

Regional Integration of Agricultural Trade in Southern Africa : Infatuation or Real Need?

Alejandro Nin-Pratt

International Food Policy Research Institute, Washington, DC, USA

Xinshen Diao

International Food Policy Research Institute, Washington, DC, USA

Abstract

The potential benefit of several regional integration initiatives undertaken by African countries in recent years is a contentious issue that is continuously being debated. This article assesses the impact of a free trade agreement between member countries of the Southern African Development Community on agriculture. Findings show negative welfare results for regional importers because of the increased imports from inefficient regional producers, who are the major beneficiaries of the agreement. To enhance the benefits gained, the region should implement regional policies beyond trade arrangements, such as those enhancing investment, agricultural productivity, and product diversification.

* **Corresponding Author: Alejandro Nin-Pratt;** Environment and Production Technology Division, International Food Policy Research Institute, 2033 K Street, NW Washington D.C. 20006, USA; Tel: +202 8625689, Fax: +202 4674439, Email: a.ninpratt@cgiar.org.

Co-Author: Xinshen Diao; Development Strategy and Governance Division, International Food Policy Research Institute, 2033 K Street, NW Washington D.C. 20006, USA; Tel: +202 8628113, Fax: +202 4674439, Email: x.diao@cgiar.org.

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I. Introduction

Since the success of export oriented growth strategies followed by Asian countries in the 1970s and 1980s, the prevailing view in multilateral lending agencies in the 1980s and 1990s assumed integration into the global economy was essential to achieve economic growth. However, during the multilateral trade negotiations that delivered the Uruguay Round agreement and created the World Trade Organization (WTO), the world saw a stunning growth of regional trading blocs. According to Krugman (1991), the growing importance of regional agreements raised concerns among some economists that regional agreements would undermine multilateralism with no clear gains to be obtained because of the inherent ambiguity of preferential trading agreements. In his 1995 paper, Bhagwati coins the term *infatuation* referring to the reasons behind the growth of Regional Trade Agreements (RTAs) and argues that their proliferation is leading to the creation of a spaghetti bowl of tariffs whereby a country subjects the same product to different tariff rates depending on its ostensible origin. For Bhagwati, proliferation of regional trade agreements threatens to reproduce the chaos in the tariff regime that was created in the 1930s by protectionism and the absence of the Most Favored Nation (MFN) principle in trade policy.

Africa was not an exception to these trends and debates. Starting in the late 1980s, countries that have been implementing inward development strategies and interventionist trade policies since independence, undertook substantial trade policy reforms in line with market liberalization policies and regional integration initiatives. Among these regional schemes, the Southern African Development Coordination Conference (SADCC) was formed in April 1980 to promote cooperation in the area of infrastructure. The Southern African Development Community (SADC), which superseded the SADCC, was created in 1992 as a regional organization between nine member countries with the aim to facilitate flexible coordination on national development plans which have potential regional impact. SADC as of today has 15 member countries: Angola, Botswana, The Democratic Republic of the Congo,

Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe.

The new vision of SADC was in essence one of trade liberalization and full economic integration of the Southern Africa region. A series of milestones were defined by the Regional Indicative Strategic Development Plan (RISDP) to be achieved within the context of the SADC Common Agenda: a) Formation of a Free Trade Area (FTA) to support inter-regional trade by 2008; b) Establishment of a Customs Union with common external tariffs for the Free Trade Area by 2010; c) Achieve a Common Market by agreeing common policies on production regulation by 2015; d) Attain Monetary Union through macro-economic convergence by 2016; e) Accepting a Single Currency and becoming an Economic Union by 2018.

The process of regional integration formally started with the adoption of the SADC Protocol on Trade in 1996 which came into force in 2000 and was signed by 12 SADC Member States. Angola, the Democratic Republic of Congo, and Seychelles have asked for more time before joining the FTA. Once the Trade Protocol came into force in 2000, the first major step for Member States was to undertake negotiations for the gradual removal of customs duties. The process of eliminating tariffs was guided by the principle of asymmetry out of the realization that SADC Member States were at varying levels of economic development. Member States were put into three categories: (i) Developed Countries (mainly South Africa but *de facto*, Southern African Customs Union - SACU); (ii) Developing Countries (Mauritius and Zimbabwe) and; (iii) Least Developed Countries (Angola, the Democratic Republic of Congo, Madagascar, Malawi, Mozambique, Tanzania, and Zambia).

Different product categories were defined for the tariff phase down. Category A products were those whose tariffs would move to 0% at the start of the phase down process in 2000; Category B products were those subject to tariff phase down to 0% over an 8-year period to 2008; Category C products were sensitive products, phase down over a 12-year period to 2012; Category E products were those products excluded from preferential trade. Sensitive products under Category C comprise only 2.8% of all agricultural products, and included products such as textiles, clothing/cotton, cereals, dairy products and motor vehicles. Wheat flour, textiles/garments and sugar were also considered very sensitive and hence were given special treatment under the tariff phase down process. In addition to the removal of tariffs, Member States have also agreed to several other trade facilitation measures such as the elimination of non-tariff barriers to trade that involve harmonization of customs rules and procedures, harmonization

of sanitary and phytosanitary measures as well as adoption and implementation of common rules of origin.

The Southern African Development Community (SADC) Free Trade Area was achieved in August 2008, when 85% of intra-regional trade amongst the partner states attained zero duty (Category A and B products), which is the threshold stipulated by the World Trade Organization to achieve FTA status. The tariff phase down process for sensitive products should have been completed by January 2012 but some member states lagged behind in implementing their tariff phase down schedule and in certain cases, the reductions were less than initially scheduled. In this context, the 2010 milestone of achieving the custom union status has not yet been attained and these delays in the implementation of the SADC Customs Union means that the subsequent steps in the chain of integration milestones will also be delayed, including the SADC Common Market and Monetary Union.

The potential benefit of the Regional Trade Agreement (RTA) for SADC countries is a contentious issue that is still being debated. For instance, Cassim (2000), Longo and Sekkat (2001), Subramanian and Tamirisa (2001) have shown that the implementation of an RTA in SADC would have favorable impact on bilateral trade, and that the elimination of agricultural tariffs among SADC countries would benefit real agricultural gross domestic product, and agricultural output in the region. Other expected benefits of RTA are export diversification and the attraction of private investments.

On the other hand, Lewis (2001) and Lewis, Robinson, and Thierfelder (2002) concluded that only limited gains can be achieved through trade expansion given SADC's small size relative to the global economy and the trade imbalances among its members. In this context, Holden (1996) argues that South Africa, the economic powerhouse in the region, has little incentive to seek preferential treatment largely because its share of regional exports remain small relative to its exports to the rest of the world.¹

Chauvin and Gaulier (2002) established that SADC countries have comparative advantages in similar products and that exports from the region concentrate on a small number of products, more so than in the case of other developing countries. Holden (1996) also finds that regional trading blocs, such as SADC, encourage import substitution industrialization and trade diversion. Other studies by Cassim (2000), Chauvin and Gaulier (2002), Davies (1996), Geda and Kibret (2002), Goldstein (2004),

¹ For 2000–2005, South Africa's agricultural exports to the region were, on average, 20 per cent of its total exports.

Holden (1996), Jenkins, Leape, and Thomas (2000), Longo and Sekkat (2001), Nyirabu (2004) and Radelet (1997) have also argued that an RTA will play a limited role in the region because of the importance of other non-tariffs factors affecting trade like transport and transaction costs, inadequate infrastructure, lack of diversification in sources of comparative advantage, and underdeveloped production structures.

In the case of trade in agricultural products, Koester (1986) found potential opportunities for intra-regional trade in agricultural products, mainly live animals, meat, maize, vegetables, sugar and honey, vegetable oils, and animal feed. Maasdorp (1998) concludes that regional trade can contribute substantially to improved food security, as SADC as a whole has the potential to be self-sufficient in white maize and a wide range of other food crops. It also concludes that there is considerable scope for greater intra-regional trade in grain and other food products and for greater cross-border investments in agriculture and agro-industry.

The limited information and analysis about integration in agriculture, as well as the contrasting results among some of the studies reviewed here, justify further exploration of the impact of RTAs on agriculture in SADC. To complement these studies, we combine the use of the most disaggregated bilateral trade data available, four-digit Standard International Trade Classification (SITC) level data, and a methodology that is simple and theoretically sound to assess the potential welfare impacts of an FTA on the agricultural sector of Southern African countries and to determine opportunities and challenges faced by the region as a consequence of such agreement.

Section II present the conceptual framework used for this analysis. Section III presents the methodology used to analyze the contribution of different agricultural industries to changes in the welfare of producers and consumers in different countries, determining the welfare effects of a FTA for different regions and agents. The last section summarizes the findings and discusses policy implications.

