending on whether the

traded product is an export or import, adjustments are made for transportation, insurance, marketing margins and the like. For exports, the border price represents the price at the point of export, such as a harbour, less transportation costs from the farm. The resulting border price is also known as the free on board (f.o.b.) price. For imports the border price represents the cost/ world price of the product plus insurance and freight charges. The resulting border price is also known as the cost, insurance and freight (c.i.f.) price.

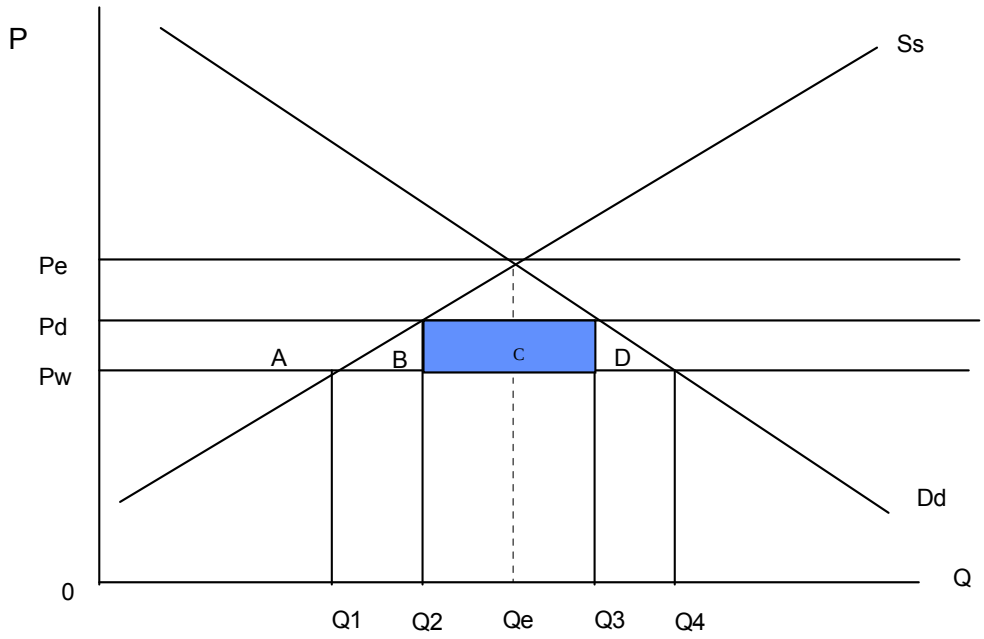

Figure 4.1 An Illustration of the Border Price, P_W in relation to other prices

Here P refers to price and Q to quantity; S_s and D_d, respectively, stand for supply and demand. P_e stands for the equilibrium price while Q_e represents the equilibrium quantity.

In Figure 4.1 the border price, P_b, is the same as the world efficiency price, P_w. The opportunity cost incurred by a country in producing or importing a good is based on this world price or border price. Specifically, this price indicates what the country/society will give up or pay in the event that it produces or imports the good. The country foregoes its scarce resources

(area B in figure 4.1), which could be applied to other uses, by investing/ producing the good. These resources include land, investment capital and technology. In this study it is assumed that Botswana, as a small economy, is a price-taker in the global commodity markets.

When the border price is used as a basis for importing a commodity, the relevant cost, insurance, freight (c.i.f.) costs are included in the pricing policy. However, where a country is an exporter, the border price, P_b or P_w, represents the real economic price of the good in the international market less the relevant costs of transportation, etc. Like those who produce the commodity for domestic consumption in the place of imports, exporters of the good will receive the border price or P_w and are paid in equivalent local currency after adjusting for relevant costs.

In Figure 4.1, the government administers the domestic price, P_d, to encourage local producers to enjoy an advantage over their foreign competitors. This price is intended to protect local producers against foreign competition by means of an import duty, which makes the domestic support price, $P_{d,}$ higher than the world price, P_w. The import duty creates a wedge between the domestic and imported price of the same good. In fact, food self-sufficiency objectives as well as other import substitution strategies normally mean that authorities administer autarky prices so as to provide additional incentives, to local producers, to increase domestic supply. As indicated in Chapter 2, autarky or self-sufficiency prices do not necessarily improve per capita food consumption, especially among poor households.

At the autarky price or protected domestic price, P^d, domestic supply is Q_2 while consumption is Q_3. At the efficiency price/border price, P_w, domestic supply is Q1 while consumption is Q_4. The autarky price favours domestic producers but penalizes consumers as they pay a higher price ($Pd > P_w$) and also consume less ($Q_3 < Q_4$). Studies undertaken in several parts of the world, including Africa, indicate that in most cases a high domestic price or autarky price, P_d, generally benefits only a small number of large-scale farmers who in

most cases are net sellers of agricultural products (Weber, *et al.* 1988; Van Zyl and Van Rooyen, 1991; Sarris, 1997). In figure 4.1, the equilibrium price is P_e while the equilibrium quantity is Q_e. Area C represents government tariff/import revenue.

Consumer surplus covers the area below demand D_d up to the intersection with the price axis, P, but above the world price, P_w. Essentially consumer surplus indicates the advantage or opportunity buyers or consumers would enjoy by purchasing a product at the border/world price, P_w, while some would even be willing to buy at higher prices, including the protected domestic price, P_d. However with the imposition of import duties in order to support local agricultural producers, the consumer surplus/welfare is reduced. The subsequent consumer surplus area is the area below D_d up to the price axis but now above the domestic price, P_d. Consequently, the imposition of an import duty to support local production has reduced the advantage or opportunity that consumers/buyers would otherwise enjoy without government intervention. From the food security perspective, in essence the reduction in the consumer surplus means reducing per capita food consumption, especially among the poor.

In Figure 4.1, producer surplus represents the area above the supply curve, S_s, up to the intersection with the price axis but below the world price/border price, P_w. The area covered by producer surplus indicates the net gain or revenue that domestic producers would enjoy if they sold at world price P_w, with some being willing to sell at even lower prices than the border/world price. Fortunately for the domestic producers owing to government's objective to protect the local industry and sometimes to develop small local farmers, etc., the producer surplus area/net gain is increased to below P_d but is still above S_s. Evidently, the increase in producer surplus implies an increase in net revenue gains/income for domestic producers. However, available evidence shows that the main beneficiaries of a high and protected domestic price are large-scale farmers with resources, technology, access to credit, infrastructure, skills, political power, and so forth. In short, government

support to local producers by imposing import duties leads to adverse equity and food security implications, as poor farmers do not generally have an adequate marketable surplus to benefit from high producer prices.

Differential and unequal access to productive resources, infrastructure, and institutions, including political power, may partly explain the inability of several farming households to benefit from high producer prices. In Botswana most small farmers lack capital, draught power for arable farming, technology and skills (National Development Plan 9, 2003). In addition, like most farmers in developing countries, small farmers in Botswana wield limited political influence. Consequently an agricultural pricing policy that assumes that all farmers are net sellers of food or agricultural commodities and therefore will benefit from high producer prices, such as P_d in Figure 4.1, may largely be empirically flawed and ill-advised. In fact poor households do not benefit from high domestic food prices that are intended to replace imports such as the autarky prices (Weber, *et al.* 1988; Van Zyl & Van Rooyen, 1991; Sarris, 1997).

4.4 Application of a Partial Equilibrium Model to Global Trade Liberalization in the Agricultural Sector

The agricultural sector has continually been one of the more contentious industries in international trade primarily because of its strong political and economic linkages in both developed and developing countries. During the Uruguay Round, the sector was excluded from multilateral trade negotiations owing to its political and economic sensitivity. However, during the multilateral trade negotiations leading to the formation of the current World Trade Organization (WTO), the agricultural sector was included in order to integrate the industry into global commerce.

In order to understand and appreciate the likely effects of global trade liberalization of the agricultural sector on the economies of both industrialized and developing/low-income countries, the United Nations Conference on

Trade and Development (UNCTAD) together with the Food and Agriculture Organization (FAO) developed a partial equilibrium model in the early 1990's, to quantify the effects of reforming the sector. The Agricultural Trade Policy Simulation Model (ASTPSM) was then created to quantify the effects of global trade liberalization. Below is a brief description of the ATPSM.

ATPSM is a deterministic, comparative static, partial equilibrium model. Hence there are no stochastic shocks or other uncertainties, and there is no specific time dimension to the implementation of the policy measures or to the maturing of their economic effects. The comparative static nature of the model does not imply that the policies take effect instantaneously. Rather, one is comparing two states at a similar point in time: one with the policy change, the other without. Finally, whereas the model aims at estimating far-reaching details of the agricultural economy, it does not deal with the repercussions of barrier reductions on other parts of the national economy. Thus, neither effects on the government budget (except for tariff revenues and subsidies to exports and domestic production) nor on the industrial and service parts of the economy or the labour market are the subjects of analysis. Simplifying the model in these respects allows for a detailed specification of policies regarding numerous commodities in a large number of countries.

The Agricultural Trade Policy and Simulation Model (ATPSM) covers about 176 countries and 36 agricultural product groups. All members of the Organization of Economic Cooperation and Development or OECD are included in the ATPSM; the majority of developing countries including those in Sub-Saharan Africa are also covered by the model. In fact ATPSM covers large economies (US, EU, Japan, etc.) as well as several developed, developing and least-developed countries, most of which are price-takers. Except for the EU, which is treated as one economic bloc, all other countries in the model are covered as individual entities.

Further, in ATPSM, agricultural products are classified into 36 commodity groups covering both basic and food commodities such as meat (bovine,

sheep, pork and poultry), dairy products (fresh milk, dried milk, butter and cheese), cereals (wheat, rice, barley, maize and sorghum), sugar, vegetable oils and oil seeds, pulses and roots and tubers. The other products include fruits (tropical and non-tropical), tropical beverages (cocoa, tea and coffee), tobacco and cotton (UNCTAD, 2005). Botswana and SACU's main agricultural products as well as sensitive commodities are included in the ATPSM database. These products are beef, maize, wheat, dairy products and sugar. In addition, for Botswana poultry and sheep and goat meat are considered as sensitive products, given the high level of domestic production as well as of public and private investment. As a developing country, Botswana has encouraged domestic production in these commodities in order to improve food security and generate scarce employment and income opportunities.

Equation system

After a trade policy change, such as a change in tariffs, export subsidies and / or domestic support, is specified the model calculates the new equilibrium. The equation system for all countries contains four equations

1) $$\hat{D}_{ir} = \eta_{i,i,r}\hat{P}_{ci} + \sum_{\substack{j=1 \\ j \neq 1}}^{j} \eta_{i,j,r}\hat{P}_{c,j} \; ;$$

2) $$\hat{S}_{i,r} = \varepsilon_{i,j,r}\hat{P}_{pi} + \sum_{\substack{j=1 \\ j \neq 1}}^{j} \varepsilon_{i,j,r}\hat{P}_{p,j} \; ;$$

3) $$\Delta X_{i,r} = \Delta M_{i,r} - D_{i,r}\hat{D}_{i,r} + S_{i,r}\hat{S}_{i,r} \; ;$$

4) $$\Delta M_{i,r} = \frac{A_{new}}{1 + A_{new}} D_i \hat{D}_{i,r} - \left(\frac{A_{init}}{1 + A_{init}} - \frac{A_{new}}{1 + A_{new}} \right) D_{i,r} \, ,$$

where $A_y = \left(\frac{\alpha_m}{\alpha_d} \left(\frac{P_d}{P_m} \right)_y \right)^{\sigma}_{i,r}$

Source: ATPSM, UNCTAD, 2005

Key: D, S, X and M denote demand, supply, exports and imports, respectively;

^ denotes relative changes and Δ *absolute changes;*

P_c *denotes consumer price,* P_p *producer price,* P_d *price for domestic supply,* P_m *price for imports (see below);*

ε *denotes supply elasticity,* η *denotes demand elasticity;*

I and j are commodities indexes, r is a country index;

y = init indicates initial values and y = new indicates values after the policy changes;

σ *denotes the Armington elasticity between imports and domestically produced goods.*

Equations 1 and 2 specify that the new demand and supply are determined by the price changes and trade policy changes together with the corresponding elasticities and cross-price elasticities. Equation 4 ensures that the relation of imports and domestic supply is determined by the price ratio of domestic supply and imports.

$$\frac{M}{D-M} = \left(\frac{\alpha_m}{\alpha_d}\frac{P_d}{P_m}\right)^{\sigma}$$

Equation 3 clears the market, so that production plus imports equals domestic consumption and exports.

These equations can be transformed into matrix notation and the equation solved arithmetically for world prices by matrix inversion. A market equilibrium requires that, globally, the sum of the change in exports equals the total change in imports for each commodity.

5) $$\sum_{n=1}^{N}\left(\Delta X_n - \Delta M_n\right) = 0;$$

Prices

Domestic prices are all functions of the world market price (see figure 4.1) and the border protection or special domestic support measures. Thus, domestic price data is not required and transaction costs (such as wholesale and retail

margins) are not taken into account. All protection measures are expressed in tariff equivalents.

The relationship between world and domestic prices is complicated by the existence of two-way trade in the one (aggregated) good. In order to accommodate heterogeneous goods with one price, the approach taken here is to estimate a composite price and a composite tariff for determining the domestic consumption and production price, respectively. To derive a composite price, products are divided into three groups: imports; exports; and production supplied to the domestic market (S_d).

First, a domestic market price wedge (t_d) is computed as the weighted average of two tariffs, the export tariff (t_x) and import tariff (t_m), where the weights are exports (X) and imports (M):
$t_d = (Xt_x + Mt_m)/(M + X)$.

The price for domestic supply is $P_d = P_w(1+t_d)$, where P_w is the world price, and the price for imports is $P_m = P_w(1+t_m)$. Then, a composite consumer price is computed as $P_c = \left(\alpha_m^{\sigma} P_m^{1-\sigma} + \alpha_d^{\sigma} P_d^{1-\sigma}\right)^{1-1/p}$. The producer price wedge is computed as the weighted average of the export tariff (t_x) and the domestic market price wedge (t_d), where the weights are exports (X) and domestic supply (S_d) plus the domestic support tariff (t_p): $t_s = (Xt_x + S_d t_d)/S + t_p$. The producer price is $P_s = P_w(1+t_s)$. The calculations of consumer and producer prices are applied both to the baseline and the final tariffs.

A feature of this structure is that if there are no exports, domestic producer prices are determined by the tariff plus the domestic support. If there are no imports the export subsidy effectively determines the producer price. Finally, if two-way trade exists, the share of total production or consumption of the specific good influences the importance of each tariff.

The heterogeneous nature of imports and exports also requires a means of specifying the volume of either imports or exports. In this model imports are specified so that the relationship of imports and domestic supply is determined by the price ratio of domestic supply and imports (equation 4). In essence, this means that imports are not perfect substitutes for domestic products. This product differentiation between domestically produced and imported goods is known as Armington specification. Further, exports are determined as the residual of production, consumption and imports. Elasticities of demand and supply are based on data from the Food Agriculture Organization.

Trade revenue

Once changes in world prices and hence domestic prices are determined from the model solution, volume changes can be derived from equations 1-4. Given the volume responses ΔX , ΔM , ΔS , and ΔD , the trade revenue and welfare effects can be computed. The trade revenue effect of the policy changes is computed for each country and each commodity from:

$$\Delta R_1 = \left(P_w + \Delta P_w\right)\left[\left(X + \Delta X\right) - \left(M + \Delta M\right)\right] - P_w\left(X - M\right)$$

Secondly, there is a change in quota rents, ΔU , which generates a further trade revenue effect (in each country and each commodity):

$$\Delta R_2 = \left(U + \Delta U\right)\left[X + \Delta X\right] - UX \ .$$

The total trade revenue effect is the sum of these components: $\Delta R = \Delta R_1 + \Delta R_2$.

Welfare

The welfare change contains three components. The first two constitute changes in producer surplus $\left(\Delta PS\right)$ and consumer surplus (ΔCS). These

changes depend on the domestic market price changes and the own-price domestic demand and supply volume responses to these changes. The change in producer surplus is also dependent on the change in quota rent. For each country and commodity:

$$\Delta PS = \Delta P_p\left[S + 0.5(\Delta S_d)\right] + \Delta R_2\ ;\ \Delta CS = -\Delta P_c\left[D + 0.5(\Delta D_d)\right];$$

The third component is the change in net government revenue (ΔNGR), consisting of the change in tariff revenue, that in export subsidy expenditure and that in domestic support expenditure. For each country and commodity:

$$\Delta NGR = \Delta TR - \Delta ES - \Delta DS$$

$$= \underbrace{(t_w + \Delta t_w)(Q + \Delta Q) - t_w Q}_{Change-in-within-quota-revenue} + \underbrace{(t_o + \Delta t_o)\left[(M + \Delta M) - (Q + \Delta Q)\right] - t_o(M - Q)}_{Change-in-out-of-quota-revenue}$$

$$- \underbrace{\left[(t_x + \Delta t_x)(X + \Delta X) - t_x X\right]}_{Change-in-export-subsidy-expenditure} - \underbrace{\left[(t_d + \Delta t_d)(S + \Delta S) - t_d S\right]}_{Change-in-domestic-support-expenditure}$$

The sum is the total welfare effect: $\Delta W = \Delta PS + \Delta CS + \Delta NGR$

4.5 ATPSM formulas applied to Liberalize Global Agricultural Trade

Currently, four scenarios/formulas are under consideration by WTO in order to liberalize global agricultural trade. These scenarios were submitted to the WTO Ministerial meeting in Hong Kong, in 2005 but members failed to agree on them. All the formulas/scenarios include a reduction in bound/applied tariff, domestic farm support and export subsidy. Below we describe briefly the elements of each scenario before the ATPSM results are presented and analyzed.

Uruguay

Developed countries are to reduce their bound tariffs in agriculture by 36 percent over six years while export subsidy and domestic support are reduced by 21 and 20 percent respectively over the same period.

Developing countries are to reduce their bound tariffs in agriculture by 24 percent over 10 years while export subsidy and domestic support are reduced by 14 and 13 percent respectively over the same period.

Swiss Formula

By means of the Swiss formula, also known as the ambitious tariff reduction formula, developed countries should have 25 percent as their maximum applied tariff while export subsidy and domestic support are reduced by 100 percent and 95 percent respectively over five years.

Developing countries on the other hand should have 50 percent as their maximum applied tariff while export subsidy and domestic support are to be reduced as in developed countries, i.e., by 100 and 95 percent respectively over the same period. In essence, regarding the differing maximum applied tariff rates between developed and developing countries, the Swiss formula treats the two groups of countries in respect of cuts in export and domestic subsidies as the same.

Cancun/Blended Formula (Derbez)

Under the Cancun/Blended formula, developed countries are to reduce their export subsidy by 80 percent while domestic support is reduced by 60 percent, subject to a maximum of 25 percent of the applied tariff. Forty percent of the tariff lines are subjected to the Uruguay formula while another 40 percent is subject to the Swiss formula. This allows developed countries to include sensitive products under the conservative Uruguay formula while less sensitive products are covered under the radical Swiss formula. Agricultural products of interest as exports to developing countries are likely to face limited market access if developed countries classify them as sensitive imports. The remaining 20 percent of the tariff lines are to be reduced to zero. The Cancun formula is described as blended because it includes components of both the Swiss Formula and the Uruguay approach. Sensitive agricultural products are also

factored in (Special Products). For developed countries sensitive products include sugar, dairy, beef meat and some cereals.

Insofar as developing countries are concerned, they are to reduce the export subsidy by 70 percent while domestic support is cut by 20 percent, subject to a maximum of 50 percent of the applied tariff. As with developed countries, 40 percent of the tariff lines are to be covered by the Uruguay formula while another 40 percent of the tariff lines are subjected to the Swiss formula. About 10 percent of the tariff lines of the most cover sensitive tariff lines are to be reduced by five percent (special products). The remaining 10 percent of tariff lines are to be reduced by five percent. Sensitive agricultural products are also factored into special products. For Botswana, sensitive products include beef, wheat, maize, sugar and dairy products. Other developing countries might include fruits, vegetables, oil seeds, etc. The list of sensitive products remains a point of contention for both the exporting and the importing developing countries.

Harbinson Formula

Developed countries are to reduce export subsidy by 80 percent while domestic support is reduced by 60 percent. Tariff reductions are arranged according to bands. Only bound tariffs are to be reduced.

Developing countries are required to reduce export subsidy by 70 percent while domestic support is reduced by 20 percent. As in developed countries, tariff reductions are arranged according to bands. Only bound tariffs are to be reduced.

Before examining the results of the various scenarios, it should be noted that the application of each formula triggers simultaneous changes in each commodity group by country/region, according to those equations of the model which have been indicated earlier under the description of the ATPSM. As part of the WTO provisions, least developed countries do not make reduction commitments.

Country and Product Coverage in ATPSM

The current ATPSM covers 176 countries in terms of which the European Union is treated as one region, while most of the developing countries including Sub-Saharan Africa are also encompassed in the model (ATPSM, UNCTAD, 2005). All members of the industrialized Organization of Economic Cooperation and Development (OECD) together with key trade players like the EU, USA and Japan are included in the current ATPSM.

Regarding product coverage, ATPSM covers 36 agricultural commodity groups. These are classified as:

- Meat (beef, pork, sheep/goat and poultry products)
- Dairy (fresh, concentrated/powdered, butter, cheese)
- Cereals (wheat, maize, rice, barley and sorghum)
- Vegetables and fruits (tomatoes, tubers, roots, fruits, etc)
- Sugar
- Oilseeds (pulses, cotton lint, vegetable oils, etc)
- Others (coffee, cocoa, chocolate, tobacco, tea, cigarettes, etc.).

Botswana's main traded agricultural products, including those from SACU, are included in the model.

4.6 ATPSM Results on Agricultural Trade Liberalization in Botswana.

The results of the various scenarios cover changes in agricultural exports, imports, government revenue, producer and consumer welfare as well as in overall welfare after global trade liberalization. While all WTO members, except for least-developed countries, are expected to make reduction commitments in tariffs, export subsidy and domestic support, the developed countries, in particular, are required to undertake more cuts so as to improve market access to agricultural exports of interest to both developing and least-developed countries. Commitments to further reductions by developed countries are consistent with the WTO's Doha Development Agenda (WTO, 2001).

The results of four scenarios for Botswana are examined below.

4.6.1 The effects of global agricultural trade liberalization on Botswana's agricultural export earnings.

ATPSM has been used to assess the impact of proposed tariff reduction formulas on the agricultural export revenue of WTO members. Figure 4.2 below shows the results for Botswana by formula. Figure 4.2 shows a change in agricultural export revenue brought about by each scenario/tariff reduction formula. The results show that the Swiss formula, also known as the Ambitious Scenario, provides Botswana with the largest additional gain in total agricultural export revenue **(US $ 7.1 million).**

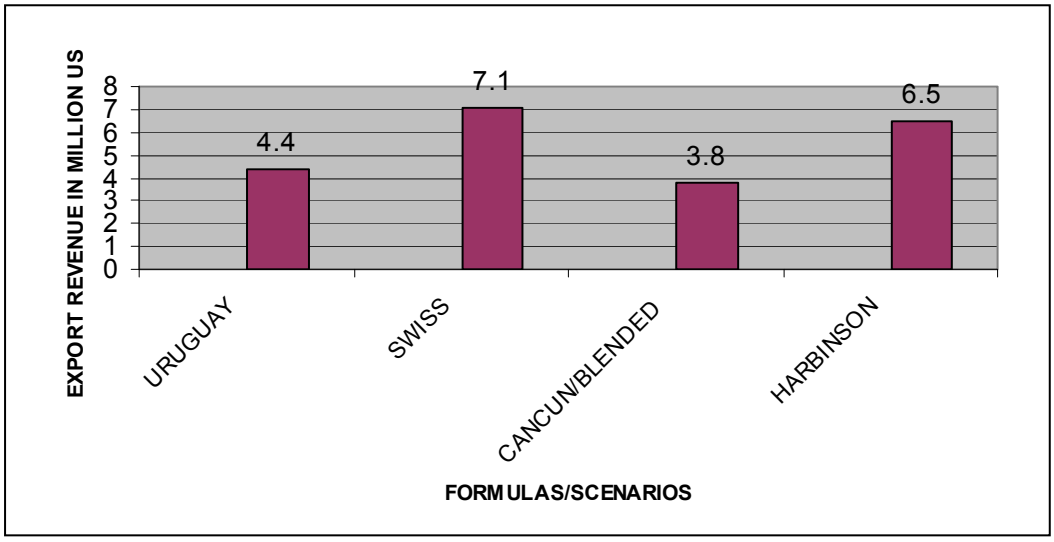

Figure 4.2: Change in Agricultural Export Revenue by Formula in Million US Dollars

The Swiss formula argues for major cuts in applied tariffs, total elimination of export subsidy and to some extent of domestic support in both developed and developing countries. Beef generates almost all the additional agricultural export revenue. This possibly indicates the global competitiveness of the industry after trade-distorting measures such as tariffs and subsidies are reduced. The relatively high competitiveness of beef following global trade liberalization is an indication that the industry enjoys a comparative advantage, which is consistent with the HOS model described in Chapter 3.

The Harbinson formula, a compromise between the Uruguay and Swiss Formula, comes second by providing Botswana with about **US $ 6.5 million** additional agricultural export revenue. As in the Swiss formula, beef generates almost all the additional agricultural export revenue. This also indicates the global competitiveness of the industry after trade-distorting measures like subsidies are reduced.

The Uruguay formula, also known as the conservative scenario, comes third and generates about **US $ 4.4 million** additional agricultural export revenue for Botswana. The Uruguay formula is considered as less liberal, especially for agricultural exports from developing countries, since bound tariffs, export subsidy and domestic support do not experience major cuts as is the case with both the Swiss and the Harbinson formulas. As in the other two previous scenarios almost all additional agricultural export revenue under the Uruguay formula stems from beef.

Finally, the Cancun/Blended Formula generates the lowest additional agricultural export revenue for Botswana (**US $ 3.8 million)**. Part of the reason for this lower additional export revenue could be that the Cancun/Blended Formula has factored in sensitive products such as beef, which developed countries could include under the conservative Uruguay component for protection. Almost all additional agricultural export revenue, as in other scenarios, is from beef. As indicated in Chapters 1 and 2, Botswana is semi-arid and mainly suitable for extensive beef production.

4.6.2 The effects of global trade liberalization on Botswana's agricultural import Cost by Formula

As in the case of agricultural export revenue, ATPSM also calculates the potential change in agricultural import cost by country. Figure 4.3 illustrates the change in agricultural imports by scenario in Botswana. The results indicate that under the Swiss formula, Botswana allows the largest inflow of imports (**US $**

3.7 million), followed by the Harbinson approach (**US $ 3.5 million**). The Uruguay and the Cancun/Blended formulas provide Botswana with equal inflows of imports (**US $ 2.3 million**). The Swiss formula, because of its major cuts in applied tariffs and subsidies, opens up markets more than any other formula. Products that experience the largest import flows are concentrated milk, livestock, cereals (maize, wheat), butter, tea, and tobacco. Cereals constitute the main sources of calories and to meet household requirements in these commodities, Botswana depends on imports (see food balance sheets in Chapter 1). Livestock imports here cover live animals which are mainly used for breeding purposes. Unfavourable climatic and physical factors are mainly responsible for the high dependency on imports. Botswana's food security also depends on accessing competitive imports to meet domestic consumption.

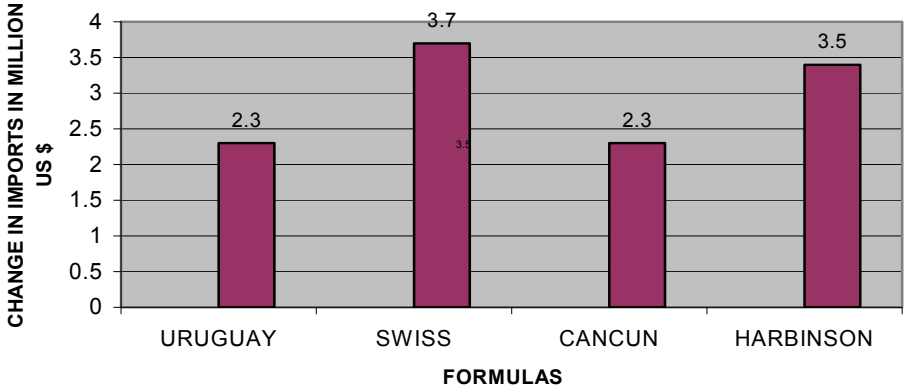

Figure 4.3: The effects of international trade liberalization on Botswana's agricultural imports by tariff reduction formula (Million US Dollars)

In addition to cereal and dairy imports, all scenarios also indicate an increase in beef imports. Currently, Botswana is self-sufficient in beef and has also been an exporter of the same product for several generations. A food security challenge or dilemma for several decision makers and other relevant stakeholders in the country is whether beef imports should be allowed to improve per capita protein consumption especially among poor households and children or maintain the status quo? Evidently, this could pose major political and economic challenges. Livestock/cattle farmers and export meat-processing plants (like BMC) that depend on income from sales will strongly

resist any liberalization of the beef market as this could adversely affect their economic rents. Cattle farmers include very powerful political individuals or households. Workers who also depend on labour income from the cattle and meat processing industry could join these political heavyweights to resist the liberalization of the beef market. It is therefore evident that the liberalization of the beef industry in Botswana to foreign competition could pose serious political and economic problems, hence the need to exercise extreme caution in order to minimize unforeseen high social costs.

Further, beef liberalization might also be associated with the importation of mad cow disease, a threat that would negatively affect the export-led industry. Unless effective domestic and SACU-wide safeguard mechanisms are implemented, dumping and importation of subsidized beef/meat could also pose additional threats to Botswana's beef sector. Industrialized countries, especially the EU and US, still provide export subsidies to commodities like beef, which if imported into Botswana in large quantities could threaten the domestic industry and adversely affect household food security (Ingco and Nash, 2004). Chapter 6 will therefore also examine the linkages between the cattle industry and the rest of the economy.

On the other hand for poor households and children who face protein food insecurity, the liberalization of the beef industry could increase per capita protein consumption. Protein malnutrition owing to poverty has continued to be one of the main household food insecurity concerns facing Botswana for many years, even though the country is self-sufficient in beef (NDP 9, 2003). Further, the importation of beef could encourage increased domestic meat processing so as to meet local and export market demand. Currently, this segment of the market is curtailed by relatively high domestic beef prices owing mainly to protection by means of tariffs, disease controls and the export monopoly enjoyed by BMC (see Chapter 2).

Welfare Changes

Besides indicating the effects on agricultural exports and imports, the four proposed WTO tariff reduction formulas/scenarios also assess the impacts on producers and consumers' welfare as well as on government tariff revenue. In most developing countries, the agricultural sector is one of the largest employers in the economy while many households/consumers also spend a disproportionate share of their income on food.

Further, many developing countries depend on import tariff revenue in order to finance their government's recurrent and development budgets. In Botswana, about **15-20 percent** of total government revenue is derived from customs/tariff earnings. Agricultural tariff revenue accounts for about **3-5 percent** of the total tariff/customs revenue. Total welfare here is the sum of producers/surplus, consumers' welfare and government revenue. The results in change of welfare by formula are indicated in Figure 4.4 below.

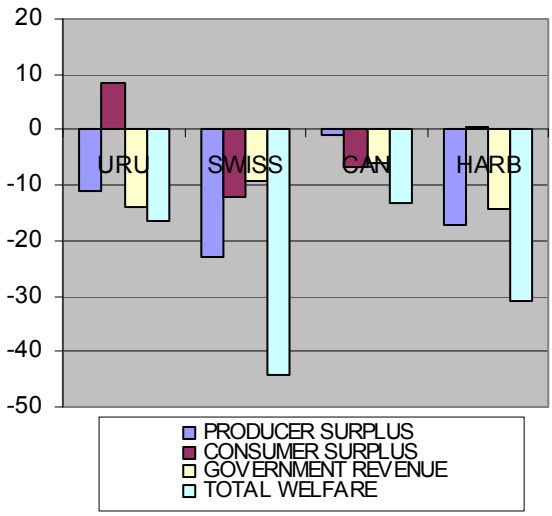

Figure 4.4: The effects of global trade liberalization on welfare in Botswana by tariff reduction formula in Million US Dollars

Based on the welfare results generated by the proposed WTO tariff reduction formulas, we arrive at the following findings covering producer and consumer welfare as well as government revenue.

Change in Producer Surplus in Botswana

Producer surplus or welfare is adversely affected by all formulas. The loss in welfare ranges from a modest negative (-) US $ 0.8 million under the Cancun/Blended Formula to about - US$ 22.8 million under the Swiss formula. As indicated earlier, the Swiss formula makes major cuts in applied tariffs, as well as in export subsidy and domestic support, in both developed and developing countries. Producers, including those in Botswana, benefit from the domestic price support provided in industrialized countries, in particular to protect farmers. For instance, beef farmers in Botswana benefit from the producer price subsidies extended to farmers by the EU under the Common Agricultural Policy/CAP. As the Cancun/Blended Formula applies both Uruguay and Swiss components to many tariff lines, it is not surprising that its effect on producers' welfare is less dramatic compared to that of other scenarios.

The effects of the Uruguay and Harbinson formulas are in between those of the Swiss and Cancun scenarios but the loss to producers is still very high. While under the Uruguay approach producers lose about US $ 11 million worth of income, in the Harbinson scenario producers are US $ 17 million worse off. Among the major losers are producers in the beef, livestock and sorghum enterprises, but producers of sheep meat, poultry, pork, sugar refiners, pulses and vegetable oils, maize and cotton stand to gain. Beef and livestock producers are adversely affected by major cuts in the current CAP under the EU, in compliance with the WTO provisions under the Agreement on Agriculture (WTO, 1995). The WTO Agreement on Agriculture requires members to reduce trade-distorting measures such as direct producer subsidies in prices and inputs, in order to promote global trade based largely on the comparative advantage/HOS model. Major cuts in CAP support programmes strongly influence Botswana's producer prices as most bovine meat is sold there in the EU.

Potential gains by producers of sheep meat, poultry, pork, sugar refiners, pulses and vegetable oils, maize and cotton could also open up investment

opportunities for some more viable agricultural diversification. The development of sustainable alternative agricultural enterprises following global trade liberalization could also enhance household food security by expanding income and employment opportunities in order to reduce poverty. In essence, additional gains by producers of sheep and pork meat, maize, oil seeds, pulses, etc. imply that global trade liberalization improves the comparative advantage of Botswana in these products, because direct trade-distorting measures are reduced or removed.

Change in Consumer Surplus/ Welfare in Botswana

Figure 4.4 illustrates the change in consumer welfare in Botswana following global trade liberalization in the agricultural sector. Except under the Uruguay and Harbinson's formulas, consumers' surplus/welfare is adversely affected by the Swiss and Cancun/Blended formulas. While in terms of the Uruguay scenario consumers gain about US$ 8.5 million and a modest US $ 0.5 million under the Harbinson approach, in terms of the Swiss and Cancun formulas the welfare of consumers of agricultural products in Botswana is negatively affected.

If the Swiss formula is applied, consumers lose about US $ 12 million while in terms of the Cancun/Blended formula consumers experience a US $ 6.7 million loss in their welfare. The Swiss formula makes major cuts in export and domestic subsidies that in turn increase the price to consumers by reducing supply. In fact the aggregate/world supply curve shifts to the left, owing to the reduction of producer subsidies by major trade players, especially the EU, US and Japan. Unlike the radical Swiss scenario, the Uruguay formula is very conservative in reducing domestic support and helps to maintain relatively high world agricultural production as well as surpluses. As the Cancun/Blended formula contains both Uruguay and Swiss features, the scenario causes less welfare loss for consumers than the Swiss formula. The Harbinson scenario, as indicated earlier, is a compromise between the Swiss and Uruguay formulas, and the modest gain by consumers should not necessarily be surprising.

Among the main beneficiaries are consumers of tobacco, coffee and to some extent sorghum, while buyers of beef and livestock also benefit. However, consumers of dairy products, wheat, maize, rice, sheep, poultry and pig meat as well as of sugar and vegetable oils are the main losers when global trade has been liberalized. Currently in Botswana, while households at a national level on average spend about 24 percent of their disposable income on food, low-income households earning below P 1 500 per month[3] spend on average about 36 percent of their disposable income on food, which is dominated by cereals, meat, dairy, vegetables and pulses (HIES 2002/03, CSO, 2004). Except for meat, almost all these other food commodities are imported. Improvement in consumer welfare is clearly an important part of food security, especially in a food deficit country like Botswana. Given the likely high cost of imported food commodities after global trade is liberalized, food deficit countries like Botswana might require temporary food assistance in order to minimize household hardships, especially among the poor. The successful implementation of the WTO provision for Net-Food Importing Countries is critical for Botswana. It is hoped that when operational, the provision could offer food deficit countries with additional food aid/financial assistance so as to enable them to adjust to short-term price shocks to consumers. The implementation of this provision will also complement WTO's provision of special differential treatment (SDT) for developing countries. SDT provisions include provision of technical assistance in order to enable developing countries to be fully integrated into world economy and trade.

Change in Government Revenue

Under all scenarios/formulas, government tariff revenue in Botswana is adversely affected. Reducing tariffs on agricultural imports exerts negative effects on Botswana's government revenue. While the contribution of agricultural tariff revenue to total public revenues is relatively small, development challenges such as poverty, unemployment and HIV/AIDS require

[3] 1 Pula is about US $ 0.18

additional resources. Currently, tariff revenue accounts for about 12 percent of the total budget in Botswana, while customs duties from agricultural products alone account for just fewer than 2 percent of the country's total public revenues (NDP 9, 2003). Consequently, the reduction in agricultural tariffs may not adversely affect the budget, because currently diamonds and other service sectors contribute significantly to government revenue. As tariff revenue, in general, is likely to be adversely affected by global and regional trade liberalization, the government of Botswana has already introduced a value added tax (VAT) to diversify its revenue sources.

The loss of government revenue ranges from about US $ 5.8 million under the Cancun/Blended formula, US $ 9.4 million in the Swiss Formula, and US $ 13.8 million in terms of the Uruguay scenario, to about US $ 14.3 million if the Harbinson approach is employed.

Change in Total Welfare in Botswana

In all scenarios, total welfare is negative. Total welfare is the sum of the change in producers' surplus, consumers' surplus and government revenue. Figure 4.4 above shows changes in total welfare by formula

The Swiss formula, as one might expect, accounts for the largest loss in total welfare because of its major cuts in tariffs, export subsidy and domestic support. In terms of the Swiss formula, total welfare declines by US $ 44.2 million, followed by the Harbinson approach where total welfare declines by about US $ 31 million. If the Cancun/Blended formula is applied, Botswana witnesses the lowest decline in total welfare. Under this formula, the country loses about US $ 13.3 million worth of total welfare while the Uruguay formula records a total welfare loss of about US $ 16.4 million.

Overall it would appear that the Cancun/blended formula, if applied to Botswana, leads to a smaller loss in total welfare than other formulas/scenarios.

4.7 Summary: Advantages and Disadvantages of the Partial Equilibrium Approach in Agricultural Trade Liberalization/Policy

Partial equilibrium analysis provides certain key advantages in order to understand agricultural trade liberalization or policy changes. At a sectoral/commodity level, the approach can help to identify constraints and practicable solutions, utilizing minimum cost and data requirements, unlike economy-wide models.

The determination of consumer and producer welfare, government and export revenue, and other statistics using ATPSM has partly made it possible to make comparisons about the likely effects of the various tariff reduction formulas on each country by product. The results from the partial equilibrium analysis assist one to design policies in order to safeguard vulnerable groups (producers and consumers) and sensitive industries/commodities, as well as to put in place measures to minimize adverse effects on government and export revenues. In negotiating for SDT provisions, based on ATPSM results Botswana can collaborate with other similarly affected countries, in order to request for additional financial and technical assistance to protect her small economy for a longer time before fully integrating it into the global economy.

Further, through partial equilibrium analysis or ATPSM, a country can assess the effects of tariff changes at both commodity and sectoral levels. These effects cannot be captured by economy-wide models/general equilibrium approaches. The response by producers to price incentives and other farm inputs, for instance, can be accurately analyzed by using partial equilibrium analysis. Partial equilibrium analysis is less data and skill-intensive than economy-wide models. Data and skills are generally scarce among low-income countries such as Botswana. The reduced demand for advanced analytical skills and detailed data in partial equilibrium analysis could in the medium term save limited resources whose opportunity cost in low-income countries is high.

As will become apparent in subsequent chapters, partial equilibrium analysis has certain disadvantages. Firstly, the approach assumes that the sector under consideration exhibits limited linkages with the rest of the economy. For many low-income countries agriculture is one of the main sectors. In Botswana, the farming sector (despite its low share in the country's GDP), through the circular flow of income and expenditure linkages in the economy, demonstrate strong links with the household, food, non-food manufacturing, transport, finance and external trade sectors (see Chapters 6 and 7).

Secondly, as indicated in Chapter 3, international trade can increase farm incomes of those exporting while those in the non-exporting sector may experience lower per capita income. It is not possible through the application of partial equilibrium analysis to assess the impact of international trade liberalization on income distribution and welfare. For instance, the ATPSM results do not indicate which groups of producers (large-scale or net buyers of food) and consumers (low-income versus high-income) benefit when tariffs regarding the selected agricultural products in Botswana are reduced.

In summary, this chapter has described the utilization of partial equilibrium analysis in agricultural trade liberalization and the application of the ATSPM to Botswana's agricultural sector, as well as indicating the welfare implications of the WTO tariff reduction proposals for the country. Whereas the Swiss formula provided Botswana with the largest potential export revenue and import flows, the formula also lead to the highest loss in total welfare. The Cancun/blended approach, on the other hand, provided the country with the least agricultural export revenue, import flows and loss of total welfare. The Harbinson and the Uruguay formulas gave results that were in between the Swiss and the Cancun approaches. Cautiously and recognizing the development challenges facing Botswana, the Cancun/blended formula appears relevant for the country as it covers sensitive industries that employ many people. The chapter has also examined the advantages and disadvantages of using partial equilibrium analysis in trade liberalization as well as for determining policy in general. Subsequent chapters will deal with

economy-wide policy effects, as opposed to those considered in the partial equilibrium approach.

CHAPTER 5

SOCIAL ACCOUNTING MATRIX THEORY (SAM)

5.1 Introduction

Chapter 4 described the use of a partial equilibrium framework in policy analysis. It was, however, observed that this analysis is only applicable at sectoral and commodity levels and therefore does not provide a complete picture of the economy-wide effects following policy changes. Similarly, the partial equilibrium approach overlooks sectoral linkages and income and expenditure relations that are normally found in an economy. To complement the partial equilibrium framework, this chapter describes the theory of a Social Accounting Matrix (SAM) that does capture the linkages and income and expenditure relationships in an economy.

Further, this chapter describes the SAM income and price multipliers and the steps used to derive them. The SAM multipliers will be used to measure the economy-wide effects of trade liberalization and market access on household food security/welfare and the competitiveness of the agricultural sector in Botswana in Chapters 7 and 8. The present chapter also provides empirical evidence concerning the use of economy-wide or SAM-based policy models in international trade liberalization. The merits and demerits of economy-wide approaches are also covered.

5.2 A description of a SAM

A social accounting matrix (SAM) constitutes a “circular flow of income around the familiar macro-economic loop of demands on activities, leading to demands for factors, hence to the incomes of institutions, and from there back to demands on activities” (Pyatt and Round, 1985, p.9). As the current study is, *inter alia*, interested in food security including the welfare of consumers, a

SAM-based analysis also enables one to measure the effects of international trade liberalization on household income by socio-economic group, factor, sector/production activity, etc. In fact, SAM as a technique illustrates that the distribution of employment and income opportunities and hence a society's living standard is "inextricably interwoven with the structure of production and the distribution of resources" (Pyatt and Round, 1985, p.2).

A social accounting matrix is primarily concerned with the organization of information about the economic as well as the social structure of a country in a particular year. The provision of this statistical base also enables a country to develop economic models through which policy analysis and decisions can be made. A schematic illustration of a basic SAM is presented in Figure 5.1. A SAM is a square matrix with rows and columns. Rows represent income/receipts while columns cater for expenditure/payments.

Besides analyzing the interrelationships/interdependence of various accounts as indicated in Figure 5.1, a SAM views the aggregate economy as a complex interaction of interdependent activities, since outputs of one activity form part of the raw materials/inputs of the other (Pyatt and Round, 1985). In the matrix the rows are aggregated according to commodity, activity, factor, household, institution and government, capital and the rest of the world receipts or incomes while along the columns expenditures of the same accounts are represented.

Total income from each account, say commodities or factors, must equal total expenditure for the same account. Specifically, row totals for each account must equal the column totals of that account. There are six main accounts in the SAM. These are activities, commodities, factors, institutions, capital and the rest of the world. Government, as distinct from an administrative activity, can be separated from institutions and be made an account on its own in conformity with macro-economic theory. In this scenario, government spends on its current and capital accounts and also receives tax revenues and

transfers abroad. Figure 5.1 below illustrates the structure of a SAM covering the accounts indicated above.

	Expeditures									
Incomes	1	2	3		4			5	6	7
			Factors		Institutions			Capital	Rest of	
	Activities	Commodities	Labour	Capital	Households	Firms	Government	Account	World	Total
1 Activities		Domestic sales					Export Subsidies		Exports	Production
2 Commodities	Intermediate demand				Households consumption		Government consumption	Investment		Domestic Demand
3 Factors										
labour	wages								Factor incomes from abroad	Gross national product at factor cost
4 Institutions										
Households			Labour income	Distributed profits	Intrahousehold transfers	Transfers	Transfers		Transfers	Households income
Firms				Nondistributed profits	Transfers		Transfers		from	Firms income
Government	Value-added taxes	Tariffs ind.taxes	Taxes Social sec.	Taxes on profits	Direct taxes	Taxes			abroad	Government income
5Capital account					Households savings	Firms savings	Government savings		Capital transfers	Total savings
6Rest of World		Imports	factor payments			Current transfers abroad				Imports
7 Total	Production	Domestic supply	Factor outlay		Households expeditures	Firms expeditures	Government expeditures	Total investment	Foreign Exchange earnings	

Source: Sadoulet and de Janvry, 1995, p.275

Figure 5.1: The Structure of a Social Accounting Matrix (SAM)

Figure 5.1, under activities (across row 1), illustrates that receipts or income are gained from sales on the domestic market, exports and government subsidies, the row total gives the aggregate value of production. Activity expenditure (column 1) covers the purchase of intermediate inputs, payment of factors (land, capital, labour, etc) and remitting taxes to government. The column total for activities represents as aggregate expenditure.

On the commodity account (maize, wheat, beef, milk, fruits, vegetables, sugar, diamonds, etc), receipts or income are gained from the domestic market through the purchase of intermediate raw materials by activities, consumption by households and government and as investment goods of the capital account. The purchase of commodities by activities to make finished goods, etc is also known as the use or absorption matrix. The row total for the commodity account accounts for domestic demand. On expenditure, the commodity account shows purchases of domestically produced goods by

activities and payment of indirect taxes, including import duties, by government, excluding public subsidies on commodities. Payments made by the commodity account for goods domestically produced by activities are also known as the make matrix. The column total for commodities represents domestic supply. Both the use/absorption and make matrices are central to the conventional Leontief input-output tables or inter-industry interactions. Input and output tables are made up of commodity and activity accounts only (Sadoulet and de Janvry, 1995, p.285). As a result, the income and expenditure relations in the economy with institutions, government and international transactions are not captured in input and output accounts/tables. In order to capture the full impact of external policy impact on the economy as illustrated in Figure 5.1, income and expenditure flows between institutions such as households, government and the rest of the world, are included in the conventional input-output accounts (Francois and Reinert, 1997, p.96). Infact input-output tables or accounts are a subset of a SAM.

Insofar as the factor account is concerned, receipts (across row 3) are derived from the activity account as payment of their services (wages, rent, etc), as well as from remittances from abroad. The row total for the factor account forms the country's gross national product at factor cost. Factor revenue is distributed to households as labour income, while profits after government tax are retained by firms/companies. Total expenditure by the factor account is classified as factor outlay.

Households as institutions receive income (row 4) by factors, transfers from other households, government, other firms, and from abroad as remittances. Expenditure by households (column 4) includes current consumption, income taxes and savings. Firms, as part of institutions, obtain their income from profits and transfers, and spend the income on paying taxes as well as transfers. As with households, residual savings by firms contribute to the country's capital account. Government receives income from taxes and also current transfers from abroad, as foreign assistance.

On the capital account, receipts or income are derived from savings by institutions such as households, firms and government, as well as transfers from abroad. Income from the capital account is spent as the country's total investment.

For an open economy, transactions take place with other parts of the world. Payments by the rest of the world for the country's exports, such as diamonds and beef, constitute imports for the rest of the world. Furthermore, foreign exchange earnings are obtained by means of factor income from abroad and transfer from abroad, including capital transfers. In turn, the rest of the world pays for imports and for factors abroad, as well as for other transfers abroad. The column total for the rest of the world's transactions accounts for the country's imports foreign exchange earnings.

