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.

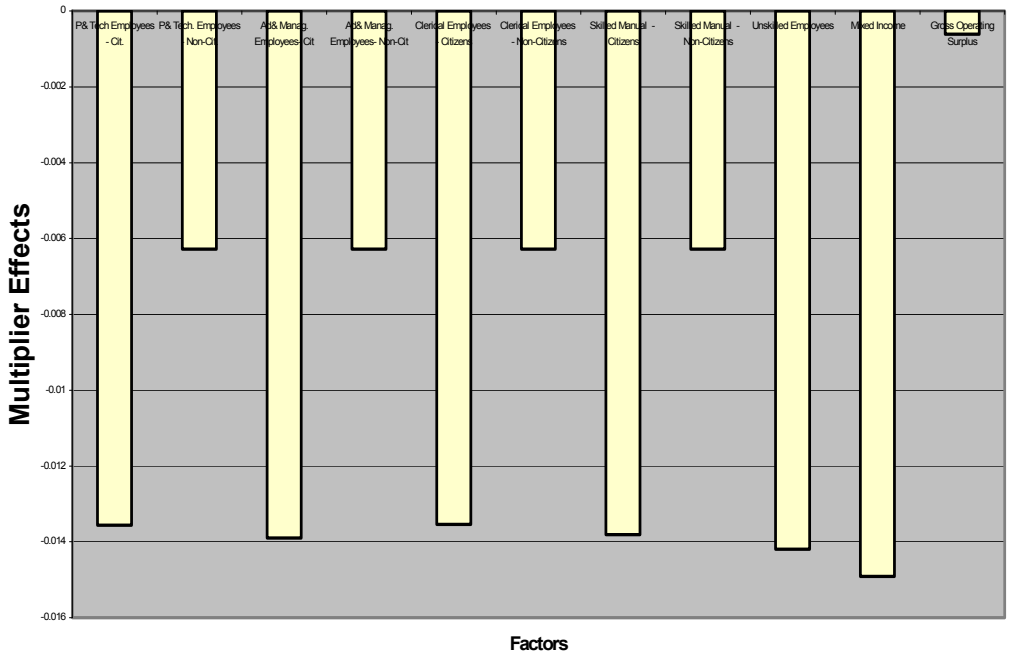

Figure 8.1: Effects of change in Domestic Beef Price due to Tariff Reduction

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.