II. Conceptual Framework

Panagariya (1999, 2000), over the past 20 years, mainly focused on the analysis of static welfare effects of regional integration wave of regionalism. The analysis derives from the Heckscher-Ohlin-Samuelson (HOS) framework of comparative advantage

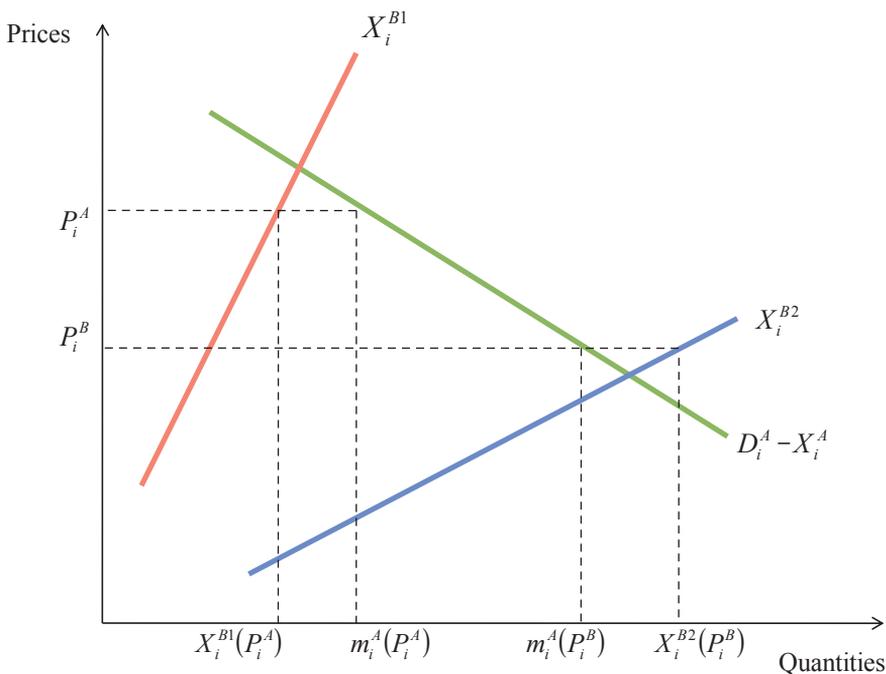
and from the theory of customs unions with contributions from the theory of second best that goes back to Viner (1950), Meade (1955), and Kemp and Wan (1976). This literature is concerned with what happens when one or more optimal conditions are not satisfied given that RTAs are essentially discriminatory policies. Under this approach, discussed in Burfisher *et al.* (2003) and Panagariya (2000), the welfare impacts of RTAs concerning trade creation, trade diversion and terms of trade effects, are determined by a few crucial variables: changes in commodity trade between countries within the RTA; changes in trade between the RTA and the rest of the world; and changes in international prices faced by RTA partners. Three main distinctive methodological approaches can be found in the HOS framework: Revealed Comparative Advantage (RCA) indicators as in Balassa (1965); *ex-post* econometric evaluations as in Panagariya (2000) and Frankel (1997); and *ex-ante* counterfactual analysis, based on partial or general equilibrium models as in Deardorff and Stern, (1986), Harris and Cox (1984), and Harrison, Rutherford and Tarr (1994). The study of North American Free Trade Agreement (NAFTA) and the European Community 1992 (EC92) have also shown the range of possible effects that can be captured in such models. A good example of this kind of model is Francois and Shields (1994).

This study employs an *ex-ante*, partial equilibrium counterfactual analysis of regional trade liberalization in SADC using Grossman and Helpman's (1995) framework and in particular, the adaptation of their framework by Vaillant and Ons (2003). We present this framework for the particular case of a Free Trade Agreement (FTA) and two small economies, *A* and *B*, which could represent regional import and export markets, respectively. We assume that all goods are produced with constant returns to scale, using labor and a sector specific factor; consumers within each economy have identical preferences which are represented by a quasi-linear utility function. The economy is small and therefore world prices are given exogenously. Without loss of generality, all international prices (P_i) are normalized to one, while domestic prices in countries *A* and *B* are equal to the international price increased by an *ad valorem* tariff. Initially, the MFN principle holds.

To analyze the impact of opening trade of commodity *i* as part of a FTA between importing country *A* and exporting country *B*, the key variables are: the value of imports by *A*; supply and exports from *B*; and the import tariffs applied to trade of *i* in both countries. We assume that country *B* has a more efficient producer of commodity *i* than *A*, which means that domestic prices of good *i* in *A* and *B* are: $P_i^A > P_i^B$ with $P_i^B = 1$ if *B* is an efficient exporter of good *i*.

Figure 1 shows country A 's demand for imports and two different total supply curves for country B .² The location of B 's supply depends on the endowment of the specific factor used by B to produce i . If the production capacity of B is small, then total supply of i from country B is represented by X_i^{B1} . In this case, total supply from B at price P_i^A ($X_i^B(P_i^A)$) is not enough to satisfy A 's import demand at that price ($m_i^A(P_i^A)$). The opposite extreme case is that the specific endowment in B is so large that country B 's supply of i ($X_i^B(P_i^B)$) can satisfy A 's import demand at the lower price P_i^B and still export to the rest of the world. In this case, B 's supply response is represented by the curve X_i^{B2} ; the price in importer A 's market is now reduced to the price in B (P_i^B), total imports in A are $m_i^A(P_i^B)$, and total exports in B are $X_i^{B2}(P_i^B)$.

Figure 1. Effects of a Regional Trade Agreement



(Source) Adapted from Grossman and Helpman (1995)

Three different outcomes from integration could result in this market depending on the relative size of aggregate supply of i in country B and of import demand of i in

² Notice that this is not export supply but total supply of industry i of country B .

country *A*. Grossman and Helpman (1995) refer to these results as: enhanced protection, reduced protection, and the intermediate case. We briefly discuss the first two cases and its implications for each country/region shown by Figure 1. The intermediate case can be seen as a combination of the effects of the two extreme cases and is discussed by Vaillant and Ons (2003).

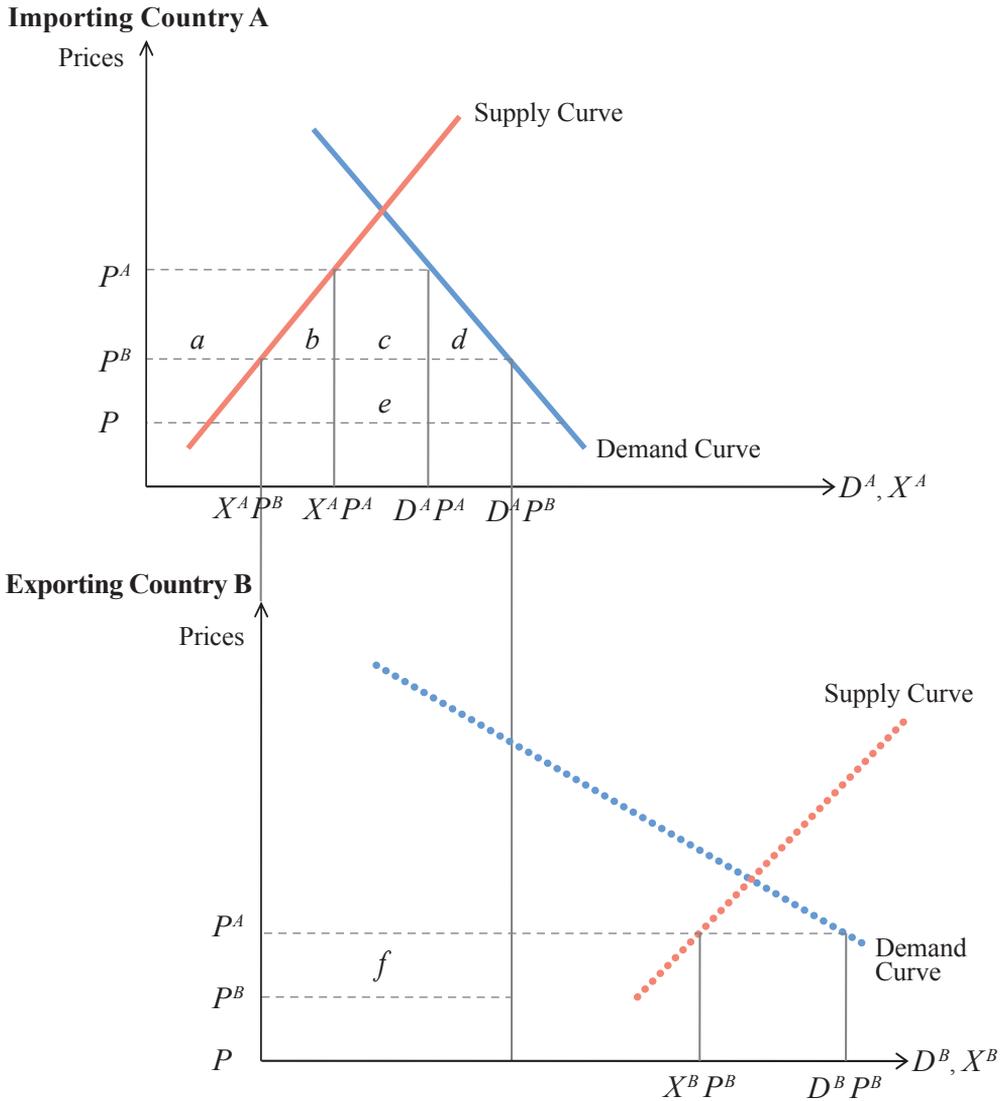
In the case of reduced protection, supply in country *B* (X_i^{B2} in Figure 1) at the lowest initial price P_i^B can satisfy all of country *A*'s import demand, $X_i^B(P_i^B) > m_i^A(P_i^B)$. Under a trade agreement, *A* stops importing from the rest of the World and its domestic price falls to P_i^B . The producers in *A* enjoy less protection under the trade agreement than in the initial equilibrium. Producers in *B* are the only foreign suppliers in *A*'s market, and they also satisfy at least a part of their domestic market. The price paid by consumers in *B* for good *i* and the price obtained by producers in *B* remains unchanged at the level P_i^B .