Each of the accounts in Figure 5.1 can be disaggregated into sub-accounts. Further, when the SAM multiplier analysis is to be undertaken, it is necessary to determine which accounts are endogenous and which are exogenous. This study will use both SAM income and price multiplier analysis to assess the effects of international trade liberalization on food security and competitiveness of the agricultural sector in Botswana. Endogenous accounts comprise those that can be influenced within the system or those whose level of expenditure is directly influenced by changes in income, while exogenous accounts constitute those whose expenditures are independent of the changes in income (Sadoulet and de Janvry, 1995, p.288). The standard practice is normally to treat government, capital and the rest of the world accounts as exogenous accounts. This classification will be followed when analyzing Botswana's SAM in Chapter 7.

5.3 Justification for using a SAM-Multiplier Analysis

As indicated in Chapter 1, this study will mainly apply the Social Accounting Matrix (SAM) multiplier analysis, in order to understand the sector- and economy-wide effects of international trade liberalization on food security and

competitiveness of agriculture in Botswana. The SAM multiplier analysis has been chosen over the conventional Leontief Input-Output model because of its special features, which the latter does not indicate. In particular, the Input-Output model, although a general equilibrium model, only examines the relationships between the production accounts, while other accounts like factors of production, institutions, capital and the rest of the world are not fully captured (Pyatt and Round, 1985, p.33).

Further, the Input-Output models analyze inter-industry flows or interactions, but the interdependence of or interrelationships among various accounts, as well as interactions within accounts or sub-sectors, are not captured by the Input-Output models (see Figure 5.1). Leontief Input-Output models basically examine the amount of one sector's output that is required for the production of output in another sector (Sadoulet and de Janvry, 1995, p.285). Unlike Input-Output models, the SAM comprehensively covers the interrelationships between and among accounts. Chapter 6 will demonstrate these linkages using the reduced 1993/94 SAM for Botswana.

When SAM multipliers are compared with the input-output multipliers, the former are seen to be larger. Multipliers refer to coefficients in the various columns generated by changes in any of the exogenous accounts. For instance, if exports were treated as an exogenous account from the "Rest of the World" account, the multiplier in this case is a coefficient of the effect of a change in exports on the various endogenous accounts. Whereas in the input-output analysis intermediate demand for inputs serves as a multiplier, in the SAM, the value added and incomes generate demand linkages, hence the larger multipliers in the latter" (Sadoulet and de Janvry, 1995, p.291).

In fact, in a study examining the effect of an increase in agricultural exports (exogenous account) on the economy of Ecuador, a country in Latin America, it was found that the SAM multipliers were significantly greater than those of the Leontief Input-Output analysis. Specifically for activities, commodities, labour and household income, the SAM multipliers were, in most cases, twice

as great as those from the Input-Output analysis because the former capture the income and demand linkages while the latter do not.

Based on Input-Output analysis, it has been observed that since agriculture exhibits low production multipliers, this has unfortunately led to a bias in investment policy against this sector, while industry/manufacturing was favoured instead (Sadoulet and de Janvry, 1995). The low production multiplier in agriculture is caused by the weak income linkages and value added. These two linkages are not captured fully in the input-output analysis, unlike the SAM approach. Generally, industry exhibits greater production linkages through intermediate demand than agriculture. Other models such as the multi-market model are essentially partial equilibrium models that analyze only sector-wide effects. In particular, multi-market models capture the interactions between, for instance, the changes in prices of maize and the effect on beef/wheat production or vice versa.

5.4 SAM-Leontief Models

In this study, two types of SAM multipliers will be described since these will be used in Chapter 7 to evaluate the effects of trade liberalization and market access on food security, household welfare and agricultural competitiveness. Below is a brief description of these multipliers.

5.4.1 Accounting/Income Multipliers

Table 5.1 illustrates different matrixes in the SAM. Matrix N represents outlay transactions between endogenous accounts (factors, institutions and production/activities) and matrix L shows leakages from endogenous accounts into exogenous accounts (government, capital and the rest of the world). The x matrix represents injections of income from exogenous accounts into endogenous ones and t is the matrix of expenditure transactions between exogenous accounts. As was indicated in the discussion of figure 5.1, the respective column and row totals must be equal.

Table 5.1: The SAM model summarized by endogenous and exogenous accounts

Receipts (Revenue)	Expenditures (Outlays)		Total
	Endogenous Accounts	Exogenous Accounts	
Endogenous Accounts	**N**	**X (injections)**	y_n
Exogenous Accounts	**L (leakages)**	**T**	y_x
Totals	y_n'	y_x'	

From Table 5.1 for any matrix $\tilde{\mathbf{A}}_n$ of the same size as A_n, such that $(1- \mathbf{A}_n)^{-1}$ exists, we can write

$\mathbf{y_1 = A_n.y_n + x}$

$\mathbf{y}_1 - \mathbf{A}_n.y_n = x$

$\mathbf{(1 - A_n)\, y_n = x}$

$\mathbf{y_1 = (1 - A_n)^{-1} x = M_{ax}}$

This equation shows the incomes ($\mathbf{y}_n$) for the factor, household/institutional and production/activity accounts that are endogenously determined following exogenous injections. The inverse, $(1- \mathbf{A}_n)^{-1}$, is termed an accounting multiplier matrix, $\mathbf{M}_a$. This multiplier matrix relates endogenous incomes y_n to injections, x. $\mathbf{A}_n$ represents the matrix of average endogenous expenditure propensities. If given the equation, $y_n = \mathbf{A}_n.y_n + x$ as indicated above, it follows that for any matrix **A~n** of the same size as $\mathbf{A}_n$ and such that the inverse $(1 - \mathbf{A\sim n})^{-1}$ exists, we can write

$$\begin{aligned} y_n &= A_n y_n + x \\ &= (A_n - \tilde{A}_n) y_n + \tilde{A}_n y_n + x \\ &= (I - \tilde{A}_n)^{-1}(A_n - \tilde{A}) y_n + (I - \tilde{A})^{-1} x \\ &= A^* y_n + (I - \tilde{A})^{-1} x \end{aligned}$$

Multiply the right hand side by $\mathbf{A}^*$ which gives

$$y_n = A^{*2} y_n + (I + A^*)(I - \tilde{A}_n)^{-1} x \tag{1}$$

Multiply both sides by $\mathbf{A}^{*2}$ and rearranging to solve for y_n gives

$$\begin{aligned} y_n &= A^{*3} y_n + (I + A^* + A^{*2})(I - \tilde{A}_n)^{-1} x \\ &= (I - A^{*3})^{-1}(I + A^* + A^{*2})(I - \tilde{A})^{-1} x \end{aligned} \tag{2}$$

A_n and $\tilde{A}_n$ can be written as

$$A_n = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \end{bmatrix} \quad \text{and} \quad \tilde{A}_n = \begin{bmatrix} 0 & 0 & 0 \\ 0 & A_{22} & 0 \\ 0 & 0 & A_{33} \end{bmatrix} \tag{3}$$

and hence

$$A^* = \begin{bmatrix} 0 & 0 & A_{13}^* \\ A_{12}^* & 0 & 0 \\ 0 & A_{32}^* & 0 \end{bmatrix} \quad where \quad \begin{pmatrix} A_{13}^* = A_{13} \\ A_{21}^* = (I - A_{22})^{-1} A_{21} \\ A_{32}^* = (I - A_{33})^{-1} A_{32} \end{pmatrix} \tag{4}$$

Three multipliers can then be defined

$$\begin{aligned} M_{a1} &= (I - \tilde{A}_n)^{-1} \\ M_{a2} &= (I + A^* + A^{*2}) \\ M_{a3} &= (I - A^{*3})^{-1} \end{aligned} \tag{5}$$

of which the product is the aggregate SAM multiplier first derived as

$$\begin{aligned} y_n &= (I - A^{*3})^{-1}(I + A^{*} + A^{*2})(I - \tilde{A}_n)^{-1} x \\ &= M_{a3} M_{a2} M_{a1} x \\ &= M_a x \end{aligned} \tag{6}$$

or

$$\begin{aligned} y_n = (I - A_n)^{-1} x &= (I - A^{*3})^{-1}(I + A^{*} + A^{*2})(I - \tilde{A}_n)^{-1} x \\ \Rightarrow M_a x &= M_{a3} M_{a2} M_{a1} x \\ \Rightarrow M_a &= M_{a3} M_{a2} M_{a1} \end{aligned} \tag{7}$$

where

$$M_{a1} = \begin{bmatrix} I & 0 & 0 \\ 0 & (I - A_{22})^{-1} & 0 \\ 0 & 0 & (I - A_{33})^{-1} \end{bmatrix} \tag{8}$$

Following Stone (1985), the multiplier effects included in $\mathbf{M_{a1}}$ arise from the repercussions of the initial injection within the group of accounts (or subsystems) that it originally entered. This measures the “intra-group” effects.

$$A^{*} = \begin{bmatrix} 0 & A^{*}_{13} A^{*}_{32} & 0 \\ 0 & 0 & A^{*}_{21} A^{*}_{13} \\ A^{*}_{32} A^{*}_{21} & 0 & 0 \end{bmatrix} \tag{9}$$

so that

$$M_{a2} = \begin{bmatrix} I & A^{*}_{13} A^{*}_{32} & A^{*}_{13} \\ A^{*}_{21} & I & A^{*}_{21} A^{*}_{13} \\ A^{*}_{32} A^{*}_{21} & A^{*}_{32} & I \end{bmatrix} \tag{10}$$

The multiplier effects included in $\mathbf{M_{a2}}$ arise from the repercussions of the initial injection when it has completed a tour outside its original group without returning to it, and so may be said to measure the “inter-group” effects.

$$M_{a3} = \begin{bmatrix} (I - A^{*}_{13} A^{*}_{32} A^{*}_{21})^{-1} & 0 & 0 \\ 0 & (I - A^{*}_{21} A^{*}_{13} A^{*}_{32})^{-1} & 0 \\ 0 & 0 & (I - A^{*}_{32} A^{*}_{21} A^{*}_{13})^{-1} \end{bmatrix} \quad (11)$$

The multiplier effects included in matrix $\mathbf{M_{a3}}$ arise from the results/consequences of the initial injection (from an exogenous account) when it has completed a tour through all three groups (factors, institutions and production activities) and has returned to the one that it had originally entered, and so may be said to measure the "circular / closed loop" effects.

In order to improve household welfare or per capita food consumption as part of a country's food security strategy, accounting matrix multipliers such as $\mathbf{M_{a1}}$, $\mathbf{M_{A2}}$ and $\mathbf{M_{a3}}$ can assist in explaining the effects of an injection, from exogenous accounts, on expenditures of endogenous accounts. As there are no transfers between factors, because the $\mathbf{M_{a1}}$ comprises of a unit/identity matrix, it is therefore possible to measure the multiplier effects of inter-group/closed-loop and extra/open loops on endogenous accounts. The $\mathbf{M_{a3}}$ multiplier or circular matrix measures the repercussions of the initial injection following the complete tour through all three groups (factors, institutions and production activities) and returns to the group it originally entered.

For instance, the injection may originate with factors and proceed through institutions and production activities, back to factors. $\mathbf{M_{a3}}$ illustrates this circular/closed loop effect of the injection. If we inject income into the factor account first, this additional money income will be spent in the factor group through the institutional as well as the production account until it returns to the factor account group; and by so doing this constitutes a circular flow or closed loop. The income expended on each of the endogenous accounts is referred to as a leakage.

Depending on the income elasticity of the various goods and services that different income household groups purchase, generally it is expected that for low-income households an increase in disposable income (injection) will increase the food budget share, while for high-income household groups such an increase in income may lead to a reduction of the food budget share. This economic observation is consistent with Engel's law that, *ceteris paribus*, if real per capita incomes increase, the budget share of food expenditure generally declines and that this result is more pronounced among high-income families.

The inter-group/circular effects derived through the $\mathbf{M_{a3}}$ multiplier matrix analysis show how an injection of income affects the expenditures of the various households/ income groups. The higher-income group will expend proportionately more of their additional income on goods/services with higher income elasticities (transport, entertainment, clothing, etc), while low-income families spend more of their additional income on basic goods and services (food, etc.). From the food security perspective, an increase in disposable income through higher agricultural export earnings, or a reduction in per capita income taxes/import levies on food and the like, may improve household welfare/consumption but this will vary from one household income group to another. Those directly involved in export agricultural production may benefit more than those outside the sub-sector, as the Stopler-Samuelson theory indicates (see Chapter 3).

Whilst the closed/circular loop examines the effects of an injection of inter-group linkages through the $\mathbf{M_{a3}}$ multiplier matrix, repercussions also emanate from the extra or open loop relationships. The $\mathbf{M_{a2}}$ matrix captures an injection of income, say into the factor group, through institutions as well as activities, but the injection does not return to the factor group where it originally started. In general, the closed loop/inter-group effects stemming from $\mathbf{M_{a3}}$ are larger than those of extra/open loop effects, $\mathbf{M_{a2}}$**.** This means that the effects on endogenous expenditure accounts arising from $\mathbf{M_{a3}}$ (the closed/circular loop) are greater than those from extra/open loop relationships. In short, the leakage effect is higher in the circular/closed loop multiplier ($\mathbf{M_{a3}}$).

To facilitate a more useful and informative way to present SAM results stemming from decomposed matrix multiplier analysis, Stone (1985) suggested an additive form of the equation of the accounting multipliers ($\mathbf{M_{a1}}$, $\mathbf{M_{a2}}$ and Ma3), as indicated below:

$$\mathbf{M = I + (M_{a1} - I) + (M_{a2} - I)\, M_{a1} + (M_{a3} - I)\, M_{a2}M_{a1}} \qquad (12)$$

where the elements of $\mathbf{M_a}$ represent (a) the initial injection, **I**; (b) the net contribution of transfer multiplier effects; (c) the net contribution of open-loop or extra group/cross multiplier effects; and (d) the net contribution of circular/inter-group or closed-loop multiplier effects.

5.4.2 Fixed-Price Multipliers

Whereas the accounting multipliers provide very useful information on the general structure of the economy, these multipliers cannot be interpreted directly as measures of the effects of changes in injections into the economy on the levels of endogenous incomes. For this latter purpose, we need to know how different economic agents behave in response to changes (Pyatt & Round, 1985, p.197).

In particular, it is important to analyze or measure how injections into endogenous accounts influence expenditure patterns, assuming that prices of goods and services are fixed and yet income is allowed to vary. Since prices are fixed, multipliers generated under such conditions are called fixed-price multipliers.

Using the accounting balance equation

$$\mathbf{Y_n = n \quad + x} \qquad (13)$$

which is basically a row/column total for endogenous and exogenous accounts (see Table 5.1), we can derive these equations if (13) is totally differentiated:

$$\partial y_n = \partial n + \partial x \quad (14)$$

$$= C_n \partial y_n + \partial x \quad (15)$$

$$= (I - C_n)^{-1} \partial x \quad (16)$$

$$= M_c \partial x \quad (17)$$

Similarly, the following equations can be derived, assuming $(I - C_n)^{-1}$ exists.

$$dl = C_l \, dy_n \quad (18)$$

$$= C_1(I - C_n)^{-1} \partial x \quad (19)$$

$$= C_l \, M_c \, dx \quad (20)$$

Assuming prices are fixed, the **n** vector of incomes received by endogenous accounts (factors, households/institutions and productive activities) is therefore a function of y_n and is constant.

The (i, j) element of the matrix C_n is the partial derivative of the element of n with respect to the element of y_n. C_n in this case is a matrix of the marginal propensity to consume.

Further, if $(I - C_n)^{-1}$ exists, equation (17) shows how the elements of y_n change, following changes in injections from exogenous accounts. Similarly, the matrix C_1 in equation (18) is a matrix of marginal propensities to leak; hence equations (19) and (20). Equations (17) and (20) are similar to the preceding accounting multiplier equation:

$$y_n = (I - A_n)^{-1} x = M_{ax}$$

As a result of this similarity and assuming that C_n is non-negative, $\mathbf{M_c}$ in equation (20) is a multiplier matrix, referred to as a fixed-price multiplier matrix. Given matrices such as C_n and C_l whose column sums must add up to one/unity, the fixed-price multiplier matrix, $\mathbf{M_c}$ will also exist under conditions similar to the accounting multiplier matrix, $\mathbf{M_a}$. Consequently, given the estimates of matrices C_n and C_l, both the fixed-price multiplier, $\mathbf{M_c}$, and the matrix of marginal leakages, $\mathbf{C_l M_c}$, can be calculated.

Decomposition of the fixed-price multipliers

Like the accounting multiplier matrices, assuming that $\mathbf{C_n}$ and $\mathbf{A_n}$ are equal (and by extension that $\mathbf{C_l}$ and $\mathbf{A_l}$ are also equal), the fixed-price multiplier matrix can be decomposed into a transfer effects multiplier, $\mathbf{M_{c1}}$; an open-loop multiplier matrix, $\mathbf{M_{c2}}$; and a closed-loop multiplier matrix, $\mathbf{M_{c3}}$. Further, these multiplier effects can be expressed as a multiplicative product, as follows:

$$\mathbf{M_c = M_{c3}\, M_{c2}\, M_{c1}} \qquad (21)$$

Alternatively, using the additive form developed by Stone, equation (21) can be re-written as

$$\mathbf{M_c = I + (M_{c1} - I) + (M_{c2} - I)\, Mc1 + (M_{c3} - I)\, Mc2\, M_{c1}} \qquad (22)$$

Assuming prices are fixed, the differences that can be identified between the corresponding elements of the multipliers, $\mathbf{M_a}$, that is the accounting matrix, and $\mathbf{M_c}$, the fixed-price multiplier, are therefore due to income effects. This can be formally presented as follows:

$$\mathbf{dy_n = C_n\, dy_n + dx} \qquad (23)$$

$$\mathbf{= (C_n - A_n)dy_n + A_n dy_n + dx} \qquad (24)$$

$$\mathbf{= (I - A_n)^{-1}((C_n - A_n)\, dyn + dx)}$$

$$\mathbf{= M_a(C_n - A_n)dy_n + M_a\, dx}$$

$$= (\mathbf{I} - \mathbf{M_a}(\mathbf{C_n} - \mathbf{A_n}))^{-1}\, \mathbf{M_a dx}$$

$$= \mathbf{M_y M_a dx} \qquad (25)$$

where $\mathbf{M_y} = (\mathbf{I} - \mathbf{M_a}(\mathbf{C_n} - \mathbf{A_n}))^{-1}$ (26)

and by definition $\mathbf{M_y M_a} = \mathbf{M_c}$ (27)

From equation (27) the matrix $\mathbf{M_y}$ captures the income effects and this matrix in turn transforms the accounting multiplier matrix, $\mathbf{M_a}$, into a fixed-price multiplier, $\mathbf{M_c}$.

5.5 Price Multiplier Analysis

Under fixed-price multiplier analysis income is allowed to vary while prices are held constant and this in turn makes input or commodity substitution extremely difficult, as there are no changes in relative prices. As Roland-Host and Sancho (1995) observe, “traditionally, the emphasis of the Social Accounting Matrix methodology has been on quantity-orientated models and their income effects. In contrast, we use the Social Accounting Matrix to develop a price model that captures the interdependence among activities, households, and factors and provides a complete set of accounting prices” (Roland-Holst and Sancho, 1995, p.361). The traditional use of SAM-based models here refers to fixed-price income multipliers, which this study will apply in Chapter 7 to examine the effects of an increase in export income on food security. For instance, case studies used later in this chapter illustrate results of the applications of SAM models based on the fixed-price income multiplier analysis. The fixed-price income multiplier analysis assumes that prices are not allowed to vary. As a result of this assumption, it is not possible for households to replace costly commodities with cheaper ones, while activities also cannot substitute less costly inputs for more expensive ones as there are no relative price changes.

In this study, some of the policy simulations/experiments will include tariff reduction among selected commodities, which in turn reduce domestic prices as well as production costs in the activity account. Chapter 8 will undertake policy experiments based on the effects of tariff reduction or price changes on food security and sectoral competitiveness. The SAM multiplier analysis that introduces price changes in a policy experiment, as opposed to the fixed-price income multiplier approach, is referred to as **price-multiplier analysis**. Further, under price multiplier analysis income as well as quantities of commodities are held constant. As a result a reduction of a tariff on an imported good, *ceteris paribus*, not only reduces its domestic price and influences relative prices, production costs of activities (via changes in inputs costs,) as well as changes in the cost of living are also affected. As Roland-Holst and Sancho (1995) indicate, tariff reduction shows how prices are formed as well as the transmission of cost among various endogenous accounts in the economy; hence the duality of price multiplier models.

Through tariff reduction/liberalization (see Chapter 8), policy experiments will analyze price formation as well as the cost of transmission among endogenous accounts, with special reference to the welfare of households and production costs of activities. The introduction of tariff reduction in selected commodities affects transactions in the quantities traded and relative prices /costs in the domestic economy. Further, according to the results of the price multiplier analysis undertaken by Roland-Holst and Sancho in Spain, endogenous accounts (factors, households and sectors/activities) respond differently to exogenous price changes/shocks (Roland-Holst and Sancho, 1995). In fact, similar findings have been observed in this study, as Chapter 8 will show. Below we outline steps taken to derive price multipliers.

Table 5.2 illustrates a schematic SAM like the one illustrated in table 5.1, in which transactions are recorded using both quantities and prices. Endogenous activities cover factors (1), households (2) and activities/production (3) while capital, government and the rest of the world are all together treated as one exogenous account (4) and the respective totals of

transactions are captured by (5). Rows still represent income or receipts while columns indicate account expenditures.

Table 5.2: A schematic SAM

	1	2	3	4	5
Factors (1)	**0** $\hat{p}_1$**Q13**		**0**	$\hat{p}_1$ ´**Q14**	
				$\hat{p}_2$´**Q24**	$\hat{p}_1$´**q1**
Households (2)	$\hat{p}_2$´**Q21** **0**		$\hat{p}_2$´**Q22**		$\hat{p}_2$´**q2**
Production (3)	**0**		$\hat{p}_3$ ´**Q32**	$\hat{p}_3$ ´**Q34**	$\hat{p}_3$´**q3**
	$\hat{p}_3$ ´**Q33**			$\hat{p}_4$ ´**Q44**	$\hat{p}_4$´**q4**
Exogenous (4)	$\hat{p}_4$ ´**Q41** $\hat{p}_4$ ´**Q43**		$\hat{p}_4$ ´**Q42**		
Totals	$\hat{p}_1$´**q1** $\hat{p}_3$´**q3**		$\hat{p}_2$´**q2**	$\hat{p}_4$´**q4**	

Defining the technical coefficients as

$$a_{ij} = \frac{Q_{ij}}{q_j} \quad \textbf{or} \quad Qij = a_{ij}q_{ij} \qquad (1)$$

the transactions matrix can be rewritten as

	1 2	3	4	5
Factors (1)	**0** $\hat{p}_1\mathbf{A}_{13}\hat{q}_3$	**0**	$\hat{p}_1'\mathbf{A}_{14}\hat{q}_4$	$\hat{p}_1'\mathbf{q}_1$
Households (2)	$\hat{p}_2'\mathbf{A}_{21}\hat{q}_1$	$\hat{p}_2'\mathbf{A}_{22}\hat{q}_2$	$\hat{p}_2'\mathbf{A}_{24}\hat{q}_4$	$\hat{p}_2'\mathbf{q}_2$
Production (3)	**0**		$\hat{p}_3'\mathbf{A}_{34}\hat{q}_4$	$\hat{p}_3'\mathbf{q}_3$
Exogenous (4)	**0** $\hat{p}_3'\mathbf{A}_{32}\hat{q}_2$ $\hat{p}_3'\mathbf{A}_{33}\hat{q}_3$		$\hat{p}_4'\mathbf{A}_{44}\hat{q}_4$	$\hat{p}_4'\mathbf{q}_4$
	$\hat{p}_4'\mathbf{A}_{41}\hat{q}_1$ $\hat{p}_4'\mathbf{A}_{43}\hat{q}_3$	$\hat{p}_4'\mathbf{A}_{42}\hat{q}_2$		
Totals	$\hat{p}_1'\mathbf{q}_1$ $\hat{p}_3'\mathbf{q}_3$	$\hat{p}_2'\mathbf{q}_2$	$\hat{p}_4'\mathbf{q}_4$	

and dividing throughout by $\mathbf{q}_i$ as appropriate, i.e., by the columns, gives

	1 2 3			4	5
Factors (1)	**0**		**0**	$\hat{p}_1 \mathbf{A}_{14}$	$\hat{p}_1$
	$\hat{p}_1 \mathbf{A}_{13}$				
Households (2)				$\hat{p}_2 \mathbf{A}_{24}$	$\hat{p}_2$
	$\hat{p}_2 \mathbf{A}_{21}$	$\hat{p}_2 \mathbf{A}_{22}$	**0**		
Production (3)				$\hat{p}_3 \mathbf{A}_{34}$	$\hat{p}_3$
	0		$\hat{p}_3 \mathbf{A}_{32}$		
	$\hat{p}_3 \mathbf{A}_{33}$				
Exogenous (4)				$\hat{p}_4 \mathbf{A}_{44}$	$\hat{p}_4$
	$\hat{p}_4 \mathbf{A}_{41}$	$\hat{p}_4 \mathbf{A}_{42}$	$\hat{p}_4 \mathbf{A}_{43}$		
Totals	$\hat{p}_1$	$\hat{p}_2$	$\hat{p}_3$	$\hat{p}_4$	

The resultant column identities are then

$$\mathbf{p}_1 = \mathbf{p}'_2\mathbf{A}_{21} + \mathbf{p}'_4\mathbf{A}_{41}$$

$$\mathbf{p}_2 = \mathbf{p}'_2\mathbf{A}_{22} + \mathbf{p}'_3\mathbf{A}_{32} + \mathbf{p}'_4\mathbf{A}_{42} \qquad (2)$$

$$\mathbf{p}_3 = \mathbf{p}'_1\mathbf{A}_{13} + \mathbf{p}'_3\mathbf{A}_{33} + \mathbf{p}'_4\mathbf{A}_{43}$$

$$\mathbf{p}_4 = \mathbf{p}'_1\mathbf{A}_{14} + \mathbf{p}'_2\mathbf{A}_{24} + \mathbf{p}'_3\mathbf{A}_{34} + \mathbf{p}'_4\mathbf{A}_{44}$$

Letting the matrices A_{4i} for I =1, 2, 3, be row vectors and p_4 be a scalar, i.e., a "weighted" average price, the vector of exogenous costs, v, is

$$V = p_4 \, \mathbf{a}_4 \qquad (3)$$

where a_4 is formed from the row adjoining the matrices $\mathbf{A}_{4i,}$ i.e., $\mathbf{a}_{4 = i'}$ [$\mathbf{A}_{41,}$ $\mathbf{A}_{42,}$ $\mathbf{A}_{43,}$ $\mathbf{A}_{44}$].

Further defining

$$\mathbf{p} = (\mathbf{p}_1, \mathbf{p}_2, \mathbf{p}_3) \qquad (4)$$

the price dual can be written as

$$\begin{aligned} &\mathbf{p'= p'A + V'} \\ &\mathbf{= v'[I - A_n]^{-1}} \\ &\mathbf{= v'M_p} \\ &\mathbf{= M_p'v} \end{aligned} \qquad (5)$$

where

$$\mathbf{A} = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \end{bmatrix} \qquad (6)$$

Whilst in terms of the fixed-price income multiplier analysis the interpretation of the multiplier matrix is undertaken through the rows of $\mathbf{M_p}$, an exogenous change in the price or cost experienced by an endogenous account or activity is transmitted in the economy by the row elements of the Multiplier Matrix. Similarly, the effects of an exogenous increase in the price faced by an account are transmitted by the row elements of $\mathbf{M_p}$. In Chapter 8 of this study, a price multiplier analysis, based on the reduction of tariffs will be undertaken.

Price Multiplier Decomposition

As with the fixed-price income multiplier derived by Pyatt and Round and Stone, a decomposed price multiplier can also be created. Using the price dual expression, then for any matrix, **Ã,** which is conformable with **A,** we can write

$p' = p'A + v' = p'A + p'\tilde{A} - p'\tilde{A} + v'$

$p' - p'\tilde{A} = p'\tilde{A} - p'\tilde{A} + v'$ (7)

$p'(I - \tilde{A}) = p'[A - \tilde{A}] + v'$

$p' = p'[A - \tilde{A}](I - \tilde{A})^{-1} + v'(I - \tilde{A})^{-1}$

and letting $A^* = [A - \tilde{A}][I - \tilde{A}]^{-1}$

$p' = p'A^* + v'(I - \tilde{A})^{-1}$ (8)

and multiplying throughout by A*

$p' A^* = (p'A^* + v'(I - \tilde{A})^{-1})A^*$ (9)

and noting that

$p'A^* = p' - v'(I - \tilde{A})^{-1}$ (10)

then

$p' - v'(I - \tilde{A})^{-1} = (p'A^* + v'(I - \tilde{A})^{-1})A^*$

$p' = (p'A^* + v'(I - \tilde{A})^{-1})A^* + v'(I - \tilde{A})^{-1}$ (11)

$= p'A^{*2} + v'(I - \tilde{A})^{-1}A^* + v'(I - \tilde{A})^{-1}$

$= p'A^{*2} + v'(I - \tilde{A})^{-1}(I + A^*)$

using $p' = p'A^* + v'(I - \tilde{A})^{-1}$ to substitute for p' on the right hand side we have

$p' = (p'A^* + v'(I - \tilde{A})^{-1})A^{*2} + v'(I - \tilde{A})^{-1}(I - A^*)$

$= p'A^{*3} + v'(I - \tilde{A})^{-1}A^{*2} + v'(I - \tilde{A})^{-1}(I + A^*)$ (12)

$= p'A^{*3} + v'(I - \tilde{A})^{-1}(A^{*3} + (I + A))$

$= p'A^{*3} + v'(I - \tilde{A})^{-1}(I + A^* + A^{*2})$

and solving for p'

$p' = p'A^{*3} + v'(I - \tilde{A})^{-1}(I + A^* + A^{*2)}$

$p' - p'A^{*3} = v'(I - \tilde{A})^{-1}(I + A^* + A^{*2})$

$p'(I - A^{*3}) = v'(I - \tilde{A})^{-1}(I + A^* + A^{*2})$ (13)

$p' = v'(I - \tilde{A})^{-1}(I + A^* + A^{*2})(I - A^{*3})$

$= v'M_{P1}M_{P2}M_{P3}$

where

$$\mathbf{M}_{p1} = (\mathbf{I} - \tilde{\mathbf{A}})^{-1} \quad (14)$$

$$\mathbf{M}_{p2} = (\mathbf{I} + \mathbf{A}^* + \mathbf{A}^{*2})$$

$$\mathbf{M}_{p3} = (\mathbf{I} - \mathbf{A}^{*3})$$

Defining the matrix Ã as

$$\tilde{\mathbf{A}} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & A_{22} & 0 \\ 0 & 0 & A_{33} \end{bmatrix} \quad (15)$$

then[4]

$$\left[I - \tilde{A}\right]^{-1} = \begin{bmatrix} I & 0 & 0 \\ 0 & \left[I - A_{22}\right]^{-1} & 0 \\ 0 & 0 & \left[I - A_{33}\right]^{-1} \end{bmatrix} \quad (16)$$

and $\left(A - \tilde{A}\right)$ is

$$\left(A - \tilde{A}\right) = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & 0 & 0 \\ 0 & A_{32} & 0 \end{bmatrix} \quad (17)$$

thus

$$\mathbf{A}^* = \begin{bmatrix} 0 & 0 & A_{13}\left[I - A_{33}\right]^{-1} \\ A_{21} & 0 & 0 \\ 0 & A_{32}\left[I - A_{22}\right]^{-1} & 0 \end{bmatrix}$$

$$\mathbf{A}^{*2} = \begin{bmatrix} 0 & A_{13}\left[I - A_{33}\right]^{-1} A_{32}\left[I - A_{22}\right]^{-1} & 0 \\ 0 & 0 & A_{21}A_{13}\left[I - A_{33}\right]^{-1} \\ A_{32}\left[I - A_{22}\right]^{-1} A_{21} & 0 & 0 \end{bmatrix}$$

$$\mathbf{A}^{*3} =$$

[4] Note that the inverse of a block diagonal matrix **A** is

$$A^{-1} = \begin{bmatrix} A_{11}^{-1} & 0 \\ 0 & A_{22}^{-1} \end{bmatrix} \text{ where } \quad A = \begin{bmatrix} A_{11} & 0 \\ 0 & A_{22} \end{bmatrix}$$

$$\begin{bmatrix} A_{13}[I-A_{33}]^{-1}A_{32}[I-A_{22}]^{-1}A_{21} & 0 & 0 \\ 0 & A_{21}A_{13}[I-A_{33}]^{-1}A_{32}[I-A_{22}]^{-1} & 0 \\ 0 & 0 & A_{32}[I-A_{22}]^{-1}A_{21}A_{13}[I-A_{33}]^{-1} \end{bmatrix} \quad (18)$$

Defining

$$\mathbf{A}^*_{13} = \mathbf{A}_{13}\,(\mathrm{I} - \mathbf{A}_{33})^{-1}$$

$$\mathbf{A}^*_{21} = \mathbf{A}_{21} \quad (19)$$

$$\mathbf{A}^*_{32} = \mathbf{A}_{32}\,(\mathrm{I} - \mathrm{A}_{22})^{-1}$$

the expressions for $\mathbf{A}^*$, $\mathbf{A}^{*2}$ and $\mathbf{A}^{*3}$ can be written as

$$\mathbf{A}^* = \begin{bmatrix} 0 & 0 & A^*_{13} \\ A^*_{21} & 0 & 0 \\ 0 & A^*_{32} & 0 \end{bmatrix}$$

$$\mathbf{A}^{*2} = \begin{bmatrix} 0 & A^*_{13}A^*_{32} & 0 \\ 0 & 0 & A^*_{21}A^*_{13} \\ A^*_{32}A^*_{21} & 0 & 0 \end{bmatrix} \quad (20)$$

$$\mathbf{A}^{*3} = \begin{bmatrix} A^*_{13}A^*_{32}A^*_{21} & 0 & 0 \\ 0 & A^*_{21}A^*_{13}A^*_{32} & 0 \\ 0 & 0 & A^*_{32}A^*_{21}A^*_{13} \end{bmatrix}$$

Therefore

$$\mathbf{M}_{p1} = \left[I - \tilde{A}\right]^{-1} = \begin{bmatrix} I & 0 & 0 \\ 0 & \left[I - A_{22}\right]^{-1} & 0 \\ 0 & 0 & \left[I - A_{33}\right]^{-1} \end{bmatrix} \quad (21a)$$

$$\mathbf{M}_{p2} = \left(I + A^{*} + A^{*2}\right) = \begin{bmatrix} I & A^{*}_{13}A^{*}_{32} & A^{*}_{13} \\ A^{*}_{21} & I & A^{*}_{21}A^{*}_{13} \\ A^{*}_{32}A^{*}_{21} & A^{*}_{32} & I \end{bmatrix} \quad (21b)$$

$$\mathbf{M}_{p3} = \left[I - A^{*3}\right]^{-1} = \begin{bmatrix} \left[I - A^{*}_{13}A^{*}_{32}A^{*}_{21}\right]^{-1} & 0 & 0 \\ 0 & \left[I - A^{*}_{21}A^{*}_{13}A^{*}_{32}\right]^{-1} & 0 \\ 0 & 0 & \left[I - A^{*}_{32}A^{*}_{21}A^{*}_{13}\right]^{-1} \end{bmatrix} \quad (21c)$$

Source: Roland-Holst and Sancho, 1995

The multipliers $\mathbf{M}_{p1,}$ $\mathbf{M}_{p2}$ and $\mathbf{M}_{p3}$ capture, as in accounting/income multiplier analysis, transfer (T_p), open- (O_p) and closed-loop (C_p) effects respectively. Chapter 8 will use these disaggregated price multipliers to explain the effects of exogenous shocks on endogenous accounts and subsequently on food security and activity accounts.

Additive Decomposition of Multiplier

As was the case in income multiplier analysis, an additive decomposition of the multiplicative multiplier by Pyatt and Round (1979) can also be done under price multiplier analysis. By means of Stone's additive decomposition of the multiplicative multiplier we can derive,

$$\mathbf{M}_p = \mathbf{I} + (\mathbf{M}_{P1} - \mathbf{I}) + \mathbf{M}_{P1}(\mathbf{M}_{P2} - \mathbf{I}) + \mathbf{M}_{P1}\mathbf{M}_{P2}(\mathbf{M}_{P3} - \mathbf{I})$$
$$= \mathbf{I} + \mathbf{T}_P + \mathbf{O}_P + \mathbf{C}_P.$$

The interpretation of the additive and decomposed price multiplier, $M_{p,}$ is the same as in accounting/income multiplier analysis. Chapter 8 will also use Stone's additive and decomposed multiplier analysis. The importance of the use of decomposed multipliers is to provide information especially to policy

makers about “the underlying patterns of economic interdependence and price transmission” (Roland-Holst and Sancho, 1995, p.370). In particular, such information can reveal whether there is competition and full transmission of the cost/tariff reduction in the economy following the introduction of a shock into the endogenous accounts. Rigity in the input and output markets after price changes, say through tariff reduction, can be a policy challenge during trade liberalization (Stiglitz, 1998; 2002).

5.6 Empirical Evidence Regarding Trade Liberalization using SAM-based Models

Following the global trend towards trade liberalization, several models have been applied to assess the effects of the removal of tariffs and other non-tariff barriers (NTBs) on the economies of various countries. In Chapter 4, we described the empirical experience of partial equilibrium analysis in trade liberalization.

Firstly, Powell and Round (1997) undertook a SAM income multiplier analysis of Ghana. The policy experiment was based on the effects of additional export income of cocoa on the economy. Cocoa is a very important agricultural export commodity for Ghana. Government, capital and the rest of the world were treated as exogenous accounts while factors, households and activities were endogenous accounts in a static SAM income multiplier analysis. The study established that unskilled male workers and mixed income were the largest beneficiaries of additional export income stemming from an increase in global demand for cocoa. Unskilled male workers form the backbone of factor employment in primary cocoa production in Ghana, while mixed income represents returns to labour for non-incorporated firms.

Besides returns to labour, certain urban and rural households also benefited significantly from an increase in international cocoa demand (Powell and Round, 1997). These households own factors such as labour. Among activities, primary cocoa production was the largest recipient of export income

from cocoa, as its output increased greatly. The study also found that compared to a similar income injection in mining and construction, an increase in income from cocoa exports exhibited a comparable national impact to that of construction while such an increase in the effect of the income from mining was less. In short, an injection of additional export income into cocoa produces similar effects or national benefits to the construction industry. However, the study found that system-wide linkages or closed-loop effects (see detailed discussion in Chapters 7 and 8) were weak in the Ghanaian economy, demonstrating limited interdependency or income interrelationships among endogenous accounts.

Secondly, in a study on macro-economic, trade and agricultural reforms in Zimbabwe, Bautista and Thomas (2000), using a SAM-income multiplier analysis, found that not only does the GDP increase, but also that foreign trade and household income distribution improved significantly. Resource allocation based upon the Ricardian/HOS model also improved. Trade creation dominated trade diversion and smallholder farm production also increased because of improved access to land and competitive world commodity prices following the removal of price and exchange rate controls. As one would expect, Zimbabwe, like several other low-income countries, depends on trade tariff revenue. Consequently, while economic and trade reforms benefit the macro-economy in the form of higher GDP and also increase household income, government revenue is adversely affected. Loss of government revenue can reduce expenditure on providing public goods such as infrastructure, health, education and research. For a developing country like Zimbabwe, the failure to provide public goods could be politically and socially very costly.

While the Zimbabwe study (2000) advocates for major fiscal and monetary reforms including trade liberalization, the investigation also supports a comprehensive land reform for the benefit of smallholders but advises against a disruptive land distribution that destroys production and employment among large-scale farmers. The study supports the distribution of unused land and

implementation of other complementary policies in infrastructure, education, water, input supply, etc.

Regarding economic and trade reforms, however, the same study identifies serious crises. Zimbabwe has over the years regulated trade by means of price and exchange rate controls, quotas, import duties, monopoly controls, and the like. The currency is overvalued while inflation, interest and unemployment rates are very high. Moreover, government over-expenditure has created chronic budget deficits. The macro-economic reforms advocated in the study mentioned, apart from trade and agricultural liberalization, also cover financial discipline. The recent government programme of economic revival attempts to implement the reforms indicated in the study, as well as to expand the role of the private sector in trade (2003). Recently, however, government has been gradually relaxing controls on the economy.

In another SAM income multiplier analysis of Mozambique, Arndt, Jensen and Tarp (2000) established that primary agriculture displays strong income linkages in the country's economy. According to this study, primary agriculture accounts for about 28 percent of Mozambique's GDP while services, industry and commerce also account for 27 percent, 25 percent and 20 percent, respectively, of the country's GDP. Factors, households and activities were classified as endogenous accounts while, as is the general convention, government, capital and the rest of the world were treated as exogenous accounts.

The results of the study on Mozambique indicate that primary agriculture exhibited the largest income multipliers on factor account, compared to industry and services. Specifically, a unit increase in income from agriculture generated the greatest demand for factors (labour and capital), compared to industry and services. As was to be expected, agricultural labour gained most from primary agriculture while non-agricultural labour benefited most from the demand created by the services sector. Further, following an injection of additional income into activities, primary agriculture and the services sector

exhibited a comparable demand for capital while industry lagged behind (Arndt, Jensen and Tarp, 2000).

Rural households improved their welfare after an injection of additional income into primary agriculture, while urban households registered almost the same benefits in both the agriculture and the services sectors. Industry lagged behind for both types of households. Rural households gained most in terms of additional income injected into agriculture, followed by the services industry, while urban households benefited almost equally in both the agriculture and services sectors. Like most SADC countries, Mozambique's population is largely rural and depends mainly on farming and therefore, the development and support of this sector could create more broadly-based benefits to the economy.

With respect to the activity account, the results of the Mozambique study indicate that an injection of additional income into agriculture exerts an almost similar effect on total sectoral output to that on the services sector. Through inter-industry input-output interactions, an injection of additional income into agriculture generates almost the same sectoral output as the services sector, while industry exhibits limited inter-industry or transfer effects. The most important agricultural activities that demonstrated the highest production linkages in Mozambique were rice, other grains, raw cashew, raw cotton, forestry, livestock and fishery production. Some of these activities provide Mozambique with important export commodities. The same primary agricultural activities also created the largest demand for factors including agricultural labour (Arndt, Jensen and Tarp, 2000).

The experiences and lessons on economy-wide analysis indicated in the preceding paragraphs are based on SAM multiplier analysis, the tool which study will mainly focus on in Chapters 7 and 8. In addition, to experiences based on SAM multiplier analysis, other economy-wide studies on agricultural trade liberalization and food security using computable general equilibrium (CGE) investigations have been made. CGE analysis while based on a SAM

database like SAM multiplier analysis, it has different features. In CGE analysis, an advanced and more complex economy-wide approach, all accounts are endogenous, whilst under SAM multiplier analysis, factors, households and activities are classified as endogenous while government, capital and the rest of the world are conventionally treated as exogenous (see Chapters 7 and 8 about how accounts were classified in this study). Secondly, in CGE studies, bilateral trade flows are covered whereas in SAM multiplier analysis, they are not included. Thirdly, in CGE analysis it is assumed foreign goods are not perfect substitutes of domestically produced goods, e.g. white maize in Botswana/SACU is not perfectly substituted for by white maize from Europe or the United States. There are other distinguishing features between the two economy-wide tools.

However, there are equally important common features between the two approaches that are based on the SAM database. Both analytical tools reveal the interdependence of accounts through the circular flow of income and expenditure. Secondly, the disaggregation of the multiplier effects can provide useful information about the behaviour of markets through the strength/weakness of price transmission when a shock is applied. The general direction of multiplier effects on factors, households and activities is generally the same between the two analytical tools. Below are some of the lessons/experiences on agricultural trade liberalization based on CGE approach which show some common features with SAM multiplier analysis.

Weck and Piermartini (2005) in their CGE study on the economic impact of the economic partnership agreements(EPAs) in SADC countries, found that livestock and food sectors would benefit more if the region entered into a free trade area with the European Union(EU). The EU and African, Caribbean and Pacific (ACP) countries are currently negotiating for the creation of regional free trade areas or EPAs in order to establish reciprocal trade and strengthen regional economic and trade integration, etc. Currently, the EU has non-reciprocal arrangements with ACP countries except for South Africa as the latter is classified as a developed country. To achieve the EPA objective, ACP

countries are expected to form geographic economic groups to establish free trade areas. SADC is currently negotiating an EPA with the EU.[5] According to the study, SADC should strongly advocate for the inclusion of agricultural products in the EPA negotiations as they enjoy comparative advantage in them vis-à-vis the EU. The EU has comparative advantage in manufactures. In a highly aggregated CGE analysis, where there were no households, etc, Weck and Piermartini found that overall, the welfare of SADC improved as well as the region's GDP. The study also indicated that if the EPA is established trade diversion could occur as cheaper imports from other parts of the world could be replaced by expensive ones from the EU. Inflows of costly and uncompetitive food and agricultural imports from the EU in particular, could adversely affect household food security and per capita food consumption.

Bouet (2006) in a CGE study on how trade liberalization can affect the poor, the researcher found that welfare gains globally increase mainly due to the reduction/removal of agricultural trade distortions, especially if the barriers are tariff-based. GDP in countries/regions covered increases due to efficiency gains. According to the study, agricultural tariffs constitute a major market access constraint in global trade. Whilst the agricultural sector was disaggregated, households were not included and factors were also not comprehensively disaggregated. Countries were also aggregated into regions with Africa represented by less than five countries. The results indicate that poverty will reduce through increase in income for unskilled workers engaged in agriculture. At household level, the results do not indicate specifically which ones would benefit between those in the rural and urban areas, or those who are self-employed vis-à-vis wage-based families, etc. The importance of non-tariff barriers in influencing potential gains is not captured in this study. Jean and Matthews (2005) identify non-tariff barriers such as sanitary and phyto-sanitary standards as critical for developing countries to access export markets. According to their study, tariff restrictions play a smaller role

[5] Some SADC members are however negotiating an EPA under the east and southern Africa configuration. Angola, Botswana, Lesotho, Namibia, Mozambique, Swaziland and Tanzania are negotiating under SADC.

compared to non-tariff barriers as currently developing countries enjoy duty-free or low-duty market access in several preferential trade arrangements.

Several economy-wide studies on trade liberalization and agricultural reforms also confirm that, in general, welfare will improve but that the gains are not equally distributed between the industrialized and low-income countries (Davies, Masters and Hertel, 1999; Trueblood and Shapouri, 1999; Wobst, 2002; Winters, McCulloch and McKay, 2004; FAO, 2005; Olympio, Robinson and Cocks, 2006; Bouet, 2006; Bouet and Krasniqi, 2006). In general, rural households as well as unskilled workers benefit most from income injected into primary agriculture, rather than into industry or manufacturing. As most of the poorest households in several developing countries including the SADC region are situated in rural areas and depend on farming, forestry and fisheries, the results of the case studies strongly favour investment in and support for agricultural development coupled with the implementation on complementary policies (infrastructure, skills development, education, water, etc.).

Furthermore, it is also necessary that, in order for global trade liberalization to benefit low-income or developing countries, in particular, major reforms be undertaken in the agricultural sector and other areas of the domestic and world economy. Results of studies on trade liberalization indicate that highly industrialized countries such as OECD members benefit most, as well as Australia, New Zealand and some middle-income Asian countries (Vaitinen, 2001; Brown, 2002). In addition, those countries with comparative cost advantage in agricultural exports (cereals, dairy, sugar, meat, fruits, vegetables, oilseeds and so forth) will benefit more from global trade liberalization, but net food-importing countries in the short term will be adversely affected by an increase in commodity prices if major trade players like the EU, US, and Japan reduce both export and domestic subsidies in conformity with their WTO obligations.

Trade liberalization will also assist in aligning interest and exchange rates with market forces. At present, several countries are adjusting these rates, partly owing to macroeconomic imbalances caused by, *inter alia*, overvalued currencies, subsidized interest rates, and chronic budget deficits. Several other studies concur with most of the findings or simulated results of these models. Specifically, trade liberalization, accompanied by other reforms such as aligning domestic exchange rates with international currencies, removal or reduction of barriers to trade (high import tariffs, quotas, export subsidies, import taxes, market/commodity monopolies, and the like) and macro-economic stability can contribute to economic growth, employment creation, household welfare, an increase in private investment and reduced public deficit.

5.7 Advantages and Disadvantages of SAM-Income Multiplier analysis

Economy-wide models provide information about structure and income distribution in an economy. Unlike the partial equilibrium models described in Chapter 4, SAM multiplier analysis also indicate inter- and intra-sectoral linkages by identifying income and expenditure interrelationships. For economies dependent on agricultural growth, an economy-wide model captures the links between factors (labour, capital) and households (rural or urban as well as poor or rich) to productive activities/services, government, capital and transactions with the rest of the world. Chapter 6 describes these inter-relationships in detail using the Botswana SAM. In fact as Reimer (2002, p.15) observes, SAM-based models “quantify at a single point in time, the interdependence of sectors and regions in an economy”. Partial equilibrium models are not able to show such linkages.