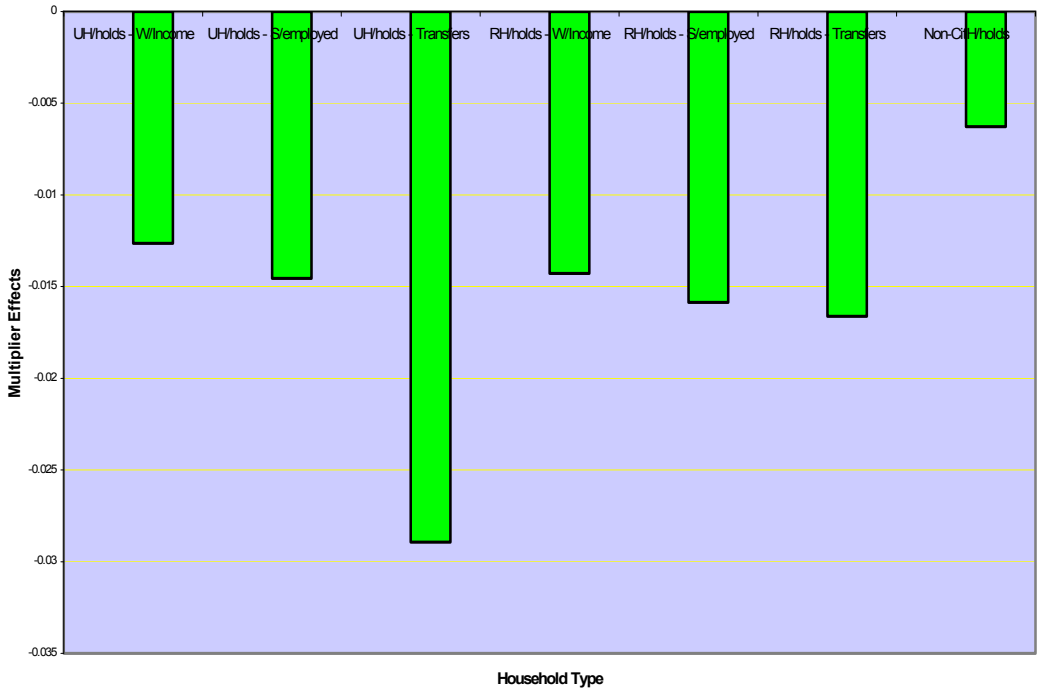

Figure 8.2: Multiplier effects on the Household Account after a change in Domestic Price in Beef

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).

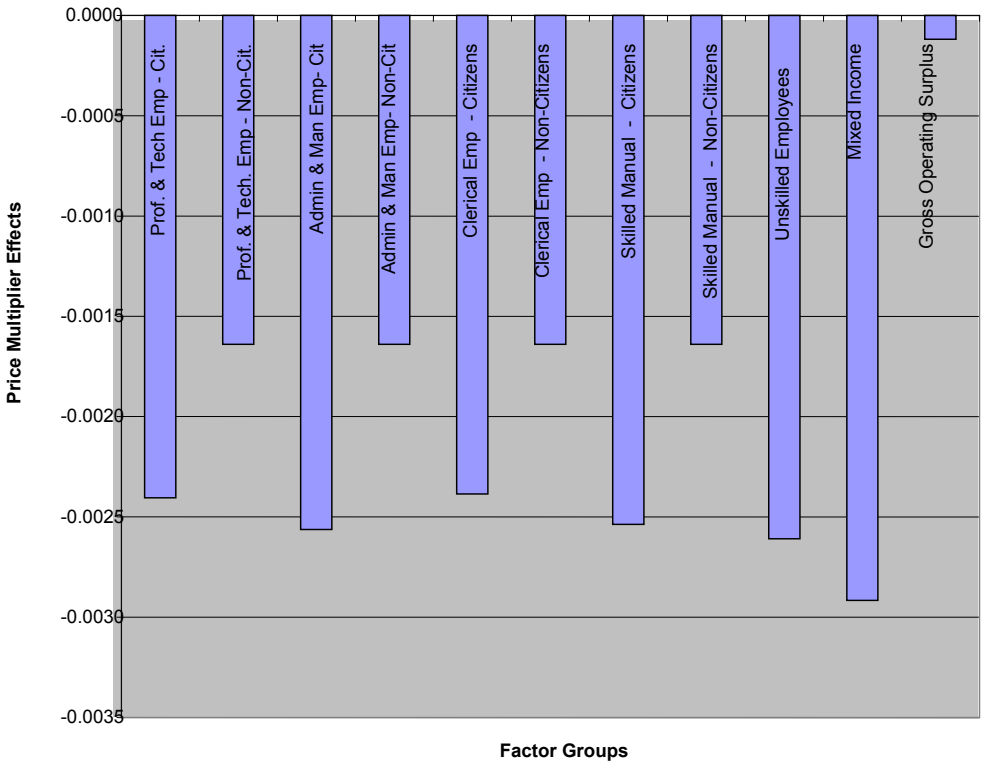

Figure 8.3: Price Multiplier Effects on the Factor Account after Maize Tariff Liberalization