A FTA results in enhanced protection for the exporter when supply from country *B* is small with respect to demand in country *A* as a result of a relatively small endowment of the specific factor in *B* (supply X_i^{B1} in Figure 1). At the initial price in *A* (P_i^A), the aggregate supply from country *B* is not enough to satisfy all the import demand of country *A*, $X_i^B(P_i^A) < m_i^A(P_i^A)$. Therefore, under an eventual FTA, *A* has to continue importing from the rest of the world and its domestic price remains unchanged. Given that $P_i^A > P_i^B$, producers in *B* divert all their production to *A*'s market, while consumers in *B* have to satisfy all their demand by purchasing from the rest of the world at the initial price. The only effect of the RTA in this case is an increase in those prices paid to producers in the more efficient country. The result is enhanced protection for producers in country *B*.

This classification of industries show that reduced or enhanced protection is directly related to the welfare results of the FTA. When a country applies the same tariff to all nations, it will always import from the most efficient producer with the lowest price. Trade diversion occurs when discriminatory tariff liberalization leads a country to import from a supplier that is not the lowest cost source, thereby reducing the domestic welfare. When increased trade is associated with a switch from higher-cost suppliers to lower-cost suppliers, that is, the supplier in the FTA is more efficient than the supply source before the establishment of the FTA, the FTA is said to be trade creating (Panagariya 2000).³ These effects are graphically presented in Figures 2 and 3.

³ If FTAs include large countries, then the welfare results depend not only on trade flows and the creation or diversion of trade but also on changes in terms of trade. With imperfect competition, the welfare effects of a FTA may be many times larger than in the case of perfect

Figure 2. Reduced protection as a result of Free Trade Area



(Source) Vaillant and Ons (2003)

Figure 2 shows welfare changes in an importing country *A* and an exporting country

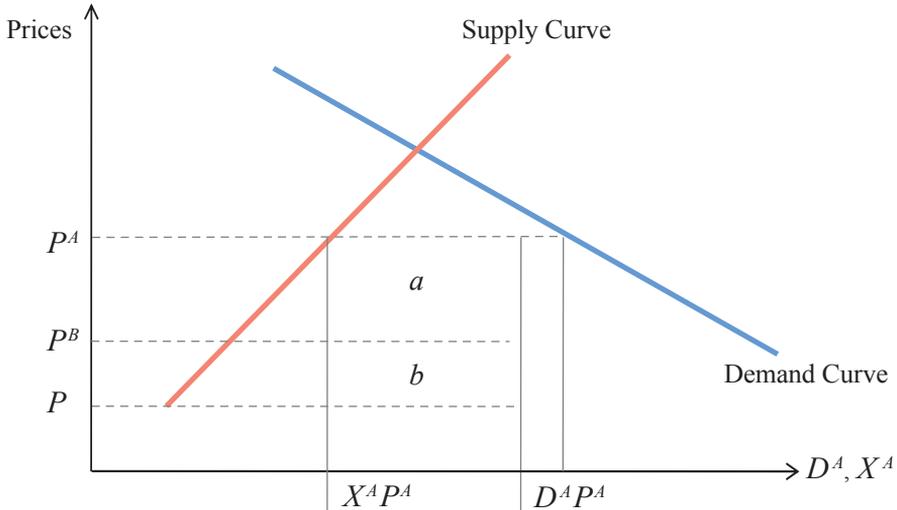
competition, due to production shifting, with the FTA attracting more production as a result of the increased varieties of a differentiated good being produced (Baldwin and Venables 1995). Welfare also increases due to procompetitive effects of the FTA when scale and cost effects are significant.

B in the case of reduced protection and an inefficient exporter. It shows that the demand in the importing country is smaller than total supply in the exporting region. When A eliminates tariffs imposed on regional exporter B , consumers in A import from B instead of from the rest of the world because now they pay P_i^B for product i instead of P_i^A (with $P_i^A > P_i^B$). With lower domestic prices, producers in A lose area a ; consumers' surplus increases by area $a+b+c+d$ but area e corresponds to a loss for consumers in tariff revenue given that all imports come from B . As production from B is now being exported to A , country B imports from the rest of the world at price P^B to meet its domestic demand. Consumers in country B gain tariff revenue f as a result of these imports. Given that $f > e$ (e is only a fraction of f), the region as a whole gains unambiguously. Exporters in B are not affected by the FTA as they still produce X^B at price P^B . Results in the importing country depend on the relative size of areas e (trade diversion) and $b+d$ (trade creation), which means that if regional exporters in industry i are inefficient, the results for the importing country are ambiguous. When trade creation is bigger than trade diversion, $e < b+d$, then consumers in A benefit from the FTA.

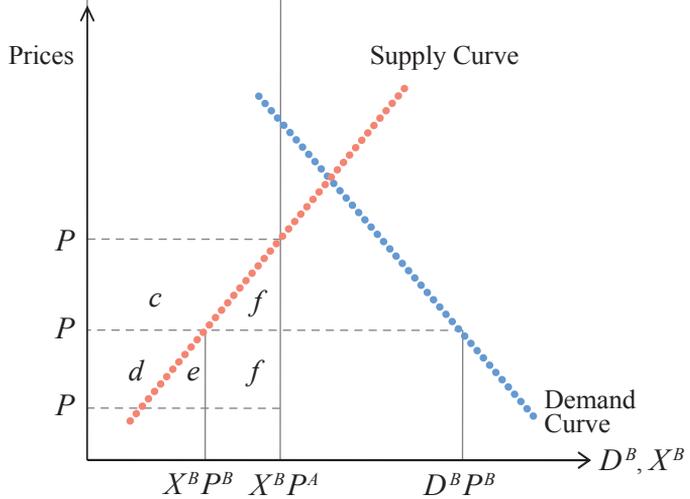
Figure 2 can be also used to show efficient regional exporter. In this case, $P_i^B = P_i$ resulting in $f = e = 0$ and areas b , c and d being bigger than in the previous case. Now, consumers in importing country A unambiguously gain, while exporting country B is not affected by the FTA.

Figure 3. Enhanced Protection as a result of Free Trade Area

Importing Country A



Exporting Country B



(Source) Vaillant and Ons (2003)

Figure 3 presents the case of enhanced protection with an inefficient regional producer where import demand is larger than total supply in the exporting region. Elimination of tariffs imposed by A result in increased imports from B, although in this case, production in B cannot supply total import demand in A. As a consequence, A still

imports from the rest of the world imposing a tariff and because of this, domestic price in A after trade liberalization is still P_i^A . Consumers in country A lose tariff revenue $a+b$ as no tariff is collected from the FTA partner. Exporters in B benefit from their preferential access to country A 's protected market and increase surplus by area c , while consumers gain from tariff revenue $d+e$ from increased imports from the rest of the world, as domestic production goes now to country A . Total gains in country B result from adding gains in consumer and producer surplus $c+d+e$. As $a+b = c+d+e+f$, net loss for the region is equal to area f . The loss in country A does not depend on the level of protection in B but only on the level of its own tariff. All gains in country B now go to producers ($c+d$) given that there is no tariff revenue for consumers.

In the case of enhanced protection with an efficient producer ($P^B=P=1$), the loss for the region as a whole is bigger than in the case of the inefficient exporter. The welfare loss in A remains the same and is the result of the loss in tariff revenue. In country B on the other hand, only producers improve their welfare (area c) but this gain is not sufficient to compensate for the absence of an increment in tariff revenue in A .

In sum, assuming that the importer is inefficient and imposes a tariff on imports of product i before the agreement, and depending on: (i) the relative size of import demand in the importing country, (ii) on the total supply in the exporting country, and (iii) on the efficiency of the exporter, we can have the four situations summarized in Table 1. The total effect on the region of the different cases shows that enhanced protection results in unambiguously negative impacts for the region as a whole. On the other hand, reduced protection unambiguously results in trade creation with positive effects on the region as a whole. An intermediate case combining effects of enhanced and reduced protection is possible and is discussed in Vaillant and Ons (2003).

Table 1. Summary of Regional Welfare effects of a Trade Agreement

Country	Consumers	Producers	Members	Region
Reduced protection, B inefficient				
A (importer)	Ambiguous	Negative	Ambiguous	Positive
B (exporter)	Positive	Nil	Positive	
Reduced protection, B efficient				
A (importer)	Positive	Negative	Positive	Positive
B (exporter)	Nil	Nil	Nil	
Enhanced protection, B inefficient				
A (importer)	Negative	Nil	Negative	Negative
B (exporter)	Positive	Positive	Positive	
Enhanced protection, B efficient				
A (importer)	Negative	Nil	Negative	Negative
B (exporter)	Nil	Positive	Positive	

(Source) Adapted from Vaillant and Ons (2003)

Industry *i* in country *A* is threatened by the FTA when there is a displacement of domestic production in *A* led by imports from country *B* (reduced protection). Exporter *B* has a trade opportunity when as a result of the FTA, there is an expansion of its production driven by exports to country *A* (enhanced protection).