While SAM multiplier analysis provides detailed information about economic linkages, income distribution, etc, there are indeed formidable problems facing them. Firstly, in many cases certain accounts such as factors and households might be too aggregated to understand any relationships. For instance, several economy-wide models using the Global Trade Analysis Project

(GTAP)[6] have for some time assumed one type of household in both country and regional analysis. As expected households are very different by area: rural versus urban. Further, households differ by income levels and sources of income. Some households depend on wages and self-employment while others subsist on transfers and remittances. The use of one household type in economy-wide models can be very misleading in policy designs or responses.

Further, economy-wide models are data and skill-intensive. Data are required from national accounts, household and income surveys as well as farm or agricultural surveys. In many countries these data may not be available at the same time in order for one to conduct a SAM-based analysis. In fact this data constraint may accord partial equilibrium analysis an advantage over economy-wide models. Fairly advanced analytical skills are required to undertake economy-wide investigations. In addition, many people may not easily understand and interpret economy-wide models.

5.8 Summary

This chapter described the SAM theory, income and price multipliers, and the advantages and disadvantages of economy-wide or SAM multiplier analysis. As sectors are directly and indirectly linked to one another and issues of efficiency, welfare and income re-distribution are becoming central in national, regional and global discussions and trade negotiations, economy-wide approaches will increasingly become more important, in measuring the full impact of various macro-economic reforms that partial equilibrium approaches are not able to capture more comprehensively. These factors include monetary, fiscal and trade reforms. However, both the economy-wide and partial equilibrium models should be regarded as complementary, given the advantages and disadvantages of each approach (Schiller, 1997; Gardner, 1998).

[6] GTAP is based at the University of Purdue, USA.

CHAPTER 6

A DESCRIPTION AND AN ANALYSIS OF THE 1993/94 SOCIAL ACCOUNTING MATRIX (SAM) FOR BOTSWANA

6.1 Introduction

This chapter describes the Social Accounting Matrix (SAM) of Botswana for 1993/94. Besides providing information about this macro-SAM, the chapter indicates the various national and sub-accounts of Botswana and the linkages between them. As indicated in Chapter 5, a SAM provides a comprehensive and consistent database regarding the circular flow of income and expenditure in an economy in a given period of time.

"The utility of SAMs is that they can provide a comprehensive and consistent record of the interrelationships of an economy at the level of individual production sectors, factors, and general public and foreign institutions. They can be used to disaggregate the macroeconomic accounts and they can reconcile these with the economy's input-output accounts" (Francois and Reinert, 1997, p.95). A SAM also provides information about the structure of the economy as well as on the distribution of income among the various factor groups and institutions.

Before a detailed description of Botswana's 1993/94 SAM is offered, one should mention that since her independence in 1966, Botswana has produced seven SAMs. The first SAM was published in 1974/75. The 1996/97 SAM, the latest has been published. As is the international and standard practice, SAMs for Botswana cover principal accounts such as factors, households/institutions, activity/production, commodities, capital and the rest of the world. Rows represent income received by an account while columns cover expenditure for the same. Conventionally, for any SAM, "receipts must equal expenditure for each and every account", (McDonald *et al*., 1998, p.93).

6.2 Justification for and the description of Botswana's 1993/94 SAM

The 1993/94 SAM was selected for this study because it represented a normal performance of agricultural sector and the aggregate economy (mining, manufacturing, food processing, tourism, finance, and so on). Specifically, the rainfall season during the 1993/94 season was normal in respect of the average area planted while the conditions of livestock, grazing and access to water were generally also normal. Agricultural output during 1993/94 was also normal and therefore representative of the country's average annual performance (Agricultural Statistics, 1996). With respect to the aggregate economy, the 1996/97 SAM, the latest to be published, did not differ markedly from the 1993/94 SAM. In particular, GDP sectoral contributions were almost similar between the two periods, implying very minimal structural differences. The diamond-led economy is still dominant in the two periods/SAMs followed by retail, restaurants and hotels (NDP 9, MFDP, 2003). As this study is also concerned about how household food security could be affected by international trade liberalization, it is also worth noting that both the 1993/94 SAM and the 1996/97 SAM relied on the 1993/94 HIES. The use of the 1993/94 HIES by both SAMs means household level characteristics are similar. In addition, since Botswana and her households are also affected by HIV/AIDS, a study on the macro-impact of the epidemic found that there was markedly very little difference between the two periods as the intensity of the scourge started after 1996 (UNDP, 2000). It is estimated that for adults it takes at least 10 years for the HIV infection to lead to death (UNDP, 2000).

In order to construct the 1993/94 SAM, data had already been compiled by CSO from national accounts, household income and expenditure, farm/agricultural, consumer price, industry and labour surveys. As remarked earlier, to produce this data set is time-consuming and costly, and requires high-quality standards in order for a SAM to provide consistent and comprehensive information of the kind described above.

The 1993/94 SAM was reorganized and reduced. The original SAM had about 150 rows and an equal number of columns, i.e. a 150 x 150 structure. To carry out this investigation the numbers of rows and columns were reduced equally to 59, that is, 59 x 59. In this reduced 1993/94 SAM, commodities and activities have been merged into one-to-one mapping so that each activity only produces one commodity. As a result of merging the activity and commodity account into a one-to- one mapping, the interpretation of the columns and rows is the same. That is, income received (in rows) by the activity is the same as that received by the respective commodity under a one-to-one mapping. Similarly, expenditure (in columns) by activities is the same as that of the respective commodity. Table 6.2 illustrates the reduced SAM used in this study.

As a result of the one-to-one mapping, unlike in Figure 5.1 of Chapter 5, Table 6.2 does not specifically show commodity accounts as these have been merged with the activity account. In Table 6.2 purchases by activities (column transactions between activities) constitute the use/absorption matrix while receipts of activities (row transactions) from other activities capture the make matrix. Table 6.2 also covers the key accounts such as factors, households/institutions, government, capital and the rest of the world (like in Figure 5.1) to have a full understanding of income and expenditure interactions in the economy. The decision to merge the commodity account with the activity account based upon one-to one mapping, was made to facilitate in the analysis and interpretation of results. In multi-commodity activity account, it is not possible to isolate the effects of a shock on several products if they all originated from one activity.

Further, following the adoption of a food security policy as part of the country's national agricultural policy in 1990 (see Chapter 2), Botswana also abolished monopoly sorghum imports by the Botswana Agricultural Marketing Board in 1992 so as to allow traders and individuals to obtain this important staple food from international markets. Prior to the adoption of this food security policy

objective, government had embarked upon a policy of basic food self-sufficiency, especially in sorghum, and had also granted a monopoly, to source imports, to BAMB. The choice of the 1993/94 SAM, it is assumed, will also adequately capture the sectoral and macro-economic wide effects of trade liberalization and market access on household food security and Botswana's agricultural sector. A SAM not only shows how income-is redistributed among households, it also shows the structure of the economy. The structure of the economy takes several years to change. Infact the description of Botswana's economy in Chapter 1 shows the dominance of the mineral sector for many years followed by trade, hotels, etc (NDP 9, MFDP, 2003). Further, it is assumed that adequate time has passed by to allow various economic players to adjust to pricing and marketing policies approved by government in 1990 when the food security policy objective was adopted.

6.2.1 Botswana's Macro-SAM

The description and analysis of the 1993/94 SAM will firstly start with a description of the macro-economic SAM for Botswana, and a detailed and disaggregated 1993/94 SAM will follow. A macro-economic SAM provides aggregated income and expenditure interrelationships among the major accounts (factors, households, institutions activities, government, capital and the rest of the world). In this SAM, government has been separated from other institutions such as households, while as a public activity, government has been aggregated under activities in the macro-SAM. The disaggregated SAM will provide further details concerning households/institutions and activities. Table 6.1 illustrates Botswana's macro-SAM in millions of Pula by major account.

Table 6.1: Botswana's 1993/94 Macro-SAM

	EXPENDITURES							
								TOTALS
RECEIPTS								
	FACTORS	HOUSEHOLDS	O/INSTITUTIONS	ACTIVITIES	GOVT	CAPITAL	ROW	
FACTORS	0	0	0	10079.2	0	0	0	10079
HOUSEHOLDS	3801.4	0	0	0	462.4	0	46.8	4311
O/INSTITUTIONS	5763.6	0	0	0	1574.9	0	753.4	8091
ACTIVITIES	0	2660.8	121.6	4292.7	3301.3	1303	5220.7	16779
GOVERNMENT	513	425.3	4590.9	578.7	12461	248.2	1067.3	21058
CAPITAL	0	321.9	2055.5	0	3654.1	0	-1123.2	2853
REST/WORLD	0	903	1323.4	1827.9	1179.1	1301.6	2310.4	7522
TOTALS	10079	4311	8091	16779	21058	2853	8275.4	

Source: CSO, Botswana, 1999.

As is the SAM convention, receipts for each account must equal the expenditure of that account. For instance in Table 6.1, while the receipts or income for the factor account total P 10079 m, equally the total expenditure for the account is the same amount. As indicated in Chapter 5, receipts are recorded in rows while expenditures/outlays are registered in columns.

In general, while households are normally grouped together with other institutions in most SAMs, in this study, however, the two have been separated because the investigation is primarily concerned with individual household food security. Private companies and state-owned organizations/ institutions are not the focus of this study, hence their sources of income/receipts and expenditure have been separated from individual households in the macro-SAM. As a result of this reorganization, the macro-SAM contains seven principal accounts, namely, the factors, household, other

institutions, activities, government, capital and the rest of the world. Below follows a brief description of sources of income/receipts and expenditure by principal/major account, following the separation of households from other institutions. The analysis will examine the major sources of income/receipts and expenditure by principal account.

6.2.1.1 Factor Account

Receipts or income for the factors all derive from the principal activity of the macro-SAM shown in Table 6.1. Labour and capital are the only factors covered. This is consistent with economic theory, since activities, including services, employ factors such as labour and capital to produce goods. These activities are shown in Table 6.2, ranging from Traditional Agriculture-cattle/P_1 to Services/$P_{40\text{-}43}$. Activities employ factors and remunerate/pay them for their services.

Insofar as sources of expenditure are concerned, factors are owned by households and institutions, including government, Hence these are the principal accounts in which the factor account spends its income. Figure 6.1 shows the percentage share of expenditure of the factor account by principal account.

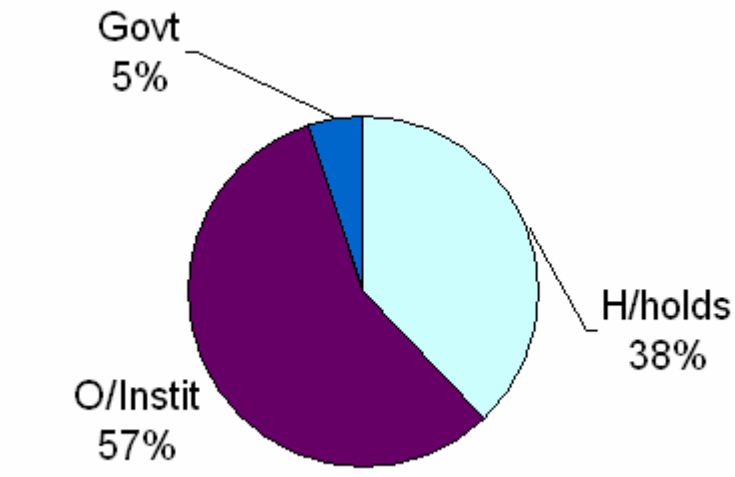

Figure 6.1: Sources of Factor Expenditure by Principal Account

Other institutions, such as the private sector companies (banks, insurance, manufacturing, and the like), account for most of the expenditure by the factor account: about 57 percent of the total such expenditure. Households, which cover both citizen and non-citizen families, received about 38 percent of the total factor income. Government as an owner of factors also received about five percent of the total factor income. The low share of government in total factor expenditure indicates the dominance of the private ownership of the means of production. In countries where the public sector is the main owner of factors of production, government would account for a major share in factor expenditure.

6.2.1.2 Household Account

As owners of labour and capital, households (rural and urban, both citizen and non-citizen) received the bulk of their income (88 per cent) from factors (labour, capital, and so forth) while government, through income transfers, provided the next most important source of income (11 %). Figure 6.2 illustrates the income share of households by major account. Households also received income, partly in the form of remittances, from an insignificant one percent of people outside the country.

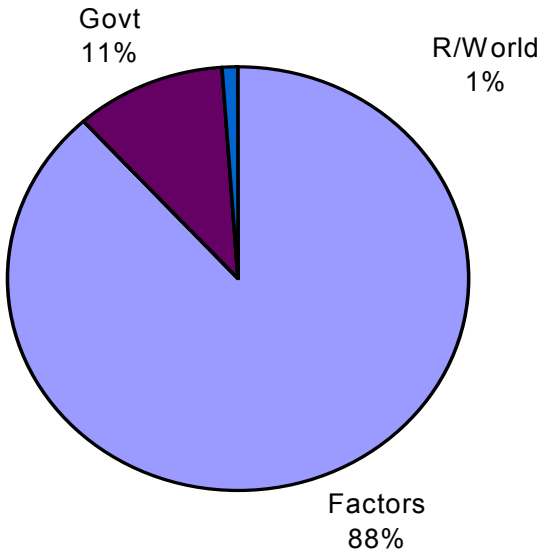

Figure 6.2: Percentage Share of total Household Income by Major Account

As far as household expenditure is concerned, Figure 6.3 shows the shares by principal account. Figure 6.3 shows that households spent about 62 percent of their income purchasing commodities produced by activities.

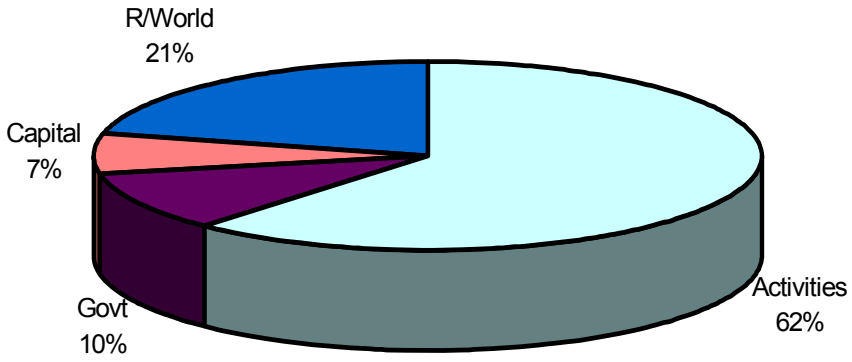

Figure 6.3: Percentage Share of total Household Expenditure

Commodities purchased by households include food, clothing, equipment, machinery and services. Besides purchasing goods from activities, households also spent about 21 percent of their income importing goods from outside or from the rest of the world(R/world).

While domestic household purchases are strongly dominant compared to purchases of the imports (62 % versus 21%), it is, however, still evident that the global market is important for household food security and welfare since the country is an open economy. Further, households paid government about ten percent of their income as tax while families disbursed another seven percent as investment (capital). As a proportion of total household income, investment accounts for a very small portion. Based on these results, it can be safely said that according to the 1993/94 SAM the greater proportion of household income is spent on consumption, as opposed to capital formation.

6.2.1.3 Other Institutions

The category of other institutions, as earlier indicated, covers private companies and state-owned organizations. Figure 6.4 portrays the share of income gained by other institutions by major account.

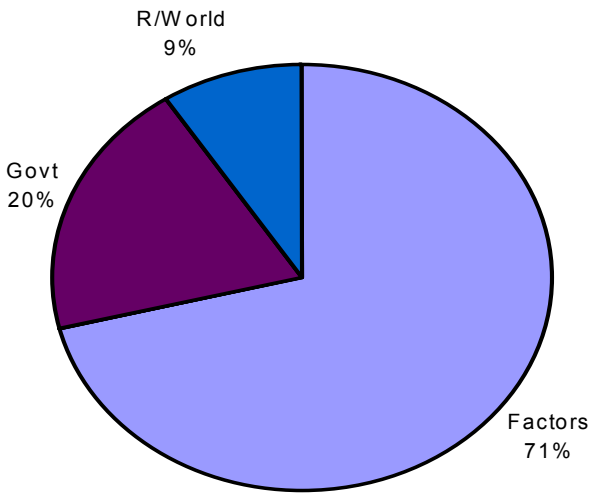

Figure 6.4: Percentage share of Income for Other Institutions

Figure 6.4 illustrates that as with households, factors accounted for most of the income of other institutions: about 71 percent of their income, while government in the form of grants/subsidies provided 20 percent. Some of the institutions benefited from government through financial grants for employment creation and manufacturing. In particular, government provided both labour and capital grants to these institutions. The rest of the world also provided other institutions with additional income worth nine percent of their total receipts during the 1993/94 SAM. Income from the outside world covers royalties, profits, and similar sources.

Other institutions spent their income as indicated in Figure 6.5. As expected, other institutions, a category which covers income-earning private companies in sectors such as minerals and manufacturing, disbursed a significant amount of their income on corporate tax. About 57 percent of their income

was paid to government as tax while 25 percent was used for investment or capital formation. About 16 percent was utilized to import goods and about two percent was used to purchase goods from activities.

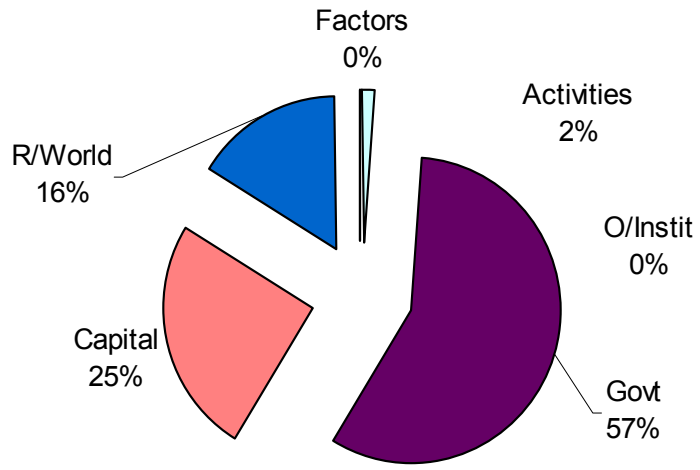

Figure 6.5: Percentage Share of Expenditure for other Institutions

6.2.1.4 Activity Account

The principal activity account received income from several sources. As indicated earlier this account obtains income by selling its goods and services in both the domestic and external markets. Figure 6.6 indicates the percentage share of the activity income by major account.

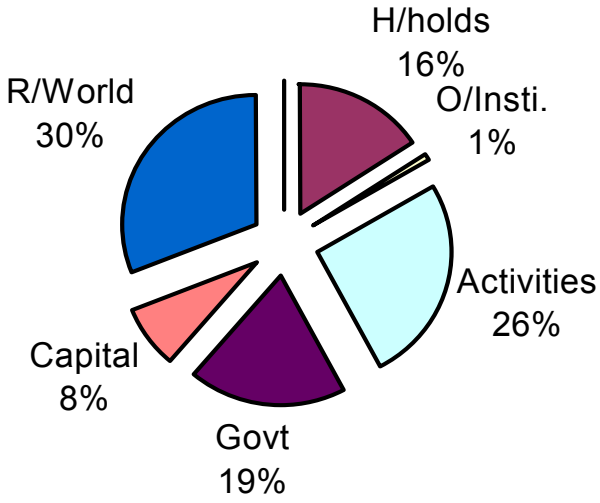

Figure 6.6: Income Sources of the Principal Activity Account

Figure 6.6 illustrates the breakdown of income sources for the principal activity account by major economic players during the 1993/94 SAM. External trade contributed 30 percent of the account's total income through exports commodities, while activities traded among themselves to contribute 26 percent of the principal activity's income. Activities purchase intermediate inputs and services from others and in this way generate income among themselves. Government provided the third largest source of income to the activity account. About 19 percent of the total account's income was derived from government. Government purchases goods and services from productive activities. Households came fourth, accounting for 16 percent of the total activity income/receipts. As households constitute final demand, they purchase commodities (food, clothing and other goods) from activities to meet their consumption requirements. Further, the capital account also purchased goods from activities for the purposes of investment. About eight percent of the activity income stemmed from the capital account. Other institutions contributed only one percent of the activity's total income.

The activity account which as indicated earlier is combined with the commodity account disbursed its income as shown in Figure 6.7. About 60 percent of the activity income was spent on remunerating factors (such as labour and capital). Factors derive their income from activities that engage their services. After expenditure on factors, the activity account spent about 26 percent of its income on purchases between the activities themselves. Purchases among activities themselves include input orders as well as payment for services regarding the production of goods. About 11 percent was used by the activity account to import intermediate inputs while three percent was spent on government taxes. Activities pay sales tax and import duties on inputs to government.

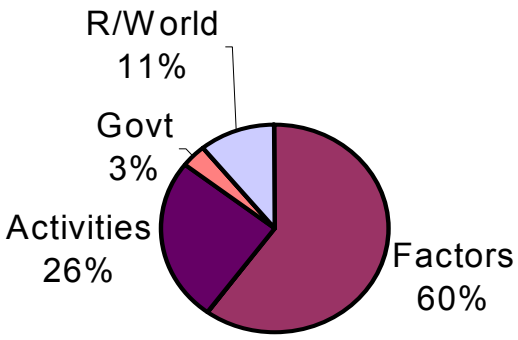

Figure 6.7: Percentage Share of Activity Expenditure by Principal Account

6.2.1.5 Government Account

As far as government receipts are concerned, income was obtained mainly from government itself by the sale of public services. Figure 6.8 illustrates the percentage share of government revenue by principal account.

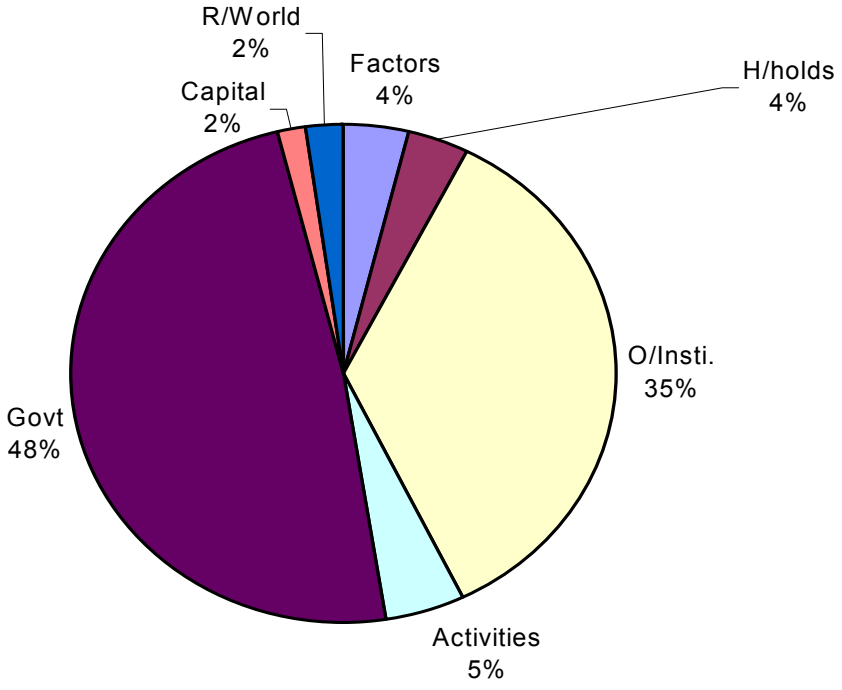

Figure 6.8: Percentage Share of Government Revenue by Principal Account

From figure 6.8, it is evident that almost half of government income was derived from the public institution itself. About 48 percent of government

income during the 1993/94 SAM came from its own organs through the provision of governmental goods and services. As a provider of public goods, government generates its own output, which in turn is consumed largely by itself (1993/94 SAM, CSO, 1999, p.26). The private sector is generally very reluctant to participate in the production of public goods owing to limited exclusion as other agents can freely benefit without investing. The market for government goods is very limited outside government itself, hence the significant income generated from within. Besides government, other institutions accounted for 35 percent of government receipts, by paying corporate taxes. These mainly comprise private companies that include the diamond, manufacturing and service industries (banks, insurance companies, etc). While activities contributed about five percent, households and factors each also accounted for four percent of government income. Activities pay government sales tax as well as duties on imported inputs. Households pay income tax while factors contribute to government revenue by paying tax on capital, in particular. Figure 6.8 also indicates that about two percent of amounts were received from the rest of the world as interest payments on external savings while another two percent represented interest payments on capital invested locally.

As far as government expenditure is concerned, Figure 6.9 illustrates the percentage share by major account.

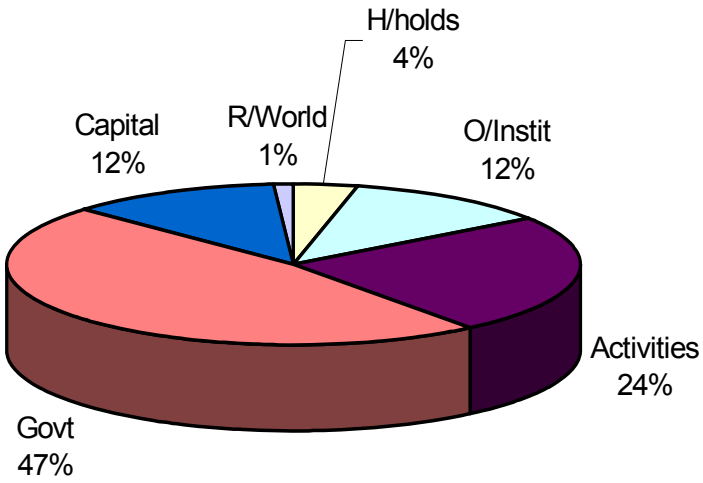

Figure 6.9: Percentage share of Government Expenditure by Major Account

Figure 6.9 indicates that government accounted for most of its own expenditure in the provision of public goods (education, infrastructure, health, and so on). About 47 percent of total government income was spent on public services while 24 percent was used to purchase goods and services from productive activities. About 12 percent each was spent on other institutions and capital. Other institutions received grants/subsidies for manufacturing or employment creation while some funds were used for investment in capital goods (such as equipment and machinery). Households also received about four percent as income transfers from government while one percent of expenditure went on imports. Of late, government expenditure has been increasing owing to the prevailing HIV/AIDS scourge, which could prejudice the development of other important public goods. Already some projects have been shelved pending an improvement in government revenue. Cost-recovery measures by means of increasing fees and reduction/removal of subsidies are being introduced and explored. A broadly based value added tax (VAT) has also been introduced recently in order to diversify and increase public revenues.

6.2.1.6 Capital Account

Regarding the capital account, receipts or income have been obtained from several sources. Income from the capital account constitutes domestic and external savings. Figure 6.10 captures the percentage share of capital receipts/savings by major account.

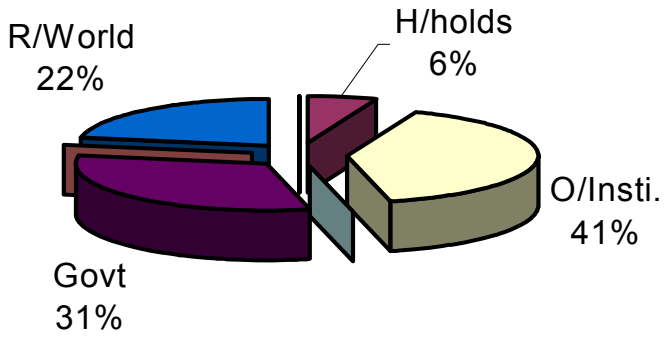

Figure 6.10: Percentage Share of Capital Income by Principal Account

Figure 6.10 portrays the breakdown of capital receipts by major account. Other institutions accounted for 41 percent of savings. These institutions include private and state-owned companies engaged in banking, insurance, diamond, manufacturing and service industries, etc. After these institutions, government comprises the next most important source of savings, accounting for about 31 percent of capital receipts. Additional and unspent funds, mainly from diamonds, account for government savings. The relatively large share of government's contribution to capital income partly shows the limited role in particular, of individual households as well as other institutions in capital mobilization. The rest of the world is the third most important source of capital receipts, accounting for 22 percent. Capital receipts from outside the country constitute foreign capital inflows, which are also critical for economic diversification as well as for enlarging the role of the private sector in the country. Households contributed the remaining six percent of the total capital receipts. Unlike the situation in other developing countries such as those in southeast Asia, where household savings account for at least 20 percent of

total capital income, Botswana is still lagging behind. While efforts are being made to encourage household savings, government has in the meantime played a crucial role in building savings.

Insofar as capital expenditure is concerned, Figure 6.11 provides the breakdown by principal account.

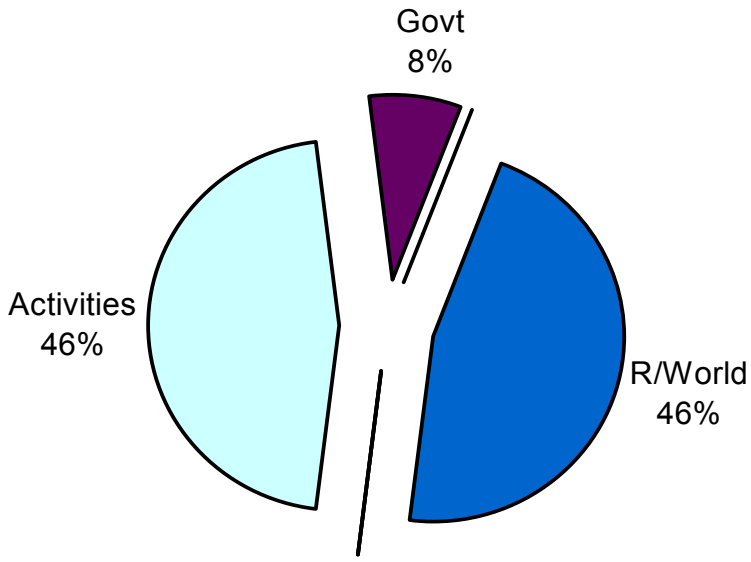

Figure 6.11: Percentage Share of Investment by Principal Account

Imports and activities received most of the capital expenditure. About 46 percent of the total capital expenditure was used to purchase imported goods, for the purposes of investment, while the same percentage was spent on activities. Activities benefited from capital expenditure, as they also require machinery and equipment, etcetera, in order to increase output. Besides payments for imported capital and investment in the activity account, government borrowed about eight percent of capital resources for its own investment. It is worth noting that although government is one of the major sources of savings, in capital expenditure the private sector takes the lead. This could help to promote the development of competitive and sustainable industries.

6.2.1.7 Rest of the World Account

As far as the account for the rest of the world is concerned, several principal accounts contributed income as export earnings. Figure 6.12 indicates the percentage share of export earnings by major account.

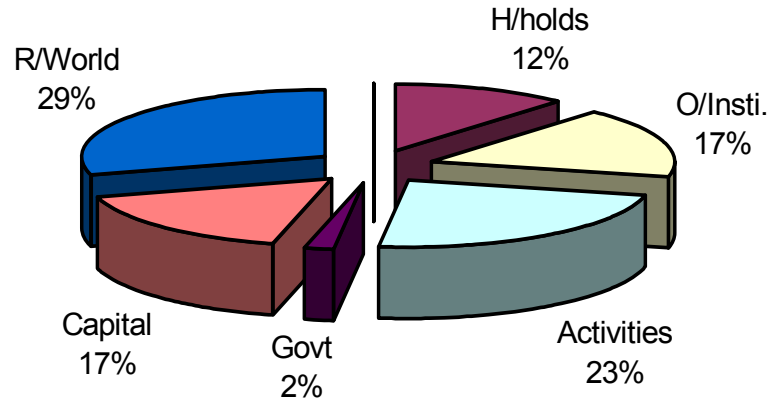

Figure 6.12: Percentage share of Export Earnings by Principal Account

About 29 percent of the income for the rest of the world originated from exports, while activities accounted for 23 percent of total income. Activities import goods as inputs from the rest of the world and in the process contribute income to the outside world. Other institutions and capital each contributed about 17 percent of the income for the rest of the world as import payments. Other institutions cover private companies as well as state-owned organizations. Imports by the capital account and other institutions altogether contributed 34 percent of the income for the rest of the world. Individual households imported goods, which accounted for about 12 percent of the income. Government accounted for the remaining two percent of the income for the rest of the world account.

Regarding expenditure, the rest of the world spent most of its income on activities. Figure 6.13 portrays the breakdown of expenditure incurred by the rest of the world account.

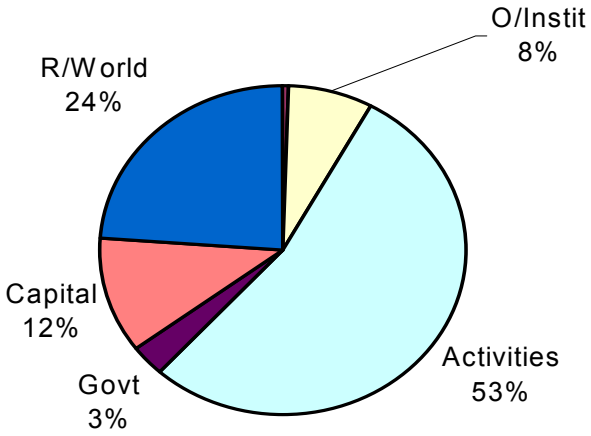

Figure 6.13: Percentage Share of Expenditure of the Rest of the World by Principal Account.

About 53 percent of the total expenditure by the rest of the world comprised payments for commodities exported by activities in Botswana. Consequently these import payments represented export earnings for the country. The rest of the world further spent about 24 percent of its income on paying for imports from other parts of the world. About 12 percent was disbursed as returns to capital (repatriated profits, etc) by the rest of the world, while other institutions benefited by about eight percent from the total expenditure of the rest of the world. This means that other institutions received income from outside the world as grants. The rest of the world also spent about three percent of its total income on government duties or taxes. A very insignificant amount (less than one percent) was spent by the rest of the world as remittances to households in Botswana.

In summary, the foregoing description and analysis of the Macro-SAM has indicated the broader interrelationships between and among the aggregate accounts, as well as offering an illustration of how SAM balances. Further, the Macro-SAM has demonstrated the circular flow of income and expenditure in the economy.

Below is a detailed description and analysis of a disaggregated SAM that will also underscore the common features of circular income and expenditure flows, as well as the overall balancing of the various accounts. Since the focus of this study falls on food security, agriculture and other linkages, including those within and between factors, households, activities and the rest of the world, the following description and analysis of the disaggregated SAM will concentrate on these relationships/linkages. Those activities and other sub-accounts where the income and expenditure relationships with household food security and farming are generally limited or weak will be accorded only a very brief description. The empirical analysis of the linkages will be undertaken in Chapters 7 and 8.

6.2.2 Botswana Micro-SAM

The disaggregated Botswana SAM for this study has been broken down into 59 sub-accounts, which cover the main accounts already described in the Macro-SAM. As the disaggregated SAM contains 59 sub-accounts, there are 59 rows/sub-accounts and 59 columns/sub-accounts. Rows represent income or receipts while columns record expenditures. As a result of this reorganization, this SAM is classified as a 59 x 59. Table 6.2 contains the disaggregated SAM for 1993/94(CSO, 1999).

Before describing the micro-SAM, it is also important to observe that unlike the SAM structure provided in Figure 5.1 of Chapter 5, in Table 6.2 there are no commodity accounts.

Table 6.2 Input-Output SAM for Botswana 1993-4

			ACTIVITIE																																
			F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	GOS	I1	I2	I3	I4	I5	I6	I7	Non-Fir	Fin	NP	P1	P2	P3	P4	P5-11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21
FACTORS	Prof. & Tech Employees - Cit	F1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.00	28.25	7.14	0.81	3.12	0.45	3.61	0.08	0.64	0.78	0.20	0.38
	Prof. & Tech. Employees - Non-Ci	F2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.82	1.17	0.65	2.54	0.90	0.83	0.41	3.09	1.02	0.27	0.50
	Admin & Manag. Employees- C	F3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.13	0.00	1.98	2.81	0.16	2.54	0.90	1.67	0.04	0.29	1.17	0.31	0.57
	Admin & Manag. Employees- Non-C	F4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.56	0.00	11.28	1.64	3.24	0.58	4.17	4.03	0.08	0.64	3.14	0.82	1.53
	Clerical Employees - Citizen	F5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.75	0.00	14.17	4.80	0.97	1.85	1.58	1.53	0.08	0.64	0.97	0.25	0.47
	Clerical Employees - Non-Citizen	F6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.28	0.01	0.05	0.07	0.02	0.04
	Skilled Manual - Citizen	F7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	0.00	149.66	16.63	4.13	9.93	17.36	3.33	0.64	4.80	7.04	1.84	3.43
	Skilled Manual - Non-Citizen	F8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	19.85	0.00	0.32	0.00	3.27	0.42	0.57	4.31	0.80	0.21	0.39
	Unskilled Employee	F9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.93	0.00	33.52	5.50	5.83	3.12	3.61	3.19	0.12	0.93	4.50	1.18	2.19
	Mixed Income	F10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	259.78	53.42	0.00	22.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Gross Operating Surplus	GOS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.23	3.05	77.39	3633.78	38.06	36.26	44.12	7.43	12.27	1.88	14.00	7.00	2.10	3.50
HOUSEHOLD	Urban Households - Wage Income	I1	287.08	0.00	77.93	0.00	284.55	0.00	365.33	0.00	208.67	38.78	28.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Urban Households - Self-employed	I2	35.52	0.00	46.39	0.00	9.33	0.00	43.85	0.00	15.77	120.12	66.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Urban Households - Transfers	I3	0.45	0.00	0.00	0.00	4.55	0.00	2.02	0.00	5.22	5.64	3.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Rural Households - Wage Income	I4	251.40	0.00	49.93	0.00	217.31	0.00	229.44	0.00	168.68	39.56	28.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Rural Households - Self-employec	I5	13.81	0.00	23.65	0.00	3.64	0.00	103.33	0.00	71.52	141.42	82.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Rural Households - Transfers	I6	3.79	0.00	1.49	0.00	2.28	0.00	18.45	0.00	45.67	24.21	14.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Non-Citizen Households	I7	0.00	297.90	0.00	196.36	0.00	5.53	0.00	91.29	0.00	11.26	15.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OTHER INSTITUTIOI	Non-Financial Enter	Non-Fin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5754.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Financia	Fin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private Non-Profit Institution	NP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Trad. Agric. - Cattle	P1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.04	14.57	3.35	38.74	26.78	13.28	7.32	0.00	0.00	0.00	0.00	7.42	0.02	19.77	0.61	0.39	99.33	24.26	0.03	0.00	0.14	0.00	0.00	1.01	0.00	0.00
ACTIVITIE	- Other	P2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.60	5.35	0.78	11.01	11.91	5.36	3.21	0.00	0.00	0.00	0.06	4.00	2.11	0.02	0.85	4.58	7.25	22.97	0.00	0.01	0.00	0.00	5.26	0.00	0.00	0.00
	Freehold Farms	P3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.45	3.02	0.50	6.75	6.70	3.08	1.91	0.00	0.00	0.00	3.97	2.08	6.70	0.02	0.36	49.20	5.24	5.21	0.03	0.08	0.00	0.00	1.76	0.00	0.00	0.00
	Hunting, Fishing & Gatherins	P4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.56	10.43	1.54	24.56	18.07	10.28	3.99	0.00	0.00	0.00	0.02	0.15	0.00	0.23	0.57	4.78	2.69	0.05	0.32	0.00	0.00	0.03	0.03	0.00	0.10
	Mining	P5-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.29	2.98	2.44	0.96	0.22	1.03	0.00	0.00	0.00	0.02	0.88	2.22	0.00	8.27	0.14	0.14	0.08	0.18	0.06	0.15	0.29	0.07	0.06	0.10
	Meat Processing	P12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.23	13.53	3.37	39.75	19.64	11.74	7.08	0.00	0.00	0.00	3.15	0.00	4.33	0.03	1.25	0.03	0.01	0.03	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00
	Dairy & Other Agric. Processing	P13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.28	13.13	2.27	35.94	26.88	12.13	6.67	0.00	0.00	0.00	1.25	0.11	2.08	0.02	0.30	1.10	15.88	51.33	15.02	0.56	2.96	0.35	2.75	5.50	1.42	0.05
	Beverages	P14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	81.08	16.03	3.90	57.92	16.02	15.75	23.23	0.00	0.00	0.00	2.40	0.00	0.44	0.00	0.00	0.04	0.25	0.01	4.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Textiles	P15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.76	3.64	1.24	15.34	2.74	3.24	3.00	0.00	0.00	0.00	0.50	0.00	0.11	0.02	0.02	0.17	0.17	0.07	0.09	20.03	0.13	0.11	0.19	0.00	0.00	0.00
	Chemicals	P16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.46	1.71	0.41	5.51	1.62	1.60	1.63	0.00	0.00	0.00	0.20	0.05	2.98	1.33	0.08	2.30	0.54	0.55	0.26	0.48	16.64	0.06	1.20	0.00	0.00	0.00
	Transport & equipmen	P17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.31	0.24	0.01	2.35	1.04	0.11	4.37	0.00	0.00	0.00	0.10	0.00	0.46	0.12	0.00	0.28	0.04	0.22	0.07	0.06	0.02	0.01	0.01	0.13	0.00	0.02
	Metal Products	P18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.37	8.55	2.30	26.33	5.90	7.27	7.60	0.00	0.00	0.00	0.90	0.27	2.39	0.57	0.31	6.11	0.00	0.76	8.39	0.01	0.01	2.54	17.84	0.00	0.00	0.00
	Bakery & Products	P19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.04	5.39	0.84	11.87	12.22	5.14	2.08	0.00	0.00	0.00	0.60	0.00	0.68	0.00	0.00	0.11	0.22	26.46	13.92	0.00	0.09	0.00	0.00	3.01	0.00	0.00
	Tanning & Leather Products	P20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00
	Wood & Products	P21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.89	0.02	1.85	1.05	0.94	0.20	0.00	0.00	0.00	0.10	0.00	0.72	0.02	0.05	0.22	0.31	0.04	0.06	0.18	0.01	0.00	0.02	0.00	0.00	2.11
	Paper & Products	P22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.67	0.83	0.20	1.14	0.22	0.27	2.76	0.00	0.00	0.00	0.69	0.28	0.24	2.72	0.22	0.85	1.02	0.59	0.08	0.01	0.09	0.01	0.00	0.00	0.00	0.00
	Village Industries	P23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.73	0.98	0.24	4.74	1.16	0.94	0.99	0.00	0.00	0.00	0.10	0.07	0.55	0.02	0.19	0.67	0.44	2.51	1.53	0.37	1.87	0.23	1.78	1.79	0.92	1.13
	Other Manufacturing	P24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.64	3.69	0.64	7.80	7.16	3.74	2.27	0.00	0.00	0.00	0.60	0.05	2.23	0.11	0.09	25.10	0.34	13.04	8.06	1.23	1.59	0.14	1.31	1.67	0.44	0.03
	Water	P25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.97	4.32	0.86	9.70	1.30	2.28	23.08	0.00	0.00	0.00	0.96	0.00	0.04	0.20	0.00	2.14	4.59	0.68	2.05	1.99	1.68	0.04	0.34	0.28	0.08	0.19
	Electricity	P26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	2.72	0.73	9.49	0.92	1.88	15.99	0.00	0.00	0.00	0.60	0.00	0.04	0.52	0.00	27.60	3.90	9.52	5.14	3.68	3.96	0.39	3.08	1.45	0.24	0.41
	Construction	P27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.28	3.18	0.96	10.73	7.84	2.41	7.28	0.00	0.00	0.00	0.50	0.02	0.81	8.66	0.00	98.08	7.18	24.95	17.20	2.48	1.95	0.12	0.92	3.43	0.22	0.82
	Trade	P28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	154.01	34.77	9.77	135.44	25.98	24.31	39.43	0.00	0.00	0.00	3.80	0.11	5.48	1.97	0.13	15.09	1.10	4.93	5.80	4.98	2.11	1.10	8.69	0.70	0.32	0.37
	Hotels & Restaurants	P29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.09	2.70	0.76	10.37	2.01	1.89	3.23	0.00	0.00	0.00	0.80	0.00	2.33	0.31	0.00	1.59	0.22	0.91	0.97	1.15	0.94	0.02	0.16	0.15	0.09	0.13
	Transport	P30-33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.95	9.13	2.87	30.46	6.36	5.95	21.34	0.00	0.00	0.00	1.20	0.10	4.56	9.41	0.00	37.00	0.42	9.82	7.33	2.92	0.94	0.16	1.23	0.16	0.29	0.53
	Communication	P34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.98	3.25	0.61	5.78	1.80	2.03	14.66	0.00	0.00	0.00	0.40	0.00	0.10	0.90	0.00	2.42	0.87	1.19	1.92	2.25	1.15	0.03	0.26	0.33	0.12	0.14
	Business Services	P35-37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.00	39.99	6.19	64.64	87.00	13.37	75.99	0.00	0.00	0.00	2.00	0.00	3.46	2.55	0.00	6.08	1.69	3.10	1.72	8.73	3.43	0.07	0.58	1.23	0.56	0.66
	Central Governmen	P38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.93	14.73	1.63	36.32	17.05	12.65	46.99	0.00	0.00	0.00	0.00	0.02	0.14	0.01	0.06	0.10	0.15	0.85	0.51	0.13	0.65	0.08	0.61	0.60	0.31	0.01
	Local Government	P39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.79	1.57	0.15	2.82	0.79	1.58	3.97	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.01	0.02	0.12	0.03	0.17	0.36	0.02	0.18	0.09	0.02	0.03
	Services	P40-43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.00	14.42	2.03	44.64	9.01	10.05	52.88	0.00	0.00	0.00	0.00	101.35	0.00	1.26	0.97	0.00	1.47	0.47	2.44	0.25	6.43	11.03	0.66	5.21	1.99	0.20	0.45
GOVERNMEN	Taxes on Products	F13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.46	3.26	2.18	32.09	21.31	16.74	8.06	0.00	0.00	0.00	0.00	2.12	3.58	9.23	0.67	55.45	35.94	22.49	20.97	5.77	10.60	1.34	10.72	5.92	1.12	1.81
	Taxes on Production	F14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	1.50	0.85	0.84	0.80	0.36	0.29	0.09	0.68	0.23	0.05	0.07
	Subsidies	F15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-2.90	0.00	-1.34	-8.15	-0.15	0.00	-7.51	-0.59	0.00	-0.35	-0.10	-0.10	-0.60
	Taxes on Income	R11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.19	4.34	0.23	17.35	2.63	0.11	46.01	1220.11	40.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Central Governmen	I17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	434.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Local Government	I18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	78.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TRANSFER	Consolidated Transfers	Transfer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.99	23.20	3.05	36.61	16.04	2.31	29.63	2403.25	899.30	28.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAPITAL	Consolidated Capita	Capita	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	218.64	57.09	-24.97	67.60	29.07	31.19	41.32	1626.74	364.15	74.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TRADE	Rest of the World	ROW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	203.51	39.18	11.29	250.78	147.98	106.12	144.02	1257.90	22.30	43.78	3.20	22.40	8.18	3.14	139.61	11.97	26.69	85.97	38.12	21.14	29.05	127.17	56.64	6.77	6.66	
	Calculated Tota		592.04	297.90	199.39	196.36	521.65	5.53	762.41	91.29	515.53	380.99	6515.74	1448.97	360.10	42.90	1058.87	479.01	267.56	653.25	6508.00	1315.85	268.06	277.41	131.31	119.59	107.51	4354.22	315.46	296.20	299.24	135.39	114.51	40.72	214.41	105.87	21.03	28.23

Source: Central Statistics Office, Ministry of Finance and Development Planning, Botswana , 199