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

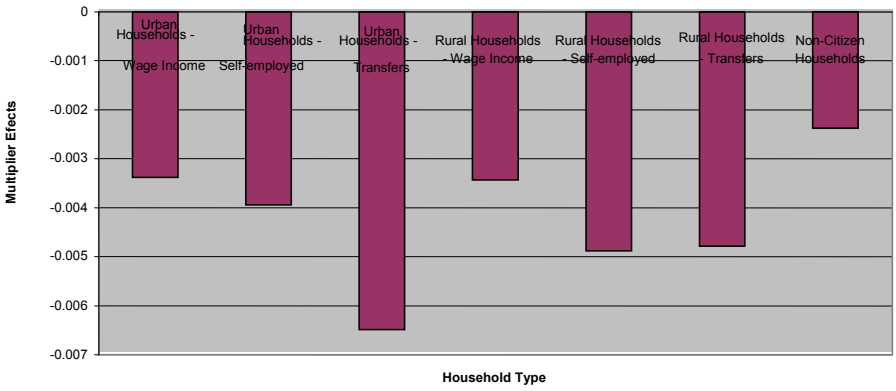

Figure 8.4: Price Multiplier Effects on Household Account after tariff liberalization of maize grain

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.

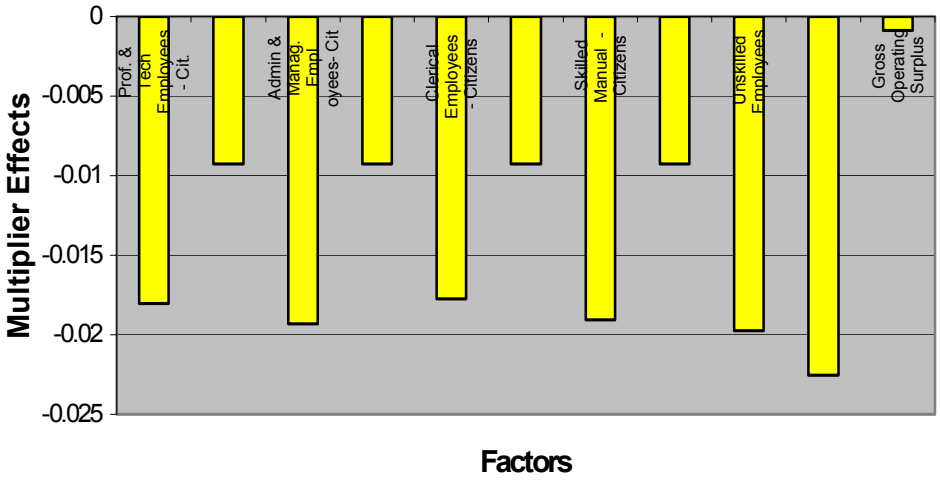

Figure 8.5 Price Multiplier Effects on Tariff Liberalisation of Powdered Milk on Factor Account

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.

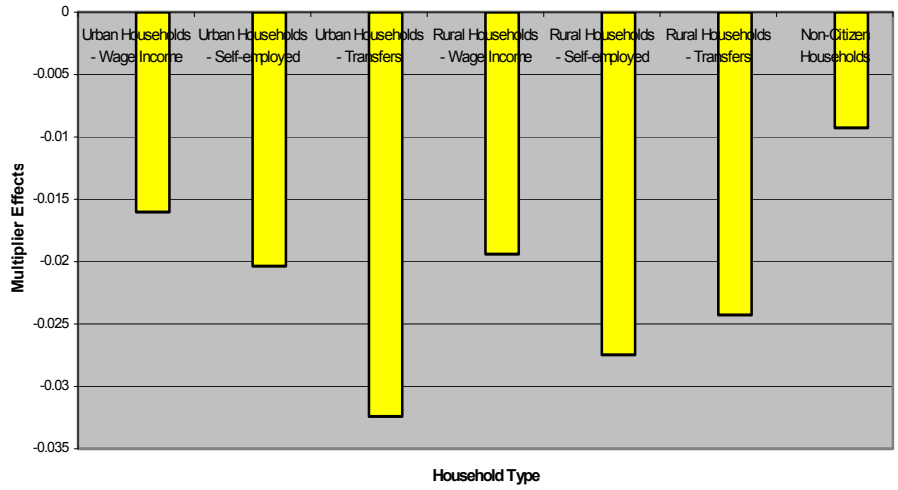

Figure 8.6: Price Multiplier Effects on the Household Account after Tariff Liberalization of Powdered Milk

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.