We apply this framework to the analysis of a FTA in Southern Africa to determine the welfare effects of the trade agreement on consumers and producers in different countries, on importing and exporting countries, and on the region as a whole. As results in Section IV show, most import markets in Southern Africa appear to be small compared to supply from the region. This means that sensitive industries in most countries are threatened by the FTA and that with the reduced protection under regional trade liberalization, importing countries would reduce domestic production of these industries.

III. Approach

The analysis of the impact of a FTA in Southern Africa using the framework presented in Section II is conducted by following three steps. In the first step, we estimate indices of Revealed Comparative Advantage (RCA) and Revealed Comparative Disadvantage (RCD) for each country and determine the set of industries showing complementarity. The RCA measure proposed by Balassa (1965) implies that a country's pattern of comparative advantage could be observed from post-trade data, assuming that actual trade reflects relative costs as well as differences in non-price factors, and is grounded in conventional trade theory. As the focus is on trade between SADC countries, the reference used to determine comparative advantage and disadvantage is the group of SADC countries, so our measure refers to advantages and disadvantages relative to the region.

Complementary agricultural industries are defined as the set of industries for which one or more countries in SADC show a comparative advantage ($RCA > 1$) and at the same time, at least one country shows a comparative disadvantage ($RCD > 1$). As discussed in Vaillant and Ons (2003), industries with high complementarity have a better chance of exploiting the eventual improvement in access to the new partner's market, and we expect that industries within this group will experience the greatest adjustments.

In the second step, we identify the group of sensitive industries. As in Vaillant and Ons (2003), we consider sensitive industries to be those industries showing trade complementarity for which the exporting country in the region faces an *ad valorem* tariff in regional markets. Thus, sensitive products are those that show trade complementarity between SADC countries and that would gain improved conditions of access to the new partner market as a result of setting up a free trade area. On the other hand, complementary industries are not sensitive if suppliers currently face a zero tariff.

In the last step, we determine which of the sensitive products constitute trade opportunities and perils for the different SADC countries. We focus particularly, on the opportunities and threats that low-income countries face in contrast with those faced by middle-income countries. To do this, we refer to our conceptual framework where industries with reduced or enhanced protection and intermediate industries are defined based on the relative size of import demand ($m_i^A(P_i)$) and supply of exporting countries ($P_i X_i^B(P_i)$). We also use the information on initial value of imports and the

estimated value of imports at exporter's price, together with information on tariffs and import elasticities to estimate the welfare results of the FTA. We assume that P , the world price for imports of products from industry i is $P_i = 1$, and that prices in exporting region A and importing region B are respectively $P_i^A = 1 + t_i^A$ and $P_i^B = 1 + t_i^B$, where t_i is an *ad valorem* tariff. Value of imports after FTA is then calculated using these prices and import elasticities. All reduced protection industries in all countries can be quantitatively measured with prices by trade data to represent current trade value, information on current supply, the areas under the demand and supply curves in Figure 2.

Trade data used in this study is from UN Comtrade, while data on tariffs from Bouët *et al.* (2004). Broda and Weinstein (2006) describe in detail the import demand elasticities (ε_i^A) used to calculate imports at exporter's price. They report three-digit elasticities for 73 countries in the world using six-digit Harmonized System (HS) import data (1992 classification system) from the UN Comtrade database from 1994–2003 to estimate these elasticities. Information was available for three SADC countries: Madagascar, Malawi and Mauritius. The information from Madagascar and Malawi was used to define elasticity values for low-income countries and the information from Mauritius was used to define elasticities for middle income countries. Given that import elasticity values could be driving our results, we checked different criteria to define these elasticities and compared results obtained with different elasticity values. We conclude that results appear to be robust and that general conclusions hold within a wide range of elasticity values. The Appendices include results of sensitivity analysis for Mozambique to illustrate the procedure followed.

IV. Results

Table 2 summarizes the general results of our classification of agricultural industries in those industries showing trade complementarity, sensitive industries, and within this group, those facing reduced and enhanced protection. For each group of industries, Table 2 presents the value of imports and exports for each country, the average tariff imposed by importing countries and the average tariff faced by exporters. The first four rows in Table 2 show the total agricultural imports and exports for the region as a whole and by country. Total imports account for 6.5 billion US dollars and exports

for 10.0 billion US dollars. SADC countries trade products from a total of 193 four-digit Standard International Trade Classification (SITC) industries. From the total set of importing and exporting industries, we find trade complementarity in 106 industries, representing 40 per cent of total imports and 29 per cent of total exports. The average tariff on imports of complementary industries for the region is 10.7 per cent, while countries exporting these products face an average tariff of 16.2 per cent in regional markets.

Table 2. Value of Agricultural Imports and Exports: Agricultural Industries of SADC Countries resulting from a FTA

	Angola	DRC	Madagascar	Malawi	Mauritius	Mozambique	Tanzania	Zambia	Zimbabwe	SACU	Total
Total trade											
Imports (million \$)	884	223	216	144	600	309	320	162	263	3,333	6,454
Tariff (%) ^a	10.1	7	1.8	3.7	6.5	6.5	8.8	5.5	5.5	9.2	8.5
Exports (million \$)	40	79	573	488	498	312	717	271	1,081	6,069	10,128
Tariff (%) ^b	1.1	2.1	4.4	4.7	13.1	3.0	4.3	9.5	6.1	8.0	7.2
Trade complementarity											
Imports (million \$)	511	88	142	52	276	149	79	60	122	1,087	2,567
Tariff (%) ^a	16.9	15.1	2.1	6.8	9.6	10.1	22.1	8.5	22	7.2	10.7
Exports (million \$)	1	20	280	130	349	48	314	170	453	1,440	3,205
Tariff (%) ^b	5.1	1.6	16.5	16.7	13.5	9.5	8.6	8.3	11.9	21.1	16.2
Sensitive industries											
Imports (million \$)	511	88	50	32	84	149	79	58	121	543	1,713
Tariff (%) ^a	16.9	15.1	6.1	11	31.4	10.1	22.3	8.9	22.3	9.4	14.5
Exports (million \$)	0	19	259	130	331	46	286	140	437	1,417	3,067
Tariff (%) ^b	11.9	2.5	17.9	17.1	14.3	12.2	10.5	12.0	13.6	22.1	17.7
Reduced protection^c											
Imports (million \$)	462	78	48	28	82	142	119	67	52	491	1,570
Tariff (%) ^a	17.7	15.1	6.2	11	31.8	10.3	24.3	9.4	22.4	9.6	12
Exports (million \$)	0	14	251	130	330	46	281	140	424	1,407	3,024
Tariff (%) ^b	12.0	2.5	18.0	16.9	13.3	12.8	10.5	11.8	13.6	22.1	17.6
Enhanced & intermediate protection^c											
Imports (million \$)	49	9	1	4	2	6	2	11	6	52	143
Tariff (%) ^a	8.8	15.3	4.7	11.2	15.5	5	10	5.6	13.6	11.8	10.5
Exports (million \$)	0	5	9	0	1	0	5	-	13	9	43
Tariff (%) ^b	1.2	4.4	4.4	3.9	9.7	1.2	4.2	0.0	12.0	13.7	8.9

(Note) (i) ^a Tariffs imposed by importing countries, ^b Tariffs faced by exporting countries, ^c Industries with reduced protection are those threatened by the FTA, with domestic production in importing countries displaced by imports while not affecting production in exporting countries. Industries with enhanced protection are those in exporting countries that find opportunities to increase production as a result of an increase in prices paid for their exports to regional markets.

(ii) Abbreviations are as follows; DRC=the Democratic Republic of Congo; SACU=Southern African Customs Unions
 (Source) Authors' calculation based on UN Comtrade data and tariff data from Bouët *et al.* (2004).

The most important group for analyzing the impact of FTA among SADC countries is the group of sensitive industries. The share of imports and exports of these industries in total regional imports and exports is below 30 per cent, with imports showing an average tariff of 14.5 per cent. Most of the sensitive industries will see reduced protection which means that the effect of a FTA will be to reduce domestic production of these industries in importing countries and increase imports from the region. Opportunities for enhanced protection for exporting countries are small and related to 12 industries with total imports of 143 million US dollars and exports of only 43 million US dollars.

Country level results in Table 2 show that Angola, the Democratic Republic of Congo (DRC), and Mozambique currently appear to have comparative disadvantages for agricultural production in the region. Angola imports 511 million US dollars (58% of total agricultural imports) of products from 30 industries with high trade complementarity while exporting only 1 million US dollars (2.3 per cent of agricultural exports) from three industries. The DRC also imports more products from industries with trade complementarity than it exports: 88 million US dollars of imports from 20 industries compared with 20 million US dollars of exports from five industries. The value of Mozambique's exports from industries with trade complementarity is only one-third of the value of imports in this group of industries. Southern African Customs Union (SACU) is the major exporter and importer of products from industries with high complementarity in the region, with 1,087 million US dollars imports and 1,440 million US dollars exports. Other net exporters are Madagascar, Mauritius, Tanzania, and Zimbabwe.