Table 6.2 Input-Output SAM for Botswana 1993-4

continued I N P U T - O U T P U T -1993/

		P22	P23	P24	P25	P26	P27	P28	P29	P30-33	P34	P35-37	P38	P39	P40-43	F13	F14	F15	R11	I17	I18	Transfer	Capita	Calculated RoW	Tota
							FACTORS												HOUSEHOLD						
FACTORS	Prof. & Tech Employees - Ci	0.75	0.00	1.61	14.95	7.94	10.08	17.88	2.69	13.78	14.96	52.98	306.14	47.71	54.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	592.04
	Prof. & Tech. Employees - Non-Ci	0.99	0.00	2.12	1.30	7.48	46.86	7.36	1.11	5.95	4.39	33.46	81.75	5.11	63.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	297.90
	Admin & Manag. Employees- C	1.13	0.00	2.42	2.14	0.35	7.84	38.39	5.78	9.82	5.77	36.43	51.11	10.22	7.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	199.39
	Admin & Manag. Employees- Non-C	3.03	0.00	6.50	0.83	0.93	26.79	33.03	4.97	6.13	1.78	40.89	20.47	1.70	12.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	196.36
	Clerical Employees - Citizen	0.94	0.00	2.01	4.74	3.97	10.08	40.92	6.16	14.46	10.43	84.61	255.65	46.01	12.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	521.65
	Clerical Employees - Non-Citizen	0.07	0.00	0.15	0.00	0.00	1.68	0.32	0.05	0.59	0.00	0.87	0.00	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.53
	Skilled Manual - Citizen	6.78	0.00	14.56	12.22	18.57	110.90	81.83	12.32	30.75	7.55	45.58	143.15	28.97	23.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	762.41
	Skilled Manual - Non-Citizen	0.77	0.00	1.66	0.83	0.47	43.50	7.36	1.11	4.31	0.14	0.43	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.29
	Unskilled Employee	4.34	0.00	9.32	6.64	4.44	76.92	28.71	4.32	12.81	12.77	17.13	163.61	30.67	61.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	515.53
	Mixed Income	0.00	25.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	380.99
	Gross Operating Surplus	-4.90	0.00	16.88	50.33	102.18	375.45	487.90	130.90	163.09	87.38	798.11	434.89	78.84	-80.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6515.82
HOUSEHOLD	Urban Households - Wage Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	150.32	0.00	7.85	1448.97
	Urban Households - Self-employed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.05	0.00	0.59	360.10
	Urban Households - Transfers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.37	0.00	1.40	42.90
	Rural Households - Wage Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.25	0.00	4.24	1058.87
	Rural Households - Self-employed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.70	0.00	4.67	479.01
	Rural Households - Transfers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	129.51	0.00	28.09	267.56
	Non-Citizen Households	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.21	0.00	0.00	653.25
OTHER INSTITUTIO	Non-Financial Enter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	752.03	0.00	1.80	6508.00
	Financia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	624.72	0.00	751.60	1315.85
	Private Non-Profit Institutions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	198.20	0.00	0.00	268.06
	Trad. Agric - Cattle	0.00	0.02	0.07	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	1.01	0.06	3.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-31.89	0.80	277.41
ACTIVITIES	- Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	26.04	2.33	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.72	4.60	131.31
	Freehold Farms	0.00	0.00	0.00	0.00	0.01	0.06	0.16	0.21	0.07	0.00	0.12	7.45	0.46	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.39	119.59
	Hunting, Fishing & Gatherin	0.00	0.23	0.52	0.01	0.03	0.06	0.06	0.12	0.24	0.06	0.14	0.07	0.06	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	107.51
	Mining	0.01	0.14	0.34	0.03	20.54	21.92	3.13	1.83	2.33	0.13	1.30	3.74	0.38	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.11	4099.69	4354.42
	Meat Processing	0.00	0.00	0.01	0.00	0.00	0.34	0.22	0.12	0.20	0.04	0.29	0.86	0.04	4.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-16.27	173.86	315.46
	Dairy & Other Agric. Processing	0.00	0.85	2.66	0.12	0.02	0.10	10.53	0.16	0.51	0.23	0.65	7.37	0.47	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.78	5.85	296.20
	Beverages	0.00	0.00	0.00	0.00	0.00	0.55	6.01	0.00	0.00	0.00	0.02	0.13	0.01	2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.54	16.78	299.24
	Textiles	0.00	0.29	0.10	0.02	0.01	0.18	0.08	0.03	0.13	0.02	0.19	0.90	0.12	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-37.20	103.29	135.39
	Chemicals	0.00	0.03	0.08	0.35	0.03	3.77	1.35	0.18	0.17	0.00	0.11	31.25	1.48	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.93	17.03	114.51
	Transport & equipmen	0.00	0.02	0.05	0.04	0.08	1.15	0.10	0.05	1.16	0.02	0.14	1.29	0.13	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.20	3.96	40.72
	Metal Products	0.00	3.14	12.07	0.11	0.07	38.45	0.74	0.62	3.73	0.16	2.14	11.70	0.56	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	8.70	214.41
	Bakery & Products	0.00	0.00	0.00	0.00	0.00	0.18	0.01	0.04	0.00	0.00	0.01	3.24	0.18	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-18.36	26.22	105.87
	Tanning & Leather Products	0.00	0.09	0.29	0.00	0.00	0.09	0.02	0.00	0.01	0.00	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-6.73	25.82	21.03
	Wood & Products	0.00	0.11	0.33	0.01	0.02	7.77	0.17	0.04	0.19	0.04	0.62	2.15	0.14	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.53	2.87	28.23
	Paper & Products	17.95	1.70	4.36	0.03	0.04	1.36	1.59	0.49	2.73	0.30	1.90	39.79	2.35	3.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64	3.27	100.20
	Village Industries	0.00	0.51	0.67	0.08	0.01	6.79	0.31	0.09	0.35	0.15	0.45	2.96	0.20	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	5.43	47.80
	Other Manufacturing	0.02	0.37	0.44	0.34	4.99	7.63	5.70	0.60	5.71	1.16	4.66	6.53	0.41	3.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-40.71	110.35	205.17
	Water	0.42	0.35	1.10	10.12	1.45	4.61	2.37	0.73	3.37	0.51	2.91	12.80	1.12	8.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	136.95
	Electricity	0.58	0.46	1.46	3.26	5.67	16.90	5.28	2.22	2.74	1.65	4.52	25.36	1.85	9.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.53	198.50
	Construction	0.02	0.39	1.22	3.54	1.86	774.92	2.43	2.31	12.74	2.36	28.84	228.91	10.29	7.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	987.84	33.25	2314.57
	Trade	0.24	1.53	4.80	1.10	1.09	73.40	9.39	11.62	22.09	3.10	21.77	75.08	3.03	19.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	117.53	119.94	965.45
	Hotels & Restaurants	0.47	0.12	0.36	1.91	0.67	3.78	1.62	0.46	3.59	0.59	6.18	23.10	1.68	3.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	144.85	235.49
	Transport	0.03	0.56	1.75	0.65	0.19	26.02	26.33	8.24	52.15	8.34	15.30	119.04	11.85	13.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	132.58	604.74
	Communications	0.11	0.32	1.00	1.20	1.55	12.83	6.83	2.18	11.71	3.85	22.37	48.46	1.54	7.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.79	180.15
	Business Services	0.26	0.31	0.98	1.21	1.71	45.99	31.50	19.03	33.77	4.57	50.55	221.44	11.79	325.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.60	121.06	1334.37
	Central Governmen	0.02	0.19	0.60	0.03	0.01	2.33	0.10	0.03	0.13	0.05	0.15	0.71	0.07	0.29	0.00	0.00	0.00	0.00	2693.96	0.00	0.00	0.00	0.03	2886.22
	Local Government	0.33	0.11	0.35	0.07	0.04	1.05	0.10	0.04	0.30	0.01	0.20	0.25	0.04	0.25	0.00	0.00	0.00	0.00	0.00	301.31	0.00	0.00	0.00	319.21
	Services	11.56	3.53	10.80	2.94	1.63	33.65	2.80	3.20	14.08	0.91	11.87	20.32	1.78	11.59	0.00	0.00	0.00	0.00	175.31	9.12	0.00	0.00	41.04	688.37
GOVERNMEN	Taxes on Products	5.48	3.18	10.22	5.14	3.72	135.20	28.07	7.85	24.66	4.21	26.47	124.51	6.20	22.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	225.64	5.52	940.00
	Taxes on Production	0.27	0.07	0.54	0.14	0.16	5.60	0.80	0.20	1.17	0.12	0.78	0.00	0.23	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.84
	Subsidies	0.00	0.00	-2.85	0.00	0.00	-1.22	-1.30	0.00	0.00	0.00	-5.20	0.00	0.00	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-32.85
	Taxes on Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1367.06
	Central Governmen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	940.05	16.61	-32.85	1342.86	0.00	0.00	2723.14	0.00	0.00	5424.79
	Local Government	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	24.20	0.00	0.00	287.60	0.00	0.00	390.89
TRANSFERS	Consolidated Transfers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	942.70	50.70	0.00	0.00	308.40	4859.28
CAPITAL	Consolidated Capita	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1568.81	29.75	0.00	0.00	-1123.21	2830.23
TRADE	Rest of the World	48.54	4.13	93.65	10.51	6.56	378.99	75.26	2.79	143.01	2.37	24.42	383.06	9.21	58.75	0.00	0.00	0.00	0.00	44.00	0.00	-188.80	1301.41	2310.38	7521.82
	Calculated Tota	100.20	47.80	205.17	136.95	198.50	2314.57	965.45	235.49	604.74	180.15	1334.37	2886.34	319.29	688.37	940.05	16.84	-32.85	1367.06	5424.79	390.89	4859.30	2830.23	7521.82	

Soorce: Central Statistics Office, Ministry of Finance and Development Planning, Botswana , 199

The detailed description and analysis of Table 6.2 is now presented below.

6.2.2.1 Factor Account

To compile information on “Factor Payments” or value added, several surveys were conducted by CSO in order to generate the 1993/94 SAM. These surveys included Employment, the Census of Manufacturing and Construction and the Census of Production and Distribution (all in 1993) and Household Income and Expenditure for 1992/93 and 1993/94. Data from the National Accounts were also used extensively to construct the 1993/94 SAM.

There are eleven (11) sub-accounts/ sub-matrices under the principal factor account (see Table 6.2):

F1 - Professional & Technical Employees (citizen),
F2 - Professional & Technical Employees (non-citizen),
F3 - Administration & Management Employees (citizen),
F4 - Administration & Management Employees (non-citizen),
F5 - Clerical Employees (citizen),
F6 - Clerical Employees (non-citizen),
F7 - Skilled Manual Workers (citizen),
F8 - Skilled Manual Workers (non-citizen),
F9 - Unskilled Workers,
F10 - Mixed Income,
F11 - Gross Operating Surplus.

The first nine sub-matrices represent payments to or income received by employees, F1 to F9. Furthermore, the classification of employee categories is by skill and citizenship, except for employee category F9 where the classification was not based on citizenship, as at the time few unskilled workers who were non-citizens were employed in the economy. However, this

situation may change since Botswana has recently approved a policy to import unskilled workers for sectors such as agriculture.

Of the total factor income of P 10079m, 65 percent of it is dominated by gross operating capital/F_{11} or returns to owners of capital while the remaining income largely comprises wage income for F_1 to F_9. Mixed income/F_{10} accounts for about four percent of total factor income. Figure 6.14 illustrates the main sources of factor income based on a disaggregated 1993/94 SAM.

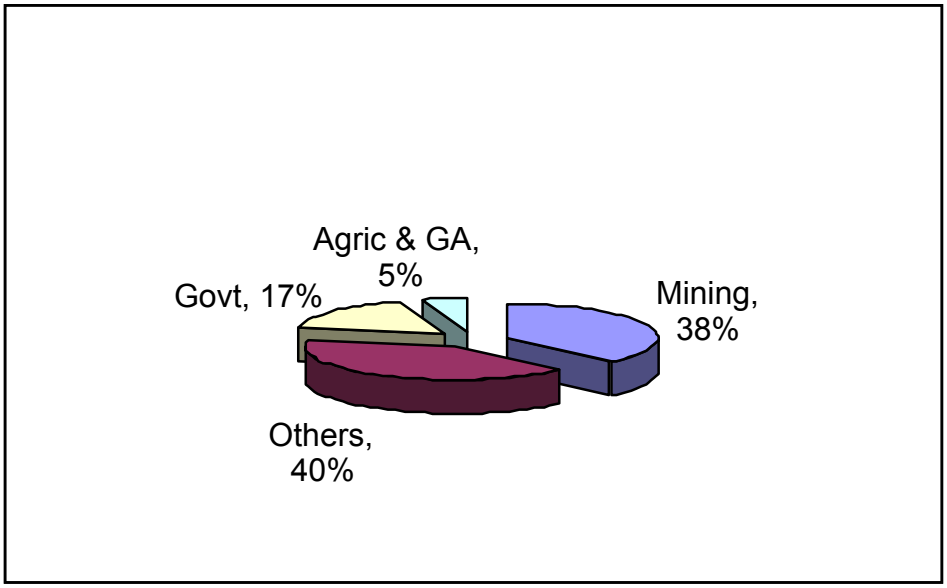

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Figure 6.14: Sources of Factor Income by sub-account

It is shown in Figure 6.14 indicates that other sectors (P_{12} to $P_{40–43)}$ and mining/$P_{5\text{-}11}$ in Table 6.2 accounted for about 40 percent and 38 percent respectively of total factor income. These activities include manufacturing, textiles, meat processing, transport, construction and business services. It is also evident that mining, dominated by the diamond industry, contributes substantially to factor income, especially through the gross operating surplus/F_{11}. Central and local government (P_{38} and P_{39}) contributed just 17 percent of the total factor income. Specifically, central government contributed the largest source of wage income to workers. Agricultural activities together with gathering, harvesting and hunting (P_1 to P_4) accounted for five percent while services/) contributed only two percent.

Regarding the distribution of total factor income, about 65 percent went to gross operating surplus/F_{11} as returns to owners of capital. Owners of capital here comprise institutions such as private companies and state-owned enterprises. Workers received only about 31 percent of total factor income. By examining the share of the income of citizens versus the income of labour, we derive very interesting results. As a proportion of total factor income, citizen wage income accounts for about 26 percent while non-citizen workers retain just five percent of the total factor income. The major beneficiaries of wage income among citizen workers are skilled personnel/F_7, professional and technical employees/F_1, clerical staff/F_5 and unskilled employees/F_9. Among non-citizen workers, professional/F_2 and administrative staff/F_4 gained most from wage income. Central and local government, mining, trade, construction and business services were the main sources of wage income (accounting for at least 60 percent) for professional, technical, administrative, clerical, skilled and unskilled personnel, both citizens and non-citizens. Except for mixed income/F_{10}, agriculture contributes minimally to wage income. Mixed income represents factor income that is derived mainly from traditional farming.

When we examine the expenditure of total factor income by the disaggregated principal account, we find that, as expected, all the income is received by owners of factors, namely households (citizen and non-citizen), other institutions and government. Figure 6.15 illustrates the breakdown of total factor expenditure by disaggregated principal account.

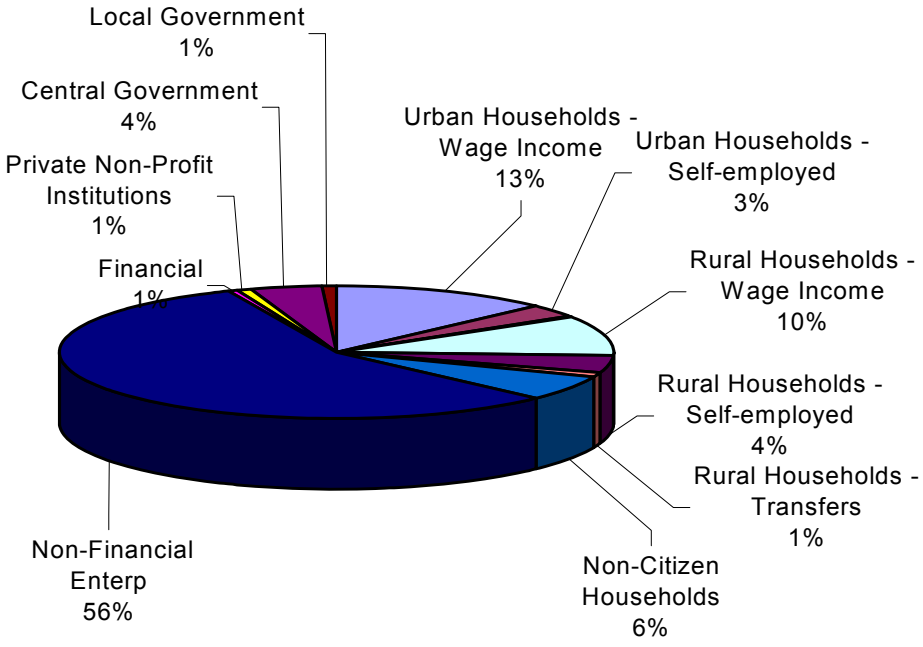

Figure 6.15: Sources of Factor Expenditure by Sub-Account

From Figure 6.15, it is evident that non-financial enterprises/institutions received most of the total factor expenditure (56 %). Non-financial enterprises cover private and state-owned organizations such as mining, manufacturing and business service companies. The diamond mining company dominates these institutions. Their gross operating surplus is the single largest source of income for non-financial institutions. The next most important institutions to benefit from total factor outlays are urban and rural households, both based on wage income. These received 13 percent and ten percent respectively of total factor expenditure, through wages of professional, technical, administrative, technical, skilled and unskilled personnel. Other significant institutions that have benefited from total factor expenditure include non-citizen households (6%), self-employed rural households (4%), central government (4%) and self-employed urban households (3%). While households mainly benefited from total factor expenditure through wage income, central government gained from gross operating surplus, as one of the owners of capital. Local government, rural and urban households, based

on income transfers, and non-profit private institutions each gained about one percent from total factor outlay/expenditure.

6.2.2.2 Household Account

Because this study is largely concerned with improving household food security in Botswana through global trade liberalization, the income sources of household by type, as well as the ways in which households spend their income, will be extensively discussed. In the 1993/94 SAM, seven types of households are included of which the first six are classified as citizen, while the last is non-citizen. Citizen households are further divided into two broad socio-economic and geographic areas, namely urban versus rural. Within each broad socio-economic group, citizen households have been classified as wage-based, self-employed or those dependent on income transfers from government. In terms of this classification, the seven household types are as follows:

Urban households - wage (citizen)
Urban households - self-employed (citizen)
Urban households - transfers (citizen)
Rural households - wage (citizen)
Rural households - wage (citizen)
Rural-households - transfers (citizen)
Non-citizen households.

Before we examine the share of total household income by household type, the sources of total household income should be investigated. As one might expect most of the household income derives from factors (see Section 6.2.2.1 above), especially wage income. In Figure 6.16 we indicate different sources of household income based on disaggregated accounts. The different sources of income appear in table 6.2 of the reorganized 1993/94 SAM.

Figure 6.16 indicates that administrative, managerial and clerical personnel (AD & MC) contributed about 21 percent of total household income while both professional and technical (Prof & T) and skilled personnel (SK) each accounted for 20 percent of household income. Unskilled employees (UNSK) and government income transfers (GOVT/Tran) accounted for 12 and 11 percent respectively of total household income.

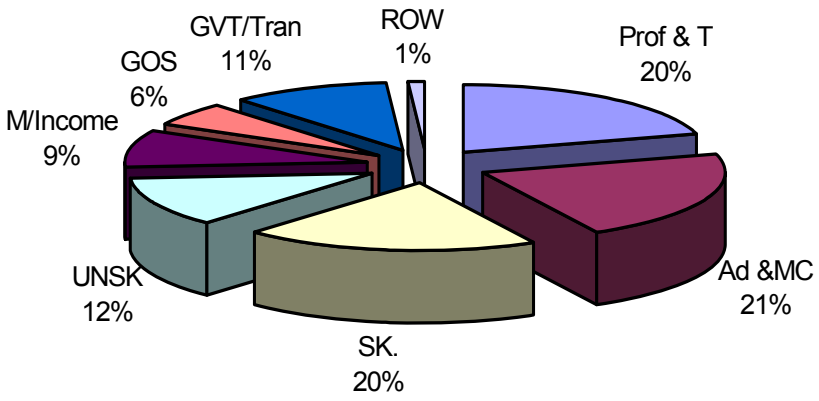

Figure 6.16: Sources of Household Income by Disaggregated Factor Group

Furthermore, mixed income (M/Income) and gross operating surplus (GOS) contributed nine and six percent, respectively, to total household income, as shown in Figure 6.16. Mixed Income covers receipts from the sale of farm produce, handicrafts, firewood, traditional beer, employment in herding livestock and working in arable farming, income from village industries, hunting and gathering, traditional healing, etc (SAM 1993/94, CSO, 1999, p.21). GOS covers returns to owners of capital.

Finally, the rest of the world (ROW), through remittances, provided just one percent of the total household income. ROW covers remittances from workers outside the country. ROW used to be a significant source of income while mine workers from Botswana were employed in South Africa during the 1970's. It is evident from Figure 6.16 that those households that do not have employed members, especially in the relatively high-income areas such as professional, technical, managerial, administrative and skilled categories, face

serious food and income insecurity. We now examine the share of total household income by household type. Figure 6.17 illustrates the breakdown.

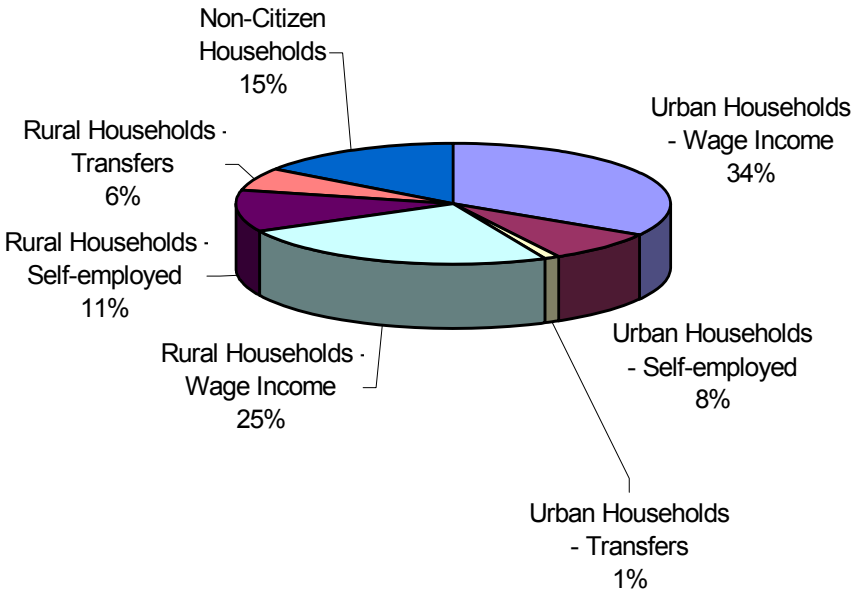

Figure 6.17: Share of total Household Income by Household type

Figure 6.17 shows that urban households who received wage income gained the largest share of total household income, followed by their rural counterparts. Whilst the (citizen) urban households reliant on wage income accounted for about 34 percent of the total household income, (citizen) rural households also dependent on wages received 25 percent of the household income. This means that citizen households in both urban and rural areas which were dependent on wage income, altogether accounted for 59 percent of total household income during the 1993/94 SAM. Wage income from professional, technical, administrative, managerial, skilled and unskilled personnel accounted for almost all income among the wage-based citizen households.

Further, non-citizen households came third, by receiving 15 percent of total household income. This is a result of the large number of foreign workers in the relatively high- income professional, technical, administrative, managerial

and skilled groups. Government has since intensified training in these scarce skills in order to reduce dependency on foreign workers.

Rural households whose income is dependent on self-employment accounted for 11 percent of total household income while their counterparts in the urban areas of Botswana received about eight percent of household income. Citizen households in both rural and urban areas which were together dependent on self-employment received 19 percent of total household income. For citizen households reliant on self-employment, mixed income/F_{10} and wage employment constituted the key sources of income. The two sources contribute at least 50 percent of total household income.

Citizen households with an income derived from transfers altogether received seven percent of total household income. While rural households depending on such income transfers accounted for about six percent of total household income, their urban counterparts only received one percent. Government income transfers and mixed income are the major sources of income for citizen households largely dependent on income transfers. The two sources account for at least 50 percent of total household income among these households.

Based on results in figure 6.17, it is therefore evident that citizen households whose income is based on transfers constitute the poorest families in the country and therefore face food insecurity. As these impoverished households spend a significant proportion of their disposable income on food and other basic commodities, this study will examine how international trade liberalization could contribute to their food security. Chapter 4, which dealt with partial equilibrium analysis, indicated that the reduction of tariffs and subsidies improves the overall consumer surplus as well as welfare but the results did not indicate which consumers/households are affected. Chapters 7 and 8 examine this aspect by employing the SAM-based approaches.

Insofar as total household expenditure is concerned, Figure 6.18 illustrates the breakdown. The figure shows that purchases of goods and services from other activities accounted for about 50 percent of the total household expenditure for the seven socio-economic family types.

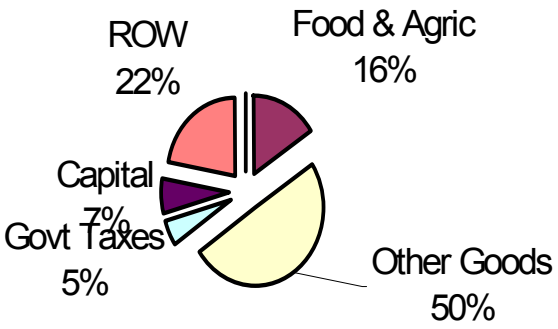

Figure 6.18: Household Expenditure by Sub-Account

These goods cover commodities and services produced by activities ranging from beverages/P_{33} to services/P_{40-43} in Table 6.2, including mining/P_{5-11}. Goods such as beverages, clothing/textiles, leather, chemicals, furniture, electrical, transport equipment, housing and utilities form part of the essential household purchases. Imported goods came second and accounted for about 22 percent of total household expenditure. Food items, especially cereals, dairy and vegetables, constitute Botswana's major food imports. At least 70 percent of the country's requirements for these products are met from imports.

Thirdly, about 16 percent of aggregate household expenditure was spent on food and other agricultural commodities produced by all primary activities, i.e. traditional agriculture/ $P_{1,}$ other agriculture/P_2 and freehold farming/$P_{3,}$ gathering, harvesting and hunting/$P_{4.}$ Commodities originating in primary agriculture cover purchases of livestock for meat and milk as well as grains (maize, sorghum, cowpeas, etc.), while products from the veldt also form part of household expenditures. In addition to goods produced by primary agriculture, products of meat processing/P_{12}, dairy processing/P_{13} and the

bakery/P_{19} were included under food and agricultural purchases. Meat, dairy and bakery products are very important food items. If imported food items from ROW are included, the share of food and agricultural purchases in total household expenditure increases above the 16 percent indicated in Figure 6.18. Furthermore, households also used about seven percent of their income as savings (capital) while about five percent was paid by all households as taxes to government.

In order to evaluate the effects of international trade liberalization, it is important to understand how different households spend their income, as this would assist one in identifying those goods that could improve food security if markets are made more open and competitive. Table 6.3 records expenditure on goods/services by household type.

Table 6.3: Share of Expenditure on Goods/Services by Household type (%)

	Food & Agric	Others	Govt	Capital	ROW
Urban Households - Wage Income	14.11	49.21	5	16.4	15.27
Urban Households - Self-employed	19.41	50	2.2	16.95	11.63
Urban Households - Transfers	31.71	96.55	6.1	-62.64	28.32
Rural Households - Wage Income	16.49	47.52	4.84	6.61	24.53
Rural Households - Self-employed	26.39	42.75	5.17	-6.28	31.96
Rural Households - Transfers	23	42.4	6.35	-11.76	40
Non-Citizen Households	5.17	56.44	8.67	6.63	23

Source: 1993/94 SAM, CSO, 1999.

Table 6.3 shows that wage-based households in both urban and rural areas spent less than 20 percent on food and other agricultural items/goods, including primary goods produced by activities P_1 – P_4. However, if imported food is included, then these households also exhibit a proportionally higher food-related family budget. About 50 percent of total expenditure by wage-based households in both urban and rural areas was spent on other goods. While wage-based households in urban areas spent about 49 percent of their income on other goods such as clothing, transport, equipment and furniture their rural counterparts used about 48 percent of their income on similar

goods. Further, wage-based urban households disbursed almost the same amount on savings (16.4 percent) as imports or the rest of the world (15.3 percent). Their rural counterparts spent more on imports (24.5 percent) but saved only 6.6 percent of their income. Both households paid government the same amount of their total income in taxes (5 percent).

With respect to self-employed households, the expenditure trend is similar to that of wage-based households. While self-employed households in urban areas disbursed about 19.4 percent of their income on food and other agricultural primary products, their rural counterparts used 26.4 percent of their total family income on similar commodities. On purchases of other goods and services from other activities, self-employed urban households spent about 50 percent of their income on these items while their rural counterparts used 43 percent of their disposable income. In general, relative to urban areas, goods/services such as housing, utilities and clothing tend to be cheaper in rural areas. For instance, land costs are almost negligible in rural areas. Land in the rural areas is generally free; hence lower fixed costs apply.

Whilst self-employed households in urban areas used about 17 percent of their income as savings (capital), their rural counterparts instead drew on their savings in order to finance household expenditure. Specifically, self-employed households withdrew about 6.3 percent of their savings to pay for their household expenditure. Drawing from savings could also imply unreliable or risky regular sources of income for such households. Agriculture is an important source of income among self-employed households. Given the high frequency of drought as well as disease outbreaks, it is not surprising that self-employed households resort to drawing from their savings.

On imported goods, self-employed households in the urban areas disbursed about 11.6 percent of their total income while those in rural areas used almost a third (32 percent) of their disposable income. Once again, imported goods also cover food items, which, as in the case of wage-based households, increase the proportion of the food budget among self-employed households.

With respect to government taxes, self-employed households in the urban areas paid over about 2.2 percent of their income while their rural counterparts contributed 5.2 percent of their total income to government. Part of the reason for this disparity between the two could be that many rural households own cattle, the income from which is subject to tax.

Households dependent on income transfers spent at least 20 percent of their income on food and agricultural primary products, including the gathering of these. As indicated in Figure 6.19, such households accounted for just seven percent of total household income in the country during the 1993/94 SAM. Households reliant on income transfers constitute the poorest families in Botswana.

Whereas urban households dependent on income transfers spent about 32 percent of their income on food and other primary products from agriculture, gathering, harvesting and the like, their rural counterparts used 23 percent of their income on similar goods. The disparity in food-related expenditure between the two household types possibly results from the fact that in rural areas some of the food is easily obtained from relatives and commodity prices are less, owing to lower transportation and marketing costs than in urban areas. Despite the disparity in food-related expenditure, the share of the budget disbursed on the food sector is relatively high for poor households. This will also be examined in detail in Chapter 8 when a policy experiment on tariff reduction/price changes is undertaken.

Where purchases of other goods are concerned, Table 6.3 indicates that households dependent on income transfers in urban areas used almost all their income, about 96.6 percent, on these items that technically prejudiced other household consumer and capital items. As shown in the table, these households drew down their savings by 62.6 percent in order to finance additional expenditure. As for households dependent on similar income in the rural areas, about 42.4 percent of their income was disbursed on other goods. Like their urban counterparts, rural families based on income transfers also

drew down their savings by 11.8 percent to finance additional household expenditure. In general, impoverished households tend to utilize their savings and other assets to finance basic household expenditure.

With respect to imported goods, while urban households based on income transfers used about 28.3 percent of their income to pay for these goods, their rural counterparts surpassed them by spending 40 percent of their total income on similar commodities. Imported goods once again cover food items, among other goods. As a result, the proportion of the food budget among households dependent on income transfers is higher than that captured in Table 6.3. With this relatively high proportion of imported goods purchased by impoverished households, in particular, coupled with the unsuitability of Botswana's land resources for most food and agricultural products, it is important that trade liberalization through tariff reduction, *inter alia,* is advocated and supported so as to enhance food and income security

6.2.2.3 Rest of the World (ROW) Account

Figure 6.19 shows sources of income for the rest of the world (ROW). Total ROW income represents Botswana's total bill of imports from other countries. Imports from other parts of the world accounted for about 29 percent of the total income, while other activities ($P_{5\text{-}11}$ to $P_{40\text{-}43}$ in Table 6.2) in Botswana imported inputs, which contributed 23 percent of the income spent outside Botswana. Activities purchase raw materials from outside Botswana for the purpose of the production of final goods. Imports by capital and other institutions each accounted for 17 percent of the ROW's total income. Capital imports cover foreign investment, while other non-financial institutions imported goods. Households imported goods including food, which contributed about 12 percent of the ROW's income. Wage-based households in both urban and rural areas accounted for at least 50 percent of total household expenditure on imports. Imports by primary agriculture including gathering activities (P_1 to P_4 in Table 6.2) contributed less than one percent of

the ROW's total income, while government together with transfers accounted for two percent of the ROW's total income.

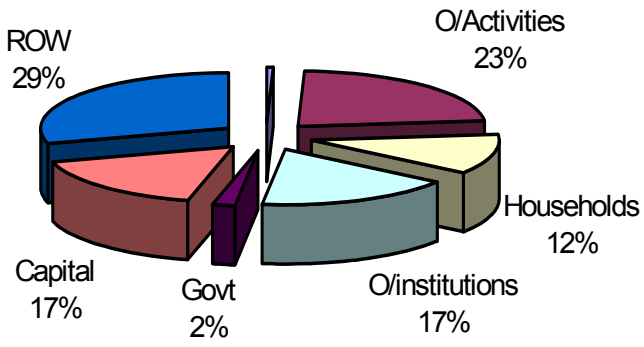

Figure 6.19: Sources of Income for the ROW Account by Sub-Account

Insofar as the ROW's total expenditure is concerned, this represents income to Botswana accruing from the country's exports (diamonds, textiles, meat, tourism, etc). Specifically, ROW's total expenditure is equal to Botswana's total export revenue from international trade. In Figure 6.20, the rest of the world disbursed about 54 percent of its expenditure by paying for exports from products generated by several activities in Botswana. These include minerals, textiles and meat. Furthermore, ROW also paid for other imports from Botswana, which accounted for 24 percent of total expenditure. About 11 percent was paid to Botswana as capital revenue. This covers profits, dividends, and the like from investments made outside the country. Other institutions received eight percent from ROW as remittances and so forth, while government earned about three percent as import duties. Primary agriculture and households received less than one percent from ROW.

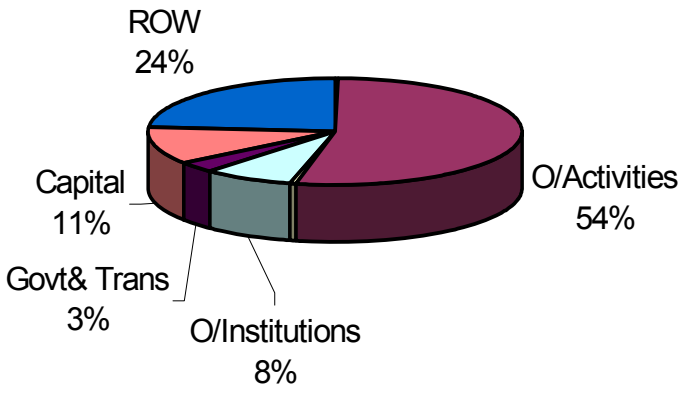

Figure 6.20: Sources of Expenditure for the ROW Account by Sub-Account

It is evident from Figure 6.20 that exports originating from several productive activities in Botswana provide the country with valuable foreign exchange earnings. These earnings are in turn used to import food, inputs, technology, machinery, etc. ROW also provides government with import tariff revenue. In view of the relatively large contribution of exported goods to the country's total export revenue, it is important that improved market access is pursued in order to increase foreign earnings for the purposes of food security, development and economic diversification.

The next two chapters analyze the effects of various policy shocks/experiments on the food security/welfare and competitiveness of Botswana's economy and agricultural sector, in particular. Specifically, both the fixed-price income as well as the price multiplier analysis described in chapter 5 will be used to examine the effects of international trade liberalization on food security and agricultural competitiveness in Botswana.

CHAPTER 7

POLICY SIMULATIONS/EXPERIMENTS USING SAM ACCOUNTING MULTIPLIERS

7.1 Introduction

In Chapter 5, it was indicated that both accounting income and price multipliers would be used in this study, in order to analyze the effects of international trade liberalization on household food security and agricultural competitiveness in Botswana using SAM-based models. In this chapter accounting-income multiplier analysis are used to examine the effects of global trade liberalization on food security in Botswana. Under SAM-accounting multiplier analysis income is allowed to vary while commodity prices are held constant.

Specifically, Round (2003: 7-8) observes that SAM fixed-price multipliers rely on some strong assumptions such as “that there is excess capacity in all sectors and unemployed (or under-employed) factors of production… as prices are fixed, there is no allowance for substitution effects anywhere, at any stage”. Furthermore, some accounts are classified as endogenous while others are exogenous (see section 7.2 below). These assumptions imply that an increase in export demand or government expenditure/investment in the economy will not influence the domestic prices, supply constraints or the underemployment of factors of production.

While they might be true for certain economies or sectors of the economy, these assumptions might overstate or underestimate the SAM multiplier effects. In Chapter 8 we will relax one of these assumptions by allowing prices to vary following an external policy shock. In the global economy it might be true that for small countries like Botswana, factor or commodity prices may

not change, as such countries are price-takers. Suffice, to note that the fixed price multiplier analysis have limitations.

Whereas in terms of conventional Leontief input-output models, agriculture has low production multipliers, through the application of SAM multiplier analysis, the sector exhibits larger multipliers and very strong income and consumption linkages (Sadoulet and de Janvry, 1995). In conventional Leontief analysis, intermediate demand serves as a multiplier, of which agriculture shows low multipliers when this demand is considered. However, in the SAM income multiplier analysis, value-added or factor income is regarded as a leakage (in institutions such as households). As a result, value-added or factor income generates demand in the SAM, hence the higher income and consumption linkages by agricultural sector (Sadoulet & de Janvry: 1995, p. 291).

This chapter applies the SAM accounting fixed-price multipliers in order to analyze the effects of changes in income on household food security, through policy experiments that cover beef and textiles exports. These goods, in addition to diamonds, currently provide Botswana with foreign earnings to import food, other goods, services, etc. Diamonds constitute at least 70 percent of the country's total export earnings and about 50 percent of the government revenue (NDP 9, 2003).

Whilst the diamond sector has been the mainstay of the economy for almost three decades, Botswana still has a significant number of impoverished households. Diamond corporate tax revenue has been used by government to finance and promote sustainable economic diversification since the early 1980's by means of public assistance schemes. The textiles industry constitutes one of the key potential areas for diversification, as well as assisting the country to increase foreign earnings and employment opportunities (NDP 9, 2003). The beef sector, like diamond mining, still remains one of the traditional sectors for generating scarce foreign export earnings for the purposes of ensuring household and national food security.

Improved export earnings for developing countries, following enhanced market access in developed countries, constitute the main component of the Doha Development Agenda (DDA). In fact the DDA as contained in the Ministerial Declaration observes that:

> International trade can play a major role in the promotion of economic development and the alleviation of poverty. We recognize the need for all our peoples to benefit from the increased opportunities and welfare gains that the multilateral trading system generates. The majority of WTO members are developing countries. We seek to place their needs and interests at the heart of the Work Programme adopted in this Declaration. Recalling the Preamble to the Marrakesh Agreement, we shall continue to make positive efforts designed to ensure that developing countries, and especially the least developed among them, secure a share in the growth of world trade commensurate with the needs of their economic development. In this context, enhanced market access, balanced rules, and well targeted, sustainably financed technical assistance and capacity-building programmes have important roles to play (WTO, 2001).

In this regard, it is expected that countries like Botswana will advocate for improved market access to the developed countries by removing several trade barriers such as quotas, subsidies, tariffs, discriminatory sanitary and phyto-sanitary (SPS) and food safety measures. At least the results of the partial equilibrium analysis, the ATPSM, in Chapter 4 indicate that if developed countries, and major, players like the EU, USA and Japan reduce trade-distorting measures such as subsidies, quotas and tariffs, countries such as Botswana could possibly improve their export earnings from competitive enterprises such as beef. ATPSM results in Chapter 4 show that global trade liberalization in agriculture can improve beef exports for

Botswana but that there are other potential welfare losses (a decline in government revenue, consumer welfare, etc).

The loss in welfare is due to loss of preferences especially in the EU as producer price subsidies under the amber box provisions of the WTO-Agreement on Agriculture are considered as trade distorting (Agreement on Agriculture, WTO, 1995). As indicated in Chapter 4, the proposed tariff reduction formulas to liberalize global agricultural trade all include the reduction of the amber box provisions (direct farmer producer price and input subsidies) especially among major industrialized countries to improve competitiveness and export market access to developing countries. According to ATPSM, Botswana's beef exports are globally competitive. In all the four scenarios captured in ATPSM, it is evident that Botswana's beef industry is globally competitive primarily because of its relative higher comparative cost advantage in relation to other beef exporters/producers. While higher producer prices based on preferential market access to the EU play an important role in the industry, by and large, Botswana's relative success in the beef export industry is also largely depended on relative free land resources, suitable climatic conditions and public subsidies compatible with the green box provisions of the WTO-Agreement on Agriculture.

In addition, the World Bank (2002) has also confirmed in its study that the reduction or removal of agricultural subsidies by major trading players could increase export earnings for developing countries. The WTO is currently working on improving, in particular, market access for exports from developing countries, including agricultural and industrial goods. However, progress here has still remained elusive for most developing countries, as evidenced by several unsuccessful WTO Ministerial Conferences (Seattle, 1999; Doha, 2001 and Cancun, 2003). Below we briefly describe the steps that are followed to generate SAM income multipliers before we carry out the policy experiments.

7.2 Exogenous and Endogenous Accounts under SAM-Accounting Income Multiplier Analysis

Of the 59 accounts described in detail in Chapter 6, some are classified as endogenous while others are exogenous. In general, government (regarded as an institution not an activity), capital and the rest of the world are, normally, in terms of macro-economic theory, classified as exogenous factors while the rest are endogenous (see Chapter 5). An exogenous factor/account represents an account whose importance or influence in the economy is exogenously determined and through this account an external policy shock is introduced into an endogenous account(s). As in an econometric analysis, the exogenous account is an independent variable while an endogenous account is a dependent variable.

It is customary that government, capital and the rest of the world are classified as exogenous accounts (Pyatt and Round, 1985; Thorbecke, 1989 and 1994; Powell and Round, 1997; Arndt, Jensen and Tarp, 2000; Round, 2003). Specifically, Round observes, “government outlays are essentially policy determined, the external sector is outside domestic control and as the model has no dynamic features so investment is exogenously-determined” (Round, 2003, p.6).

Furthermore, in an open and small economy such as Botswana, the preceding assumptions about exogenous accounts are to some extent valid. For instance, government cannot realistically control capital or investment since investors are influenced by returns to their scarce resources. Following globalisation and recent easy movement of capital, several governments have placed limitations on the influence of capital flows and movement. Similarly, while government can to some extent influence trade transactions by means of export and import duties and the like, entrepreneurs are strongly influenced by other factors such as risks and profitability, as well as returns to their scarce resources including those of capital, labour and management. In carrying out policy experiments based on the SAM-multiplier analysis,

exogenous accounts are aggregated into a single account, which records an aggregate set of injections into the system and the leakages from it (Round, 2003, p.6).

In this present study, endogenous accounts range from "Professional and technical employees - citizen/P_1" under the category of factors through households, institutions until they end up at activity, "services/P_{40-43}" (see Table 6.2). There are 50 endogenous accounts in this study but one single exogenous account at time, to undertake policy experiments will be used.

To generate fixed-price income multipliers only endogenous accounts (factors, households/institutions and production activities) were used. The steps described in Chapter 5 of this study were followed.

Finally, before we analyze the results, one should explain how the results are interpreted after a shock has been introduced. For each policy shock, a table showing all the endogenous accounts, the entry of the shock into the endogenous account(s), the vector or multiplier matrix, $\mathbf{M_a^x}$**,** and the Stone's decomposed multiplier matrices, i.e. I, T, O and C are provided (see Table 7.1 below).

After $\mathbf{M_a}$ **'Dx**, columns showing the decomposed Stone's multiplier matrices follow (I, T, O and C). In order to check whether the aggregate $\mathbf{M_a}$ **'Dx** is indeed equal to Stone's additive multipliers, another column indicated as "check" is provided in the table. The difference between M_a 'Dx and the sum of Stone's additive multiplier matrices is zero and hence the "check" column should also show a zero value opposite each endogenous account.

7.3 Policy shock based upon an increase in beef export Income/Earnings

Beef export earnings, in general, are able to pay for Botswana's food import bill regarding basic cereals such as maize and sorghum, excluding dairy and

vegetable products (External Trade Statistics, CSO, 2003 & 2004). As a result, improved market access for Botswana's beef exports in industrialized countries, in particular, is expected to enhance food security by increasing domestic supply through imports. Additional supply from imports enables, *ceteris paribus*, households to purchase more food and other tradables. The domestic supply of beef in several industrialized countries is curtailed by high import duties, stringent sanitary and phyto-sanitary measures, rules of origin, technical barriers, etc (Ingco and Nash, 2004).

In this policy experiment, we introduce the external shock of an increase of beef export earnings in the reduced 1993/94 SAM with 50 endogenous accounts and analyze the effects of the shock on food security and activity accounts, in particular. Specifically, the shock is applied to the "meat processing/P_{12}" activity as the appropriate endogenous account for the policy experiment. The demand for imported food and other consumables at household and national levels depends, in part, on access to foreign exchange, which the beef industry also generates.

In addition, the beef industry exhibits very strong income and demand linkages in Botswana's economy (see Townsend & Sigwele, 1998). Below we analyze the effects of an increase of beef export earnings based on fixed-price income multipliers. Both the multiplicative aggregate multiplier developed by Pyatt and Round (1979) and the additive and decomposed multiplier approach used by Stone (1985) will be employed to analyze the results of the policy shock.

7.3.1 The Effects of an Increase in Beef Export Earnings/Income on Food Security based on the Multiplicative Multiplier Matrix ($\mathbf{M_a}^{\mathbf{x}}$)

Based upon the multiplier matrix, $\mathbf{M_a^x}$, when beef export earnings increase by ten percent, we observe the following effects at factor, household and activity levels. The ten percent shock is primarily based on ATPSM results which indicate that after global trade liberalization in agriculture, beef export

earnings in Botswana would increase by about 13 percent (see Chapter 4). A ten percent increase in beef export earnings or about P 17.386 million (column 3 under "shock" opposite the "Meat Processing/P_{12}" activity in table 7.1), generated an additional P 17.911 million in P_{12} (column 4 under Multiplier, $\mathbf{M_a * D_x}$) which in turn, by means of the movement of the income injection amongst endogenous accounts, also created demand for factors to meet the additional external demand. Table 7.1 records the effects of a ten percent increase in beef export earnings on factors, households and activities.

Table 7.1 An Increase in Beef Export Earnings

Income Multiplier Experiment

			Multiplier		**Stone**				
		Shock (Dx)	Ma * Dx		I	T	O	C	Check
Prof. & Tech Employees - Cit.	F1	0	0.859	0.15%	0.000	0.000	0.521	0.338	0.000
Prof. & Tech. Employees - Non-Cit.	F2	0	0.345	0.12%	0.000	0.000	0.139	0.206	0.000
Admin & Manag. Employees – Cit.	F3	0	0.604	0.30%	0.000	0.000	0.404	0.200	0.000
Admin & Manag. Employees - Non-Cit.	F4	0	0.505	0.26%	0.000	0.000	0.298	0.207	0.000
Clerical Employees - Citizens	F5	0	0.729	0.14%	0.000	0.000	0.390	0.339	0.000
Clerical Employees - Non-Citizens	F6	0	0.015	0.28%	0.000	0.000	0.010	0.005	0.000
Skilled Manual - Citizens	F7	0	1.851	0.24%	0.000	0.000	1.319	0.533	0.000
Skilled Manual - Non-Citizens	F8	0	0.089	0.10%	0.000	0.000	0.038	0.051	0.000
Unskilled Employees	F9	0	1.268	0.25%	0.000	0.000	0.917	0.351	0.000
Mixed Income	F10	0	7.118	1.87%	0.000	0.000	6.070	1.048	0.000
Gross Operating Surplus	GOS	0	6.893	0.11%	0.000	0.000	3.569	3.324	0.000
Urban Households - Wage Income	I1	0	3.205	0.22%	0.000	0.000	2.260	0.945	0.000
Urban Households - Self-employed	I2	0	2.665	0.74%	0.000	0.000	2.186	0.479	0.000
Urban Households -Transfers	I3	0	0.134	0.31%	0.000	0.000	0.108	0.025	0.000
Rural Households - Wage Income	I4	0	2.560	0.24%	0.000	0.000	1.827	0.733	0.000
Rural Households - Self-employed	I5	0	3.253	0.68%	0.000	0.000	2.667	0.586	0.000
Rural Households - Transfers	I6	0	0.638	0.24%	0.000	0.000	0.515	0.123	0.000
Non-Citizen Households	I7	0	1.181	0.18%	0.000	0.000	0.672	0.510	0.000
Non-Financial Enterp	Non-Fin	0	6.087	0.09%	0.000	0.000	3.152	2.935	0.000
Financial	Fin	0	-0.064	0.00%	0.000	0.000	-0.033	-0.031	0.000
Private Non-Profit Institutions	NPI	0	0.074	0.03%	0.000	0.000	0.038	0.036	0.000
Trad. Agric - Cattle	P1	0	7.073	2.55%	0.000	6.236	0.000	0.837	0.000
- Other	P2	0	0.661	0.50%	0.000	0.352	0.000	0.309	0.000
Freehold Farms	P3	0	3.255	2.72%	0.000	2.999	0.000	0.256	0.000
Hunting, Fishing & Gathering	P4	0	0.647	0.60%	0.000	0.276	0.000	0.371	0.000
Mining	P5-11	0	0.199	0.00%	0.000	0.113	0.000	0.086	0.000
Meat Processing	P12	17.386	17.911	5.68%	17.386	0.018	0.000	0.507	0.000
Dairy & Other Agric. Processing	P13	0	1.833	0.62%	0.000	1.091	0.000	0.742	0.000
Beverages	P14	0	0.678	0.23%	0.000	0.017	0.000	0.661	0.000
Textiles	P15	0	0.176	0.13%	0.000	0.014	0.000	0.162	0.000
Chemicals	P16	0	0.190	0.17%	0.000	0.092	0.000	0.098	0.000
Transport & Equipment	P17	0	0.045	0.11%	0.000	0.009	0.000	0.035	0.000
Metal Products	P18	0	0.454	0.21%	0.000	0.069	0.000	0.385	0.000
Bakery & Products	P19	0	0.420	0.40%	0.000	0.116	0.000	0.304	0.000
Tanning & Leather Products	P20	0	0.005	0.02%	0.000	0.002	0.000	0.002	0.000

Wood & Products	P21	0	0.060	0.21%	0.000	0.026	0.000	0.034	0.000
Paper & Products	P22	0	0.114	0.11%	0.000	0.041	0.000	0.074	0.000
Village Industries	P23	0	0.124	0.26%	0.000	0.048	0.000	0.076	0.000
Other Manufacturing	P24	0	0.345	0.17%	0.000	0.102	0.000	0.242	0.000
Water	P25	0	0.539	0.39%	0.000	0.296	0.000	0.243	0.000
Electricity	P26	0	0.552	0.28%	0.000	0.304	0.000	0.248	0.000
Construction	P27	0	1.792	0.08%	0.000	1.127	0.000	0.665	0.000
Trade	P28	0	1.709	0.18%	0.000	0.226	0.000	1.483	0.000
Hotels & Restaurants	P29	0	0.187	0.08%	0.000	0.044	0.000	0.143	0.000
Transport	P30-33	0	0.970	0.16%	0.000	0.382	0.000	0.588	0.000
Communications	P34	0	0.330	0.18%	0.000	0.108	0.000	0.222	0.000
Business Services	P35-37	0	2.382	0.18%	0.000	0.323	0.000	2.059	0.000
Central Government	P38	0	0.579	0.02%	0.000	0.016	0.000	0.563	0.000
Local Government	P39	0	0.049	0.02%	0.000	0.004	0.000	0.045	0.000
Services	P40-43	0	0.850	0.12%	0.000	0.131	0.000	0.719	0.000

Source: Own Calculations, 2006.