As shown in Table 2, producers facing the most significant challenges from SADC's trade agreement are those in the group of industries in countries with reduced protection showing high tariffs, such as Mauritius, Tanzania, and Zimbabwe where the average tariff is greater than 22% and to a lesser degree, Angola and the DRC where the average tariff is 18% and 15%, respectively. The agreement will negatively affect producers in 17, 11, and 25 industries in Mauritius, Tanzania, and Zimbabwe, respectively. Angola and the DRC will see protection reduced in more than 20 industries, representing 52 and 35 per cent of total agricultural imports in those countries, respectively. The effect of reduced protection on production will likely be smaller in countries such as Madagascar, Malawi, Zambia, and SACU, where average import tariffs are below 11% which is low.

According to our results, for producers to benefit from industries with enhanced

protection under a FTA appears to be very limited and likewise, the negative effect of trade diversion from these industries would also be very limited. Producers who could benefit from enhanced protection are those in the exporting industries in the DRC, Madagascar, SACU, Tanzania, and Zimbabwe. These benefits could be significant for producers in four industries in Zimbabwe, nine in SACU, and five in Madagascar and Tanzania (Table 3). However, the overall effect on agriculture would be small, given that these industries represent 1.2 per cent or less of total exports from these countries.

Table 3. Welfare Gains and Losses for Importing and Exporting from a Free Trade Area

(in millions, US dollars)

	Importing industries			Exporting industries	Net welfare gain	Share of total gain	Share of total Agricultural trade
	Trade creation	Trade diversion	Net welfare gain from imports	Trade creation			
Low-income	7,173	-16,474	-9,302	96,784	87,482	68	29
Madagascar	120	-876	-756	5,191	4,436	3	5
Malawi	305	-973	-668	16,182	15,514	12	4
Mozambique	706	-5,134	-4,428	12,135	7,706	6	4
Tanzania	1,706	-4,701	-2,995	18,036	15,041	12	6
Zambia	584	-1,545	-961	2,078	1,117	1	3
Zimbabwe	3,751	-3,245	506	43,162	43,668	34	8
Other	12,355	-31,631	-19,276	60,693	41,417	32	71
Angola	3,037	-16,126	-13,088	4	-13,085	-10	6
DRC	797	-4,594	-3,798	304	-3,494	-3	2
Mauritius	3,072	-9,555	-6,483	22,691	16,208	13	7
SACU	5,449	-1,356	4,093	37,694	41,787	32	57
Total	19,528	-48,106	-28,578	157,477	128,899	100	100

(Note) Abbreviations are as follows; DRC=the Democratic Republic of Congo, SACU= Southern African Customs Union

(Source) Authors' calculation

With respect to the welfare impact of an FTA on agriculture, our analysis indicates that while FTA has a positive welfare impact for the regional economy as a whole, such benefit is small as shown in Table 3. We estimate the total value of trade creation to be 177 million US dollars, or 1.1 per cent of total agricultural trade of SADC countries, while our estimate of the net effect between trade creation and trade diversion is 129 million US dollars, or 0.75 per cent of total agricultural trade. These results indicate that FTA would not have a significant welfare effect on SADC's agriculture.

Main factors explaining this result are the relatively small shares of sensitive industries in total trade that lie below 30 per cent and the low level of tariffs on agricultural products in most countries where the average for sensitive industries are 14.5 per cent. Structural characteristics of SADC countries, like the concentration of agricultural exports among a few commodities and markets, as well as the fact that most SADC countries export a similar group of commodities seems to affect complementarity and constrain the expansion of regional trade and the opportunities of trade creation under a FTA.

At the country level, Table 3 shows that two-thirds of the gains from agricultural trade liberalization would go to low-income countries while almost one-third would go to the Southern African Customs Union (SACU). Countries that benefit the most are those with a comparative advantage for agriculture in the region, while still being inefficient producers of regionally traded commodities like Zimbabwe.

To look at welfare effects at the country level, we divide the effects on welfare gains into two main components: (i) gains for importers as a result of reduced industry protection; and (ii) gains for exporters to markets with reduced protection. We focus on low-income countries and first look at the gains for importers as the result of reduced protection in different markets, as shown in Table 4. Elimination of tariffs in a regional FTA results in negative welfare impacts for importers in all countries except for Zimbabwe, although the absolute values of these losses are small. This means that in industries facing reduced protection, trade diversion dominates trade creation in agriculture when low-income countries open their agricultural markets to the region. This is because the loss in tariff revenue that results from exports from the region is not compensated by the new trade created within the region. As discussed in Section III, trade diversion in the importing country is a result of the importer shifting from an efficient exporter to an inefficient one as a consequence of the FTA. In almost all industries and countries, the welfare effect of a FTA is negative, which is evidence of the importance of inefficient regional exporters. Thus, while we expect a reduction

of production in several agricultural industries in countries with relatively high tariffs as a result of a FTA, the producer's welfare losses would not be compensated by the consumer's welfare gains. This means that in low-income importing SADC countries, there is no direct gain from opening their agricultural markets to regional imports.

Table 4. Low-Income Countries: Welfare Gains of Importing after Eliminating Tariffs Between SADC Countries

(in thousands, US dollars)

SITC	Industry	Madagascar	Malawi	Mozambique	Tanzania	Zambia	Zimbabwe	Total
4312	Hydrogenated oils & fats	0	65	0	0	114	186	364
0470	Meal & flour of cereals, excluding wheat or meslin	0	-66	0	0	0	281	216
0440	Maize (corn), unmilled	0	0	0	0	-394	531	137
0814	Meat & fish meal, unfit for human consumption	0	0	8	0	11	93	112
0482	Malt, including malt flour	0	4	0	68	15	0	88
1123	Beer, including ale, stout, porter	0	0	-69	0	0	0	-69
0459	Cereals, unmilled, nes	0	-11	-3	0	-49	-14	-76
0541	Potatoes, fresh, not including sweet potatoes	0	0	0	0	-33	-58	-91
0545	Other fresh vegetables	0	0	-100	0	7	0	-94
0752	Spices, excluding pepper & pimento, ground or not	85	0	-99	0	-93	0	-106
0460	Meal & flour of wheat or meslin	-364	0	209	0	0	0	-155
0620	Sugar confectionery & other sugar preparations	0	-175	0	0	0	0	-175
0914	Margarine, imin. lard & prepared edible fats, nes	-152	-22	47	46	-140	0	-222
0484	Bakery products	0	0	-452	0	0	0	-452
4313	Acid oils, fatty acids & solid residues	0	-59	0	-412	0	0	-471
0542	Beans, peas, lentils & leguminous vegetables dried	0	-25	-73	0	-226	-239	-563
0488	Preparations of cereals, flour & starch for food	0	-238	0	-386	0	0	-623
0422	Rice, glazed or polished, not further prepared	0	0	-1,943	1,121	0	0	-822
0481	Cereal grains, flaked, pearled	0	-144	-250	0	-212	-321	-927
0611	Raw sugar, beet & cane	-327	0	-588	-107	0	0	-1,021
1121	Wine of fresh grapes, including grape must	0	0	-1,093	0	0	0	-1,093
0612	Refined sugar & other products of refining, no syrup	0	0	0	-3,332	0	0	-3,332
	Other	2	2	-23	4	40	47	73
	Total	-756	-668	-4,428	-2,995	-961	506	-9,302

(Note) SITC=Standard International Trade Classification

(Source) Authors' calculation based on UN Comtrade data

A different picture arises with welfare results of the FTA for countries exporting to markets with reduced protection. Producers in these exporting countries do not benefit from trade because the price they receive is the same as the one they have received before the FTA. However, if the exporter is inefficient with respect to the rest of the world, consumers in exporting countries benefit from the fact that these countries need to import from the rest of the world to compensate for the supply that is now being directed to importing countries in the region. Because the exporting country has a tariff on imports from the rest of the world, imports generate additional tariff revenue, which benefits consumers. This means that the same inefficiency of exporters that results in negative welfare effects for regional importers is the factor explaining welfare gains in exporting countries, with these benefits going to consumers. If the exporter is efficient by imposing no tariffs, then there is no welfare effect, neither positive or negative, for the exporting country as a result of the FTA. Table 5 summarizes welfare results for countries exporting to markets with reduced protection in the region.

Table 5. Low-Income Countries: Welfare Gains of Exporting after Eliminating Tariffs between SADC countries

(in thousands, US dollars)

SITC	Industry	Madagascar	Malawi	Mozambique	Tanzania	Zambia	Zimbabwe	Total
2631	Raw cotton, other than linters	0	61	409	7,380	223	5,206	13,280
1123	Beer, including ale, stout, porter	0	0	0	0	0	12,462	12,462
0440	Maize (corn), unmilled	0	992	7,618	773	410	0	9,794
0422	Rice, glazed or polished, not further prepared	0	9,427	0	0	0	0	9,427
0813	Oilseed cake & meal & other vegetable oil residues	1,953	382	354	1,697	0	4,680	9,066
0741	Tea	0	3,782	0	2,432	0	2,023	8,237
0113	Meat of swine, fresh, chilled, or frozen	0	0	3,741	0	0	98	3,839
1222	Cigarettes	0	0	0	906	0	2,842	3,748
6114	Leather of other bovine cattle & equine leather	0	0	0	0	0	3,638	3,638
0482	Malt, including malt flour	0	0	0	0	0	2,677	2,677
0460	Meal and flour of wheat or meslin	0	0	0	1,340	740	142	2,221
0612	Refined sugar & other products of refining, no syrup	1,572	163	0	0	0	307	2,043
0484	Bakery products	0	0	0	0	0	1,866	1,866
1223	Tobacco, manufactured for smoking, chewing, snuff	0	32	0	0	0	1,748	1,780
0914	Margarine, imitin, lard & prepared edible fats, nes	0	0	0	0	0	1,711	1,711
0611	Raw sugar, beet & cane	0	760	0	0	0	951	1,711
0542	Beans, peas, lentils & leguminous vegetable dried	291	0	0	984	0	0	1,275
0488	Preparations of cereals, flour & starch for food	0	0	0	0	0	822	822
0545	Other fresh vegetables	0	0	0	153	0	523	676
0470	Meal & flour of cereals, excluding wheat or meslin	0	0	0	674	0	0	674
2929	Materials of vegetable origin, nes	413	0	0	235	0	0	648
6113	Calf leather	0	0	0	0	523	32	555
0620	Sugar confectionery & other sugar preparations	0	0	0	0	0	507	507
	Other	963	582	13	1,463	182	928	4,129
	Total	5,191	16,182	12,135	18,036	2,078	43,162	96,784

(Note) SITC=Standard International Trade Classification

(Source) Authors' calculation based on UN Comtrade data

The positive welfare effects for low-income exporters in SADC shown in Table 5 are 10 times bigger than the negative effects of opening their markets to agricultural trade as importers. Trade gains result from exports of cotton, beer, maize, rice, oilseed cakes, and tea. Exports from industries such as meat of swine, cigarettes, leather of other bovine animal, malt, meal and flour of wheat, refined sugar and other products, bakery products, manufactured tobacco, and margarine also contribute to significant welfare gains. Most welfare gains go to regional exporters, many of which are protected from the rest of the world by tariffs. Zimbabwe receives almost half of the total welfare gains of low-income countries. The other half is shared by Malawi, Mozambique, and Tanzania.

Table 6 presents total net welfare gains for low-income countries. This table was obtained by adding welfare results for each industry and country from Tables 4 and 5. Zimbabwe, as a relatively inefficient exporter of agricultural products to the region, obtains the largest welfare gain among low-income countries through its exports of beer, cotton, oilseed cakes, leather, cigarettes, and malt, among others. Malawi and Tanzania follow Zimbabwe, with Malawi benefiting mainly from regional exports of rice and tea and Tanzania from exports of tea, oilseed cake, and meal and flour of wheat. Major benefits in other countries come from exports of maize and meat of swine (Mozambique), refined sugar (Madagascar), and meal and flour of wheat (Zambia).

Table 6. Low-Income Countries: Net Welfare Gains^a of a FTA after Eliminating Tariffs Between SADC Countries

(in thousands, US dollars)

SITC	Industry	Madagascar	Malawi	Mozambique	Tanzania	Zambia	Zimbabwe	Total
2631	Raw cotton, other than linters	0	61	409	7,380	246	5,206	13,303
1123	Beer, including ale, stout, porter	0	0	-69	0	0	12,462	12,394
0440	Maize (corn), unmilled	0	992	7,618	773	16	531	9,931
0813	Oilseed cake & meal & other vegetable oil residues	1,953	382	354	1,697	0	4,680	9,066
0422	Rice, glazed or polished, not further prepared	0	9,427	-1,943	1,121	0	0	8,605
0741	Tea	0	3,782	0	2,432	46	2,023	8,283
0113	Meat of swine, fresh, chilled, or frozen	0	0	3,741	0	0	98	3,839
1222	Cigarettes	0	0	0	906	0	2,842	3,748
6114	Leather of other bovine cattle & equine leather	0	0	0	0	0	3,638	3,638
0482	Malt, including malt flour	0	4	0	68	15	2,677	2,765
0460	Meal & flour of wheat or meslin	-364	0	209	1,340	740	142	2,066
1223	Tobacco, manufactured for smoking, chewing, snuff	0	32	28	0	0	1,748	1,808
0914	Margarine, imitn. lard & prepared edible fats, nes	-152	-22	47	46	-140	1,711	1,489
0484	Bakery products	0	0	-452	0	0	1,866	1,414
0470	Meal & flour of cereals, excluding wheat or meslin	0	-66	0	674	0	281	889
0481	Cereal grains, flaked, pearled	0	-144	-250	100	-212	-321	-827
1121	Wine of fresh grapes, including grape must	0	0	-1,093	0	0	0	-1,093
0612	Refined sugar & other products of refining, no syrup	1,572	163	0	-3,332	0	307	-1,289
0752	Spices, excluding pepper & pimento, ground or not	412	0	-99	107	-93	0	327
4313	Acid oils, fatty acids & solid residues	188	-59	0	-412	0	0	-283
2929	Materials of vegetable origin, nes	413	0	0	235	0	0	648
	Other	415	961	-795	1905	500	3777	6762
	Total	4,436	15,514	7,706	15,041	1,117	43,668	87,482

(Note) (i) ^a Calculated as the sum of welfare gains of each country as an importer and an exporter of each industry from Tables 4 and 5

(ii) SITC=Standard International Trade Classification

(Source) Authors' calculation based on UN Comtrade data.

Finally, Table 7 shows net welfare gains for other countries consisting of Angola, the Democratic Republic of Congo, Mauritius, and SACU. Similar to Zimbabwe, SACU benefits from protection from the rest of the world and from its comparative advantage as an agricultural producer in the region. Meal and flour of cereals, wine, beer, and maize explain most of the welfare gains by SACU countries. Mauritius, a country with comparative disadvantage in agriculture with respect to global markets, is able to benefit from a regional FTA with exports of manufactured products from industries like beer and meal and flour of wheat. Angola and the DRC, which have the highest comparative disadvantage for agriculture in the region, lose from the agreement because they import products from protected industries such as wine, beer, meal and flour of wheat, preparation of cereals, sugar, and bakery products. The inefficiency of the main regional exporters also explains the negative welfare impacts of a FTA on regional net importers like Angola and the DRC. This is because the elimination of tariffs on regional imports in these countries would increase imports from inefficient regional producers, with trade diversion dominating trade creation, which offer no direct gain for importing countries in SADC from opening their markets to regional imports.

Table 7. Other Countries: Net Welfare Gains after Eliminating Tariffs Between SADC Countries

(in thousands, US dollars)

SITC	Industries	Angola	DRC	Mauritius	SACU	Total	Share (%)
0470	Meal & flour of cereals, excluding wheat or meslin	-304	-193	0	11,341	10,845	26.2
1123	Beer, including ale, stout, porter	-1,397	0	7,260	4,955	10,818	26.1
0460	Meal and flour of wheat or meslin	-1,106	-660	9,261	-6	7,490	18.1
0611	Raw sugar, beet & cane	0	-406	4,881	101	4,576	11.0
0440	Maize (corn), unmilled	0	0	0	4,298	4,298	10.4
0483	Macaroni, spaghetti, noodles, vermicelli, etc.	0	0	739	1,374	2,113	5.1
4312	Hydrogenated oils & fats	0	27	0	2,081	2,107	5.1
0741	Tea	0	138	0	1,395	1,532	3.7
2631	Raw cotton, other than linters	0	0	0	1,082	1,082	2.6
0813	Oilseed cake & meal & other vegetable oil residues	0	0	0	885	885	2.1
0481	Cereal grains, flaked, pearled	0	0	-320	1,048	727	1.8
0730	Chocolate & other food preparations of cocoa	0	-224	-385	1,227	617	1.5
4313	Acid oils, fatty acids & solid residues	0	0	525	0	525	1.3
0459	Cereals, unmilled, nes	0	0	0	503	503	1.2
0814	Meat & fish meal, unfit for human consumption	0	0	0	502	502	1.2
0541	Potatoes, fresh, not including sweet potatoes	-228	0	0	702	474	1.1
1223	Tobacco, manufactured for smoking, chewing, snuff	450	0	0	5	454	1.1
0620	Sugar confectionery & other sugar preparations	0	-486	0	58	-428	-1.0
0545	Other fresh vegetables	0	-107	-353	-27	-487	-1.2
0422	Rice, glazed or polished, not further prepared	0	0	-974	318	-656	-1.6
0542	Beans, peas, lentils & leguminous vegetables dried	-686	-107	0	0	-793	-1.9
0488	Preparations of cereals, flour & starch for food	3	-979	0	0	-977	-2.4
0612	Refined sugar & other products of refining, no syrup	0	-346	-675	-137	-1,158	-2.8
0484	Bakery products	0	-445	-1,029	77	-1,397	-3.4
1121	Wine of fresh grapes, including grape must	-8,493	0	-1,615	5,187	-4,920	-11.9
	Other	-1,324	294	-1,106	4,820	2,684	6.5
	Total	-13,085	-3,494	16,208	41,787	41,417	100.0

(Note) Abbreviations are as follows; SITC=Standard International Trade Classification, DRC=the Democratic Republic of Congo, SACU=Southern African Customs Union (Source) Authors' calculation based on UN Comtrade data

From a political economic perspective and based only on our comparative static results, it could be inferred that FTA offer little incentive to agricultural producers in the region given that no gains are expected for producers in competitive industries, while producers in protected domestic industries are threatened by output reductions and welfare losses. The small size of regional import markets is also a negative factor for producers because it leaves very limited scope for enhanced protection. On the other hand, benefits to consumers in exporting countries appear to be small.