Factor level

At factor level, the increase in beef exports generated an additional income or improved welfare of about P 20.3 million in all. The major factor beneficiaries are "Mixed Income// F_{10}" and Gross Operating Surplus/GOS, which received P 7.1 million and P 6.7 million respectively (column 4 under "Multiplier") of the total factor impact after a ten percent increase in beef exports. The distribution of the gains among factors or the total factor multiplier impact is displayed in Figure 7.1 below.

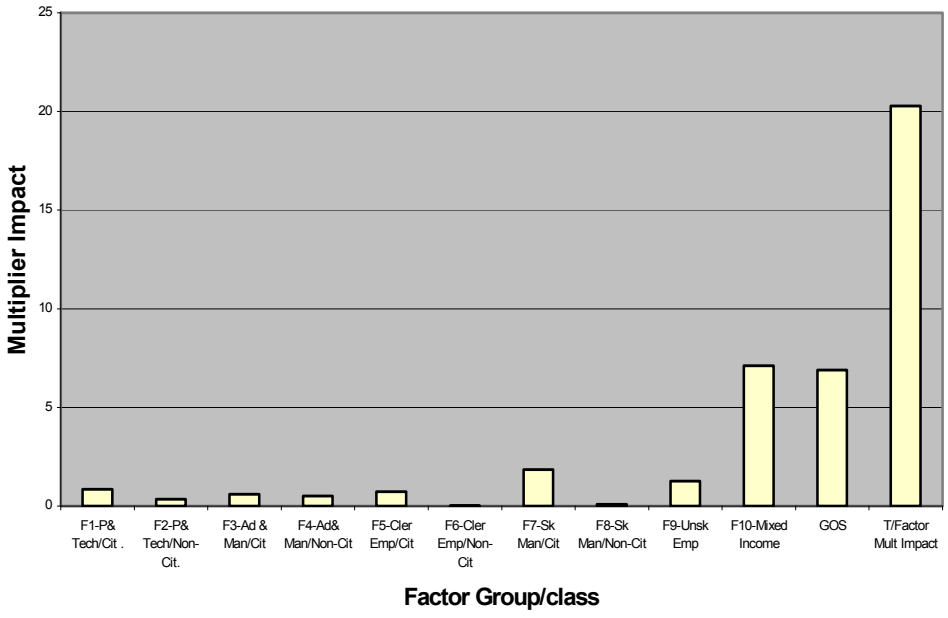

Figure 7.1: Distribution of Additional Factor Income in Botswana after an Increase in Beef Export Earnings (in million Pula)

As indicated in Chapter 6, “Mixed income” is a factor income associated with traditional cattle farming as well as the informal sector, while GOS is a return to owners of capital in the beef industry, including the meat-processing firms: especially the Botswana Meat Commission (BMC), a state-owned organization enjoying an export monopoly on beef. Both mixed income and GOS account for more than 50 percent of the additional total factor income/welfare after an increase in beef exports. Mixed income constitutes one of the main sources of income among self-employed rural households (see Chapter 6). Traditional cattle farming/P_1 is a primary activity that provides intermediate inputs, i.e. cattle for meat processing.

Among workers only citizen skilled manual personnel/P_7 and unskilled workers/F_9 benefited most from the increase in exports originating in the meat-processing activity. This should not necessarily be surprising, as the industry largely requires skilled labour. The increase in export demand for beef benefited skilled manual workers most while unskilled personnel who provide labour for primary cattle farming, the source of intermediate input, gained less. Currently, Botswana is faced with increasing unemployment especially among the young and unskilled people.

Household Level

At the household level, a ten percent increase in beef export earnings led to an additional income of about P 13.6 million in total for all households, excluding other institutions. The main beneficiaries of additional income following an increase in export demand for beef are wage and self-employed households in both urban and rural areas. Altogether, these households accounted for about 87 percent of the total impact on households of the increase in beef export earnings. Additional household income following an initial injection of beef export income into the meat-processing activity ranges from just P 130 000 for rural households dependent on income transfers to about P 3.2 million each for wage-based urban and self-employed rural households. The additional household gains between urban and rural

households dependent on wage income and self-employment, are almost equal.

Households receive their additional income from factors that benefit from an increase in export demand for beef. Increase in export demand in turn leads to more output in the activity account. Mixed income, a factor of unincorporated enterprises, is one of the major sources of income for self-employed households, while wage-reliant households depend on income from workers (see Chapter 6). Primary or traditional cattle farming, which provides intermediate inputs to the meat-processing activity, accounts for about 80 percent of mixed income (1993/94 SAM, CSO, 1999). It is therefore not surprising that an increase in beef export earnings benefits self-employed households the most because they own cattle.

Figure 7.2 illustrates the distribution of additional household income following an injection of beef export earnings initially into the endogenous “meat processing” activity.

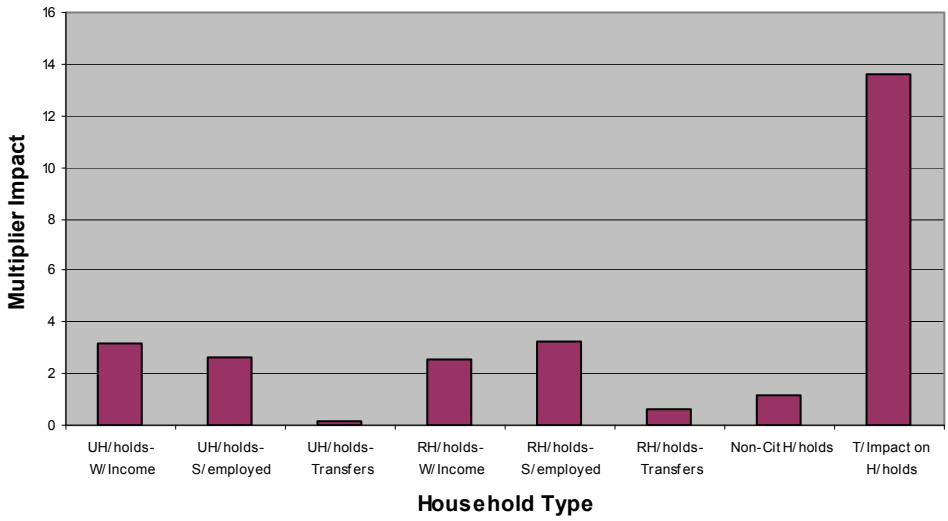

Figure 7.2: Distribution of Additional Household Income after Improved Beef Export Earnings (in million Pula)

Households in both rural and urban areas whose income is reliant on transfers benefit marginally from an increase in beef exports. As a group, these households account for less than one percent of the additional total income that accrues to all households after injecting beef export earnings into the "meat processing" activity. Households which are dependent only on income transfers receive less than 30 percent of the additional income gained by the two top most beneficiaries of household income generated by an increase in export demand for beef (i.e. wage-based urban and self-employed rural households). In fact non-citizen households, as represented in Figure 7.2 gain more than households whose income is derived from transfers. This is primarily because the former depend on wage income while the latter have only a few members of their families in formal employment. Non-citizen households, in general, enjoy an additional advantage over citizen households because they have skilled professional, technical or managerial members in the formal sector (see Chapter 6). Lack of skills and limited formal education in those households dependent on income transfers reduce their opportunities to benefit from wage income. Government is currently increasing access to education and vocational institutions in order to benefit, among others, such households (NDP 9, 2003).

As indicated in Chapter 6, households dependent on income transfers constitute the poorest sections of the country's population and spend at least 36 percent of their disposable income on food (HIES 1993/94, CSO, 1995; HIES 2002/03, CSO, 2004). As the distribution of cattle is highly skewed in Botswana, it should not be surprising that households whose income is derived from transfers do not benefit much from an increase in export demand for beef. Currently, about 45 percent of rural households in the country do not own cattle (CSO, 2002). Ownership of or access to a factor or endowment/asset such as cattle is, clearly, important if households are to benefit from an increased demand for beef exports. In fact improved market access for beef exports in Botswana vindicates Stopler-Samuelson theorem (see Chapter 3). According to this theorem owners of factors of production (including assets) used intensively in the export industry under free or

liberalized trade gain more compared to those who own less. In this case households who own cattle benefit more from improved export market access.

Case studies in Indonesia, Gambia and Mexico employing SAM income multiplier analysis indicate the importance of skilled human resources for the poor to be able to benefit from increased export demand for agricultural products (Thorbecke, 1994). Skilled labour gains relatively more from an increase in external demand because of their scarcity unlike unskilled workers. As access to grazing land in Botswana is increasingly becoming a binding constraint, investment in human capital is now one of the most important determinants for income distribution, because ownership of cattle by the poor faces major technical and economic constraints. Since wage-based households obtain their income mainly from their skilled employed members, households whose income is reliant on transfers could also benefit from an increase in export demand if their human capital base is developed.

In terms of the results of the policy experiment regarding beef exports, it appears that improved export market access for beef under the Doha Development Agenda (DDA) may not necessarily improve the welfare/food security of poor households or those whose income is derived from transfers. Lack of relevant resource endowments, in other words cattle, and wage income do not contribute much to their welfare compared to that of wage-based households, because poor households have very few skilled members employed in the formal sector (see Chapter 6). Income transfers account for about 50 percent of their income. It should, however, be pointed out that SAM multiplier analysis handles income effects between socio-economic groups but fails to capture/measure intra-group income differentials because it assumes zero variance within groups (Thorbecke *et al.* 1999, p.26 and Round, 2003, p.10).

Improved market access for beef exports mainly enhances the incomes of wage-based and self-employed households in both urban and rural areas, together with non-citizen households in Botswana. This means that these

households can, *ceteris paribus*, enhance their income food security by means of increased foreign exchange earnings. Additional foreign earnings from expanded beef exports could be used to purchase and import more food and other household items. The Doha Development Agenda advocates (among other objectives) for improved export market access to products of special interest to developing countries. It further suggests the reduction of tariff and other barriers, especially those erected by industrialized countries that are protecting their farm sectors with tariffs and high domestic subsidies.

From a food security perspective, household income which is augmented as a result of foreign earnings from beef exports increases disposable income. This additional income can be used to increase domestic production by the purchase of farm inputs, or the hiring of animal/mechanical draught power to increase sustainable production. As Botswana is semi-arid and less suited to arable farming, additional household income from beef exports could be used to import food and other household effects. Importing food will augment household supplies and complement domestic production or stocks. In this way, improved access to beef export markets enhances the physical availability of household and national food supplies through imports.

Similarly, additional household income, especially for self-employed and wage-based families in both rural and urban areas, increases, *ceteris paribus*, effective demand for food and other essentials (the economic access component of the food security equation). Regarding nutrition, obviously an important food security component, it is assumed that households will purchase or prepare nutritionally balanced and safe food, whether by means of imports or their own production. The three aspects of physical availability, economic access and nutrition form the basic elements of household food security (World Bank, 1986; World Food Summit, 1996).

However, for households dependent on income transfers, an enlarged beef export market does not contribute much to their food security. The main reasons for this are that these households, unlike self-employed households,

do not own cattle or do they possess the necessary skills for employment in the formal sector. For these households, alternative domestic income and employment opportunities coupled with skills development and safety-nets are critical. Safety-nets include welfare grants, old age pensions and food aid. Concerning employment, efforts are being made to establish sustainable enterprises by providing subsidized capital and training to potential local and foreign investors. Limited success has been achieved in this regard, as in general, the new firms tend to be skill and capital-intensive.

It should also be indicated that the implementation of the Doha Development Agenda will erode trade preferences enjoyed by countries such as Botswana under the current Cotonou Agreement (see results in Chapter 4 on global, agricultural trade liberalization). At present other WTO members feel the current ACP-EU trade agreement is discriminatory and is therefore in conflict with the WTO Agreement on liberalized trade. Recognizing the concerns by other WTO members on ACP-EU trade cooperation, the current Cotonou Agreement which was initially signed in 2000 in Benin and revised in 2005, shows that future trade relations/agreements between the EU and ACP countries will be reciprocal and regional (Cotonou Agreements, 2000 and 2005). The economic partnership agreements or EPAs will promote EU-ACP trade cooperation on reciprocal and regional basis while at the same time complying with the WTO rules. EPAs are expected to be WTO-compliant to avoid trade disputes in which are non ACP countries feel discriminated by the current EU-ACP trade arrangement. Already banana exporters outside the EU-ACP framework have partly won their case (through the WTO) to access the EU market based on the most favoured nation (MFN) treatment. MFN treatment demands equal treatment for all members. Before the WTO ruling, non-ACP countries faced higher import duties before they could access the EU market.

Further, EPAs including the envisioned SADC-EU Economic Partnership Agreement will cover development /economic assistance, regional integration, trade, investment, etc in the respective regional free trade areas. The planned

development assistance is meant to allow ACP countries to adjust and integrate fully into the global economy. It is also expected that development assistance in the agricultural sector by the EU to EPAs will concentrate on the minimally-trade distorting "green box measures". The green box measures of the WTO Agreement on Agriculture cover public goods such as infrastructure (roads, telecommunications), research, extension, pest and disease control, human resource development, environment, conservation, etc (Agreement on Agriculture, WTO, 1995). Assistance to Botswana to implement minimally trade-distorting measures as the green box provisions will enable her, *inter alia*, to address the perennial supply-side constraints in the beef industry to benefit from improved export market access. Supply-side constraints are mainly due to underdeveloped physical and marketing infrastructure, lack of appropriate technology, effective pest and disease control mechanisms, skills, etc. In general, almost all WTO members support the continued implementation of the green box measures to develop agriculture provided there is discipline to prevent the use of farm subsidies that distort trade such as input and price support especially by industrialized countries (WTO Ministerial Declaration, Hong Kong, 2005).

Activity level

Of the total P 44.2 million gained by 29 endogenous activities, after an injection of P 17.4 million worth of beef export income into the "meat processing/P_{12}", the main beneficiaries are the seven activity sub-accounts: meat processing itself (P 17.9 million), traditional cattle (P 7.1 million), freehold farming (P 3.2 million), business services (P 2.4 million), dairy processing (P 1.8 million), construction (P 1.8 million) and trade (P 1.7 million).[7] These activity sub-accounts gain each at least P1 million worth of additional output (see figures in bracket for each activity) after a ten percent increase in beef exports. The meat-processing activity alone accounts for about 41 percent of the additional total activity output gained, while traditional

[7] The total of P 44.2 million is obtained by adding the figures opposite each activity under the Multiplier Column in Table 7.1.

cattle farming, the supplier of intermediate input, contributed about 16 percent of the total activity output gained. The seven activity sub-accounts demonstrate very strong inter-industry linkages through input-output interactions following an external income shock.

The remaining 22 activities almost all gained from an injection of beef export income, although they each registered an additional output of less than P 1 million. By means of conventional Leontief input-output or inter-industry interactions, these activities recorded incremental outputs ranging from just P 10 000 for transport and equipment, tanning and leather products and local government to about P 970 000 for transport/$P_{30\text{-}33}$. Whilst the inter-industry or input-output linkages between the 22 activities are relatively weaker than for the first seven sub-accounts indicated earlier, it is evident that an increase in beef export demand has evidently significant sectoral linkages in Botswana's economy. Specifically, activities like traditional cattle production/P_1 and freehold beef farming/P_3, which provide primary inputs into meat processing/P_{12}, demonstrate relatively strong input-output linkages with the latter following an increase in beef export demand.

The existence of strong sectoral linkages augurs well for efforts to improve market access in industrialized countries, in particular, in order for a relatively competitive beef export industry in Botswana to contribute to rural development and household welfare. Non-agricultural activities such as transport, business services, construction, trade, services, water and electricity also demonstrate the importance of forward and backward linkages between the meat-processing activity and other productive enterprises, something that partial equilibrium or sectoral policy analysis normally ignores or underestimates.

One other important policy implication of the effects of improved market access for Botswana beef exports, is that the country should address supply-side constraints to meet export demand. Whilst beef farming is largely extensive, grazing land and access to portable water are increasingly

becoming binding factors in cattle farming. As a result, strategies that improve productivity on current range lands supported by appropriate technology, efficient marketing infrastructure, disease control measures, etc are critical for the economic and environmental sustainability of the industry.

7.3.2 The Effects on Food Security of an Increase in Beef Export Earnings, based on Stone's Additive Multiplier

In the preceding analysis, we examined the effects of a ten percent increase in beef export earnings based on the multiplicative multiplier, $\mathbf{M_a^x}$, used by Pyatt and Round. In this section we now employ the additive multiplier approach to analyze the effects of improving beef export earnings on household food security. As indicated in Chapter 5, Stone's additive multiplier matrix is given as I+T+O+C= $\mathbf{M_a^x}$, where I represents an identity, T stands for transfer effects, O covers inter-group effects while C represents the circular flow. M_a^x still represents the multiplicative multiplier as in the previous analysis.

$\mathbf{M_a^x}$ as a multiplicative multiplier is not disaggregated, unlike Stone's additive multiplier. By means of the decomposed Stone's additive multiplier it is possible to identify which effects (transfer, inter-group or circular) dominate the influence of the external shock on the endogenous account. Below we will now examine the effects of the disaggregated additive multiplier on household food security following a ten percent increase in beef export earnings at factor, household and activity levels.

Factor level

In almost all the factor accounts, the inter-group or open-loop effects (O) dominate, while the circular or closed-loop (C) effects only prevail over more than one or two factors. Table 7.2 shows Stone's disaggregation of the multiplier effects on the factor account after an injection of beef export income. This information is extracted from Table 7.1. There are no transfer

effects among factor sub-accounts. Except for non-citizen professional and technical workers/F_2 where the C multiplier effects are largest, for several factors the open-loop or inter-group (O) effects are at least twice greater than the C effects (mixed income/F_{10}, unskilled employees/F_9, skilled manual/F_7, etc.). The inter-group or open-loop (O) effects measure the results arising from a policy shock/injection that completes its tour outside its original group without returning to it (the group) while the C effects capture the circular flow of the external shock through all groups. The O effects, also known as cross/spill-over effects, capture the impact on meat processing, initially, and on factors and households and other activities following an increase in beef export demand (Round, 2003, p.11).

As additional beef export income is injected into various activities, additional demand on factors is created. Increased demand for beef exports leads to employment and compensation of the factors of production by means of inter-group/spill-over income and expenditure interactions. Table 7.2 shows that factors like “mixed income, gross operating surplus and skilled manual/F_7 and unskilled workers/F_{10}” (in the second fifth column under Stone’s decomposed open-loop “O” effects) benefited the most from open-loop (O) or inter-group interactions. For instance, mixed income gained P 6.07 million additional factor income, while gross operating surplus/GOS came second and recorded an additional return to owners of capital worth P 3.57 million. Other workers who also gained significantly from open-loop effects comprise (citizen) professional and technical workers/F_1, administrative and managerial staff/F_3 as well as clerical officers/F_5. If mixed income and capital are excluded, skilled workers as opposed to unskilled personnel gained more from an injection of additional beef export income into endogenous accounts through open-loop effects.

The closed-loop (C) effects in Table 7.2 capture the complete circular flow of income among all endogenous accounts, indicating interdependency or integration in the economy following a shock from beef exports (Powell & Round, 1997). Compared to open-loop effects, the factor account shows that

the closed-loop (C) effects are smaller in almost all factor sub-accounts except for (non-citizen) professional and technical personnel/F_2. This implies a limited circular flow of beef export income among endogenous accounts.

Table 7.2: Stone's Disaggregated Multipliers on the Factor Income

Factor Group	Multiplier	I	T	O	C
F1-P& Tech/Cit.	0.859	0	0	0.521	0.338
F2-P& Tech/Non-Cit.	0.345	0	0	0.139	0.206
F3-Ad & Man/Cit.	0.604	0	0	0.404	0.200
F4-Ad& Man/Non-Cit.	0.505	0	0	0.298	0.207
F5-Cler Emp/Cit.	0.729	0	0	0.390	0.339
F6-Cler Emp/Non-Cit.	0.015	0	0	0.010	0.005
F7-Sk Man/Cit.	1.851	0	0	1.319	0.533
F8-Sk Man/Non-Cit.	0.089	0	0	0.038	0.051
F9-Unsk Emp.	1.268	0	0	0.917	0.351
F10-Mixed Income	7.118	0	0	6.070	1.048
GOS	6.893	0	0	3.569	3.324
T/Factor Multi Impact	20.276	0	0	13.673	6.603

Source: Own calculations, 2006

Briefly, the economic policy implications, arising from Stone's disaggregated multipliers, to the factor account after an increase in demand for beef exports reveal interesting structural features of Botswana's economy. Firstly, an increase in beef export demand leads to additional employment of factors by endogenous activities including meat processing, the initial entry of the policy shock. Mixed income, gross operating surplus, skilled and unskilled manual workers (citizens) benefit most from increased production by activities to meet export demand for beef. Other workers like professional, administrative and clerical staff (all citizens) also benefit significantly from income generated by activities to meet additional export demand.

Secondly, the inter-group or open-loop (O) effects have a greater impact on factor employment and income compared to closed-loop (C) or circular effects. This implies stronger income leakages through inter-group interactions, compared to the complete circular flow of income among

endogenous activities. As a result, additional beef export income does not lead to stronger closed-loop effects or interdependence among endogenous accounts (factors, households and activities) for the complete circulation of income. Weak closed-loop effects suggest limited economic integration (Thorbecke, 1994; Powell and Round, 1997; Round, 2003). Similar results concerning the dominance of open-loop or inter-group effects over closed-loop effects under the factor account have been observed in a case study of Ghana, using a SAM fixed price multiplier approach (Powell and Round, 1997; Round, 2003).

Whilst unskilled manual workers benefit significantly from an external beef export income injection, by and large skilled workers benefit still more, and this finding implies a bias towards intensity in skills. Whereas mixed income also covers returns to labour in unincorporated informal enterprises which employ unskilled labour, the results of the disaggregated multiplier effects on factor income indicate a bias towards employment of relatively skilled personnel, a development which may not contribute much to addressing the issue of rising unemployment among young and unskilled school leavers in Botswana. Evidently, it is critical that Botswana provide technical knowledge to upgrade workers with skills for them to be able to benefit from increases in export demand for commodities like beef. Already government is investing in technical skills through the establishment of vocational training centres as well as the creation of a second university to specialize in science and technology.

Household level

As in the factor account, the inter-group or open-loop (O) effects dominate all household accounts. Table 7.3 displays Stone's disaggregated multiplier effects on the Household Account after an injection of beef export income, initially, into "meat processing".

Table 7.3: Disaggregated Fixed-Price Multiplier Effects by Household after an Increase in Beef Exports

	Ma * Dx	I	T	O	C
UH/holds - W/Income	3.205	0.000	0.000	2.260	0.945
UH/holds - S/employed	2.665	0.000	0.000	2.186	0.479
UH/holds – Transfers	0.134	0.000	0.000	0.108	0.025
RH/holds - W/Income	2.560	0.000	0.000	1.827	0.733
RH/holds - S/employed	3.253	0.000	0.000	2.667	0.586
RH/holds – Transfers	0.638	0.000	0.000	0.515	0.123
Non-Citizen H/holds	1.181	0.000	0.000	0.672	0.510
Total Impact	13.636	0.000	0.000	10.235	3.401

Source: Own calculations, 2006

In Table 7.3, as under factors described earlier, the O or open-loop effects dominate circular or C effects by a factor of at least two in most cases. For instance, the analysis of additional income for urban households based on wage income (UH/holds-W/income) shows that these households gained P2.26 million under open-loop effects while through closed-loop effects the same households only registered a net benefit of P 0.945 million, which is less than half. This feature is true for almost all citizen households.

Open-loop effects again contributed over fifty percent of additional total household income following the injection of beef export income into all endogenous accounts. Additional household income gained through “O” multiplier effects, as earlier indicated, benefited mainly wage-based and self-employed (citizen) households in both rural and urban areas. Whilst (citizen) households based on income transfers gained more through “O” multiplier effects, their additional income was still far less than that which wage-based and self-employed households received under the same effects. Closed-loop effects only contributed less than fifty percent of additional total household income after an increase in beef exports.

As households, like other institutions, receive their income from factors, the results of Stone’s additive and decomposed multipliers reveal some interesting features about the country’s economy. Whilst additional beef export income creates more demand for factors by activities in order to meet

external demand, additional factor income translates into further household income. The additional household income is mainly generated through open-loop or cross/spill-over effects while the closed-loop effects contribute the remainder. The dominance of open-loop or "O" effects over closed-loop effects, demonstrates weak interdependence or integration among endogenous activities (factors, households and activities).

The closed-loop effects, also known as interdependency effects, "reflect the extent of integration within an economy, on both the consumption and production sides. The more consumers spend on domestic goods and services, the more diversified their consumption patterns, the larger the interdependency effects" (Thorbecke, 1994, p.26). In the event of weak closed-loop effects, this strongly implies limited domestic economic diversification, a major policy challenge facing Botswana, since the capital-intensive diamond sector still dominates. The sector accounts for at least 30 percent of the country's GDP and this has been the trend for more than 20 years (NDP 9 and MFDP, 2003). Scarcities of skills and management have been identified as some of the key constraints of economic diversification in several national development plans. Current government policies and programmes, offering education and an emphasis on technical, business and management training, are intended to meet private sector demand, in particular, for skilled manpower. Scholarships and grants for undergoing technical, business and management training have been provided to citizens.

Further, we can also note that part of the reason for the limited economic integration could also be found in the basic assumptions of the SAM fixed price multiplier analysis itself. In terms of this approach, prices are held constant and no dynamic effects are introduced, while excess capacity and underemployment of factors are also assumed. Substitution effects are not allowed owing to fixed prices, while excess capacity could be confined to certain sectors of the economy, not necessarily all industries.

No transfer (T) effects were observed in the household account following the injection of beef export income into endogenous activities. Similar findings were also recorded for the household account in the Ghana case study (Powell and Round, 1994; Round, 2003).

Activity Level

Disaggregated multiplier results of introducing additional beef export income into activities are recorded in Table 7.4 below. We can observe from this table that the three primary agricultural activities (traditional cattle/P_1, free-hold farms/P_3), together with dairy processing/P_{13} and construction/P_{27} and the transfer (T) effects (column five) dominate the circular (C) effects by at least a factor of five, excepting other agriculture/P_2, after an increase in beef export earnings. For instance, traditional cattle farming registers a gain in output worth P 6.24 million under T effects while through closed-loop (O) effects, the same activity only gains about P 0.84 million (see column 5 in Table 7.4).

Also known as “intra-group” effects, transfer effects capture the typical Leontief input-output interactions or inter-industry interrelationships. This means that in order to meet demand for beef exports, the injection of income into meat processing triggers an increase of output in other activities. Traditional cattle and freehold farming, in particular, provide intermediate inputs (cattle) into meat processing. The relatively high multiplier for “meat processing” under the fourth column, “I”, captures the initial impact of the shock or injection.

Table 7.4: Disaggregated Fixed Price Multiplier Effects on the Activity Account

Income Multiplier Experiment

			Multiplier	Stone			
		Shock (Dx)	Ma * Dx	I	T	O	C
Trad. Agric - Cattle	P1	0	7.073	0.000	6.236	0.000	0.837
- Other	P2	0	0.661	0.000	0.352	0.000	0.309
Freehold Farms	P3	0	3.255	0.000	2.999	0.000	0.256
Hunting, Fishing & Gathering	P4	0	0.647	0.000	0.276	0.000	0.371
Mining	P5-11	0	0.199	0.000	0.113	0.000	0.086
Meat Processing	P12	17.386	17.911	17.386	0.018	0.000	0.507
Dairy & Other Agric. Processing	P13	0	1.833	0.000	1.091	0.000	0.742
Beverages	P14	0	0.678	0.000	0.017	0.000	0.661
Textiles	P15	0	0.176	0.000	0.014	0.000	0.162
Chemicals	P16	0	0.190	0.000	0.092	0.000	0.098
Transport & Equipment	P17	0	0.045	0.000	0.009	0.000	0.035
Metal Products	P18	0	0.454	0.000	0.069	0.000	0.385
Bakery & Products	P19	0	0.420	0.000	0.116	0.000	0.304
Tanning & Leather Products	P20	0	0.005	0.000	0.002	0.000	0.002
Wood & Products	P21	0	0.060	0.000	0.026	0.000	0.034
Paper & Products	P22	0	0.114	0.000	0.041	0.000	0.074
Village Industries	P23	0	0.124	0.000	0.048	0.000	0.076
Other Manufacturing	P24	0	0.345	0.000	0.102	0.000	0.242
Water	P25	0	0.539	0.000	0.296	0.000	0.243
Electricity	P26	0	0.552	0.000	0.304	0.000	0.248
Construction	P27	0	1.792	0.000	1.127	0.000	0.665
Trade	P28	0	1.709	0.000	0.226	0.000	1.483
Hotels & Restaurants	P29	0	0.187	0.000	0.044	0.000	0.143
Transport	P30-33	0	0.970	0.000	0.382	0.000	0.588
Communications	P34	0	0.330	0.000	0.108	0.000	0.222
Business Services	P35-37	0	2.382	0.000	0.323	0.000	2.059
Central Government	P38	0	0.579	0.000	0.016	0.000	0.563
Local Government	P39	0	0.049	0.000	0.004	0.000	0.045
Services	P40-43	0	0.850	0.000	0.131	0.000	0.719
Total Activity Impact			44.127	17.386	14.584	0.000	12.157

Source: Own calculations, 2006

After the dominance of transfer effects which result from input-output industry interactions, Table 7.4 indicates the strength of closed-loop effects in all the remaining 25 endogenous activities. Closed-loop effects capture interdependence or integration within an economy following the introduction of a shock. Unlike the factor and household accounts, the activity account

exhibits very strong closed-loop effects, which in turn capture the full, circular, flow of income/expenditure among endogenous activities after a shock. This development further indicates a degree of economic diversification that was very weak in the factor and household disaggregated multipliers. The circular flow of income or shock in an economy is one of the main features demonstrated by a country's SAM (see Chapter 6).

It is also worth observing that when the disaggregated effects in Table 7.4 are expressed as a proportion of total activity impact, that is P44.127 million, transfer (T) effects are greater than closed-loop effects. Transfer effects account for 33 percent (14.584/44.127*100) of total activity impact after an injection of additional beef export income while closed-loop effects contribute about 28 percent (12.157/44.584*100). Overall, the activity impact is dominated by the contribution of transfer effects or Leontief input-output inter-industry income interactions. This further suggests limited economic integration or diversification in the economy, although at activity level, interdependence among endogenous accounts is stronger than at factor and household levels (see Tables 7.2 and 7.3).

The analysis of Stone's additive and decomposed multipliers in the activity account in Table 7.4 suggests important economic implications for Botswana. The overall dominance of transfer effects or Leontief input-output interactions indicates strong input-output industry interactions or transfer effects following the introduction of a shock. Specifically, an increase in beef export demand triggered, overall, stronger transfer (T) effects or Leontief input-output inter-industry interactions than closed-loop effects. This implies that an income shock to the meat processing activity after an increase in beef export demand created strong inter-industry interactions, in order to raise output so as to meet external demand. It should also be borne in mind that the overall dominance of transfer effects also suggests limited interdependency effects or economic integration which is achieved through closed-loop effects owing to the complete circular flow of income among endogenous accounts.

Furthermore, compared to the initial income injection of P17.386 million in meat processing (see column 5 under "I"), additional total activity output owing to transfer effects is smaller (P14.584 million), which suggests weak input-output inter-industry interactions in the economy. Presumably the introduction of additional technical and managerial skills coupled with infrastructural support could improve activity output, owing to inter-industry interactions.

Whilst overall the transfer effects are greater than closed-loop effects, it is also worth noting that for most activities, closed-loop effects dominate. For these 25 activities, the dominance of closed-loop effects suggests relatively strong economic integration among endogenous accounts, which in turn enhances the diversification of the country's economy. However, compared to the initial income injection of P17.386 million in meat processing (see column 5 under "I"), overall increase in activity output owing to closed-loop effects, as was the case with transfer effects, is smaller (P12.127 million). This implies a weak full circular flow of income among endogenous accounts or low interdependency effects which contribute towards economic diversification.

Improvements in economic diversification constitute some of Botswana's current policy challenges (NDP 9, 2003). Enhanced economic integration exhibits a full and complete circulation of income among endogenous accounts after a policy shock. Government and the private sector continue to address the technical, institutional and infrastructural constraints that, if dealt with, could enhance inter-economic integration and diversification, in order to generate scarce employment opportunities among other results. No open or inter-group effects were observed among activities in Table 7.4.

7.4 Policy Simulation based upon an increase in textiles export earnings

The textiles industry has been identified as a potential sector for sustainable economic diversification and employment creation, as well as for generating foreign earnings to be used in importing food, inputs, machinery, technology, and the like (NDP 9, 2003). Currently, Botswana exports textiles and clothing

to the United States under a preferential trade agreement. This agreement, commonly referred to as the Africa Growth Opportunity Act (AGOA), allows developing countries in Africa to access the US textiles and clothing market duty-free. Through AGOA Botswana has obtained additional scarce export earnings while employment opportunities for less-skilled women, in particular, have been created to enhance household income and food security.

Whilst most of the poor or food-insecure households are situated in the rural areas, growing numbers of impoverished households are found in urban areas (HIES 2002/03, 2004). Some of these households depend on income transfers (see Chapter 6). In fact poverty or food insecurity is no longer merely a rural phenomenon but constitutes a nationwide concern. As textile activities are based mostly in urban areas, it is assumed that diversification into this sector could also enhance income and food security of households, including those dependent on income transfers. Botswana's textiles industry is export-led. Over the last few years, textiles export earnings have surpassed beef foreign earnings indicating the potential of the industry (External Trade Statistics 2000-05, CSO, 2006). The relatively low wage rate enjoyed by Botswana coupled with improved infrastructure, technology and a pool of skilled youth could promote loose industries like textiles if niche markets are identified (Barnes, 2005; Department of Labour, 2006).

7.4.1 The Effects of an Increase in Textiles Export Earnings/Income on Food Security based upon the Multiplicative Multiplier, M_a^x

As the textiles has been identified as a potential sector for economic diversification and employment creation, we examine the effects of a ten percent or P 10.329 million increase in textiles export earnings on household food security at factor, household and activity levels. The ten percent increase is also based on the similar growth rate earlier adopted for beef. If Botswana exploits some of her comparative advantages including a stable macro-economic environment, it is possible for the country to increase her textiles exports like high-wage countries in south-east Asia.

Table 7.5 records the multiplier results of the policy shock in all 50 endogenous accounts. The policy shock is introduced into the "textiles" activity/$P_{15.}$ The analysis of the results in the subsequent paragraphs will be undertaken, as before, at factor, household and activity levels.

Table 7.5: Fixed Price Multiplier Effects after an Increase in Textiles Exports

Income Multiplier Experiment								
			Multiplier		**Stone**			
		Shock (Dx)	Ma * Dx	**I**	**T**	**O**	**C**	Check
Prof. & Tech Employees - Cit.	F1	0	0.374	0.000	0.000	0.230	0.144	0.000
Prof. & Tech. Employees - Non-Cit.	F2	0	0.303	0.000	0.000	0.215	0.087	0.000
Admin & Manag. Employees - Cit.	F3	0	0.250	0.000	0.000	0.170	0.079	0.000
Admin & Manag. Employees - Non-Cit.	F4	0	0.550	0.000	0.000	0.470	0.080	0.000
Clerical Employees - Citizens	F5	0	0.442	0.000	0.000	0.305	0.137	0.000
Clerical Employees - Non-Citizens	F6	0	0.005	0.000	0.000	0.003	0.002	0.000
Skilled Manual - Citizens	F7	0	2.017	0.000	0.000	1.803	0.215	0.000
Skilled Manual - Non-Citizens	F8	0	0.335	0.000	0.000	0.315	0.020	0.000
Unskilled Employees	F9	0	0.637	0.000	0.000	0.494	0.143	0.000
Mixed Income	F10	0	0.412	0.000	0.000	0.061	0.351	0.000
Gross Operating Surplus	GOS	0	3.635	0.000	0.000	2.337	1.298	0.000
Urban Households - Wage Income	I1	0	1.802	0.000	0.000	1.425	0.378	0.000
Urban Households - Self-employed	I2	0	0.391	0.000	0.000	0.221	0.170	0.000
Urban Households - Transfers	I3	0	0.024	0.000	0.000	0.015	0.009	0.000
Rural Households - Wage Income	I4	0	1.279	0.000	0.000	0.988	0.291	0.000
Rural Households - Self-employed	I5	0	0.602	0.000	0.000	0.393	0.209	0.000
Rural Households - Transfers	I6	0	0.145	0.000	0.000	0.100	0.045	0.000
Non-Citizen Households	I7	0	1.215	0.000	0.000	1.011	0.204	0.000
Non-Financial Enterprises	Non-Fin	0	3.210	0.000	0.000	2.064	1.146	0.000
Financial	Fin	0	-0.034	0.000	0.000	-0.022	-0.012	0.000
Private Non-Profit Institutions	NPI	0	0.039	0.000	0.000	0.025	0.014	0.000
Trad. Agric - Cattle	P1	0	0.291	0.000	0.014	0.000	0.277	0.000
- Other	P2	0	0.106	0.000	0.005	0.000	0.101	0.000
Freehold Farms	P3	0	0.091	0.000	0.007	0.000	0.084	0.000
Hunting, Fishing & Gathering	P4	0	0.146	0.000	0.031	0.000	0.116	0.000
Mining	P5-11	0	0.101	0.000	0.066	0.000	0.034	0.000
Meat Processing	P12	0	0.183	0.000	0.008	0.000	0.176	0.000
Dairy & Other Agric. Processing	P13	0	0.323	0.000	0.079	0.000	0.244	0.000
Beverages	P14	0	0.277	0.000	0.006	0.000	0.272	0.000
Textiles	P15	10.33	12.188	10.329	1.795	0.000	0.065	0.000
Chemicals	P16	0	0.092	0.000	0.055	0.000	0.037	0.000
Transport & Equipment	P17	0	0.026	0.000	0.007	0.000	0.019	0.000
Metal Products	P18	0	0.180	0.000	0.029	0.000	0.150	0.000
Bakery & Products	P19	0	0.103	0.000	0.008	0.000	0.095	0.000

Tanning & Leather Products	P20	0	0.001	0.000	0.001	0.000	0.001	0.000
Wood & Products	P21	0	0.031	0.000	0.021	0.000	0.011	0.000
Paper & Products	P22	0	0.114	0.000	0.082	0.000	0.032	0.000
Village Industries	P23	0	0.069	0.000	0.040	0.000	0.029	0.000
Other Manufacturing	P24	0	0.228	0.000	0.144	0.000	0.084	0.000
Water	P25	0	0.342	0.000	0.215	0.000	0.127	0.000
Electricity	P26	0	0.497	0.000	0.378	0.000	0.119	0.000
Construction	P27	0	0.695	0.000	0.439	0.000	0.256	0.000
Trade	P28	0	1.147	0.000	0.541	0.000	0.606	0.000
Hotels & Restaurants	P29	0	0.182	0.000	0.123	0.000	0.059	0.000
Transport	P30-33	0	0.613	0.000	0.365	0.000	0.248	0.000
Communications	P34	0	0.359	0.000	0.256	0.000	0.103	0.000
Business Services	P35-37	0	1.981	0.000	1.211	0.000	0.770	0.000
Central Government	P38	0	0.262	0.000	0.014	0.000	0.247	0.000
Local Government	P39	0	0.036	0.000	0.017	0.000	0.019	0.000
Services	P40-43	0	0.991	0.000	0.652	0.000	0.339	0.000

Source: Own calculations, 2006

Factor level

Figure 7.3 indicates that of the total additional factor income of P 8.960 million generated by an increase in demand for textiles exports, about 41 percent was gained by owners of capital or gross operating capital/GOS while (citizen) skilled and unskilled manual workers gained 23 percent and 7 percent respectively. (Non-citizen) administrative managerial staff also gained about 6 percent of total factor income. Figure 7.3 also illustrates that other factor groups that gained from additional income originating from an increase in textiles exports include (citizen) clerical staff, mixed income, professional and technical personnel (both citizen and non-citizen) and (non-citizen) skilled manual workers.

Relative to other worker groups, it is evident from figure 7.3 that, overall, the textiles industry is skill-intensive and this is likely to hurt Botswana, especially when targeting high-income and quality-sensitive markets in the industrialized countries. Low-wage and leading textiles and clothing exporting countries such as China, India, Pakistan, Thailand, Bangladesh and Vietnam will also create employment problems for high-cost producing countries such as Botswana (UNCTAD, 2004; FIAS, 2004).

UNCTAD observes that high quality standards, low production costs including wages, compliance with importing customer and legal requirements, etc will determine the benefits to be gained from global textiles trade liberalization (UNCTAD, 2004). The multi-fibre agreement has further liberalized the textiles industries by removing quotas, hence the recent dominance of low-cost exporters such as China. Land-locked and high-cost countries like Botswana may not benefit from more liberalized textiles and clothing industries unless certain trade preferences are retained for some time so as to build technical and business capacities as well as to identify niche markets. As a result, further textiles and clothing global trade liberalization holds major policy implications for Botswana, in creating competitive and yet sustainable employment opportunities for the unskilled workforce as well as improving the incomes of the poor. All raw materials for the textiles and clothing industries are imported, while economies of scale in these activities may also work against Botswana.

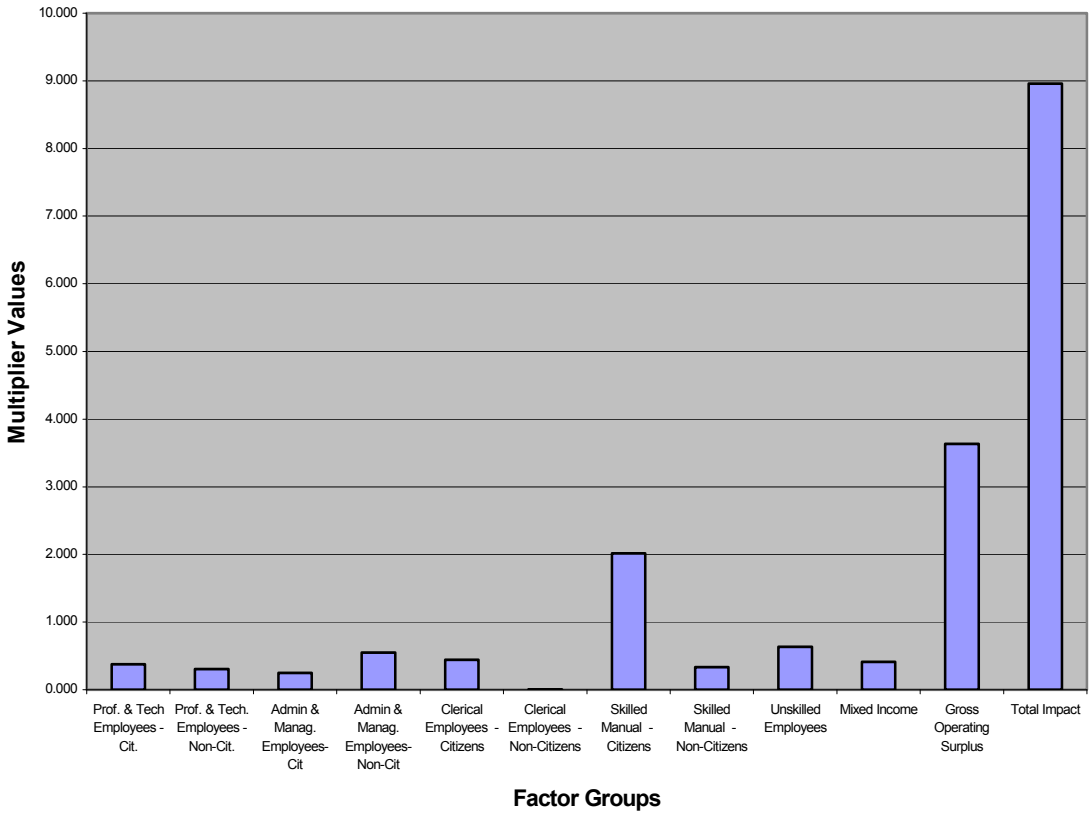

Figure 7.3: Distribution of Additional Factor Income after an increase in Textiles Exports

Household Level

Figure 7.4 illustrates the distribution of additional income at household level, after an initial injection of about P 10.329 million into the textiles activity in order to meet external demand. Of the total additional household income of P 5.458 million gained from an increased demand for textiles exports, wage-based households altogether received about 56 percent. Wage-based households in urban areas gained 33 percent of the total additional household income while their rural counterparts received about 23 percent. Non-citizen households gained about 22 percent of the total additional household income.

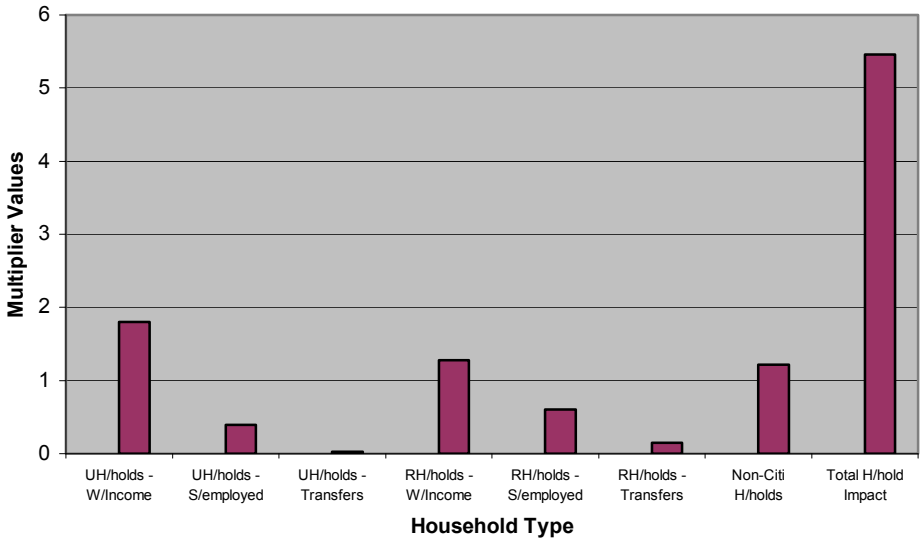

Figure 7.4 Distribution of Additional factor Income after Textile Earnings

Households obtain their income from factors they own, such as labour and capital. As a result, wage-based households received their additional income from their members who were employed in the textiles industry. The relative income share for non-citizen households results from the employment of skilled non-citizen workers in the textiles industry.

Self-employed households altogether shared about 18 percent of the total household income gained from increased demand for textiles. Figure 7.6 indicates that self-employed households based in the rural areas gained more than their urban counterparts. Households dependent on income transfers

altogether shared about three percent of the total household income gained through an increase in demand for textiles exports. As indicated earlier, such households constitute the poorest in the country. Possessing limited endowments in skilled human resources, these households, unlike wage-based ones, do not benefit much from a booming textiles industry.

Given the apparently unfavourable conditions for textiles development in Botswana, it is therefore unlikely that expanding textiles exports will generate sustainable employment opportunities and also contribute to poverty alleviation in this country. In particular, as countries with a comparative advantage (natural resources), lower production costs including low wage rates and skilled personnel intensify their competition in a more liberalized global textiles industry, price-takers and high-cost countries like Botswana will find it extremely difficult to maintain a foothold. The implications for Botswana are that niche markets should be identified while skills development and quality standards are enhanced in order to access the highly competitive global textiles and clothing markets. Government has therefore established vocational and industrial training centres to develop, among other capacities, technical and management skills in these industries.

Activity level

Of the P 21.657 million total activity output gained after an injection of textiles export income, about 56 percent was generated by the textiles industry itself while the next most important beneficiary activity was business services, which registered an additional nine percent increase in output. Trade and services each displayed a five percent increase in output following an injection of textiles export income. These activity output gains are primarily owing to inter-industry output interactions. An analysis of the disaggregated multiplier effects will shed more light on this aspect.

After textiles, business services, trade and services, the next activities to gain from an injection of textiles export income are construction, electricity, and

communications and water, while primary agricultural activities (cattle farming, other agriculture and freehold farming) altogether registered only a three percent increase in output. As indicated earlier, all raw materials in the textiles industry are imported, since Botswana is generally not suited to viable cotton production owing to unfavourable climatic factors.

The few activities benefiting from an increase in textiles exports suggest very limited inter-industry linkages. This further implies very weak prospects for economic diversification in the textiles industry unless niche markets are identified, and skills and high quality standards developed competitively. In general, countries with a comparative advantage in textiles and clothing industries and also endowed with skills, coupled with lower production and marketing costs, usually demonstrate strong inter-industry linkages (UNCTAD, 2004). As the UNCTAD observes, " factors such as…cost reduction, quality, investments in modern technologies, and product innovation are regarded as key ingredients for creating dynamic textiles and clothing industries… there will be a relocation to countries with lowest wages" (UNCTAD, 2004, p.8). For Botswana, this adds more pressure to be globally competitive in the textiles and clothing industries.

7.4.2 Effects of an Increase in Textiles Export Earnings based upon the Stone's Additive Multiplier

As in the previous sections, we now also examine the effects of an increase in textiles export earnings on household food security based on decomposed additive multipliers which captures the transfer (T), open-loop (O) and closed-loop (C) effects. Below we analyze these effects on the endogenous accounts after introducing a policy shock, namely an increase in export income from textiles. The analysis is once again undertaken at factor, household and activity levels.

Factor level

At factor level based on Stone's additive and decomposed multiplier analysis, it is evident from Table 7.6 that of the total factor income of P 8.960 million gained after an increase in textiles export demand, about 75 percent was generated through open-loop (O) effects while the remaining 25 percent stemmed from closed-loop (C) effects. As a result of open-loop effects, gross operating surplus/GOS and (citizen) skilled manual workers gained 37 percent and 28 percent respectively from the total factor income.

Table 7.6: Disaggregated Fixed Price Multiplier Effects on the Factor Level after Textiles Exports

Factor	Ma * Dx	I	T	O	C
Prof. & Tech Employees - Cit.	0.374	0.000	0.000	0.230	0.144
Prof. & Tech. Employees - Non-Cit.	0.303	0.000	0.000	0.215	0.087
Admin & Manag. Employees - Cit.	0.250	0.000	0.000	0.170	0.079
Admin & Manag. Employees - Non-Cit	0.550	0.000	0.000	0.470	0.080
Clerical Employees - Citizens	0.442	0.000	0.000	0.305	0.137
Clerical Employees - Non-Citizens	0.005	0.000	0.000	0.003	0.002
Skilled Manual - Citizens	2.017	0.000	0.000	1.803	0.215
Skilled Manual - Non-Citizens	0.335	0.000	0.000	0.315	0.020
Unskilled Employees	0.637	0.000	0.000	0.494	0.143
Mixed Income	0.412	0.000	0.000	0.061	0.351
Gross Operating Surplus	3.635	0.000	0.000	2.337	1.298
Total Impact	8.960	0.000	0.000	6.404	2.556

Source: Own calculations, 2006

In addition, Table 7.6 indicates that most factor groups gained more through open-loop effects except for the mixed income group, whose additional income came mainly from closed-loop effects. Open-loop effects capture the effects of increased textiles production (in order to meet export demand) on factor and household income while taking into account production linkages only (Powell and Round, 1997). This demonstrates very weak interdependency effects or integration among accounts.

Under closed-loop effects, Table 7.6 illustrates that the full and complete circulation of additional income at factor level is very weak, since open-loop effects dominate. The implication is that at factor level, the additional textiles export income does not enjoy full circulation owing to limited integration among endogenous accounts. Specifically, this implies limited income-expenditure interactions among the accounts that in turn adversely affect efforts by government to achieve economic diversification by means of textiles.

Household Level

Insofar as the household account is concerned Table 7.7 records disaggregated multiplier effects after an injection of textiles export income.

Table 7.7: Disaggregated Fixed Price Multiplier Effects on the Household Account after Textiles Exports

Household Type	Multiplier	I	T	O	C
UH/holds - W/Income	1.802	0.000	0.000	1.425	0.378
UH/holds - S/employed	0.391	0.000	0.000	0.221	0.170
UH/holds – Transfers	0.024	0.000	0.000	0.015	0.009
RH/holds - W/Income	1.279	0.000	0.000	0.988	0.291
RH/holds - S/employed	0.602	0.000	0.000	0.393	0.209
RH/holds – Transfers	0.145	0.000	0.000	0.100	0.045
Non-Cit. H/holds	1.215	0.000	0.000	1.011	0.204
Total H/hold Impact	5.458	0.000	0.000	4.152	1.306

Source: Own calculations, 2006

Of the total additional household income of P5.458 million gained from an increase in textile exports, about 76 percent (P 4.152 million) was created through open-loop (O) effects while the remainder, 24 percent (P 1.306 million), stemmed from closed-loop (C) effects. The main recipients of the total household income generated through open-loop effects include wage-based households in urban areas (34 percent), wage-based households in rural areas (24 percent) and non-citizen households (24 percent). Self-

employed households in both urban and rural areas were the next largest group to benefit from household income generated through open-loop effects.

Households whose income is derived from transfers only received three percent of the total additional household income generated through open-loop effects. In fact most of their income was generated through open-loop effects. As indicated in the earlier analysis, households whose income originates mainly from transfers constitute the poorest in the country, and the results of the textiles multiplier demonstrate that the industry exerts a very limited income/food security effect on them.

Closed-loop (C) effects only accounted for 24 percent of the total household income gained after an injection of additional textiles export income. These results imply very limited interdependency effects or integration among endogenous accounts, since full and complete circulation of the injected textiles export income is not realized. Possible reasons include limited skills, capital, technology and the like, as these factors are considered critical for a strong textiles industry (UNCTAD, 2004).

Activity Level

Table 7.8 records Stone's decomposed multiplier effects on the activity account after an injection (I) of P 10.329 million worth of textiles export income. Of the total activity output of P 21.657 million gained after an increase in textiles exports, about 56 percent is derived from the textiles industry itself. When Stone's additive and decomposed multipliers are used, 31 percent of the additional output has been generated through transfer (T) effects, while closed-loop (C) effects account for 22 percent of the total activity output realized.

Table 7.8: Disaggregated Fixed Price Multiplier Effects on the Activity Account after Textiles

Activity	Multiplier	I	T	O	C
Trad. Agric - Cattle	0.291	0	0.014	0	0.277
- Other	0.106	0	0.005	0	0.101
Freehold Farms	0.091	0	0.007	0	0.084
Hunt, Fish & Gathering	0.146	0	0.031	0	0.116
Mining	0.101	0	0.066	0	0.034
Meat Processing	0.183	0	0.008	0	0.176
Dairy & O/Process	0.323	0	0.079	0	0.244
Beverages	0.277	0	0.006	0	0.272
Textiles	12.188	10.329	1.795	0	0.065
Chemicals	0.092	0	0.055	0	0.037
Transport & Equip.	0.026	0	0.007	0	0.019
Metal Products	0.180	0	0.029	0	0.150
Bakery & Products	0.103	0	0.008	0	0.095
Tan & Leather Prod	0.001	0	0.001	0	0.001
Wood & Products	0.031	0	0.021	0	0.011
Paper & Products	0.114	0	0.082	0	0.032
Village Industries	0.069	0	0.040	0	0.029
Other Manufacturing	0.228	0	0.144	0	0.084
Water	0.342	0	0.215	0	0.127
Electricity	0.497	0	0.378	0	0.119
Construction	0.695	0	0.439	0	0.256
Trade	1.147	0	0.541	0	0.606
Hotels & Restaurants	0.182	0	0.123	0	0.059
Transport	0.613	0	0.365	0	0.248
Communications	0.359	0	0.256	0	0.103
Business Services	1.981	0	1.211	0	0.770
Central Government	0.262	0	0.014	0	0.247
Local Government	0.036	0	0.017	0	0.019
Services	0.991	0	0.652	0	0.339
Total Activity Impact	21.657	0	6.609	0	4.719

Source: Own calculations, 2006

The results in Table 7.8 indicate that transfer or intra-group (T) effects dominate the closed-loop effects. Transfer effects capture the inter-industry or conventional Leontief input-output interactions. Specifically, here we measure the effects of textiles production (increased to meet export demand) on the output of other activities. For most activities, transfer effects are greater than the circular or C effects. Activities in which the transfer (T) effects dominate

include mining, business services, transport, communications, water, electricity, construction, wooden products, hotels and restaurants, paper products, village industries and the textiles industry itself. In activities where the transfer effects are greater, the implication is that the inter-industry input-output interactions are stronger than closed-loop effects. This suggests very limited circulation of the additional output/income among activities, which in turn implies limited economic integration among endogenous accounts after injecting the textiles export income.

Interestingly, for the primary agricultural as well as food-processing activities, the closed-loop or C effects were dominant. This signifies that for the latter activities the policy shock of the textiles export income completed its circular tour of all endogenous accounts and returned to its origin, i.e. the “textiles” activity. The dominance of closed-loop effects among these activities implies strong economic integration or inter-dependency effects among endogenous accounts, a feature that is desirable for diversification since consumers enjoy a wider choice of goods and services in the domestic economy.

7.5 Summary

This chapter has demonstrated that improved export market access is important for Botswana as well as for food security and an increase in sectoral output including the agricultural industry. As she is structurally a food deficit country owing to unfavourable climatic and physical factors, any increase in the domestic supply of food and other household items depends on access to foreign exchange earnings or income in order to augment locally-produced goods. As the food balance sheets in Chapter 1 indicate, most of Botswana’s basic food goods are imported, hence the need to improve export market access so as to generate foreign exchange.

The results of the SAM-accounting multiplier analysis have indicated the importance of injecting additional export income into endogenous accounts (factors, households and activities). An increase in beef export earnings

benefited factors and households, while the meat-processing activity also gained. Among factors, gross operating surplus and mixed income gained most from an injection of additional export income into meat processing. Skilled manual workers (citizens) were the main beneficiaries of gains from meat processing induced by an increase in demand for beef, followed by unskilled manual workers (citizens). Self-employed households in both urban and rural areas benefited the most from an increase in external demand for beef. Some of these households own cattle, hence their gaining from improved export market access for beef. Wage-based households in both urban and rural areas were the next ones to benefit most, after self-employed households. Employed members of wage-based households contributed to the latter are gains from improved beef export earnings.

Not surprisingly, (citizen) households who depend on income transfers gained only marginally from an increase in external demand for beef, primarily because they lack the primary resource, cattle. At least 45 percent of rural households do not own cattle and as indicated earlier, access to an endowment asset is important for households to benefit from trade liberalization. Households reliant on income transfers constitute the poorest group in the country and therefore their food security is not likely to improve much from enhanced export market access unless they have access to assets or skills.

The other policy experiment, that is, an increase in textiles export income, displayed similar results, with gross operating surplus or return to owners of capital gaining the most after an injection of additional export income into textiles activities. As was expected, the textiles activity witnessed an increase in output, which induced an additional requirement for factors to meet the demand. Among workers, skilled manual workers (citizens) followed by unskilled manual employees (citizens), benefited most from an increase in external demand for textiles products. In general, the textiles industry, like meat processing, are also relatively skill-intensive and therefore they may not necessarily assist Botswana to reduce unemployment amongst her youth.

Wage-based households in both urban and rural areas gained more than self-employed households or those dependent on income transfers. Employed members of wage-based families are responsible for remitting money to owners of factors. Compared to other citizen households, those dependent on income transfers, once again, did not benefit much from an increase in external demand for textiles products, partly owing to lack of skills among their family members. Consequently, as in the case of improved beef exports, households reliant on income transfers are not likely to improve their food security or welfare as a result of enhanced export market access. Other supportive systems will need to be developed to improve the welfare of poor households or those dependent on income transfers as export market access does not necessarily enhance their income security.

From the food security perspective, this chapter has demonstrated that improved market export market access increases, *ceteris paribus*, additional household disposable income which could be used to purchase and import more food and other household effects (thereby enhancing economic access). However, households depended on income transfers or with limited factors (skilled workers or capital) or assets like cattle gained marginally from improved export market access. In fact the results of improved market access support the Stopler-Samuelson theorem which states that in free or liberalized trade those who own factors or assets which are intensively used in the export industry benefit more than those who are least endowed. Owners of cattle or factors like capital and skills benefit more from trade liberalization.

Notwithstanding the negative income distributional effects of trade liberalization, additional household income generated by exports from beef and textiles could pay for more imported food and other basic items (increasing physical availability). As indicated in Chapter 1, Botswana depends heavily on food imports to meet her national and household food requirements. Imports are financed by, among other sources, export earnings from beef and, textiles. In this way, this chapter has shown that trade

liberalization could contribute to improved food security by increasing consumption and supplies.

Of course, for Botswana to benefit from improved export market access of beef and textiles, the country will need to address supply-side constraints. Specifically, both sectoral output and productivity will need to improve through investment in infrastructure, production technology, skills, information and communication technology, quality standards of traded goods, etc. Investments in these areas do not constitute trade-distorting measures as defined under the WTO. During the current national development plan, like in the previous plans, government continues to increase public investment in infrastructure, human resource development, etc to improve productivity, competitiveness and efficiency (NDP 9, MFDP, 2003).

Finally, this chapter has also indicated that open-loop effects dominate the path/movement of shock among factor and household endogenous accounts once an injection has been introduced. At an activity level, in the two policy experiments (beef and textiles) transfer or inter-industry input-output interactions and closed-loop effects are very important in capturing the movement of the shock, once introduced among endogenous accounts. Whilst closed-loop effects capture the full and circular flow of the shock, other effects demonstrate very limited income and demand inter-account linkages or interdependency. Limited closed-loop effects strongly suggest an economy where integration is very weak, which in turn could adversely affect efforts to diversify Botswana's economy, given the dominance of diamond mining.

Lack of skills, limited competition, underdeveloped infrastructure, etc could be partly responsible for weak economic integration and diversification. Plans are underway during NDP 9 to attend to some of these challenges. As a free enterprise country, Botswana also strives to improve competition in the input and output markets for the benefit of the economy and households. A competition policy has already been approved by Parliament following which

the necessary institutional/legal structures will be created to enforce fair business practices in the country.

CHAPTER 8

POLICY SIMULATIONS/EXPERIMENTS BASED UPON SAM PRICE MULTIPLIER ANALYSIS

8.1 Introduction

Chapter 7 examined the effects of improved market access as regards Botswana's exports on food security in particular, and agricultural competitiveness in general. Because, as mentioned earlier, Botswana exports agricultural and non-agricultural goods to the rest of the world that in turn generate scarce foreign earnings to import food, equipment, fuel, technology, and so forth, improved market access is considered critical for developing countries like Botswana to be able to reduce poverty and transform the economy, amongst other results. This study hypothesizes that improved export market access will contribute to enhance food security by increasing effective demand, by providing a higher disposable income from exports. Further, an increase in disposable income, *ceteris paribus*, will enable households to import more food, which in turn will augment domestic supplies (See Chapter 1). The WTO is currently working with member states to enhance export market access for the benefit of developing countries through multilateral trade negotiations and the implementation of the Doha Development Agenda of 2001. Industrialized countries, in particular, have imposed market restrictions on exports from developing countries by enforcing various measures like quotas, tariff rules of origin, technical and food safety standards, etc.

In this chapter, we examine the potential effects of tariff reduction on food security and agricultural competitiveness. Tariffs imposed on imported food raise the cost of food. A tariff not only constitutes a wedge between the domestic and world prices, but the duty levied on imported food also represents an additional household expenditure. As indicated in the problem

statement (see Chapter 1), Botswana is primarily a food-deficit country that heavily depends on imports to meet domestic demand while at the same time poverty is also a major development challenge. Poverty leads to low per capita food consumption in many low-income households (NDP 9, 2003). Like several other countries in the world, Botswana through SACU imposes import duties in order to protect local industries and raise government tariff revenue for development.

8.2 Household Consumption Expenditure and SACU Tariffs on Main Food Items

Impoverished households spend a disproportionate share of their disposable income on food (HIES, 1985/86; HIES, 1993/94 & HIES, 2002/03). The recently published household income and expenditure survey (HIES) similarly shows that such households still spend most of their income on food (HIES, 2002/03 & CSO, 2004). Cereals account for the single largest expenditure item in the total household food budget. Table 8.1 records the expenditure/budget share of various goods and services purchased by these households in Botswana based on the latest HIES (2002/03). Poor households cover those whose monthly income is below P1500.[8] Based on the basket of consumption, the HIES 2002/03 estimates that about 30 percent of Botswana's population lives below the poverty datum line (HIES 2002/03, CSO, 2004). Botswana's population is estimated at 1.7 million. The poverty rate covers about 86 000 households, mostly in the rural areas, with an average monthly disposable income of about P 822 for a family size of about 6 people.[9]

According to Table 8.1, impoverished households spend on average about 36 percent of their disposable income on food. The main food commodities purchased include cereals (10.85 percent), meat (6.04 percent), vegetable

[8] At current exchange rates, this translates into about US$270.
[9] The average monthly disposable income of poor households at the current exchange rate is about US$148.

and fruits (3.87 percent), dairy (3.23) and other food commodities (11.74 percent). Other food commodities cover sugar, drinks, and edible oils.

Besides food expenditures, Table 8.1 indicates that poor households purchase alcohol and tobacco (13.46 percent), clothing and footwear (8.60 percent), housing and household effects (23.83 percent), transport (11.17 percent) and other services. Compared to the national average, these households spend more on food (36 percent versus 23.77 percent), alcohol and tobacco (13.46 percent versus 9.64 percent) and housing and household effects (23.83 percent versus 20.97 percent).

Table 8.1: Average Monthly Expenditure of Low-Income Households as % of total Household Consumption Expenditure

Good/Service	% Share	% Share at National
Cereals	10.85	6.96
Meat	6.04	3.48
Dairy	3.23	2.36
Vegetables & Fruits	3.87	2.1
Other Food	11.74	8.87
Drinks & Tobacco	13.46	9.64
Clothing & Footwear	8.6	6.82
ts	23.83	20.97
Health	0.93	2.08
Transport	11.17	18.65
Education & Entertainment	2.91	6.88
Miscellaneous	3.37	11.19
Total	**100**	**100**

Source: HIES 2002/03, CSO, 2004

As this study is aimed at analyzing the effects of international trade liberalization on food security and agricultural competitiveness in Botswana, a discussion of the reduction of applied import duties/tariffs levied on the main food items consumed by the poor will now be undertaken: beef, wheat and

maize grains (cereals) and powdered milk. Except for beef, all these products are imported to meet most of the country's domestic requirements. Botswana's climate is not suited to the sustainable and competitive production of cereals or to some extent dairy products, unless feed costs are reduced in the latter.

Despite the limited suitability of most SACU countries for cereal production in particular, relatively high import duties have been imposed so as to restrict the availability of supplies from competitive global sources where the climate is favourable. Within SACU, cereals, especially maize and wheat, together with beef and dairy products are classified as sensitive products, hence the high import duties they attract to protect the local industries (see Chapter 2). A reduction of import duties together with the implementation of other supportive policies or measures could lead to lower and more competitive domestic prices for both agricultural and non-agricultural goods. If domestic prices decline after a reduction of import duties, *ceteris paribus*, the demand for the respective food commodities is expected to increase, which in turn might increase per capita food consumption. A decline in domestic prices owing to tariff reduction could increase household real income, which may also greatly benefit the poor. Botswana imposes import tariffs that are common to all members of the customs union. SACU lays down both bound and applied tariffs for imported goods.

Table 8.2 reports the current SACU bound and applied tariffs for boneless beef, wheat, maize and dairy products by region or trading area. All bound tariffs are presented in percentage form. Bound tariffs are the highest possible import duties that a WTO member can impose to protect its domestic industries, while applied duties represent the day-to-day duties administered by a country in order to conduct trade or commerce with other countries.

Bound tariffs are based on the value of the imported good or *ad valorem* duty. Primary products like maize and wheat grain attract lower bound tariffs than processed products (maize and wheaten flour). Tariff escalation or an

increase in duties based on the level of processing or value addition is very common in global trade and generally discriminates against developing countries that normally specialize in exporting primary products (Ingco & Nash, 2004).

Table 8.2: SACU Bound and Applied Tariffs for Selected Agricultural Products

	Bound	Applied Tariffs		
	Tariff/Duty			
		SADC	EU	Rest of the World
Boneless beef	160%	free	40%	40%
Powdered milk	96%	free	450c/kg	450c/kg
Wheat grain	72%	free	2 %	2 %
Wheat flour	99%	20%	20 % +29.4c/kg	20 % + 29.4c/kg
Maize grain	50%	free	13 %	13 %
Maize flour	99%	10.1c/kg	10.1c/kg	10.1c/kg

Source: SACU, 2005

Note: C stands for South African cents, which is SACU's unit of account.

Currently, R1.20 is equal to 1 Pula, the Botswana currency.

Where applied agricultural tariffs are concerned, SACU, as indicated in Table 8.2, has divided the world into three trading regions with SADC, generally, receiving preferential treatment in respect to lower *ad valorem* import duties while the EU and the rest of the world pay equal import duties for agricultural goods. Duty-free and lower import duties for SADC are intended to contribute towards regional integration, as per the SADC Trade Protocol of 2000. Applied duties are generally very complex because in some cases they use a combination of percentages based on the value of the product together with a duty/tariff per given quantity/weight of an imported good. This is illustrated by the case of imported wheat flour in Table 8.2. Since the 1990's, SACU has over the years reduced applied tariffs in order to increase the domestic supply of certain products in which the region does not necessarily enjoy comparative advantage. These products include cereals, dairy products and the like. In principle, the reduction of applied agricultural tariffs is intended to increase domestic supply and possibly enhance per capita consumption by a decline in prices. Tariffs increase domestic prices by protecting the respective

industries and producers. It is also possible that the reduction of applied tariffs could represent a gradual compliance with the WTO's desire to liberalize agricultural trade, subject to SACU's development challenges and priorities.

To undertake an examination of the effects of tariff reduction on food security and agricultural competitiveness in Botswana, a SAM-price multiplier analysis will be used. While in Chapter 7 an income multiplier analysis was employed, it was assumed there that prices do not change. Only income or export earnings were allowed to vary. In this chapter, we assume prices to change as import tariffs are reduced. An import duty is a wedge between the domestic and world prices. A reduction of import duties on commodities indicated in Table 8.2 affects domestic prices in Botswana including prices in other SACU members, as the former cannot unilaterally reduce import tariffs. As a result of the common external tariff among members, this study assumes a SACU-wide tariff reduction.

Following the democratic and institutional reforms in the current SACU agreement, a tariff board representing the economic and trade interests of all member countries has been established (see Chapter 2). Tariff policy changes are then submitted to the SACU Council of Ministers for consideration and approval. The Council of Ministers is the SACU's top decision-making body.

Whilst SACU, like other WTO members, lays down both bound and applied agricultural tariffs, this study will utilize applied tariffs for analysis. Applied tariffs are preferred over bound duties because the former affect the day-to-day trade transactions with the rest of the world. In any event, global trade liberalization is aimed at removing/reducing applied tariffs, as these constitute the direct cost borne by the exporting countries in accessing global markets. Bound tariffs are legally the maximum tariffs that a WTO member can impose on imports in order to insulate a local industry.

8.3 Policy Experiments using Price Multiplier Analysis

As in Chapter 7, the following price multiplier analysis will examine the effects of tariff reduction on food security using Pyatt and Round's multiplicative multiplier, $\mathbf{M_a^x}$, and Stone's additive or decomposed multiplier approach (**I, T, O, C**). Whereas in Chapter 7 relative prices were held constant while income was allowed to vary, in the present chapter prices will change when tariffs are reduced as part of trade liberalization, while income and relative quantities are held constant. Changes in prices while income and quantities are constant will not only affect the domestic prices of traded commodities, substitution by activities resulting from changes in relative prices will occur as well, while households will also be able to substitute items in their consumption basket. This flexibility in the price multiplier analysis offers an added advantage over the fixed price income multiplier approach, where substitution and consumer choice are very limited.

The price multiplier analysis is also undertaken at factor, household and activity levels. The steps used to derive these multipliers for the SAM price-multiplier approach were fully described in Chapter 5. As in Chapter 7, the same endogenous accounts are maintained, while one exogenous account through which an external policy shock is introduced will be adopted in this chapter. As indicated by Roland-Holst and Sancho (1995) in Chapter 5, the application of the price multiplier analysis, say following a tariff reduction, covers the formation of a price and cost transmission in the economy. In particular, a reduction of a tariff on an imported product, ceteris paribus, not only affects the domestic price of that commodity, cost transmission in the economy is also expected to take place. The full transmission of the cost in the endogenous accounts/economy after tariff reduction depends on the rigidity or lack of competition in the domestic input/output markets, laws and policies regulating the various industries, etc.

Before the price multiplier analysis is undertaken, it is important to explain briefly how the policy shock is introduced. In general, as pointed out above a tariff constitutes a wedge between the domestic price and the world price and is indicated as follows:

$P_d = P_w (1+ t_m)$

where P_d represents the domestic price, while $P_{w\ is}$ the world price and t_m is the duty/tax imposed on the imported product. It is assumed that the duty is imposed on a homogeneous product. As the SACU current applied tariff for beef is 40 (see Table 8.2), therefore t_m is 0.40. In the price multiplier model, P_d is assumed to equal 1 so that in the above equation

$P_w = P_d / (1+ t_{m)}$.

When t_m is 0.40, a change or reduction in the domestic price, P_d, that is due to tariff liberalization, is given by

$\Delta P_d = (1/ (1+t_{m)}) -1$.

The shock in the case where t_m equals 0.40 for beef is

$(1/ (1+ 0.4))-1= -0.286$.

As a result, in order to undertake a price multiplier analysis based on a change in the domestic price, $P_{d,}$ owing to tariff liberalization, the policy shock is -0.286 and is introduced into the “meat processing” activity, the appropriate endogenous account. Table 8.3 illustrates the multiplier results of the shock on the endogenous accounts in this study. The same procedure is followed for other commodities, namely wheat and maize grains as well as powdered milk.

Table 8.3: Effects on Food Security of a Reduction of SACU's Applied Tariff on Beef

Price Policy Experiment								
			Multiplier	Stone				
Accounts		Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp	Check
Prof. & Tech Employees - Cit.	F1	0	-0.014	0.000	0.000	-0.010	-0.003	0.000
Prof. & Tech. Employees - Non-Cit.	F2	0	-0.006	0.000	0.000	-0.003	-0.003	0.000
Admin & Manag. Employees - Cit	F3	0	-0.014	0.000	0.000	-0.011	-0.003	0.000
Admin & Manag. Employees - Non-Cit	F4	0	-0.006	0.000	0.000	-0.003	-0.003	0.000
Clerical Employees - Citizens	F5	0	-0.014	0.000	0.000	-0.010	-0.003	0.000
Clerical Employees - Non-Citizens	F6	0	-0.006	0.000	0.000	-0.003	-0.003	0.000
Skilled Manual - Citizens	F7	0	-0.014	0.000	0.000	-0.011	-0.003	0.000
Skilled Manual - Non-Citizens	F8	0	-0.006	0.000	0.000	-0.003	-0.003	0.000
Unskilled Employees	F9	0	-0.014	0.000	0.000	-0.011	-0.003	0.000
Mixed Income	F10	0	-0.015	0.000	0.000	-0.011	-0.003	0.000
Gross Operating Surplus	GOS	0	-0.001	0.000	0.000	0.000	0.000	0.000
Urban Households - Wage Income	I1	0	-0.013	0.000	0.000	-0.010	-0.003	0.000
Urban Households - Self-employed	I2	0	-0.015	0.000	0.000	-0.011	-0.003	0.000
Urban Households - Transfers	I3	0	-0.029	0.000	0.000	-0.023	-0.006	0.000
Rural Households - Wage Income	I4	0	-0.014	0.000	0.000	-0.011	-0.003	0.000
Rural Households - Self-employed	I5	0	-0.016	0.000	0.000	-0.012	-0.004	0.000
Rural Households - Transfers	I6	0	-0.017	0.000	0.000	-0.013	-0.004	0.000
Non-Citizen Households	I7	0	-0.006	0.000	0.000	-0.003	-0.003	0.000
Non-Financial Enterp	Non-Fin	0	0.000	0.000	0.000	0.000	0.000	0.000
Financial	Fin	0	0.000	0.000	0.000	0.000	0.000	0.000
Private Non-Profit Institutions	NPI	0	-0.007	0.000	0.000	-0.004	-0.003	0.000
Trad. Agric - Cattle	P1	0	-0.014	0.000	0.000	0.000	-0.014	0.000
- Other	P2	0	-0.018	0.000	-0.010	0.000	-0.008	0.000
Freehold Farms	P3	0	-0.009	0.000	0.000	0.000	-0.009	0.000
Hunting, Fishing & Gathering	P4	0	-0.007	0.000	-0.003	0.000	-0.004	0.000
Mining	P5-11	0	-0.002	0.000	0.000	0.000	-0.002	0.000
Meat Processing	P12	-0.286	-0.294	-0.286	0.000	0.000	-0.008	0.000
Dairy & Other Agric. Processing	P13	0	-0.005	0.000	0.000	0.000	-0.004	0.000
Beverages	P14	0	-0.004	0.000	-0.001	0.000	-0.003	0.000
Textiles	P15	0	-0.005	0.000	0.000	0.000	-0.005	0.000
Chemicals	P16	0	-0.005	0.000	0.000	0.000	-0.004	0.000
Transport & Equipment	P17	0	-0.001	0.000	0.000	0.000	-0.001	0.000
Metal Products	P18	0	-0.002	0.000	0.000	0.000	-0.002	0.000
Bakery & Products	P19	0	-0.004	0.000	-0.001	0.000	-0.004	0.000
Tanning & Leather Products	P20	0	-0.004	0.000	0.000	0.000	-0.004	0.000
Wood & Products	P21	0	-0.006	0.000	0.000	0.000	-0.005	0.000

Paper & Products	P22	0	-0.004	0.000	0.000	0.000	-0.004	0.000
Village Industries	P23	0	-0.009	0.000	0.000	0.000	-0.009	0.000
Other Manufacturing	P24	0	-0.003	0.000	0.000	0.000	-0.003	0.000
Water	P25	0	-0.005	0.000	0.000	0.000	-0.005	0.000
Electricity	P26	0	-0.004	0.000	0.000	0.000	-0.004	0.000
Construction	P27	0	-0.004	0.000	0.000	0.000	-0.003	0.000
Trade	P28	0	-0.004	0.000	0.000	0.000	-0.004	0.000
Hotels & Restaurants	P29	0	-0.004	0.000	0.000	0.000	-0.003	0.000
Transport	P30-33	0	-0.004	0.000	0.000	0.000	-0.003	0.000
Communications	P34	0	-0.005	0.000	0.000	0.000	-0.005	0.000
Business Services	P35-37	0	-0.004	0.000	0.000	0.000	-0.004	0.000
Central Government	P38	0	-0.006	0.000	0.000	0.000	-0.006	0.000
Local Government	P39	0	-0.008	0.000	0.000	0.000	-0.008	0.000
Services	P40-43	0	-0.009	0.000	-0.002	0.000	-0.007	0.000

Source: Own Calculations, 2006

Below we now examine the effects of reducing import duties for boneless beef on food security and agricultural competitiveness in Botswana at factor, household and activity levels. Despite Botswana's self-sufficiency in beef, protein malnutrition is still high among children and poor families in Botswana (NDP 9, 2003). It is assumed in this study that one possible strategy to increase the supply of proteins to Botswana is by reducing the SACU applied tariff on imported boneless beef which in turn could reduce the domestic price of the commodity and, ceteris paribus, increase per capita consumption for the benefit of poor households and children.

8.3.1. The Effects of a Change in Domestic Price of Boneless Beef on Food Security in Botswana (based upon the Multiplicative Multiplier, M_P)

Factor Level

Following a change in domestic price, P_d, of beef owing to tariff elimination Table 8.3 illustrates that the factor account is also affected. Specifically, after the introduction of a shock, -0.286 or a reduction of the domestic price of beef by 28.6 percent, the factor account exhibits a decline in food expenditure or the real cost of living for all factors, although the magnitude differs by factor sub-account owing to substitution effects. The beneficiaries of improved

welfare, resulting from the decline in the real cost of living induced by tariff elimination in beef, are all citizen workers (professional, technical, administrative, clerical, skilled and unskilled). Low-income workers, in particular, spend a relatively high proportion of their disposable income on food, as is the case with poor households.

A decline in food expenditure benefits workers not only to substitute items in their consumption basket but also by increasing their real income, which in turn could assist their households to save. The decline in food expenditure induced by tariff elimination or liberalization regarding boneless beef ranges from almost zero (-0.001) for gross operating surplus/GOS to about -0.015 or about 2 percent for mixed income/F_{10}. Mixed income refers to returns to labour in non-incorporated or unregistered firms. Figure 8.1 records the price multipliers at factor level following tariff liberalization in boneless beef.

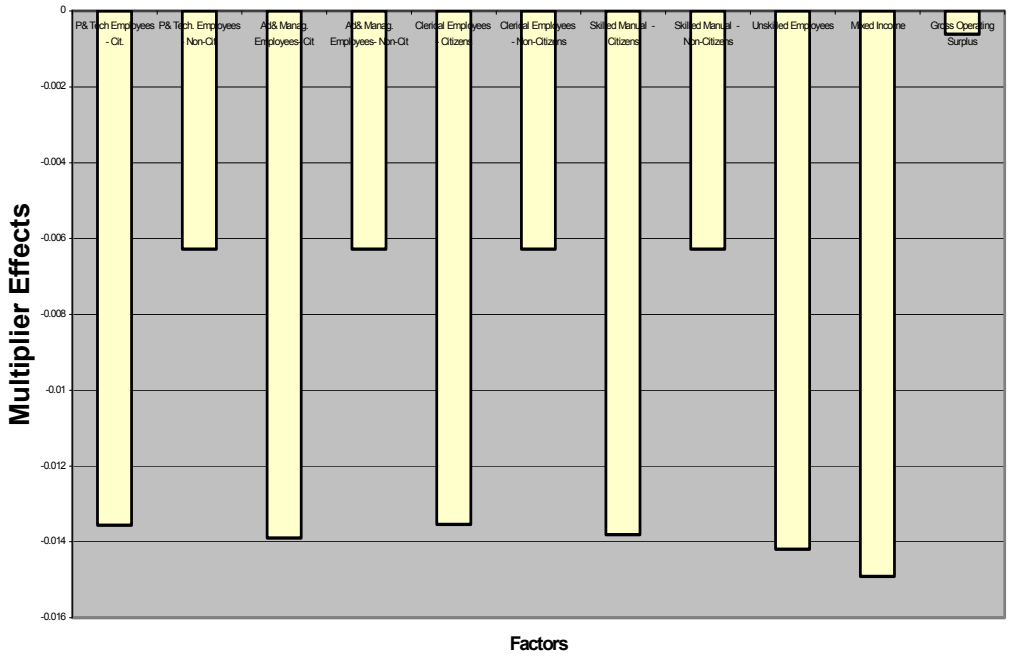

Figure 8.1: Effects of change in Domestic Beef Price due to Tariff Reduction

In essence, Figure 8.1 demonstrates that mixed income/F_{10} gains, of approximately two percent decline in food expenditure induced by a tariff elimination or liberalization in boneless beef, while citizen professional, technical, administrative, skilled and unskilled workers are the next categories

to benefit more than other factor sub-accounts. The apparently limited welfare gains to the factor account following tariff elimination/liberalization in boneless beef could result from poor price transmission and other institutional factors that reduce the complete price transmission in the economy. This implies a need to design and implement an effective competition policy/law in Botswana so as to gain from tariff liberalization. Of course it is not necessarily automatic that tariff reduction leads to a decline in domestic prices**!**

As Stiglitz cautions, trade or tariff liberalization, including globalisation, should be accompanied by supportive domestic policies such as an effective competition policy (Stiglitz, 1998; Stiglitz, 2003). In Botswana, as in several developing countries, factor and output markets, including service industries, are generally characterized by uncompetitive behaviour, coupled with state-owned monopoly organizations (Jammeh, 1988). In fact according to the 1993/94 SAM**,** it is observed**, "**often goods on sale in Botswana clearly imported from South Africa are charged the same price in Pula, as they would fetch in Rands, that is a mark up of around 33 percent even on the South African retail values at the 1993/94 exchange rate" (CSO: 1999, p.37). Given the strength of the Pula against the Rand since the 1980's, it is evident that consumers of imported items from South Africa did not benefit from the Pula/Rand exchange rate due to weak competition or imperfect market behaviour by traders, etc. In short, the strength of the Pula did not translate into greater quantities of imported goods partly because of poor limited competition by traders and others. Except for South Africa where there is apparently an effective competition law/authority, other SACU countries do not have a similar enforceable legal framework to protect consumers against unfair business practices.

The policy challenge here is that tariff liberalization be accompanied by complementary policies such as an effective and enforceable competition policy and law. Acknowledging the importance of fair business practices in the country, Government has already approved a Competition Policy, which, it is hoped, will benefit households as well as the entire economy and promote

efficient allocation and utilization of scarce resources. Further, it is also assumed that by means of the implementation of the competition policy and law, price transmission in the economy will circulate as fully as possible in the factor and product/service markets. Both the input and output markets for domestic and imported goods will be subject to competition. In addition, there will be a need to monitor anti-competitive behaviour in the economy while at the same applying penalties to offenders.

In general, lower costs could partly enhance Botswana's global competitiveness. According to a study by the Foreign Investment Advisory Section (FIAS) of the World Bank, Botswana is considered as a high-cost country (FIAS Report, 2004). The report identified low labour productivity, the cost of obtaining finance, the cost of premises, lack of skilled manpower, a weak competitive environment and the like as the most serious constraints facing investors. The envisioned competition policy may also possibly contribute to food security by minimizing the adverse effects of market failures caused by, among other reasons, unfair business practices as described in the 1993/94 SAM quoted above.

Household level

At household level, both citizen and non-citizen households benefited from a tariff reduction on boneless beef even though in most cases the gain was less than one percent. Non-citizen households benefited the least following a tariff reduction on such beef (see Table 8.3). After a shock of -0.286 or a domestic price reduction of 28.6 percent in boneless beef, the reduction in food expenditure declined from just under one percent for non-citizen households (-0.006) to about three percent (-0.029) for urban-based citizen households dependent on income transfers (UH/holds-transfers). Figure 8.2 illustrates the multiplier effects at household level by type, following a reduction of the domestic price of boneless beef. A decline in food expenditure for households means that their cost of living has been reduced in real terms, which in turn translates into an improvement in real income.

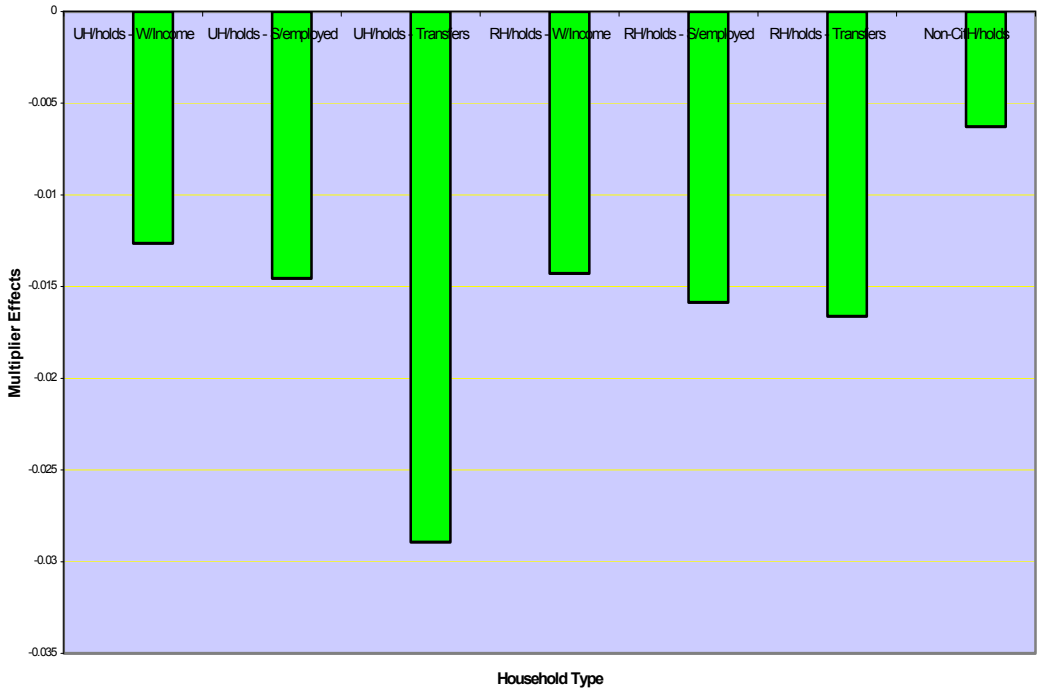

Figure 8.2: Multiplier effects on the Household Account after a change in Domestic Price in Beef

Figure 8.2 indicates that urban-based households reliant on income transfers (UH/holds-transfers) are the largest recipients of benefits arising from a decline in domestic beef prices following tariff liberalization in boneless beef, since their food expenditure declines by almost three percent. Rural households also dependent on income transfers (RH/holds-transfers) come second as the major beneficiaries of a decline in household food expenditure following tariff liberalization. RH/holds-transfers gain by just less than two percent (-0.17). As pointed out earlier, households whose income is mainly derived from transfers constitute the poorest in the country, hence trade policies that improve their welfare deserve attention. One possible reason why urban-based households reliant on income transfers gained more than their rural counterparts might be that the former mainly purchase their meat requirements while the latter might benefit from acquisitions or gifts of meat in kind.

It will be recalled that in Table 8.1, it was indicated that poor households spend almost 36 percent of their consumption budget on food that is dominated by cereals, meat, dairy and other food items. Further, it is also documented in NDP 9 that protein malnutrition, especially among children, is very high. From the results of the price multiplier analysis shown in Figure 8.2, it is evident that tariff elimination or liberalization regarding boneless beef mostly benefits poor households because their per capita protein consumption improves owing to a reduction in domestic prices of beef. Unlike the situation in Chapter 7, tariff liberalization benefits the poor whilst improved export market access displays a limited effect, owing mainly to endowment factors (assets, skills, etc.). The results of this price multiplier analysis, therefore, strongly suggest that tariff liberalization concerning beef may enhance food security, especially that of poor households.

Next to households based on income transfers, citizen households in both rural and urban areas dependent on self-employment (UH/holds and RH/holds-self-employed) also gained from a decline in domestic beef prices. Figure 8.2 shows that these households benefited from a 0.015-0.016 percent decline in food expenditure, induced by tariff liberalization regarding boneless beef. In general, self-employed households depend on the traditional cattle industry because some of them own cattle (see Chapters 6 and 7). While on the consumption side a reduction in beef prices could increase these households' per capita and household meat consumption, lower beef producer prices (currently insulated from global commerce owing to SACU tariffs) could also adversely affect their income.

Households reliant on wage income (UH/holds and RH/holds-w/income) gained the least from tariff liberalization, if non-citizen households are excluded. Unlike the position in Chapter 7, where the non-citizen households benefited from improved export market access due to a greater wage factor income, the results of tariff liberalization in beef indicate that their household food expenditure declined less than that of all citizen households. Figure 8.2

indicates that wage-based households experience gains in reduced food expenditure of between 0.013-0.014 percent, almost half of what urban-based citizen households depending on income transfers realized. It is possible that wage-based households are less price-sensitive to a decline in the domestic price of beef than other citizen households, especially those reliant on income transfers.

As indicated earlier, non-citizen households gained very little from tariff liberalization in beef compared to citizen households. Their household beef-related food expenditure hardly registered a gain/decline, despite introducing a 28.6 percent shock in order to reduce domestic prices of beef. This could also suggest less sensitivity to a decline in the domestic price of beef.

Compared to Chapter 7, it is interesting to observe that while improved beef exports exerted a minimal welfare impact on households, especially those of the poor whose income is based on transfers, a tariff reduction on beef in this chapter has enhanced the latter's food security and per capita consumption. As indicated in Chapter 7, poor households do not own cattle and therefore increases in beef export earnings generally only benefit cattle owners. A tariff reduction on imported beef under competitive conditions, on the other hand, essentially reduces domestic prices, which in turn could benefit the poor since meat prices also decline. However, while the domestic beef industry is one of Botswana's globally competitive sectors (see Chapter 4), both Botswana and SACU still classify it as a sensitive industry because of its strong household and inter-sectoral linkages. As a result, safeguards are still necessary to sustain the livelihoods of those who depend on it directly and indirectly. These measures include effective anti-dumping and countervailing duties against imports, while disease control laws and regulations should also be vigilantly implemented. Such measures are consistent with WTO's Doha Development Agenda, since countries faced with poverty, unemployment and other social ills, such as Botswana, require additional support while trading.

Whilst an increase in per capita beef consumption (resulting from tariff reduction/liberalization amongst other factors) is important, especially for impoverished households, the beef industry, as indicated in Chapter 6, displays very strong income and demand linkages in the economy. Besides providing a livelihood to most rural people as well as to many urban families, the sub-sector also employs numerous unskilled persons. Furthermore, the sector generates sufficient export earnings to pay for imports of basic cereals such as maize, wheat, rice and sorghum (Ministry of Agriculture, 2005). Given this pivotal and developmental role played by the beef industry in Botswana's rural economy, where alternative and viable income and employment sources are limited, further tariff/reduction liberalization in the sector requires extreme caution.

Activity Level

Regarding the activity account, all activities benefited from a tariff reduction in boneless beef although some of them gained less than one percent. A tariff reduction on imported beef favours related activities by reducing their direct production costs. Tariff reduction for boneless beef benefited several activities as shown in Table 8.3. Meat processing, the endogenous account into which the initial shock is introduced, exhibits the largest decline in production costs after tariffs are liberalized. This activity experienced a 29.4 percent decline in production cost following tariff liberalization with respect to boneless beef.

Currently, almost all beef produced in Botswana comes from domestic cattle, because imports are prohibited under the Botswana Meat Commission Act. Tariff liberalization may promote diversification and promote private sector participation, but the export-led monopoly over meat processing enjoyed by the Botswana Meat Commission could be adversely affected by an inflow of cheaper sources of meat imports. Government is, however, planning to liberalize the beef meat industry, which could benefit from cheaper imported materials for use by the domestic processing enterprises. While beef import liberalization could potentially benefit the domestic processing industry, it is

also critical that strict and hygienic standards are adhered to during the liberalization of meat processing, lest the whole industry is threatened by importation of diseases and similar problems. The risk of the spread of mad cow disease is one other SPS concern.

Besides meat processing/P_{12}, Table 8.3 illustrates that at least 50 percent of the 29 activities register a one percent decline in production costs, with traditional cattle farming/P_1 and other farming/P_2 benefiting by more than a one percent reduction in production costs. Production costs of other activities benefited minimally from a tariff reduction regarding boneless beef. However, for those activities where the decline in production costs is minimal after such a reduction, this result suggests very weak input-output interactions and possibly poor price transmission, as well as limited market competition in other sectors owing to certain technical and institutional factors.

Suffice to note that, at the least, many activities witness a decline in production costs induced by tariff liberalization in boneless beef. As a decline in the beef import tariff reduces the production costs of many activities, this implies strong inter-industry linkages between meat processing and other enterprises. Lower production costs, caused among other reasons by tariff liberalization, could benefit Botswana's economic diversification. Indeed, a reduction in production costs owing to tariff reduction is in line with Botswana's foreign trade policy (NDP 9, 2003). However, government also depends for up to 20 percent of its income on SACU tariff revenue, hence the need for caution when complete tariff liberalization is advocated. Because of the increasing costs of HIV/AIDS, high unemployment and poverty, it is still necessary that government receive some public revenue from tariffs, while broadening the revenue base through levying value-added tax and other means.

8.3.2 The Effects of a Change in Domestic Price of Beef, after Tariff Liberalization, on Food Security (based upon Stone's Additive Multiplier)

The preceding analysis was based on the multiplicative price multiplier, $\mathbf{M_p}$, which is not disaggregated, unlike the decomposed Stone's additive multiplier.