V. Policy Implications

In this study, we assess the potential welfare impacts of a Free Trade Area (FTA) on the agricultural sector of Southern African countries and determine opportunities and challenges faced by the region as a consequence of the agreement. We identify agricultural industries that would face challenges under regional liberalization and the impact of the agreement on different countries. To do this, we conduct an *ex-ante* counterfactual analysis of regional trade liberalization in Southern African Development Community (SADC), using a partial equilibrium approach based on bilateral trade data at the Standard International Trade Classification (SITC) 4-digit level. We found this approach to be best suited for dealing with highly disaggregated trade data.

Our analysis indicates that while a FTA will have a positive welfare impact for the region as a whole, such benefit is small. Countries that benefit the most are those with a comparative advantage for agriculture in the region, while still being inefficient producers of regionally traded commodities. The inefficiency of the main regional exporters also explains the negative welfare impacts of the agreement on net agricultural importers.

At the country level, inefficient agricultural producers with a regional comparative advantage for agriculture will benefit the most from the agreement. Exports from these countries generate trade diversion in importing markets that, in most cases, cannot be compensated for by trade creation from eliminating tariffs. The fact that estimated welfare gains in exporting countries are positive, while they are negative in importing countries shows the importance of regional exports from protected industries in explaining these results. Most benefits to exporting countries come from exports of

beer, cotton, oilseed cakes, leather, cigarettes, malt, rice, tea, oilseed cake, meal and flour of wheat, and refined sugar.

Looking at the results, agents, consumers, and producers in importing countries lose as a result of trade diversion from regional imports. Producers in exporting countries are not affected, while consumers in exporting countries only benefit when production of exporting industries is protected by tariffs on products from the rest of the world. Consumers in these countries are the ones receiving these benefits, and they result from increased imports from the rest of the world to compensate for the current production being exported to the region, instead of being consumed domestically.

Industries facing output contraction and increased regional imports as a result of the FTA vary from country to country but are mostly concentrated in cereals, cereal preparations, live animals and meat, and industries incorporating higher value added, like beverage and tobacco (wine, beer, cigarettes and manufactured tobacco), spices, fresh and frozen vegetables, raw and refined sugar, animal and vegetable oils, hydrogenated oils and fats, and cotton yarn and thread. In Southern African Customs Union (SACU), the industries that would be the most affected by a regional trade agreement are: non-alcoholic beverages and fermented beverages, dairy (cheese and curd, milk, and cream fresh), tobacco industries (cigarettes, tobacco manufactured), bakery products, natural honey, coffee, tea, cocoa, and spices.

Given regional policy priorities of accelerating growth, increasing income, reducing poverty, and promoting food security in low-income countries, our results suggest that trade policy does not appear to be the most effective means to achieve these goals. This is mainly because of the concentration of agricultural exports among a small number of agricultural industries, the small size of the regional market, and the significant amount of trade diversion that results from the agreement. Export concentration greatly reduces the possibilities of increasing welfare from trade liberalization, reducing trade complementarity. Also, the small size of regional import markets, leaves very limited scope to benefit regional producers through enhanced protection as a result of the FTA. Similarly, no major gains are expected for consumers who could see their welfare negatively affected by increased imports from inefficient regional producers.

These results highlight the importance of reducing tariffs that regional exporters impose to the rest of the world in order to reduce trade diversion and increase benefits for consumers in countries that face output contraction as a consequence of the agreement. Results also suggest that the region should be looking at regional policies beyond trade arrangements, such as those targeting investment, agricultural productivity

and diversification. With growing productivity and enhanced diversification in agricultural production, regional trade liberalization could play a much more significant role in achieving main policy goals.

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Appendices

Appendix 1: Indexes of Revealed Comparative Advantage and Disadvantage

Revealed Comparative Advantage (RCA) index for commodity i in country k is defined as the ratio of the share of this commodity in total exports from k (x_i^k) to the share of exports of i in total exports of a reference group of countries (x_i^R):

$$RCA_{ik} = x_i^k / x_i^R$$

Similarly, Revealed Comparative Disadvantage (RCD) index for commodity i in country k is the ratio of the share of k 's imports of this commodity in total imports of k (m_i^k) to the share of imports of i in total imports of a reference group of countries (m_i^R):

$$RCD_{ik} = m_i^k / m_i^R$$

Appendix 2: Trade Complementarity

Formally, the set of industries showing Trade Complementarity in Southern African Development Community (SADC) is defined as follows,

$$TCI^{AB} = \{i / RCA_i^B > 1 \text{ and } RCA_i^A > 1\} \text{ with } A \neq B$$

where i represents a particular industry, and A and B are importing and exporting SADC countries, respectively. Industry i shows complementarity if one or more countries B in the region have a RCA in that industry and at least one country A shows a RCD.

Appendix 3: Sensitive Industries

The group of Sensitive Industries (SI) is a subset of the set of industries showing Trade Complementarity (TCI). Industries are not sensitive if the exporting country faces a

zero tariff before the RTA comes into force,

$$SI^{AB} = \{i \in TCI / X_i^B > 0, \text{ and } M_i^A > 0, \text{ and } t_i^{AB} > 0\} \text{ with } A \neq B$$

In words, these are industries i that belong to TCI for which there is at least one exporter B and at least one importer A in the region, and for which B 's exports to A faced a positive tariff before the RTA.

We use *ad valorem* equivalent measures of tariff duties and tariff rate quotas at the six-digit level of the harmonized system (5,111 products) from Bouët *et al.* (2004) to determine industries in SADC countries protected by tariffs.

Appendix 4: Protection Regimes

The sensitive products turn into trade perils for A when there is a displacement of domestic production in A led by imports from country B . The perils set of industries for A resulting from B 's exports is,

$$PE^{AB} = \{i \in SI \text{ and } Y_i^{A-RTA} < Y_i^A\}$$

As a consequence of the RTA, domestic production (Y) of i in country A is displaced by imports: the industry in country A (importer) is threatened by the RTA.

The sensitive products turn into trade opportunities for country B when as a result of the RTA, there is an expansion of its production driven by exports to country A . The set of industries offering opportunities to exporter B is then defined as follows,

$$OP^{BA} = \{i \in SI \text{ and } X_i^{B-FTA} > X_i^B\}$$

Protection regimes are defined following Vaillant and Ons (2003) based in these two definitions.

For a particular product, the enhanced protection case implies an opportunity but not a peril:

$$EN^{AB} = \{i \in OP^{BA} \text{ and } i \in PE^{AB}\}$$

The reduced protection case implies a peril but not an opportunity:

$$PP^{AB} = \{i \in OP^{BA} \text{ and } i \in PE^{AB}\}$$

The intermediate case implies an opportunity and a peril:

$$IN^{AB} = \{i \in OP^{BA} \text{ and } i \in PE^{AB}\}$$

Appendix 5: Trade Regimes

Given the previous definitions, industries expected to face reduced protection in importing SADC markets *A* are those for which import demand at exporter's prices is smaller than exporter's supply at the same prices

$$1 > \frac{P_i^B m_i^A(P_i^B)}{P_i^B X_i^B(P_i^B)}$$

Industries expected to face increased protection as a result of regional trade liberalization are those for which import demand at importer's prices is greater than the value of exporter's supply at importer's prices

$$1 < \frac{P_i^A m_i^A(P_i^A)}{P_i^A X_i^B(P_i^A)}$$

Finally, intermediate industries are those for which import demand at exporter's prices is smaller than exporter's supply at the same prices and at the same, import demand at

importer's prices is greater than the value of exporter's supply at importer's prices

$$1 > \frac{P_i^B m_i^A(P_i^B)}{P_i^B X_i^B(P_i^B)} \text{ and } 1 < \frac{P_i^A m_i^A(P_i^A)}{P_i^A X_i^B(P_i^A)}$$

Because of the limited information on supply and supply elasticities of industries at this level of disaggregation, we were able to classify sensitive industries into two groups: those industries facing reduced protection and all other industries (enhanced protection and intermediate). We did this by estimating the ratio between import demand of a particular industry i in SADC importing markets A and the aggregate value of supply in the group of SADC countries exporting products from that industry B , both at the exporter's prices. As in Vaillant and Ons (2003), the value of import demand at the exporter's prices is calculated using observed values as follows,

$$P_i^B m_i^A(P_i^B) = \frac{P_i^A m_i^A(P_i^A)}{\theta^{AB}} \left(1 + \left(\frac{1}{\theta^{AB}} - 1 \right) \varepsilon_i^A \right)$$

where $\theta^{AB} = P_i^A / P_i^B$ is a measure of relative efficiency between the importer A and the exporter B and ε_i^A is the import elasticity in A derived from a simple calculation using import demand elasticity:

$$P_i^B m_i^A(P_i^B) = P_i^A m_i^A(P_i^A) \times \left[\frac{(P_i^A - P_i^B)}{P_i^A} \right] \times \varepsilon_i^A$$

For those industries for which the value of import demand at exporter's prices was smaller than exports from the region, there was no need to determine supply in exporting countries. For those cases in which the value of imports was bigger than exports, we used supply data from different sources, depending on the industry. For basic agricultural products, information was collected from the FAOSTAT (Food and Agriculture Organization [FAO] 2008) database. For processed manufactured products, we used production data from similar industries from the Global Trade Analysis Project

(GTAP) database (Dimaranan 2006). Because of the lack of information on production for some industries, we relied on information from the production of similar industries as a proxy for the missing values.