In this section, we examine in detail the types of interactions or inter-relationships that occur when a tariff reduction is imposed on beef. These interactions or effects cover transfer (T_p) or intra-effects, open-loop (O_p) or inter-effects and closed-loop (C_p) or circular effects. Stone's price additive multiplier, like its income multiplier equivalent, is given by

$$I + T_P + O_P + C_P = \mathbf{M_p}$$

We now investigate the interactions or types of effects among the various endogenous accounts following the injection of the policy shock, that is, a 28.6 percent reduction in domestic beef prices at factor, household and activity levels.

Factor Level

Table 8.4 records disaggregated price multiplier effects following on the factor account tariff liberalization concerning beef.

Table 8.4: Disaggregated Price Multiplier Effects of Tariff Liberalization of Beef on Factor Account

Accounts	Dv' * Ma	I	Tp	Op	Cp
P & Tech Emp - Cit.	-0.014	0.000	0.000	-0.010	-0.003
P & Tech. Emp - Non-Cit.	-0.006	0.000	0.000	-0.003	-0.003
Ad & Manag. Emp - Cit	-0.014	0.000	0.000	-0.011	-0.003
Ad & Manag. Emp - Non-Cit	-0.006	0.000	0.000	-0.003	-0.003
Clerical Emp - Citizens	-0.014	0.000	0.000	-0.010	-0.003
Clerical Emp - Non-Citizens	-0.006	0.000	0.000	-0.003	-0.003
Skilled Manual - Citizens	-0.014	0.000	0.000	-0.011	-0.003
Sk/Manual - Non-Citizens	-0.006	0.000	0.000	-0.003	-0.003
Unskilled Employees	-0.014	0.000	0.000	-0.011	-0.003
Mixed Income	-0.015	0.000	0.000	-0.011	-0.003
Gross Operating Surplus	-0.001	0.000	0.000	0.000	0.000
Total Factor Impact	-0.110	0.000	0.000	-0.079	-0.031

Source: Own calculations, 2006

As indicated in Table 8.4, of the total factor impact of -0.110 or an 11 percent decline in cost of living arising from the tariff liberalization regarding boneless beef, about 72 percent (-0.079) is due to open-loop (O_p) effects while the remainder, 28 percent or -0.031, is attributed to closed-loop (C_p) effects. The interpretation of open-loop effects is exactly the same as in Chapter 7. Open-loop or O_p effects represent the effects of the reduction in domestic price of beef, after the initial shock regarding meat processing, on factors and households, taking into account the production linkages only. Specifically, the open-loop effects cover how the decline in domestic beef price, after tariff reduction, affects factor and household costs or welfare.

Table 8.4 shows that the main recipients or beneficiaries of a decline in food costs or cost of living, after a reduction in domestic beef prices in the factor account through open-loop (O_p) effects, are mainly citizen employees

(professional, technical, administrative, clerical, skilled and unskilled manual workers) as well as mixed income. Other factor sub-accounts do not experience much improvement in the cost of living through open-loop effects. For citizen employees including mixed income, the open-loop effects are at least three times greater than closed-loop effects. The dominance of open-loop effects in the factor account in terms of a price multiplier analysis indicates limited or weak interdependency effects/economic integration among endogenous accounts (Powell & Round, 1997). This implies that the transmission of the decline in the domestic price of beef after tariff liberalization does not fully circulate among endogenous accounts (factor, households and activities).

Regarding closed-loop effects (C_p), Table 8.4 illustrates that all citizen workers, mixed income and the gross operating surplus do not benefit more compared to gains from open-loop effects. In fact, gross operating surplus does not benefit in terms of any effects. Non-citizen workers gain equally as a result of both closed- and open-loop effects. Closed-loop effects capture the effects of the complete and circular transmission of the reduction in the domestic price of beef among all endogenous accounts. This implies strong economic integration or interdependency among accounts, which in turn augurs well for diversification. However, in the factor account, closed-loop effects are very weak following tariff liberalization or price reduction in the domestic meat market. Weak closed-loop effects indicate poor price transmission, limited competition and other institutional factors.

Household Level

Table 8.5 below indicates Stone's additive and disaggregated price multiplier effects on the household account after tariff elimination or liberalization as regards boneless beef. Of the total -0.109 decline in a household's real cost of living induced by such a tariff liberalization, about 77 percent (-0.084) of the gain is attributable to open-loop (O_p) effects while the remainder results from closed-loop (C_p) effects. The price multiplier results in Table 8.5 are very

similar to those at factor level in table 8.4 where open-loop effects are dominant.

Table 8.5: Disaggregated Price Multiplier Effects on Household Account after Beef Tariff Liberalization

Household Type	Dv' * Ma	I	Tp	Op	Cp
UH/holds - Wage Income	-0.013	0.000	0.000	-0.010	-0.003
UH/holds - Self-employed	-0.015	0.000	0.000	-0.011	-0.003
Urban Households - Transfers	-0.029	0.000	0.000	-0.023	-0.006
Rural Households - Wage Income	-0.014	0.000	0.000	-0.011	-0.003
Rural Households - Self-employed	-0.016	0.000	0.000	-0.012	-0.004
Rural Households - Transfers	-0.017	0.000	0.000	-0.013	-0.004
Non-Citizen Households	-0.006	0.000	0.000	-0.003	-0.003
Total H/Hold Impact	-0.109	0.000	0.000	-0.084	-0.025

Source: Own calculations, 2006

Among the households that benefited most from the decline in the real cost of living owing to open-loop effects are urban-based households who were dependent on income transfers (2.3 percent or -0.023). Their rural counterparts came second and experienced a 1.3 percent (-0.013) decline in the real cost of living after tariff liberalization as regards boneless beef. Self-employed and wage-based households in both urban and rural areas also benefited more as a result of open-loop effects. Non-citizen households gained equally (-0.003) through open- and closed-loop effects,

Closed-loop effects (C_p) only contributed 23 percent (-0.025) of the total decline in the real cost of living experienced by households. The dominance of open-loop effects indicates that the price transmission after the shock does not circulate fully among endogenous accounts, this implies limited economic integration. Factors such as imperfect market competition or market failures, as well as technical and institutional factors, could be responsible for limited closed-loop effects as opposed to open-loop effects in contributing towards the decline in a household's cost of living.

Activity Level

At activity level, the disaggregated price multiplier results following tariff liberalization in beef are recorded in Table 8.6.

Table 8.6: Disaggregated Price Multiplier Effects on Activity Account after Tariff Liberalization in Beef

Activity	Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp
Trad. Agric - Cattle	0	-0.014	0.000	0.000	0.000	-0.014
- Other	0	-0.018	0.000	-0.010	0.000	-0.008
Freehold Farms	0	-0.009	0.000	0.000	0.000	-0.009
Hunt, Fish & Gathering	0	-0.007	0.000	-0.003	0.000	-0.004
Mining	0	-0.002	0.000	0.000	0.000	-0.002
Meat Processing	-0.2857143	-0.294	-0.286	0.000	0.000	-0.008
Dairy & Agric. Processing	0	-0.005	0.000	0.000	0.000	-0.004
Beverages	0	-0.004	0.000	-0.001	0.000	-0.003
Textiles	0	-0.005	0.000	0.000	0.000	-0.005
Chemicals	0	-0.005	0.000	0.000	0.000	-0.004
Transport & Equipment	0	-0.001	0.000	0.000	0.000	-0.001
Metal Products	0	-0.002	0.000	0.000	0.000	-0.002
Bakery & Products	0	-0.004	0.000	-0.001	0.000	-0.004
Tanning & Leather Products	0	-0.004	0.000	0.000	0.000	-0.004
Wood & Products	0	-0.006	0.000	0.000	0.000	-0.005
Paper & Products	0	-0.004	0.000	0.000	0.000	-0.004
Village Industries	0	-0.009	0.000	0.000	0.000	-0.009
Other Manufacturing	0	-0.003	0.000	0.000	0.000	-0.003
Water	0	-0.005	0.000	0.000	0.000	-0.005
Electricity	0	-0.004	0.000	0.000	0.000	-0.004
Construction	0	-0.004	0.000	0.000	0.000	-0.003
Trade	0	-0.004	0.000	0.000	0.000	-0.004
Hotels & Restaurants	0	-0.004	0.000	0.000	0.000	-0.003
Transport	0	-0.004	0.000	0.000	0.000	-0.003
Communications	0	-0.005	0.000	0.000	0.000	-0.005
Business Services	0	-0.004	0.000	0.000	0.000	-0.004
Central Government	0	-0.006	0.000	0.000	0.000	-0.006
Local Government	0	-0.008	0.000	0.000	0.000	-0.008
Services	0	-0.009	0.000	-0.002	0.000	-0.007
Total Activity Impact	0	-0.452	-0.286	-0.020	0.000	-0.146

Source: Own calculations, 2006

After the shock, that is a -0.286 or 28.6 percent decline in the domestic price of beef introduced into meat processing, overall the shock accounted for 45.2 percent or a -0.452 decline in production costs for all activities. On its own, meat processing benefited from an approximately 63 percent reduction in production costs after tariff liberalization with respect to beef. Table 8.6 demonstrates that 32 percent of the decline is accounted for by closed-loop (C_p) effects while the remaining five percent stems from transfer (T_p) effects. According to these results, tariff reduction as regards boneless beef has reduced production costs among activities by 45.2 percent, following an initial 28.6 percent decline in production costs introduced into the meat-processing activity. This suggests that tariff elimination here has a positive impact on the activity account. Further, this figure implies relatively strong price transmission across activities after an initial reduction in the production costs of meat processing.

Closed-loop effects in Table 8.6 represent the interdependence or interconnectedness of endogenous accounts following the introduction of a shock/cost reduction in meat processing after tariff liberalization. Specifically, this signifies that the reduction in production costs induced by tariff liberalization in boneless beef has been transmitted fully or circulated completely among endogenous accounts (factors, households and activities) that demonstrate system-wide linkages or economic integration (Pyatt and Round, 1985; Powell and Round, 1997; Round, 2003). The system-wide linkages characterize the SAM, as they capture the complete and circular transmission of a shock or cost reduction through all the endogenous accounts, which in turn benefits the economy.

Almost all activities in Table 8.6 witness a decline in production costs as a result of closed-loop (C_p) effects, while some gain at least a one percent reduction in costs because of the same effects. The main beneficiaries of the lower production costs induced by tariff elimination in boneless beef through C_p effects include all primary agricultural activities (traditional cattle farming and freehold farming), village industries, communications, central and local

government as well as services. Traditional cattle and freehold farming are, as observed previously, the main sources of inputs for meat processing in Botswana. Meat processing, as indicated earlier, witnessed an initial (I) 28.6 percent reduction in production costs after tariff liberalization.

Transfer (T_p) effects in Table 8.6 capture the inter-industry input-output interactions following the reduction in production costs induced by tariff liberalization as regards boneless beef. Only about five percent of the decline in total production costs in the activity account results from inter-industry input-output interactions. Only the production costs of "other agriculture" are marginally reduced through transfer effects, as opposed to closed-loop effects (-0.010 versus –0.008). Transfer effects imply that the transmission of cost reduction among endogenous accounts is limited in this case to activities or inter-industry interactions. As indicated earlier, transfer effects demonstrate very weak linkages in the economy, since circular transmission of shock among accounts is greatly limited.

8.3.3 The Effects of a Tariff Elimination/liberalization as regards Maize Grain on Food Security based upon the Multiplicative Multiplier, M_p

As a semi-arid country, Botswana obtains almost all her maize grain requirements from imports, purchased mainly from South Africa (see Chapter 2). Maize grain is a primary input for the country's milling industry. Furthermore, maize is the single largest source of calories in the country (see Food Balance Sheet for Botswana in Chapter 1). Owing to SACU import duties, the domestic prices of maize and its products are also affected by tariff protection, which benefits maize surplus producers, especially in South Africa. Except for South Africa where maize farmers frequently produce a surplus for all the SACU members including other neighbouring countries, BLNS countries depend on imports from mainly South Africa. Consequently, a higher maize import duty primarily benefits surplus producers in that country as most BLNS maize farmers are effectively net buyers (Food Balance Sheets 1995-2005, SADC, 2005)

In order to increase household food security and per capita maize consumption, this study advocates for tariff liberalization in maize grain, which could reduce domestic maize prices. In Table 8.2, concerning the SACU applied tariff for maize grain, it is indicated that this tariff is about 6.7 c/kg for all regions. In fact, except for boneless beef, Table 8.2 shows the applied tariffs, which combine *ad valorem* duty and percentages, amongst other factors. For many years all WTO members have been expected to have levied tariffs on their imports by adopting a simple and transparent tariff system based on percentages only. *Ad valorem* duties, not utilizing a mixture of percentages and quantities, as indicated in Table 8.2, facilitate trade, especially at customs posts where delays are partly caused by computation of tariff revenue for government. The simpler the duties, the easier and more quickly international trade could contribute to food security.

Based on the current SACU applied tariff rate of 13 percent for maize grain, we calculate the shock by following the same steps that were taken during the beef policy experiment. In this case t_m is 0.13 and the change in domestic price, P_d, is given by

$$\Delta P_d = (1/ (1+t_{m)}) -1.$$

The shock in the case where t_m equals 0.13 for maize grain is

$$(1/ (1+ 0.13))-1= -0.115.$$

To undertake a policy experiment regarding maize grain in which the domestic price, P_d, is affected by tariff liberalization/elimination, -0.115 therefore signifies the policy shock. Table 8.7 below indicates the price multiplier effects of a change in the domestic price of maize grain induced by tariff liberalization. The shock is introduced into "other manufacturing/P_{24}", as no maize milling industry is represented among activities in the reduced SAM of 1993/94. Below we analyze the price multiplier effects in Table 8.7, after

liberalization of tariffs applied to maize grain, on factor, household and activity accounts. Like in the previous policy simulation, the results will be analyzed at factor, household and activity levels.

Table 8.7: Effects of tariff liberalization in Maize Grain on Domestic Price

Price Policy Experiment

		Multiplier		**Stone**			
Accounts	Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp	Check
Prof. & Tech Employees - Cit.	0	-0.002	0.000	0.000	-0.002	-0.001	0.000
Prof. & Tech. Employees - Non-Cit.	0	-0.002	0.000	0.000	-0.001	-0.001	0.000
Admin & Manag. Employees- Cit	0	-0.003	0.000	0.000	-0.002	-0.001	0.000
Admin & Manag. Employees- Non-Cit	0	-0.002	0.000	0.000	-0.001	-0.001	0.000
Clerical Employees - Citizens	0	-0.002	0.000	0.000	-0.002	-0.001	0.000
Clerical Employees - Non-Citizens	0	-0.002	0.000	0.000	-0.001	-0.001	0.000
Skilled Manual - Citizens	0	-0.003	0.000	0.000	-0.002	-0.001	0.000
Skilled Manual - Non-Citizens	0	-0.002	0.000	0.000	-0.001	-0.001	0.000
Unskilled Employees	0	-0.003	0.000	0.000	-0.002	-0.001	0.000
Mixed Income	0	-0.003	0.000	0.000	-0.002	-0.001	0.000
Gross Operating Surplus	0	0.000	0.000	0.000	0.000	0.000	0.000
Urban Households - Wage Income	0	-0.002	0.000	0.000	-0.002	-0.001	0.000
Urban Households - Self-employed	0	-0.003	0.000	0.000	-0.002	-0.001	0.000
Urban Households - Transfers	0	-0.004	0.000	0.000	-0.003	-0.001	0.000
Rural Households - Wage Income	0	-0.002	0.000	0.000	-0.002	-0.001	0.000
Rural Households - Self-employed	0	-0.003	0.000	0.000	-0.003	-0.001	0.000
Rural Households - Transfers	0	-0.003	0.000	0.000	-0.003	-0.001	0.000
Non-Citizen Households	0	-0.002	0.000	0.000	-0.001	-0.001	0.000
Non-Financial Enterp	0	0.000	0.000	0.000	0.000	0.000	0.000
Financial	0	0.000	0.000	0.000	0.000	0.000	0.000
Private Non-Profit Institutions	0	-0.001	0.000	0.000	-0.001	-0.001	0.000
Trad. Agric - Cattle	0	-0.003	0.000	0.000	0.000	-0.003	0.000
- Other	0	-0.004	0.000	-0.002	0.000	-0.002	0.000
Freehold Farms	0	-0.002	0.000	0.000	0.000	-0.002	0.000
Hunting, Fishing & Gathering	0	-0.001	0.000	0.000	0.000	-0.001	0.000
Mining	0	-0.001	0.000	-0.001	0.000	0.000	0.000
Meat Processing	0	-0.002	0.000	-0.001	0.000	-0.002	0.000
Dairy & Other Agric. Processing	0	-0.008	0.000	-0.007	0.000	-0.001	0.000
Beverages	0	-0.005	0.000	-0.004	0.000	-0.001	0.000
Textiles	0	-0.003	0.000	-0.002	0.000	-0.001	0.000
Chemicals	0	-0.003	0.000	-0.002	0.000	-0.001	0.000
Transport & equipment	0	-0.001	0.000	-0.001	0.000	0.000	0.000
Metal Products	0	-0.001	0.000	-0.001	0.000	0.000	0.000
Bakery & Products	0	-0.003	0.000	-0.003	0.000	-0.001	0.000
Tanning & Leather Products	0	-0.004	0.000	-0.003	0.000	-0.001	0.000
Wood & Products	0	-0.001	0.000	0.000	0.000	-0.001	0.000
Paper & Products	0	-0.001	0.000	0.000	0.000	-0.001	0.000
Village Industries	0	-0.003	0.000	-0.001	0.000	-0.002	0.000
Other Manufacturing	-0.1150442	-0.116	-0.115	-0.001	0.000	-0.001	0.000
Water	0	-0.001	0.000	0.000	0.000	-0.001	0.000
Electricity	0	-0.004	0.000	-0.003	0.000	-0.001	0.000
Construction	0	-0.001	0.000	-0.001	0.000	-0.001	0.000
Trade	0	-0.002	0.000	-0.001	0.000	-0.001	0.000
Hotels & Restaurants	0	-0.001	0.000	-0.001	0.000	-0.001	0.000
Transport	0	-0.002	0.000	-0.001	0.000	-0.001	0.000
Communications	0	-0.002	0.000	-0.001	0.000	-0.001	0.000
Business Services	0	-0.001	0.000	-0.001	0.000	-0.001	0.000
Central Government	0	-0.002	0.000	-0.001	0.000	-0.001	0.000
Local Government	0	-0.002	0.000	0.000	0.000	-0.001	0.000
Services	0	-0.002	0.000	-0.001	0.000	-0.001	0.000

Source: Own calculations, 2006

Factor level

Figure 8.3 below illustrates the price multiplier effects on the factor account following tariff liberalization with respect to maize grain. It is evident from

Figure 8.3 that all citizen workers, including those with a mixed income, witness a larger decline in their cost of living after a reduction in the domestic price of maize grain. Of all the factors, the mixed income group registers the highest decline in the cost of living (0.003 percent).

Among workers who experience a larger decline in the cost of living are unskilled citizens, skilled, professional, technical and clerical staff. All these workers benefit by at least a 0.002 percent reduction in the cost of living after tariff liberalization with respect to maize. It is interesting to note that unskilled workers, who constitute the lowest-income employee group, are among those who gain most from this decline in the cost of living. Maize grain constitutes one of the largest sources of calories in Botswana and yet the country is almost completely dependent on imports (see Chapter 1).

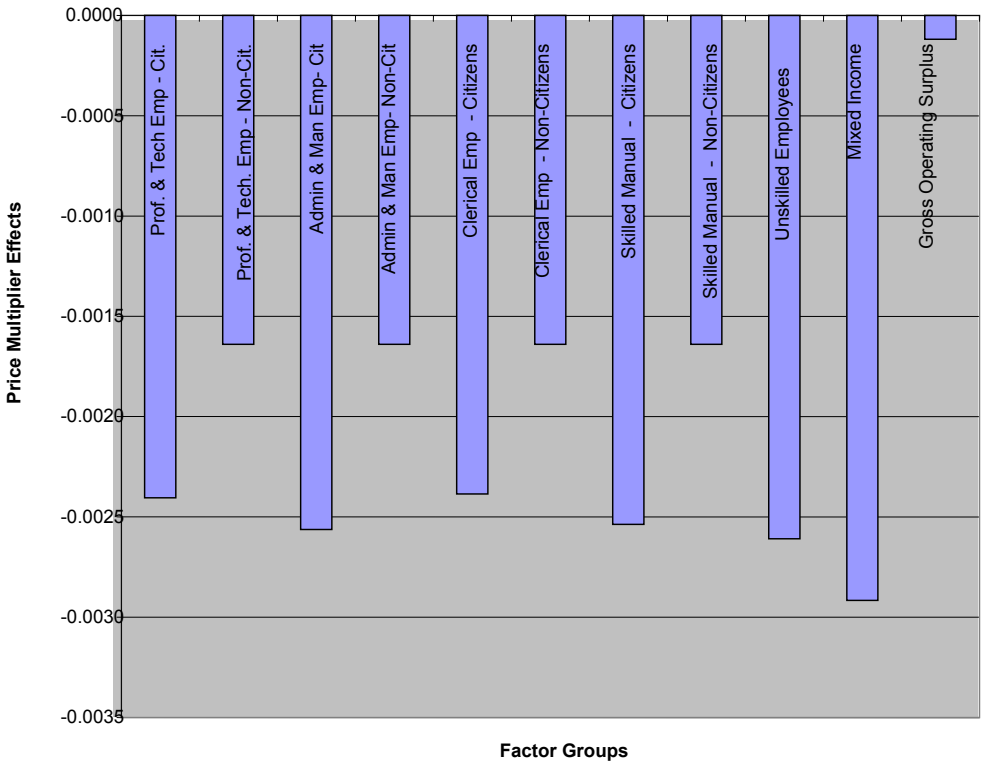

Figure 8.3: Price Multiplier Effects on the Factor Account after Maize Tariff Liberalization

This positive effect on the lower cost of living, induced by tariff reduction as far as maize grain is concerned, implies that the liberalization of the cereal industry is beneficial to the country since it also contributes to reducing wage costs, especially among low-income workers, and enhances their welfare or food security. The results are also similar to those noted with regard to liberalization of tariffs for boneless beef, which also benefited low-income workers.

Figure 8.3 demonstrates that, in addition, non-citizen employees witness the least decline in cost of living, compared to workers who are citizens**.**

Household level

Figure 8.4 indicates the price multiplier effects, on the household account, of tariff liberalization with respect to maize grain. In Figure 8.4, households of citizens which are reliant on income transfer (in both urban and rural areas), together with self-employed households in the rural areas, witness the largest decline in their cost of living after a reduction in the domestic price, P_d, of maize grain induced by tariff liberalization

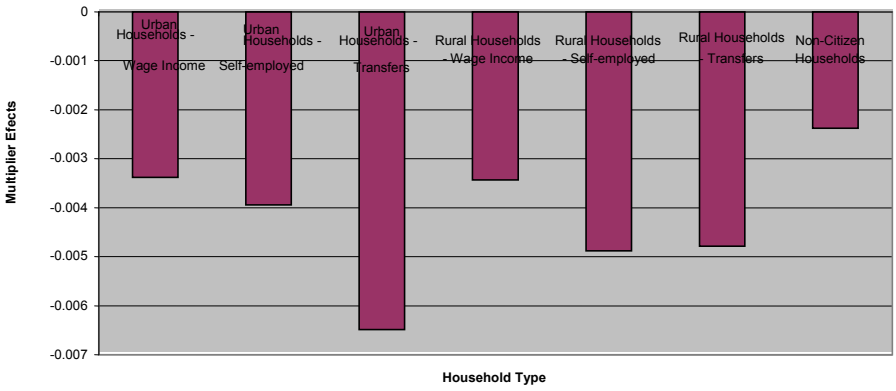

Figure 8.4: Price Multiplier Effects on Household Account after tariff liberalization of maize grain

Urban households dependent on income transfer gain the most as their cost of living declines by 0.005 percent, while self-employed households in the rural areas come second with about 0.003 percent. Rural households reliant on income transfers also register a 0.003 percent decline in their cost of living following tariff liberalization for maize grain. As earlier indicated, citizen households dependent on income transfer constitute the poorest in the country, policy measures that enhance per capita food consumption or household welfare are very important for Botswana. A decline in the cost of living for poor households after maize grain tariffs have been liberalized means, *ceteris paribus*, that such families enjoy more disposable income to spend on food and other essentials. Increased disposable income owing to lower food prices not only allows households to buy/import more food in order to increase domestic supply/physical availability, but also implies that economic access is enhanced.

Besides households dependent on income transfers, all other households in Figure 8.4 benefit from tariff elimination or liberalization in the maize grain industry. As indicated in Chapter 1, almost all maize grain consumed in the country is imported mainly from South Africa since the country does not enjoy any comparative cost advantage in the production of the cereal owing to unfavourable climatic and soil conditions. Consequently, any increase in household income, food security and per capita maize consumption in Botswana will largely depend on global trade and tariff liberalization, hence the need to reduce SACU's applied tariffs.

It should also be noted that while tariff liberalization on maize grain could improve food security in Botswana, maize grain is not homogeneous even if it is white. Specifically, whilst white maize is mainly used for human consumption in the SACU market, consumers including millers prefer a certain quality and texture of white maize. This means that a tariff reduction on white maize grain especially for human consumption, should take into account the requirements of millers and preferences of consumers as not all white maize is necessarily preferred by consumers in Botswana or SACU. In

short, imported maize grain from outside SACU may not necessarily be a perfect substitute for the locally produced. Yellow maize which is generally traded globally is mainly used for livestock and is therefore resisted by consumers unless during severe drought periods. As a result of the preference for white maize by consumers/households, over the years, surplus producers in South Africa have been able to satisfy the SACU market whilst other competing white maize sellers from region has not fully accepted due to certain grain qualities.

The policy implication from the price multiplier results regarding liberalization of tariffs affecting maize grain is that a decline in the domestic price of the cereal benefits all households, including the poorest. Such households witness the largest decline in the cost of living after this liberalization. However, the potential benefits to households could be further enhanced by effective competition in factor and product markets, in addition to changes in domestic prices. With an initial decline in domestic price of about 11.5 percent, the reduction in a household's cost of living has been marginal, that is less than one percent, and this implies limited price transmission in the economy. In addition, tariff reduction on maize grain should also take into account the special requirements of millers and consumers as certain white maize grain in particular may not preferred.

Activity Level

At activity level, tariff liberalization, *ceteris paribus*, reduces the cost of production, as was the case with boneless beef in the preceding analysis. In table 8.7, it is evident that after the initial shock of an 11.5 percent decline in the domestic price of maize grain induced by tariff liberalization, almost all activities registered a decline in production costs.

The largest decline in production cost was, as expected, observed in the endogenous activity where the initial shock was introduced: "Other manufacturing", which witnessed an 11.6 percent decline in production cost

after liberalization of tariffs applied to the maize grain industry. Besides "other manufacturing", very few activities marginally gained from the reduction in production costs induced by tariff liberalization. The reduction in such costs for these activities is less than one percent but above 0.002 percent. These activities include dairy processing, beverages, traditional cattle farming, other agriculture, chemicals, tanning and leather, village industries, bakery and electricity.

The results in Table 8.7 indicate that all activities witness a decline in production cost after tariff liberalization, although for most of them the reduction is less than one percent. The marginal decline in production costs might once again result from poor price transmission between activities. Specifically, the existence of imperfect input and product markets as well as other technical and institutional factors could stifle substitution between activities, despite the decline in the domestic price of maize grain. A further implication is that the maize grain industry exhibits limited inter-industry linkages despite the decline in the domestic price of the primary product.

8.3.2 The Effects of Tariff Liberalization of Maize Grain on Food Security (based upon the Additive Price Multiplier)

As in the case of boneless beef, we now examine the effects of tariff liberalization regarding maize grain on food security, based upon Stone's additive multiplier (I, T, O, and C) effects. The analysis will again be undertaken at factor, household and activity levels.

Factor Level

As with the previous analysis of Stone's disaggregated multiplier effects, we now examine the decomposed effects in the factor account after the domestic price of maize grain has declined as a result of tariff liberalization. Table 8.8 illustrates Stone's additive and decomposed effects on the factor account.

Table 8.8: Disaggregated Price Multipliers Effects Regarding Tariff Liberalization of Maize Grain on the Factor Account

	Multiplier	Stone			
Accounts	Dv' * Ma	I	Tp	Op	Cp
Prof. & Tech Emp - Cit.	-0.002	0.000	0.000	-0.002	-0.006
Prof. & Tech. Emp - Non-Cit.	-0.002	0.000	0.000	-0.001	-0.005
Admin & Man Emp - Cit	-0.003	0.000	0.000	-0.002	-0.006
Admin & Man Emp - Non-Cit.	-0.002	0.000	0.000	-0.001	-0.005
Clerical Emp - Citizens	-0.002	0.000	0.000	-0.002	-0.006
Clerical Emp - Non-Citizens	-0.002	0.000	0.000	-0.001	-0.005
Skilled Manual - Citizens	-0.003	0.000	0.000	-0.002	-0.006
Skilled Manual - Non-Citizens	-0.002	0.000	0.000	-0.001	-0.005
Unskilled Employees	-0.003	0.000	0.000	-0.002	-0.006
Mixed Income	-0.003	0.000	0.000	-0.002	-0.007
Gross Operating Surplus	-0.001	0.000	0.000	-0.001	0.000
Total Factor Impact	-0.022	0.000	0.000	-0.016	-0.006

Of the total -0.022 or 2.2 percent decline in the cost of living on the factor account, Table 8.8 shows that about 73 percent (-0.016) of the benefit is derived from open-loop (O_p) effects while about 27 percent (-0.006) is attributable to closed-loop (C_p) effects. For all factors, the open-loop or inter-group effects are greater. Unskilled, administrative and managerial, skilled, clerical and professional citizen workers, including those with a mixed income, gain the most through open-loop effects from a decline in the cost of living.

The O_p effects demonstrate limited economic integration among endogenous accounts, as the decline in the domestic price is not transmitted fully, or alternatively the circular movement of the shock is very limited. The implication is that the decline in the domestic price is not transmitted completely for the benefit of all endogenous accounts, owing to factors such as limited competition in factor and product markets, institutional rigidity, and so on. Limited competition does not benefit the factor account. This means that the factor account cannot substitute cheaper products for more costly goods, owing to very weak economic integration or interdependency effects.

Closed-loop (C_p) effects, which account for approximately a 27 percent decline in the cost of living for the factor account in Table 8.8, capture the complete and circular movement of the price decline among the endogenous accounts, implying economic integration or strong linkages amongst accounts. Economic integration amongst endogenous accounts implies that the shock is fully transmitted amongst them and that the decline in the domestic price of maize grain is felt system-wide. Unlike open-loop effects the price transmission or the decline in the cost of living is not confined to some endogenous accounts but affects all of them, hence strong economic integration. Strong closed-loop effects also suggest enhanced competition among endogenous accounts.

Household Level

Of the total -0.020 or 2.02 percent decline in household cost of living following tariff liberalization of maize grain and a subsequent reduction in the domestic price of the grain, about 76 percent (-0.015) of the decline is attributable to open-loop ($O_{p)}$ effects while the remaining 24 percent (-0.005) is derived from closed-loop (C_p) effects. All households witnessed a higher decline in the cost of living as a result of open-loop effects. Table 8.9 shows that citizen households reliant on income transfers, together with self-employed households in the rural areas, gained the most from tariff liberalization or a reduction in the domestic price of maize grain.

Table 8.9: Disaggregated Price Multiplier Effects after Tariff Liberalization of Maize Grain on Household Account

		Multiplier		Stone		
Accounts	Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp
Urban H/Holds - W/Inc		-0.002	0.000	0.000	-0.002	-0.006
Urban H/holds - S/Empd		-0.003	0.000	0.000	-0.002	-0.006
Urban H/Holds - Tran		-0.005	0.000	0.000	-0.003	-0.001
Rural H/holds - W/Inc		-0.003	0.000	0.000	-0.002	-0.006
Rural H/Holds - S/Empd		-0.003	0.000	0.000	-0.003	-0.007
Rural H/Holds - Tran		-0.003	0.000	0.000	-0.003	-0.007
Non-Citizen H/Holds		-0.002	0.000	0.000	-0.001	-0.005
Total H/hold Impact		-0.020	0.000	0.000	-0.015	-0.005

As indicated earlier, open-loop effects demonstrate limited economic integration among endogenous accounts. The price shock does not circulate fully among factor, household and activity accounts. This shows very weak inter-account linkages that exist following reduction of tariffs in respect to maize grain. Instead the shock is limited to certain accounts. Imperfect competition in factor and products, institutional factors (monopoly laws regarding state-owned enterprises, etc.) and other technical constraints could be responsible for limiting the full and circular movement of the price shock among endogenous accounts.).

Table 8.9 also indicates that closed-loop (C_p) effects only account for a 24 percent decline in the cost of living for the household account. Such effects capture the existence of full economic integration among endogenous accounts. This implies that the shock, or decline in the domestic price of maize grain, is transmitted or circulates fully among all endogenous accounts, for the benefit of the economy. Through closed-loop effects households are able to make substitutions in their consumption basket by purchasing least-cost goods, following the initial decline in the domestic price of maize grains induced by tariff liberalization. Consequently households, including poor households, maximize their utility function by purchasing goods whose real cost has declined.

Activity Account

In terms of the activity account, transfer effects are greater than closed-loop effects. Table 8.10 records Stone's disaggregated price multiplier effects on the activity account after tariff liberalization regarding maize grain. Of the total 18.3 percent (-0.183) decline in production costs for all activities after the introduction of the shock, about 63 percent (-0.115) of the reduction in costs is due to the endogenous activity itself, that is, "other manufacturing". This signifies that "other manufacturing" accounts for most of the decline in production costs among activities.

Table 8.10: Disaggregated Price Multiplier Effects on the Activity Account after Tariff Liberalization of Maize grain

		Multiplier	Stone			
Accounts	Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp
Trad. Agric - Cattle	0	-0.003	0.000	0.000	0.000	-0.003
- Other	0	-0.004	0.000	-0.002	0.000	-0.002
Freehold Farms	0	-0.002	0.000	-0.005	0.000	-0.002
Hunting, Fishing & Gathering	0	-0.009	0.000	-0.001	0.000	-0.007
Mining	0	-0.001	0.000	-0.007	0.000	-0.003
Meat Processing	0	-0.002	0.000	-0.007	0.000	-0.002
Dairy & Other Agric. Processing	0	-0.008	0.000	-0.007	0.000	-0.008
Beverages	0	-0.005	0.000	-0.004	0.000	-0.006
Textiles	0	-0.003	0.000	-0.002	0.000	-0.009
Chemicals	0	-0.003	0.000	-0.003	0.000	-0.008
Transport & Equipment	0	-0.008	0.000	-0.006	0.000	-0.002
Metal Products	0	-0.001	0.000	-0.001	0.000	-0.003
Bakery & Products	0	-0.003	0.000	-0.003	0.000	-0.007
Tanning & Leather Products	0	-0.004	0.000	-0.003	0.000	-0.008
Wood & Products	0	-0.001	0.000	-0.004	0.000	-0.001
Paper & Products	0	-0.009	0.000	-0.002	0.000	-0.007
Village Industries	0	-0.003	0.000	-0.001	0.000	-0.002
Other Manufacturing	-0.115	-0.116	-0.115	-0.005	0.000	-0.006
Water	0	-0.002	0.000	-0.005	0.000	-0.001
Electricity	0	-0.004	0.000	-0.003	0.000	-0.007
Construction	0	-0.001	0.000	-0.008	0.000	-0.007
Trade	0	-0.002	0.000	-0.009	0.000	-0.008
Hotels & Restaurants	0	-0.001	0.000	-0.005	0.000	-0.006
Transport	0	-0.002	0.000	-0.001	0.000	-0.006
Communications	0	-0.002	0.000	-0.009	0.000	-0.009
Business Services	0	-0.001	0.000	-0.005	0.000	-0.007
Central Government	0	-0.002	0.000	-0.006	0.000	-0.001
Local Government	0	-0.002	0.000	-0.003	0.000	-0.002
Services	0	-0.002	0.000	-0.001	0.000	-0.001
Total		-0.183	-0.115	-0.034	0.000	-0.028

After the effect on “other manufacturing”, Table 8.10 demonstrates that about 22 percent (-0.034) of the decline in total activity production costs results from transfer (T_p) effects. Transfer effects capture the conventional Leontief inter-industry input-output interactions. This signifies that the price transmission or decline in production costs following tariff liberalization with respect to maize

grain is only confined to few activities, without fully circulating among all other endogenous activities.

All activities that benefit from transfer effects witness less than a one percent decline in production costs. Only dairy processing (-0.007) almost registers about a one percent reduction in costs. Other activities that significantly gain from transfer effects include beverages, tanning, electricity, chemicals, bakery and other agriculture. The limited inter-industry input-output interactions after a reduction in the domestic price of maize grain imply very weak linkages between the maize grain processing and other activities. Hence input-output substitution due to relative price changes occurs within the activity account only. This further implies very weak economic integration or interdependence among accounts.

Closed-loop (C_p) effects in Table 8.10 account for only a 15 percent (-0.028) decline in production costs for all activities. Of the several activities whose decline in production costs comes from closed-loop effects, none witnessed at least a one percent reduction in costs resulting from tariff liberalization with regard to maize grain. Because very weak closed-loop effects imply limited linkages or economic integration among endogenous accounts, it is evident that the full transmission of the price shock through the endogenous accounts is severely limited by factors such as imperfect input and product markets and institutional factors, including the provision of public goods.

8.3.4 The Effects of Tariff Liberalization with respect to Powdered/Concentrated Milk on Food Security (based upon the Multiplier)

As is the case with many food items, dairy products are almost all imported, as the country is not suitable for a viable domestic dairy industry, owing primarily to the high cost of feed and to a large extent the excessively hot weather as far as animals are concerned. Plans are, however, under way to develop a dairy industry by providing farmers with access to recycled water in

order to produce possibly cheaper feed for the animals (NDP 9, 2003). Further, concessional loans are currently provided to dairy farmers for them to purchase animals. These initiatives are intended to increase domestic production of milk in the country, but issues of sustainability and competitiveness as well as the fact that many poor households will not be able to afford to purchase local milk will need to be examined fully, before per capita dairy consumption can be increased.

Currently, protein malnutrition is reported to be high among children less than five years (NDP 9, 2003). As part of its WTO and SADC commitments, Botswana is nonetheless expected to improve import market access to cover other goods, including dairy products. Improved access to competitive milk imports could increase supply and reduce domestic prices for the benefit of the poor and the children. In Table 8.1, it was shown that dairy products constitute some of the main food items consumed by households in Botswana.

Below we examine the effects of tariff liberalization concerning powdered/concentrated milk, which in turn is expected to reduce the domestic price of the product. Using the current SACU applied tariff rate of 40 percent for powdered milk, the change in the domestic price is given by

$\Delta P_d = (1/ (1+t_{m)}) - 1.$

As $t_m = 0.40$, the shock for powdered milk is

$(1/ (1+ 0.40))- 1= - 0.286.$

Based on the 28.6 percent reduction in the domestic price of powdered milk induced by tariff liberalization, we now introduce the price shock, that is, -0.286, to the “dairy processing” activity, as this is the appropriate endogenous activity for the price multiplier analysis. Table 8.11 records the results of the price multiplier effects on the endogenous accounts (factor, household and

activity) after introducing this price shock or a 28.6 percent reduction in the domestic price of powdered milk.

Table 8.11: Price Multiplier Effects on Endogenous Accounts after Tariff Liberalization Regarding Powdered Milk

Accounts		Multiplier		Stone			
	Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp	Check
Prof. & Tech Employees - Cit.	0	-0.018	0.000	0.000	-0.014	-0.004	0.000
Prof. & Tech. Employees - Non-Cit.	0	-0.009	0.000	0.000	-0.005	-0.004	0.000
Admin & Manag. Employees - Cit.	0	-0.019	0.000	0.000	-0.015	-0.005	0.000
Admin & Manag. Employees - Non-Cit.	0	-0.009	0.000	0.000	-0.005	-0.004	0.000
Clerical Employees - Citizens	0	-0.018	0.000	0.000	-0.013	-0.004	0.000
Clerical Employees - Non-Citizens	0	-0.009	0.000	0.000	-0.005	-0.004	0.000
Skilled Manual - Citizens	0	-0.019	0.000	0.000	-0.015	-0.004	0.000
Skilled Manual - Non-Citizens	0	-0.009	0.000	0.000	-0.005	-0.004	0.000
Unskilled Employees	0	-0.020	0.000	0.000	-0.015	-0.005	0.000
Mixed Income	0	-0.023	0.000	0.000	-0.018	-0.005	0.000
Gross Operating Surplus	0	-0.001	0.000	0.000	-0.001	0.000	0.000
Urban Households - Wage Income	0	-0.016	0.000	0.000	-0.012	-0.004	0.000
Urban Households - Self-employed	0	-0.020	0.000	0.000	-0.016	-0.005	0.000
Urban Households - Transfers	0	-0.032	0.000	0.000	-0.024	-0.008	0.000
Rural Households - Wage Income	0	-0.019	0.000	0.000	-0.015	-0.005	0.000
Rural Households - Self-employed	0	-0.027	0.000	0.000	-0.022	-0.005	0.000
Rural Households - Transfers	0	-0.024	0.000	0.000	-0.019	-0.005	0.000
Non-Citizen Households	0	-0.009	0.000	0.000	-0.005	-0.004	0.000
Non-Financial Enterp	0	0.000	0.000	0.000	0.000	0.000	0.000
Financial	0	0.000	0.000	0.000	0.000	0.000	0.000
Private Non-Profit Institutions	0	-0.007	0.000	0.000	-0.003	-0.004	0.000
Trad. Agric - Cattle	0	-0.022	0.000	0.000	0.000	-0.022	0.000
- Other	0	-0.019	0.000	-0.007	0.000	-0.012	0.000
Freehold Farms	0	-0.013	0.000	-0.001	0.000	-0.012	0.000
Hunting, Fishing & Gathering	0	-0.007	0.000	-0.001	0.000	-0.006	0.000
Mining	0	-0.002	0.000	0.000	0.000	-0.002	0.000
Meat Processing	0	-0.030	0.000	-0.018	0.000	-0.012	0.000
Dairy & Other Agric. Processing	-0.286	-0.355	-0.286	-0.063	0.000	-0.006	0.000
Beverages	0	-0.024	0.000	-0.020	0.000	-0.004	0.000
Textiles	0	-0.009	0.000	-0.002	0.000	-0.007	0.000
Chemicals	0	-0.017	0.000	-0.011	0.000	-0.006	0.000
Transport & Equipment	0	-0.005	0.000	-0.004	0.000	-0.001	0.000
Metal Products	0	-0.007	0.000	-0.005	0.000	-0.002	0.000
Bakery & Products	0	-0.025	0.000	-0.019	0.000	-0.005	0.000
Tanning & Leather Products	0	-0.031	0.000	-0.025	0.000	-0.006	0.000
Wood & Products	0	-0.009	0.000	-0.001	0.000	-0.008	0.000
Paper & Products	0	-0.006	0.000	0.000	0.000	-0.005	0.000
Village Industries	0	-0.021	0.000	-0.007	0.000	-0.014	0.000

Other Manufacturing	0	-0.010	0.000	-0.005	0.000	-0.005	0.000
Water	0	-0.008	0.000	-0.001	0.000	-0.007	0.000
Electricity	0	-0.005	0.000	0.000	0.000	-0.005	0.000
Construction	0	-0.005	0.000	-0.001	0.000	-0.005	0.000
Trade	0	-0.010	0.000	-0.004	0.000	-0.006	0.000
Hotels & Restaurants	0	-0.005	0.000	-0.001	0.000	-0.005	0.000
Transport	0	-0.005	0.000	-0.001	0.000	-0.005	0.000
Communications	0	-0.008	0.000	-0.001	0.000	-0.007	0.000
Business Services	0	-0.005	0.000	0.000	0.000	-0.005	0.000
Central Government	0	-0.009	0.000	-0.001	0.000	-0.008	0.000
Local Government	0	-0.012	0.000	-0.001	0.000	-0.011	0.000
Services	0	-0.011	0.000	-0.002	0.000	-0.009	0.000

Source: Own calculations, 2006

The analysis of the price multiplier results in Table 8.12, as in previous exercises, is undertaken at factor, household and activity levels.

Factor level

All factor sub-accounts witness a decline in the cost of living induced by tariff liberalization with respect to powdered milk. Figure 8.5 illustrates the price multiplier results on the factor account after a reduction of the domestic price of powdered milk by an initial 28.6 percent. As indicated earlier for similar price policy experiments, tariff liberalization reduces the domestic price of an imported commodity. Citizen workers together with mixed income again witness an almost two percent decline in the cost of living, while other factor sub-accounts gain less. A decline in the cost of living, especially in food items, benefits households and the economy as this reduces the demand for higher wages triggered by food prices. Low-income workers, who are unskilled manual employees, in particular, also gained more from a decline in the cost of living after tariff liberalization regarding powdered milk.

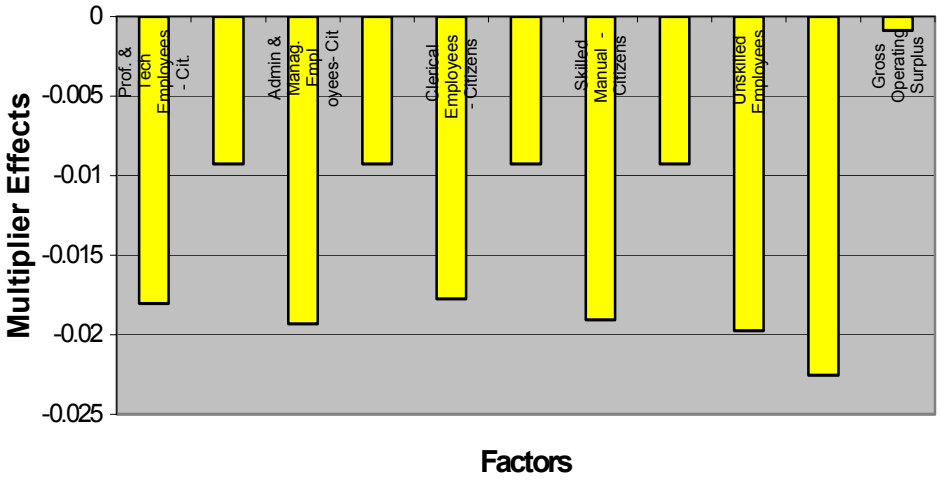

Figure 8.5 Price Multiplier Effects on Tariff Liberalisation of Powdered Milk on Factor Account

The price multiplier results indicated in Figure 8.5 imply that tariff liberalization of powdered milk can benefit workers, including low-income workers who spend a disproportionate share of their disposable income on food including dairy products. Further, as Botswana is considered a high-cost country, lower wage costs owing to access to cheaper but competitive food items enhance prospects for economic diversification and possibly regional and global competitiveness in areas where the country enjoys some comparative advantage. As a result, tariff or trade liberalization has a positive role to play in reducing workers' cost of living.

Household Level

All households witness a decline in their cost of living, with citizen households dependent on income transfer in both urban and rural areas gaining most from tariff liberalization regarding powdered milk. Figure 8.6 shows the price multiplier effects of such tariff liberalization on the household account when the domestic price of the good is initially reduced by 28.6 percent.

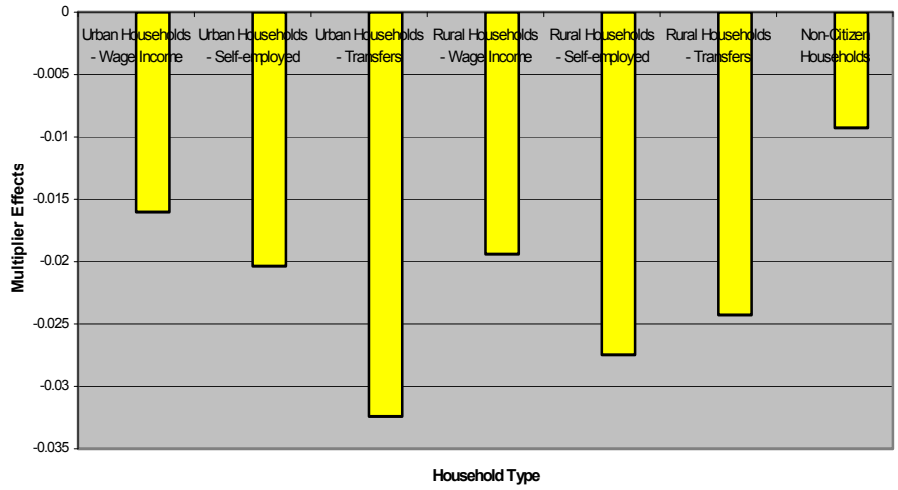

Figure 8.6: Price Multiplier Effects on the Household Account after Tariff Liberalization of Powdered Milk

In Figure 8.6, citizen households reliant on income transfer in the urban areas (UH/holds-transfers) witnessed the highest decline in the cost of living after tariff liberalization of powdered milk. They experienced at least three percent reductions in the cost of living, followed by self-employed households in the rural areas (RH/holds-self-employed), who witnessed at least a 2.5 percent decline. Rural households dependent on income transfer (RH/holds-transfers) came third and enjoyed a more than two percent decline in their cost of living. Other citizen households evidenced between a 1.5 and 2.0 percent decline in their cost of living after tariff liberalization. Non-citizen households only experienced an approximately one percent decline in their cost of living.

The economic implications of the results shown in Figure 8.8 are similar to those already noted in previous price policy experiments after tariff liberalization. Specifically, tariff liberalization of powdered milk has improved household food security, especially among the poor who spend a disproportionate share of their disposable income on food (see Table 8.1; HIES 2002/03; CSO, 2004). Furthermore, increased per capita consumption of dairy products could also reduce protein malnutrition among children (NDP 9, 2003). Secondly, cost savings by households resulting from the decline in

the real cost of living induced by tariff liberalization or reduction in the domestic price of powdered milk could be used for other household consumption items, including investment.

It should, however, be emphasized that as in the previous price policy experiments, mechanisms to protect infant industries from unfair trading practices (dumping, subsidized imports, imperfect markets, and so on) should be put in place. Dairy exports constitute some of the products most heavily subsidized by major world producers (Ingco & Nash, 2004).

Activity Level

Under the activity account, all activities benefit from tariff liberalization here. Most activities witness at least a one percent decline in production costs after an initial 28.6 percent reduction in the domestic price of powdered milk. In Table 8.11, dairy processing benefits from an approximately 36 percent (-0.355) reduction in direct production costs after tariff liberalization, while most of the remaining activities benefit from between a one percent and a three percent reduction in costs.

Besides dairy processing which benefits most from tariff liberalization, other activities like tanning and leather products, traditional cattle farming, other agriculture, meat processing, bakery and products, village industries and chemicals, etc register at least a two percent reduction in production costs resulting from tariff liberalization with respect to powdered milk. For these activities, the implication is that inter-industry input-output interactions with dairy processing are stronger whereas for others the linkages are weak.

Given the relatively high reduction in direct production costs (about 36 percent) enjoyed by dairy processing compared to other activities, it is possible that imperfect input-output markets and limited price transmission among activities could be responsible for the less than three percent decline in production costs of most activities after tariff liberalization. As in previous

price policy experiments, competition in the input and output markets will need to be improved in order to enhance benefits from trade liberalization and in turn to promote efficiency and competitiveness among activities.

8.3.5 The Effects of Tariff Liberalization of Powdered/Concentrated Milk on Food Security (based upon Stone's Additive Multiplier)

In this section, we will once again identify the multiplier effects based on Stone's disaggregated and additive price multiplier analysis, in order to capture the movement or the tour of the policy shock among endogenous accounts. As before, transfer, open-loop and closed-loop effects will be examined at factor, household and activity levels after tariff liberalization where powdered milk is concerned.

Factor Level

In all the factor sub-accounts, the open-loop or O_P effects are greater than the closed-loop or C_p effects. Table 8.12 illustrates disaggregated price multiplier effects on the factor account after tariff liberalization concerning powdered milk.

Table 8.12: Disaggregated Price Multiplier Effects on Factor Account after Tariff Liberalization of Powdered Milk

Factor	Dv' * Ma	I	Tp	Op	Cp
Prof. & Tech Employees - Cit.	-0.018	0.000	0.000	-0.014	-0.004
Prof. & Tech. Employees - Non-Cit.	-0.009	0.000	0.000	-0.005	-0.004
Admin & Manag. Employees - Cit	-0.019	0.000	0.000	-0.015	-0.005
Admin & Manag. Employees - Non-Cit	-0.009	0.000	0.000	-0.005	-0.004
Clerical Employees - Citizens	-0.018	0.000	0.000	-0.013	-0.004
Clerical Employees - Non-Citizens	-0.009	0.000	0.000	-0.005	-0.004
Skilled Manual - Citizens	-0.019	0.000	0.000	-0.015	-0.004
Skilled Manual - Non-Citizens	-0.009	0.000	0.000	-0.005	-0.004
Unskilled Employees	-0.020	0.000	0.000	-0.015	-0.005
Mixed Income	-0.023	0.000	0.000	-0.018	-0.005
Gross Operating Surplus	-0.001	0.000	0.000	-0.001	0.000
Total Factor Impact	-0.155	0.000	0.000	-0.111	-0.043

Source: Own calculations, 2006

Of the total -0.155 or 15.5 percent decline in the cost of living of the factor account, Table 8.12 shows that about 72 percent (-0.111) of the reduction results from open-loop (O_p) effects while the remaining 28 percent (-0.043) is derived from closed-loop (C_p) effects. Open-loop effects capture the transmission of the shock or price decline that does not fully circulate among all endogenous accounts. The existence of imperfect input and output markets possibly constitutes reasons for limited economic integration as all citizen employees and mixed income gain more from a decline in the cost of living through open-loop effects.

Closed-loop effects account for about 28 percent of the decline in the cost of living of the factor account. None of the factors gains more from the decline in the cost of living through closed-loop effects. Closed-loop effects, as indicated in earlier price policy experiments, capture the full and circular transmission of the price shock/decline among endogenous accounts, demonstrating economic integration. This implies that through closed-loop effects accounts can make substitutions in input/output owing to relative changes in prices. In Table 8.16, it is evident that closed-loop effects are very weak compared to open-loop effects, possibly because of limited competition in input and output markets for full transmission of the price shock among accounts.

Household Level

As in the factor account, the open-loop or O_p effects are greater than the closed-loop or C_P effects in the household account. Table 8.13 records disaggregated price multiplier effects on the household account after tariff liberalization regarding powdered milk.

Table 8.13: Disaggregated Price Multiplier Effects on the Household Account after Tariff Liberalization of Powdered Milk

H/hold type	Dv' * Ma	I	Tp	Op	Cp
Urban Households – Wage Income	-0.016	0.000	0.000	-0.012	-0.004
Urban Households - Self-employed	-0.020	0.000	0.000	-0.016	-0.005
Urban Households - Transfers	-0.032	0.000	0.000	-0.024	-0.008
Rural Households - Wage Income	-0.019	0.000	0.000	-0.015	-0.005
Rural Households - Self-employed	-0.027	0.000	0.000	-0.022	-0.005
Rural Households - Transfers	-0.024	0.000	0.000	-0.019	-0.005
Non-Citizen Households	-0.009	0.000	0.000	-0.005	-0.004
Total Household Impact	-0.149	0.000	0.000	-0.113	-0.036

Source: Own calculations, 2006

In Table 8.13, open-loop (O_p) effects account for about a 76 percent (-0.113) decline in total household cost of living (-0.149) after liberalization of tariffs on powdered milk. The remaining 24 percent (-0.036) of the decline is derived from closed-loop (C_p) effects. Open-loop effects demonstrate, as indicated previously, lack of economic integration as the price shock is not fully transmitted among endogenous accounts. Citizen households gain more from a decline in the cost of living through open-loop effects. Households which rely on income transfer in both urban and rural areas also benefit more through such effects.

Table 8.13 indicates that only 24 percent of the decline in household cost of living induced by the given tariff liberalization results from closed-loop effects. However, none of the household types gained more from a decline in the cost of living through closed-loop effects, implying limited economic integration despite the reduction in the domestic price of powdered milk. Further, weak economic integration also implies limited substitution by households, as the full and circular transmission of the reduction of the domestic price among endogenous accounts was also curtailed.

Activity Level

Concerning the activity account, the closed-loop or C_p effects are greater than transfer effects after the application of tariff liberalization to powdered milk. Table 8.14 shows disaggregated price multiplier effects on the activity account after liberalization.

Table 8.14: Disaggregated Price Multiplier Effects on the Activity Account after Tariff Liberalization of Powdered Milk

Activity	Dv' * Ma	I	Tp	Op	Cp
Trad. Agric - Cattle	-0.022	0.000	0.000	0.000	-0.022
- Other	-0.019	0.000	-0.007	0.000	-0.012
Freehold Farms	-0.013	0.000	-0.001	0.000	-0.012
Hunting, Fishing & Gathering	-0.007	0.000	-0.001	0.000	-0.006
Mining	-0.002	0.000	0.000	0.000	-0.002
Meat Processing	-0.030	0.000	-0.018	0.000	-0.012
Dairy & Other Agric. Processing	-0.355	-0.286	-0.063	0.000	-0.006
Beverages	-0.024	0.000	-0.020	0.000	-0.004
Textiles	-0.009	0.000	-0.002	0.000	-0.007
Chemicals	-0.017	0.000	-0.011	0.000	-0.006
Transport & Equipment	-0.005	0.000	-0.004	0.000	-0.001
Metal Products	-0.007	0.000	-0.005	0.000	-0.002
Bakery & Products	-0.025	0.000	-0.019	0.000	-0.005
Tanning & Leather Products	-0.031	0.000	-0.025	0.000	-0.006
Wood & Products	-0.009	0.000	-0.001	0.000	-0.008
Paper & Products	-0.006	0.000	0.000	0.000	-0.005
Village Industries	-0.021	0.000	-0.007	0.000	-0.014
Other Manufacturing	-0.010	0.000	-0.005	0.000	-0.005
Water	-0.008	0.000	-0.001	0.000	-0.007
Electricity	-0.005	0.000	0.000	0.000	-0.005
Construction	-0.005	0.000	-0.001	0.000	-0.005
Trade	-0.010	0.000	-0.004	0.000	-0.006
Hotels & Restaurants	-0.005	0.000	-0.001	0.000	-0.005
Transport	-0.005	0.000	-0.001	0.000	-0.005
Communications	-0.008	0.000	-0.001	0.000	-0.007
Business Services	-0.005	0.000	0.000	0.000	-0.005
Central Government	-0.009	0.000	-0.001	0.000	-0.008
Local Government	-0.012	0.000	-0.001	0.000	-0.011
Services	-0.011	0.000	-0.002	0.000	-0.009
Total Activity Account	-0.694	-0.286	-0.201	0.000	-0.208

Source: Own calculations, 2006

Of the total -0.694 or 69.4 percent reduction in production costs of all activities induced by tariff liberalization with respect to powdered milk, Table 8.14 illustrates that about 41 percent (-0.286) of the decline came from dairy processing itself after the introduction of the price shock. Closed-loop (C_p) effects on the other hand accounted for about a 30 percent (-0.208) decline while transfer (T_p) effects contributed almost the same to the overall decline in activity production costs. Transfer effects accounted for an approximately 29 percent (-0.201) decline in direct production costs for all activities after tariff liberalization.

As already noted, closed-loop effects capture how the decline in production costs of activities after tariff reduction is due to a full and circular transmission of the price shock among endogenous accounts. Closed-loop effects demonstrate economic integration or strong interdependence among accounts as the decline in the domestic price of powdered milk is transmitted fully. In Table 8.14, most activities benefit from a reduction of production costs owing to closed-loop effects, although the decline in costs is two percent and less.

Insofar as transfer effects are concerned, Table 8.14 illustrates that only dairy processing gains most, by about a six percent decline in production costs, while for a few activities, the reduction in costs is less than three percent. Transfer effects capture inter-industry input-output linkages, which unlike closed-loop effects limit the transmission of the price shock for only activities. The economic implication of transfer effects, as shown in previous price policy experiments, is that, weak economic integration or linkages exist among endogenous accounts. The relatively high transfer effects in the dairy processing industry imply very limited linkages with other activities.

8.3.6 The Effects of Tariff Liberalization of Wheat Grain on Food Security (based upon the Multiplicative Multiplier)

Wheat grain, like maize grain, is entirely obtained from imports, as Botswana's climate is unfavourable for domestic production. Wheat is among the most important consumed cereals in the country (see Chapter 1 and Table 8.1). Wheat consumption is the third most important cereal after maize and sorghum and the indications are that it will eventually overtake sorghum as per capita income improves.

The current SACU applied tariff for wheat grain is 2 percent, which will be used as a shock to trigger a change in the domestic price of wheat grain after tariff liberalization. The change in the domestic price is given by

$\Delta P_d = (1/ (1+t_{m)}) -1.$

As $t_m = 0.02$, the shock for wheat grain is

(1/ (1+ 0.020))- 1= -0.02. This signifies that the domestic price of wheat grain will decline by an insignificant two percent.

Table 8.15 shows the price multiplier effects on all endogenous accounts after the introduction of a price shock into the "bakery and products" activity. Wheat grain is an intermediate input in the baking industry.

Table 8.15: Price Multiplier Effects of Wheat Grain Tariff Liberalization

			Multiplier	Stone				
Accounts		Shock (Dv)	Dv' * Ma	I	Tp	Op	Cp	Check
Prof. & Tech Employees - Cit.	F1	0	0.000	0.000	0.000	0.000	0.000	0.000
Prof. & Tech. Employees - Non-Cit.	F2	0	0.000	0.000	0.000	0.000	0.000	0.000
Admin & Manag. Employees - Cit	F3	0	-0.001	0.000	0.000	0.000	0.000	0.000
Admin & Manag. Employees - Non-Cit	F4	0	0.000	0.000	0.000	0.000	0.000	0.000
Clerical Employees - Citizens	F5	0	0.000	0.000	0.000	0.000	0.000	0.000
Clerical Employees - Non-Citizens	F6	0	0.000	0.000	0.000	0.000	0.000	0.000
Skilled Manual - Citizens	F7	0	-0.001	0.000	0.000	0.000	0.000	0.000
Skilled Manual - Non-Citizens	F8	0	0.000	0.000	0.000	0.000	0.000	0.000
Unskilled Employees	F9	0	-0.001	0.000	0.000	0.000	0.000	0.000
Mixed Income	F10	0	-0.001	0.000	0.000	-0.001	0.000	0.000
Gross Operating Surplus	GOS	0	0.000	0.000	0.000	0.000	0.000	0.000
Urban Households - Wage Income	I1	0	0.000	0.000	0.000	0.000	0.000	0.000
Urban Households - Self-employed	I2	0	-0.001	0.000	0.000	0.000	0.000	0.000
Urban Households - Transfers	I3	0	-0.001	0.000	0.000	-0.001	0.000	0.000
Rural Households - Wage Income	I4	0	-0.001	0.000	0.000	0.000	0.000	0.000
Rural Households - Self-employed	I5	0	-0.001	0.000	0.000	-0.001	0.000	0.000
Rural Households - Transfers	I6	0	-0.001	0.000	0.000	-0.001	0.000	0.000
Non-Citizen Households	I7	0	0.000	0.000	0.000	0.000	0.000	0.000
Non-Financial Enterp	Non-Fin	0	0.000	0.000	0.000	0.000	0.000	0.000
Financial	Fin	0	0.000	0.000	0.000	0.000	0.000	0.000
Private Non-Profit Institutions	NPI	0	0.000	0.000	0.000	0.000	0.000	0.000
Trad. Agric - Cattle	P1	0	-0.001	0.000	0.000	0.000	-0.001	0.000
- Other	P2	0	0.000	0.000	0.000	0.000	0.000	0.000
Freehold Farms	P3	0	0.000	0.000	0.000	0.000	0.000	0.000
Hunting, Fishing & Gathering	P4	0	0.000	0.000	0.000	0.000	0.000	0.000
Mining	P5-11	0	0.000	0.000	0.000	0.000	0.000	0.000
Meat Processing	P12	0	0.000	0.000	0.000	0.000	0.000	0.000
Dairy & Other Agric. Processing	P13	0	-0.002	0.000	-0.002	0.000	0.000	0.000
Beverages	P14	0	-0.001	0.000	-0.001	0.000	0.000	0.000
Textiles	P15	0	0.000	0.000	0.000	0.000	0.000	0.000
Chemicals	P16	0	0.000	0.000	0.000	0.000	0.000	0.000
Transport & Equipment	P17	0	0.000	0.000	0.000	0.000	0.000	0.000
Metal Products	P18	0	0.000	0.000	0.000	0.000	0.000	0.000
Bakery & Products	P19	-0.020	-0.020	-0.020	-0.001	0.000	0.000	0.000

Tanning & Leather Products	P20	0	0.000	0.000	0.000	0.000	0.000	0.000
Wood & Products	P21	0	0.000	0.000	0.000	0.000	0.000	0.000
Paper & Products	P22	0	0.000	0.000	0.000	0.000	0.000	0.000
Village Industries	P23	0	0.000	0.000	0.000	0.000	0.000	0.000
Other Manufacturing	P24	0	0.000	0.000	0.000	0.000	0.000	0.000
Water	P25	0	0.000	0.000	0.000	0.000	0.000	0.000
Electricity	P26	0	0.000	0.000	0.000	0.000	0.000	0.000
Construction	P27	0	0.000	0.000	0.000	0.000	0.000	0.000
Trade	P28	0	0.000	0.000	0.000	0.000	0.000	0.000
Hotels & Restaurants	P29	0	0.000	0.000	0.000	0.000	0.000	0.000
Transport	P30-33	0	0.000	0.000	0.000	0.000	0.000	0.000
Communications	P34	0	0.000	0.000	0.000	0.000	0.000	0.000
Business Services	P35-37	0	0.000	0.000	0.000	0.000	0.000	0.000
Central Government	P38	0	0.000	0.000	0.000	0.000	0.000	0.000
Local Government	P39	0	0.000	0.000	0.000	0.000	0.000	0.000
Services	P40-43	0	0.000	0.000	0.000	0.000	0.000	0.000

Source: Own calculations, 2006

The results in Table 8.15 show that for almost all accounts the reduction of domestic price of wheat grain by two percent after tariff liberalization has no effect on all accounts. Almost all the price multipliers are zero or marginally above it. This implies that tariff liberalization regarding wheat grain based on a two percent applied import duty has no effect on the cost of living at factor, household and activity levels. As a tariff constitutes a wedge between the domestic and world prices, it means for wheat grain the current SACU import duty makes the two prices almost similar hence an insignificant effect on household welfare and activity costs.

Given the limited or negligible effect which tariff liberalization with respect to wheat grain has on all accounts, the analysis will not be carried out at factor, household and activity levels as was the case with other previous policy experiments. There are no policy implications to be derived from the analysis, as the effects on the accounts are zero or minimal. It is, however, safe to assume that if tariff reduction for wheat grain caused a significant decline in domestic prices as was the case in the beef, maize and powdered milk policy experiments, there could also be demonstrable effects at factor, household and activity levels. A low applied import duty does not have much effect on

domestic price, whilst a higher tariff creates a greater wedge between the domestic and world price. The applied tariff for wheat grain is low compared to import duties for beef, powdered milk and maize (see Table 8.2); hence its reduction has a more limited effect on domestic price. In short, the tariff wedge between the world and domestic prices on wheat grain is insignificant to influence consumption levels.

8.4 Summary

This chapter has examined the potential effects of tariff liberalization or reduction on food security and sectoral competitiveness. In particular, through the application of price multiplier analysis, it has been shown that tariff liberalization or reduction in food products reduces the domestic price of the imported goods. The decline in the domestic price reduces the cost of living by up to 3 percent for both in the factor and household accounts. Not only do most factors gain from the decline in the cost of living, in particular low-income workers including unskilled employees also benefit from cheaper food. Workers, including low-income employees, spend a disproportionate share of their disposable income on food.

As far as households are concerned, the results in this chapter have shown that they too benefit from tariff liberalization. Specifically, households dependent on income transfer in both urban and rural areas generally gain more from a decline in cost of living, compared to others. Households reliant on income transfer constitute the poorest families in the country and they spend a disproportionate share of their disposable income on food (see Table 8.1; HIES, 2002/03; CSO, 2004). Unlike the results observed in Chapter 7 with regard to improved export market access, poor households gain more from tariff liberalization to enhance their food security and per capita food consumption owing to a reduced cost of living. Improved market access for exports benefits those with assets (cattle, capital), skills and so on. Impoverished households generally lack these resources.

Besides the advantages for factors and households, this chapter has shown that tariff liberalization also benefits activities. Production costs of activities decrease as input prices decline due to tariff liberalization reduction. For an economy with a limited natural resource endowment and also one faced with high inland transportation costs, a reduction in production costs enhances sectoral competitiveness, this in turn could enhance diversification in potential industries.

Furthermore, this chapter has also indicated a limited transmission of the shock among endogenous accounts. By applying Stone's additive and disaggregated multiplier analysis, this chapter has shown that transfer (T_p) and open-loop (O_p) effects demonstrate weak economic integration or interdependence among accounts because of the limited circulation of price transmission. Factors such as imperfect input and output markets, technical and other institutional constraints curtail the full and circular movement of the price shock.

Closed-loop (C_p) effects, on the other hand, capture the full and circular flow or transmission of the shock among endogenous accounts, which strengthens linkages and economic integration. In order to minimize the adverse effects of limited economic integration resulting from market failures and the like, it is necessary that effective domestic policies and other complementary measures (technology, infrastructure, skills development etc) that promote competition in the economy are developed and administered in order to maximize the benefits accruing from trade liberalization (Stiglitz, 1998). A competition policy has already been approved by government. However, an effective and enforceable competitive law is necessary to improve potential benefits of tariff reduction or trade liberalization. Market failures in input and output industries cannot be resolved by tariff reduction alone if competition is not realized. In short, given the existing institutional and other technical constraints in Botswana, it is not automatic nor a guarantee that tariff reduction alone can benefit consumers and other economic players unless effective competition and dissemination of market and price information is

provided and monitored. In addition, acknowledging the strong links between Botswana's economy and South Africa, it is important that competition is improved in both countries as well as in other SACU members to maximize benefits from trade liberalization. Most of Botswana's imports come from South Africa whilst major companies in the former have their headquarters in the latter, hence the need for a SACU-wide competitive environment..

While advocating for tariff liberalization in order to induce a decline in domestic prices for the benefit of factors, households, activities, etc, it is also necessary that Botswana adopts safeguards against unscrupulous business or unfair trading practices caused by global market failures, export subsidies, dumping and threats from diseases and pests. Since the poverty rate is estimated at 30 percent (HIES 2002/03), and because there are also high unemployment and HIV/AIDS prevalence rates, it is in the long-term interests of Botswana that protective measures etc, are implemented so as to insulate small domestic industries against unfair competition. Antidumping, countervailing, sanitary and phyto-sanitary measures are necessary for the country to be able to meet its development challenges, while pursuing a planned and coordinated trade liberalization strategy that also promotes an increase in import flows. The policy measures advocated here are consistent with the WTO provisions as well as the Doha Development Agenda in which developing countries are allowed to maintain a certain level of protection to meet their national objectives of poverty reduction, economic diversification, support for small farmers, etc. (Doha Declaration, WTO, 2001).

CHAPTER 9

SUMMARY AND CONCLUSIONS

This study has reviewed and examined the agricultural policies of Botswana from independence until recently. It has also evaluated the performance of the agricultural sector in meeting the objectives of food security and competitiveness. Despite the public resources allocated to the agricultural sector since independence and the subsidies made available to the sector, coupled with protection of producers, food security (that is, physical and economic access to safe and nutritious food so that most people in Botswana can lead a healthy and productive life) has not been attained. About 30 per cent of the population cannot meet their basic food consumption requirements owing to, inter alia, abject poverty.

In addition, this study has considered the relationship between Botswana's agricultural policies and those of South Africa. Specifically, because of their joint membership in the customs union, both countries maintain one common external tariff together with Lesotho, Namibia and Swaziland. The common tariff has admittedly benefited all of its members in providing public revenue as well as protecting infant industries such as farming. However, by and large, South Africa as a highly industrialized member and is supported by developed infrastructure, technology, etc gained disproportionately from the customs union. Further, large scale farmers and manufacturers in SACU benefited most tariff protection and other trade restrictions. It is hoped that with a democratic SACU secretariat trade reforms will benefit all sectors including consumers.

This study applied both partial equilibrium and economy-wide analytical tools to assess the effects of trade liberalization on food security and competitiveness of agriculture in Botswana. ATPSM, a partial equilibrium approach was used to examine how Botswana's exports, imports, government

revenue, producers and consumers' welfare will be affected by the possible adoption of the current proposed WTO tariff reduction formulas. The ATPSM results indicate that Botswana's beef exports, in particular, will benefit from global trade liberalization, implying that the industry is internationally competitive, while the imports of basic cereals and dairy products will increase to enhance household food security and per capita consumption. However, government revenue will decline after a reduction in tariffs, which may adversely affect planned development programmes such as control over HIV/AIDS, creating jobs and diversifying the economy. This study has also indicated the merits and limitations of partial equilibrium models such as ATPSM. While these models are less data-intensive and costly than others, they also ignore the strong income and demand linkages in the economy of developing countries, in particular, between the agricultural sector and other players in the economy.

The results of the SAM multiplier analysis/ policy experiments have indicated that enhanced market access for Botswana's beef and textiles exports is important for attaining food security. Through the application of the SAM accounting/income price multiplier analysis, the study established that some factors (gross operating surplus, mixed income, skilled and unskilled manual workers) gained from improved export market access for beef and textiles. It was also demonstrated that wage-based households, followed by self-employed families in both urban and rural areas, benefited greatly from trade liberalization or an increase in external demand for these two products. Self-employed households in both urban and rural areas benefited the most from beef exports while wage-based households fared better in the textiles policy experiments. In general, self-employed households own cattle while wage-based households receive additional export income from members of their families who are employed.

Households dependent on income transfers gained only marginally from improved market access with respect to Botswana's beef and textiles exports. Limited resource endowment and skills constitute some of the constraints

faced by such households. As indicated in this study, these households represent the poorest members of the country's population. The results of the SAM accounting/income multiplier analysis indicate that improved market access for Botswana's exports will not enhance the food security/ welfare of such households. Owners of cattle or capital and skills benefit more from improved export market access. Consequently to assist poor households during trade liberalization, the provision of marketable skills, access to information and communication technology, infrastructure, etc are important strategies.

To gain from improved export market access, Botswana will need to address fully supply-side constraints. Improving productivity in livestock, increasing offtake rates through the development on an integrated production and marketing infrastructure, compliance with customer food safety standards, conservation of the environment, etc can enhance the country's capacity to benefit from global agricultural export markets. The study also identified the limitations of the SAM accounting multiplier analysis. Holding prices and quantities constant while income is allowed to vary was one of the major weaknesses of the analysis, since consumers are not able to substitute commodities in order to maximize their utility.

To relax some of the limitations or assumptions of SAM-accounting/income multiplier analysis, Chapter 8 introduced price changes in the domestic economy by reducing tariffs on selected commodities that play an important role in household food security in Botswana. By using SAM price multiplier analysis, this study undertook policy experiments based on the reduction of tariffs on selected commodities (beef, wheat and maize grains and concentrated powdered milk). These commodities constitute the main food items consumed by low-income households, in particular, and the country, in general. A reduction in an external tariff levied by SACU, *ceteris paribus*, reduces domestic prices of commodities while at the same time it also lowers the cost of production of activities, since imported inputs become cheaper. For factors and households, a reduction of tariffs directly reduces the cost of

living because domestic commodity prices decline. A decline in the cost of living essentially increases the real income of factors and households and also enables households to replace costly commodities with cheaper ones, owing to a change in the relative prices.

The results of the SAM-price multiplier analysis indicate that almost all factors, including low-income workers such as unskilled manual workers, witness a decline in the cost of living. In Botswana, where many people spend a disproportionate share of their disposable income on food, the decline in the cost of living potentially reduces wage costs, which may help to enhance the country's competitiveness. All households also witnessed a decline in the cost of living, induced by tariff reduction. Of particular interest to, and also very relevant to, the problem definition of this study has been the finding that households dependent on income transfers, in both urban and rural areas, benefited the most from a decline in the cost of living after a reduction of tariffs. These households, who constitute the poorest in the country, benefited as domestic prices of food commodities also declined and this also enabled them to substitute cheaper goods for more expensive ones.

This study has also shown that, at factor and household levels, a price multiplier analysis indicates that the open-loop effects are dominant, demonstrating limited economic integration among endogenous accounts. This result was also observed in the income multiplier analysis. At activity level, the closed-loop effects were generally greater than transfer effects, following the decline in production costs induced by tariff reduction. Closed-loop effects, as earlier indicated, capture the full and circular movement of price transmission after tariff reduction. As a result, the greater the closed-loop effects, the stronger the economic integration, which augurs well for potential diversification. In general, Botswana's economy lacks strong integration owing to possible factors such as market failure, institutional constraints, limited skills and high transaction costs, caused in part by poor infrastructure, in remote areas particularly. It is hoped that the initiatives planned in NDP 9 will help to address some of these policy challenges.

Arrangements are underway to establish a competition authority to minimize the adverse effects of market failures and unfair business practices.

In addition, for small local industries (beef, cereal and dairy processing) in price-taker countries like Botswana, there will also be a need to develop effective safeguards against unfair business or trading practices. These safeguards include countervailing duties against subsidized exports, while anti-dumping laws should protect local industries against global dumping. Similarly, effective sanitary and phyto-sanitary measures will be essential so as to protect primary agriculture, in particular, against the importation of pests and diseases. The proposed complementary policies/strategies and safeguards are consistent with WTO's Doha Development Agenda because trade liberalization alone cannot improve the welfare of poor households

It is also evident from all the policy experiments undertaken that no single policy instrument/strategy can become a "**silver bullet**" answer to improving food security or household welfare. In addition to putting complementary policies/strategies and safeguards in place, other changes are required for Botswana to improve her food security. In particular, developing and strengthening intra-and inter-sectoral linkages in the economy is also important to food security since the sectors that primarily contribute to GDP and gross operating surplus may not necessarily or directly improve household welfare and income security.

The study has also indicated the limitations in the analysis. Secondary data was employed to undertake both a partial and an economy-wide policy analysis. In terms of the economy-wide analysis it is, however, worth noting that the structure of Botswana's economy since 1993/94 has hardly changed sufficiently to affect the results of this study adversely. Furthermore, a static as opposed to a dynamic economy-wide policy analysis was utilized. In general, dynamic models capture the potential effects of productivity improvements induced by technology on the economy, welfare etc, while static models do not. In a fast globalizing trade environment where technology

is changing and capital and labour are also mobile, it is also necessary that static and dynamic models be used together to provide appropriate policy guidelines.

Despite the limitations in this study, it is recommended that Botswana and her SACU partners pursue and negotiate for trade liberalization that is largely based on comparative advantage for sustainable development, improves household food security/welfare especially for poor families, reduces production costs reduction in activities, promotes competition, provides safeguards against unfair trading practices and protects small industries that address policy objectives/ challenges such as poverty alleviation and employment creation. Import substitution in industries or commodities that a country does not really have prospects for competitive and sustainable development except by draining public resources when in fact international trade can efficiently, economically and environmentally play a role is not in the best interest of a SACU country.

On future research in trade liberalization, it is desirable that dynamic models that incorporate the introduction of technology and capital investment in the economy are also used. Static analytical tools do not capture what could happen to household welfare or factors including activity output if technology or investment was introduced. In addition, there is also a need to investigate the effects of trade liberalization on an economy where there is an effective competitive environment in input and output markets and improved access to price information.

Contribution of this study to economics literature on international trade liberalization

The main contribution of this study to economic literature on international trade liberalization and its effects on food security and competitiveness of the agricultural sector with special reference to Botswana is given below. Whilst many developing countries via the WTO are arguing for improved export

market access so as to increase their export earnings for the purpose of development, this study has shown that the strategy is necessary but not sufficient to improve household food security. Specifically, improved market access for exports like beef is important for Botswana to generate additional scarce foreign exchange earnings, but owners of cattle/assets (those in self-employed rural and urban households) benefit the most, while those households who rely on income transfers, the poorest group in Botswana, gain marginally. Ownership of cattle in Botswana is inequitable with about 45 per cent of rural households possessing no cattle. This finding indicates the limitations of the strategy emphasizing on market access in terms of the WTO Doha Development Agenda. In particular, improved export market access alone will not necessarily enhance food availability or economic access to food, especially among the poor, unless other complementary policies or programmes are in place. The income or capacity of poor households to produce or purchase food is not enhanced by improved market access of exports alone. Possible remedial policies and programmes include economic diversification and targeted labour-intensive works could benefit poor households.

Furthermore, improved export access largely benefits workers with some basic skills, whilst those lacking them are not likely to gain. The results of the beef and textiles policy experiments/simulations indicate that in Botswana, skilled workers including professional and technical staff benefit most from improved export market access, whilst unskilled and manual personnel do not. Most of the unemployed workers in Botswana, estimated at 18 percent, are unskilled. The major contribution of this study is that as workers as a group are not homogeneous, it is not necessarily true that all of them will benefit from export-led industries. Tourism, beef, textiles, etc have been identified as key export industries in Botswana and the government is working tirelessly to improve their access to global markets. Empowering workers with relevant skills and access to technologies enhances their opportunities to benefit from improved global market access while at the same time enhancing

productivity. The development of skills and access to technologies has fundamental implications for Botswana's educational and vocational policies.

Through the application of the SAM price multiplier analysis, this study has established that tariff liberalization in the food sector can benefit the country as a whole, as well as contribute towards household food security. Tariff liberalization reduces the domestic price of a commodity, which in turn benefits other players in the economy. A reduction in price, ceteris paribus, leads to a decline in the cost of living for workers and households, as well as production costs in activities. Workers, especially low-wage earners such as unskilled and manual personnel, spend a disproportionate share of their disposable income on food. In addition, households dependent on income transfers constitute the poorest in the country. If the share of the household budget spent on food is reduced, workers' welfare and household food security may be enhanced, while savings might be used to purchase more food and also diversify diet to improve nutrition.

Poor households in Botswana spend a disproportionate share of their disposable income on food, most of which is imported This study has established that whilst tariffs play a role in protecting domestic industries and contribute towards government revenue, tariff liberalization can also, if managed well, contribute towards household food security. As a result, tariff liberalization should not just be associated with the possible collapse of local industries and loss of employment (as is often perceived), but if properly managed, the strategy could also enhance workers' and households' welfare.

In as far as activities are concerned, tariff liberalization also contributes to lower production costs, which could enhance the country's competitiveness in potential industries. The results of the SAM price multiplier policy experiments with respect to beef, maize and milk production accounts demonstrate that besides reducing domestic prices, tariff liberalization also reduced the cost of production in many activities. In a partial equilibrium analysis, the reduction in the cost of production would be associated with one sector whereas through

the application of the economy-wide price multiplier analysis, the study has indicated that many industries benefit through inter-sectoral linkages or transfer effects as well as of the circular flow of expenditure in the economy. One of the main contributions of this study, therefore, is that not only does trade liberalization reduce the domestic price of the respective commodity, but also that input costs are reduced in many activities, which benefits the economy through price transmission. Gains by activities resulting from a reduction in input cost help to strengthen economic integration and diversification, a major policy challenge for countries like Botswana.

This study has also identified possible institutional factors that might reduce the likely effects of tariff liberalization through price transmission. By means of the disaggregation of the price multiplier effects, it was found that in certain activities, price transmission did not circulate fully because of limited competition or market rigidity. Despite the relatively high decline in domestic prices of beef, powdered milk and maize grain, the reduction in the cost of living for workers and households is still low while the same trend was also observed under the activity account. During price transmission, when closed-loop effects are weaker than others (open or transfer effects), this is an indication that market imperfections exist and that full economic integration and diversification could be adversely affected by poor inter-sectoral linkages. The policy implication for Botswana including other SACU members is strengthening competitive behaviour in the market and enhancing the dissemination of information.

In summary, the study has demonstrated that trade liberalization can indeed improve food security, per capita food consumption, reduce cost of living and production costs of activities. However, trade liberalization should be supported by complementary policies and programmes (such as competition, infrastructural and skills development) to improve price transmission and enhance competition in the economy to maximize potential net-social benefits. In particular, input cost reductions brought about by tariff liberalization are supposed to benefit the whole economy, given the circular flow of

expenditure. The development of policies regulating competition is intended to improve price transmission so that reductions in input costs can be enjoyed by the whole economy and not merely a few sectors or economic agents. Similarly, there should be policies and programmes to assist poor households and workers who may not benefit much from trade liberalization. These programmes include human resource development, economic diversification, etc.

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Annexe 1.4

RICE	**1988/89**	**1989/90**	**1990/91**	**1991/92**	**1992/93**	**1993/94**	**1994/95**	**1995/96**	**1996/97**	**1997/98**	**1998/99**	**1999/00**	**2000/01**
(Units in 000's tons)													
Population	1212	1256	1301	1327	1354	1383	1414	1444	1475	1508	1541	1574	1606
Per capita cons. (Kg/yr)	22.46	25.87	26.14	25.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL SUPPLY	29.38	32.51	36.42	35.21	35.01	35.99	37.69	38.27	37.55	34.61	35.10	0.00	0.00
Domestic Availability	0.00	2.27	2.71	2.83	2.83	2.77	2.90	3.82	2.89	2.66	2.70	0.00	0.00
Opening stocks	0.00	2.27	2.71	2.83	0.00	2.77	2.90	3.82	2.89	2.66	2.70	0.00	0.00
monitored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00		
unmonitored		2.27	2.71	2.83	2.83	2.77	2.90	2.87	2.89	2.66	2.70	0.00	0.00
Gross Harvest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Imports	29.38	30.24	33.71	32.38	32.18	33.22	34.79	34.45	34.66	31.95	32.40	0.00	0.00
Commercial	29.38	30.24	33.71	32.38	32.18	33.22	34.79	34.45	34.66	31.95	32.40		
Food Aid	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
TOTAL UTILIZATION	29.67	35.21	38.90	36.92	0.12	0.15	0.38	0.26	0.27	0.55	0.40	0.00	0.00
Domestic Utilization*	27.23	32.49	34.01	34.00									
Food Use	27.23	32.49	34.01	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feed Use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Uses & Losses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exports	0.17	0.02	2.05	0.09	0.12	0.15	0.38	0.26	0.27	0.55	0.40		
Closing Stocks	2.27	2.71	2.83	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Moniotored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Unmonitored	2.27	2.71	2.83	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unbalanced Residual	-0.29	-2.70	-2.48	-1.71	34.89	35.84	37.31	38.02	37.28	34.06	34.70	0.00	0.00
Per capita annual availability of Calories, Protein & Fat													
Per capita cons. (Kg/	22.46	25.87	26.14	25.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calories/Day	206.18	237.42	239.93	235.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proteins:G/Day	39.54	45.53	46.01	45.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fats:G/Day	0.54	0.62	0.63	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

All **Rice** statistics derived, exports from CSO trade data per calendar year

Rice consumption: Half the popn for 156 days @ 288grams a meal

Food composition source: C.E. West, F. Pepping &C.R. Temalilwa (1988) The composition of foods Commonly eaten in East Africa. Published by Wagenningen Agricultural University, Wageningen, Netherlands on behalf of CTA and ECSA.

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ANNEXURES

Annexe1.1

Botswana

MAIZE	**1988/89**	**1989/90**	**1990/91**	**1991/92**	**1992/93**	**1993/94**	**1994/95**	**1995/96**	**1996/97**	**1997/98**	**1998/99**	**1999/00**	CURRENT **2000/01**
(Units in 000's tons)													
Population	1212	1256	1301	1327	1354	1383	1414	1444	1475	1508	1541	1574	1606
Per capita cons. (Kg/yr)	76.51	91.72	81.34	83.47	100.04	70.38	76.71	90.08	86.97	80.64	87.26	68.43	82.17
TOTAL SUPPLY	130.70	162.40	149.10	142.70	161.50	125.96	133.76	155.75	150.62	135.77	145.15	123.09	5.00
Domestic Availability	32.60	54.80	55.30	53.70	30.90	25.75	35.60	23.59	40.68	28.86	11.34	15.76	5.00
Opening stocks	25.00	35.00	43.50	39.20	27.90	21.50	24.80	21.29	21.17	17.24	10.22	6.41	7.57
monitored	25.00	35.00	43.50	39.20	27.90	21.50	24.80	21.29	21.17	17.24	10.22	6.41	7.57
unmonitored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross Harvest	7.60	19.80	11.80	14.50	3.00	4.25	10.80	2.30	19.51	11.62	1.12	9.35	5.00
Imports	98.10	107.60	93.80	89.00	130.60	100.21	98.16	132.16	109.94	106.91	133.81	107.33	0.00
Commercial	98.10	107.60	89.80	89.00	127.60	96.91	98.16	132.16	109.94	106.91	133.81	107.33	
Food Aid	0.00	0.00	4.00	0.00	3.00	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL UTILIZATION	130.70	162.40	149.10	142.70	161.50	125.96	133.76	155.75	150.62	135.77	145.16	118.72	136.19
Domestic Utilization	95.70	118.89	109.21	114.31	139.79	100.45	111.94	134.23	132.39	125.50	138.75	111.15	136.19
Food Use	92.73	115.20	105.82	110.77	135.46	97.34	108.47	130.07	128.29	121.61	134.46	107.70	131.97
Feed Use	0.96	1.19	1.09	1.14	1.40	1.00	1.12	1.34	1.32	1.26	1.39	1.11	1.36
Other Uses & Losses	2.01	2.50	2.29	2.40	2.94	2.11	2.35	2.82	2.78	2.64	2.90	2.33	2.86
Exports	0.00	0.01	0.69	0.49	0.21	0.71	0.53	0.35	0.99	0.05	0.00	0.00	0.00
Closing Stocks	35.00	43.50	39.20	27.90	21.50	24.80	21.29	21.17	17.24	10.22	6.41	7.57	0.00
Monitored	35.00	43.50	39.20	27.90	21.50	24.80	21.29	21.17	17.24	10.22	6.41	7.57	
Unmonitored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unbalanced Residual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	4.37	-131.19
Per capita annual availability of Calories, Protein & Fat													
Per capita cons. (Kg/	76.51	91.72	81.34	83.47	100.04	70.38	76.71	90.08	86.97	80.64	87.26	68.43	82.17
Calories/Day	723.20	866.97	768.84	788.98	945.60	665.24	725.08	851.40	822.08	762.24	824.75	646.78	776.69
Proteins:G/Day	186.25	223.28	198.00	203.19	243.52	171.32	186.73	219.26	211.71	196.30	212.40	166.57	200.03
Fats:G/Day	21.43	25.69	22.78	23.38	28.02	19.71	21.49	25.23	24.36	22.59	24.44	19.17	23.02

Food composition source: C.E. West, F. Pepping &C.R. Temalilwa (1988) The composition of foods Commonly eaten in East Africa. Published by Wageningen Agricultural University, Wageningen, Netherlands on behalf of CTA and ECSA.

Source: National Early Warning System (1988/2001), Ministry of Agriculture, Botswana, 2001

Annexe 1.2

WHEAT	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
(Units in 000's tons)													
Population	1212	1256	1301	1327	1354	1383	1414	1444	1475	1508	1541	1574	1606
Per capita cons. (Kg/yr)	36.51	47.99	42.16	50.75	52.91	48.77	51.20	44.91	42.83	56.80	17.29	51.57	0.00
TOTAL SUPPLY	69.27	77.00	83.30	97.00	105.30	95.90	95.51	96.79	94.90	110.52	103.33	113.42	0.00
Domestic Availability	10.00	23.60	14.80	26.70	27.50	31.20	26.30	20.79	29.83	29.71	22.07	62.26	0.00
Opening stocks	10.00	23.60	14.80	26.70	27.50	31.20	26.30	20.79	29.83	29.71	22.07	62.26	28.35
monitored	10.00	23.60	14.80	26.70	27.50	31.20	26.30	20.79	29.83	29.71	22.07	62.26	28.35
unmonitored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross Harvest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Imports	59.27	53.40	68.50	70.30	77.80	64.70	69.21	76.00	65.07	80.81	81.26	51.16	0.00
Commercial	59.27	53.40	68.50	70.30	77.80	64.70	69.21	76.00	65.07	80.81	81.26	51.16	
Food Aid													
TOTAL UTILIZATION	69.27	77.00	83.30	97.00	105.30	95.90	95.51	96.79	94.90	110.51	103.33	113.42	0.00
Domestic Utilization	45.67	62.20	56.60	69.50	73.93	69.60	74.72	66.92	65.19	88.40	27.50	83.77	
Food Use	44.25	60.27	54.85	67.35	71.64	67.44	72.40	64.85	63.17	85.66	26.64	81.18	0.00
Feed Use	0.46	0.62	0.57	0.70	0.74	0.70	0.75	0.67	0.65	0.88	0.27	0.84	0.00
Other Uses & Losses	0.96	1.31	1.19	1.46	1.55	1.46	1.57	1.41	1.37	1.86	0.58	1.76	0.00
Exports	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.04	0.00	0.04	13.57	1.30	
Closing Stocks	23.60	14.80	26.70	27.50	31.20	26.30	20.79	29.83	29.71	22.07	62.26	28.35	0.00
Moniotored	23.60	14.80	26.70	27.50	31.20	26.30	20.79	29.83	29.71	22.07	62.26	28.35	
Unmonitored													
Unbalanced Residual	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Per capita annual availability of Calories, Protein & Fat													
Per capita cons. (Kg/y	36.51	47.99	42.16	50.75	52.91	48.77	51.20	44.91	42.83	56.80	17.29	51.57	0.00
Calories/Day	330.12	433.86	381.14	458.84	478.35	440.89	462.95	406.01	387.20	513.55	156.31	466.28	0.00
Proteins:G/Day	108.53	142.64	125.31	150.85	157.27	144.95	152.20	133.48	127.30	168.84	51.39	153.30	0.00
Fats:G/Day	5.35	7.03	6.18	7.44	7.76	7.15	7.51	6.58	6.28	8.33	2.53	7.56	0.00

Food composition source: C.E. West, F. Pepping &C.R. Temalilwa (1988) The composition of foods Commonly eaten in East Africa. Published by Wagenningen Agricultural University, Wageningen, Netherlands on behalf of CTA and ECSA.

Source: National Early Warning System (1988/2001), Ministry of Agriculture, Botswana, 2001

Annexe 1.3

SORGHUM	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	Current 2000/01
(Units in 000's tons)													
Population	1212	1256	1301	1327	1354	1383	1414	1444	1475	1508	1541	1574	1606
Per capita cons. (Kg/yr)	69.75	37.45	53.33	50.14	48.44	36.50	45.88	59.10	76.13	28.01	24.01	27.91	0.00
TOTAL SUPPLY	160.33	127.96	117.60	86.80	99.00	82.07	95.29	120.22	121.37	52.57	61.33	43.95	0.00
Domestic Availability	128.20	127.90	117.60	80.30	37.50	48.67	70.59	39.43	107.53	21.31	17.56	34.46	0.00
Opening stocks	31.00	73.00	77.80	46.00	16.50	30.60	29.90	26.97	26.64	4.50	8.30	23.14	19.53
monitored	31.00	73.00	77.80	46.00	16.50	30.60	29.90	26.97	26.64	4.50	8.30	23.14	19.53
unmonitored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gross Harvest	97.20	54.90	39.80	34.30	21.00	18.07	40.69	12.46	80.89	16.81	9.26	11.32	
Imports	32.13	0.06	0.00	6.50	61.50	33.40	24.70	80.79	13.84	31.26	43.77	9.49	0.00
Commercial	21.10	0.06	0.00	6.50	57.40	29.40	18.80	73.59	12.75	31.26	43.77	9.49	
Food Aid	11.03	0.00	0.00	0.00	4.10	4.00	5.90	7.20	1.09	0.00	0.00	0.00	
TOTAL UTILIZATION	160.33	127.96	117.60	86.81	99.00	82.07	95.29	120.22	121.37	52.57	61.32	46.37	0.00
Domestic Utilization	87.24	48.54	71.60	68.67	67.69	52.10	66.95	88.07	115.88	43.59	38.18	45.33	
Food Use	84.54	47.04	69.38	66.54	65.59	50.48	64.87	85.34	112.29	42.24	37.00	43.92	0.00
Feed Use	0.87	0.49	0.72	0.69	0.68	0.52	0.67	0.88	1.16	0.44	0.38	0.45	0.00
Other Uses & Losses	1.83	1.02	1.50	1.44	1.42	1.09	1.41	1.85	2.43	0.92	0.80	0.95	0.00
Exports	0.09	1.62	0.00	1.64	0.71	0.07	1.37	5.51	0.99	0.68	0.00	0.00	
Closing Stocks	73.00	77.80	46.00	16.50	30.60	29.90	26.97	26.64	4.50	8.30	23.14	1.04	0.00
Moniotored	73.00	77.80	46.00	16.50	30.60	29.90	26.97	26.64	4.50	8.30	23.14	1.04	
Unmonitored	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Unbalanced Residual	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	-2.42	0.00
Per capita annual availability of Calories, Protein & Fat													
Per capita cons. (Kg/	69.75	37.45	53.33	50.14	48.44	36.50	45.88	59.10	76.13	28.01	24.01	27.91	0.00
Calories/Day	659.27	353.96	504.06	473.96	457.88	345.04	433.66	558.61	719.56	264.75	226.93	263.77	0.00
Proteins:G/Day	198.68	106.67	151.91	142.84	137.99	103.98	130.69	168.35	216.85	79.79	68.39	79.49	0.00
Fats:G/Day	17.42	9.35	13.32	12.52	12.10	9.12	11.46	14.76	19.01	7.00	6.00	6.97	0.00

Food composition source: C.E. West, F. Pepping &C.R. Temalilwa (1988) The composition of foods Commonly eaten in East Africa. Published by Wagenningen Agricultural University, Wageningen, Netherlands on behalf of CTA and ECSA.

Source: National Early Warning System (1988/2001), Ministry of Agriculture, Botswana, 2001