To check how this constraint might have affected the allocation of sensitive industries among industries with reduced protection and among other industries, we estimated the ratio of import demand at export prices and supply at current prices, using exports as a proxy for supply. Allocating industries using exports as a proxy for supply results in 52 of the 85 sensitive industries showing an import/export ratio less than 1 (61 percent of all sensitive industries). Of the 33 industries with import/export ratio greater than one, 16 industries have ratios greater than 2 and tariffs greater than 10 per cent. For only 13 of these industries, we used data from similar or more aggregated industries to estimate supply. We conclude that inaccuracies in supply estimates due to the lack of data should not have a significant effect on our results.

Appendix 6: Import Elasticities

Table A1 show estimates of import elasticities by Broda, Greenfield, and Weinstein (2006). We present elasticities available for three Southern African countries and averages for High-Income (HI), Developing (DV), and Poor (PR) countries. One pattern that can be observed in the table is the lower elasticity of imports in more developed countries. There is also great variability within the different groups of countries. Elasticities for Madagascar and Malawi, which are among the poorest countries in the sample, are higher than those in the group of PR countries, whereas elasticities in Mauritius are larger than those in HI countries but lower than the average of DV countries. There is also variability among elasticities of different groups of industries within the groups of countries. This variability demonstrates the importance of having country-specific estimates. For instance, the import elasticity of beverages, tobacco, and cereals is relatively high in the three groups of countries (HI, DV, and PR) and in Mauritius, but it is low in Madagascar and Malawi. On the other hand, elasticities for food preparations are higher in Madagascar and Malawi than in the groups of DV and PR countries. In the case of import elasticities for fruits and vegetables, Madagascar and Malawi show relatively high elasticities, as is the case in the groups of DV and PR countries.

Because we do not have elasticity estimates for all SADC countries and because of

the variations we observed among the elasticities in average groups of countries and elasticity values in Madagascar, Malawi, and Mauritius, we assume that elasticities for other Southern African countries are more likely to be closer in value to those estimated for countries in the region. We try to capture what appear to be robust differences between elasticity values of countries with different levels of income by using values for Malawi and Mozambique for low-income countries in the region, while we used Mauritius's elasticities for Southern African middle-income countries.

Table A1. Import Elasticities

HS	Description	High Income	Developing	Poor	Madagascar	Malawi	Mauritius
010	Live animals	11.43	31.61	10.78	3.39		33.55
020	Meat	10.79	12.4	19.97		6.02	2.65
030	Fish	5.39	17	22.61			3.52
040	Dairy & eggs	6.31	10.21	12.35	17.74	103.03	7.76
041	Other edible animal products	2.44	47.12	3.74			0
050	Products of animal origin	3.84	10	13.51			6.62
051	Other inedible animal products	5.67	11.416	12.73			0
060	Live trees & plants	3.49	8.83	2.85			6.7
070	Vegetables fresh or frozen	3.74	10.97	20.18			1.78
071	Vegetables Preserved	4.34	12.16	32.89	33.55		5.8
080	Fruits fresh	4.54	19.27	21.99	103.03	103.03	5.79
081	Fruits preserved	3.89	10.93	9.02			3.07
090	Coffee, tea & spices	6.21	10.21	7.29	76.89		5.11
091	Other spices	4.8	20.61	38.47			3.14
100	Cereals	4.3	10.96	17.33	4.45	2.19	8.17
110	Milling industry products	4.29	5.96	7.68	3.24	3.96	15.23
120	Oilseeds	6.39	9.8	19.27	6.7	2.35	2.58
121	Miscellaneous grains & plants	5.24	9.45	20.96	0		1.61
130	Natural gums, resins, etc.	6.57	9.97	23.71	3.71		2.79
140	Vegetable plant materials	6.09	19.02	44.71			0
150	Animal fats & vegetable oils	4.2	8.56	4.54	6.95	6.61	4.03

Table A1. Import Elasticities

(Continued)

HS	Description	High Income	Developing	Poor	Madagascar	Malawi	Mauritius
151	Other vegetable oils	4	15.65	16.9	3.16	125.24	6.72
152	Waxes & oil residues	5.93	9.7	22.74			1.75
160	Edible preparations of meat and fish	5.93	7.34	14.43	2.65	2.79	8.58
170	Sugar & sugar confectionary	5.4	9.11	7	2.93	1.48	2.41
180	Cocoa & cocoa preparations	7.37	12.5	12.67	73.22		5.75
190	Preparations of cereals, flour, starch or milk	4.64	13.5	8.92	6.28	3.7	4.04
200	Preparations of vegetables, fruits & nuts	6.01	9.74	11.03	5.04	119.28	6.45
210	Miscellaneous edible preparations	4.89	11.16	11.5	93.46	9.44	5.04
220	Beverages	6.29	6.9	3.19	3.08	1.67	1.74
230	Animal feed	4.97	34.61	7.66	25.03	4.09	5.19
240	Tobacco manufacture of tobacco	11.27	26.47	28.2	2	4.45	33.55
	Main product groups						
010-051	Livestock & meat	6.56	14.26	13.67	10.56	54.53	7.73
070-081	Fruits & vegetables	4.13	13.33	21.02	68.29	103.03	4.11
100-110	Cereals & milling products	4.29	8.46	12.5	3.84	3.07	11.7
060, 090-091, 120-140	Other crops	5.54	12.55	22.47	21.83	2.35	3.13
150-152	Oils & fats	4.71	11.3	14.73	5.06	65.93	4.17
160-210	Food preparations	5.71	10.56	10.92	30.6	27.33	5.38
220, 240	Beverages & tobacco	8.78	16.68	15.7	2.54	3.06	17.64
	Average	5.65	13.22	15.96	22.69	31.21	6.28

(Notes) (i) HS=Harmonized System

(ii) High Income includes Australia, Austria, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States.

(iii) Developing includes Algeria, Argentina, Brazil, Chile, Colombia, Ecuador, Egypt, El Salvador, Gabon, Jordan, Mexico, Morocco, Peru, Thailand, Tunisia, Turkey, Uruguay and Venezuela.

(iv) Poor countries includes Bolivia, Central African Rep, Guatemala, Honduras, Indonesia, Nicaragua, Sri Lanka, and Togo.

(Source) Based on Broda, Greenfield, and Weinstein (2006). Elasticities available at <http://faculty.chicagobooth.edu/christian.broda/website/research/unrestricted/TradeElasticities/TradeElasticities.html>

In Table A2, we calculate welfare results for Mozambique using three different import elasticities to check the possible effect of the choice of elasticities in our results. The base elasticities are those used in the study. The other two results are obtained using the elasticities of the Developing and the Poor groups, respectively, presented in Table A1. The use of different elasticities does not change the results. In every case, Mozambique experienced a welfare loss. The results appear to be consistent for the different industries, as in most cases (especially for the most important industries) results with different elasticities show the same sign.

Table A2. Welfare Gains by Mozambique after the Elimination of Tariffs between SADC Countries Using Different Import Elasticities

SITC	Description	Base elasticity	Elasticity poor	Elasticity developed
0013	Swine	1	5	16
0422	Rice, glazed polished, not further prepared	-1943	-1657	-1787
0459	Cereals, unmilled, nes	-3	72	38
0460	Meal and flour of wheat or of meslin	209	569	417
0481	Cereal grains, flaked, pearled	-250	-245	-247
0482	Malt including malt flour	0	1	0
0484	Bakery products	-452	-443	-432
0542	Beans, peas, lentils leguminous vegetables, dried	-73	488	207
0544	Tomatoes, fresh	-38	-15	-26
0545	Other fresh vegetables	-100	60	-20
0548	Vegetable products, chiefly for human food nes	-8	2	-3
0611	Raw sugar, beet and cane	-588	-531	-505
0752	Spices excluding Pepper & pimento ground or not	-99	-105	-95
0814	Meat & fish meal unfit for human consumption	8	13	6
0914	Margarine imitn lard & prepared edible fats nes	47	-67	4
1121	Wine of fresh grapes including grape must	-1093	-1093	-1093
1123	Beer including ale, stout, porter	-69	12	377
1223	Tobacco manufactured for smoking chewing snuff	28	385	360
2440	Cork raw & waste	0	1	0
2711	Natural fertilizers of animal/vegetable Origin	0	1	1
2925	Seeds fruit & spores for planting	-6	-6	-6
4113	Animal oils, fats and greases excluding lards	0	-3	2
6511	Thrown silk & silk yarn and thread	0	1	0
	Total	-4429	-2555	-2786

(Note) SITC=Standard International Trade Classification

(Source) Author's calculations based on UN Comtrade data