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The Impact of the EU South Africa Free Trade Agreement on Botswana

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Bilateral Free Trade Agreements and Customs Unions: The Impact of the EU South Africa Free Trade Agreement on Botswana

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1. Introduction

The Southern Africa Customs Union (SACU) is the world's longest standing customs union (established in 1910), and for most of its existence the BLNS countries (Botswana, Lesotho, Namibia and Swaziland) were colonies. A legacy of those political arrangements seems to have been that SACU's trade relations were determined, almost unilaterally, by South Africa; a situation which is now a subject of negotiations. Since the late 1980s SACU's trade barriers have been severely reduced, and hence the tariff revenues received by the member states under SACU's tariff revenue sharing formula have also declined. The BLNS governments were historically dependent on tariff revenue, and although the importance of tariff revenues has declined for Botswana and Swaziland, the governments of Lesotho and Namibia have more limited alternative revenue raising capacities. Recently the government of South Africa has entered into a (unilateral) free trade agreement with the EU (EU RSA FTA), and is further considering the possibility of a (unilateral) free trade agreement with MERCUSOR. The BLNS countries have expressed concern about the implications of the EU RSA FTA for their economies, and to date have not endorsed the arrangements.

This paper reports the results from a comparative static variant of the GTAP model that quantifies the impact on Botswana of the EU RSA FTA. The model is calibrated using data from GTAP 5. The Southern Africa disaggregation in GTAP 5 separately identifies Botswana and the rest of SACU, and hence for the first time renders possible analyses of intra-SACU relationships, albeit partial analyses. A novel feature of the analyses is the modeling of the revenue sharing arrangements of SACU. The tariff revenues for Botswana and the rest of SACU are pooled and then divided between the two regions on the basis of a revenue sharing formula. The paper will report model simulations that assess both the impact of the EU-SA FTA on Botswana, South Africa and other regions.

The rest of this paper is organized as follows. The next section briefly reviews the history and current state of the Southern African Customs Union (SACU). Section 3 surveys the basic arrangements proposed by the EU RSA FTA. The data and model used for the analyses are described in the two sub-sections of section 4, with descriptions of the policy experiments and comments on the results appearing in section 5. Concluding comments appear in section 6[1].

2. Southern African Customs Union

The Southern African Customs Union (SACU) was formed in 1910 between the Republic of South Africa (RSA) and Botswana, Lesotho and Swaziland (BLS)[2]. The origins of the SACU therefore coincide with the establishment of the RSA and during a period in history when the BLS states were colonies of the UK. Moreover, the SACU was a union between states that were very unequal (Table 1 provides some structural information about the SACU members for more recent years) and different in terms of size and economic wealth and geographic location. From the late 19th century the mineral wealth of the RSA was well known and the object of large investments and rapid expansion that contributed to rapidly rising incomes for the Caucasian minority. There was a buoyant demand for labour throughout RSA, which stimulated the development of migrant labour schemes to support the mines and cities of RSA.[3] The migrant labour schemes operated throughout southern Africa, but were particularly important for the BLS economies and encouraged the development of a partially integrated labour market in the SACU.[4]

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1 Two appendices are also available from the authors. Appendix 1 provides details of the commodity and region aggregations used in the model, while Appendix 2 specifies how the closure rules were implemented for the model

2 Throughout this paper countries will be referred to by their current names rather than the names in use at those points in time being discussed.

3 In addition to migrant labour flows within southern Africa there was an appreciable inflow of labour from India that gave rise to the Asian population found in the RSA today.

4 There never appears to have been free flows of labour within the SACU. While the apartheid regime of post-1945 codified the ideology of separate states and thereby precluded the free movement of labour, it would appear that previous eras were *de facto* no different.

The lack of comparable development in the BLS countries resulted in remittances from migrant labour to the BLS countries becoming an important component of national income (see for instance Lucas and Stark, 1985a and b, and Stark and Lucas, 1988). The economic dominance of the RSA was compounded by the geographic dependence of the BLS countries. Lesotho is completely surrounded by South Africa, while Botswana's key trade routes all pass through South Africa[5]. Swaziland does possess greater alternatives because of its proximity to Maputo.

Table 1 Structural Characteristics of the SACU Member States

	RSA	Botswana	Lesotho	Namibia	Swaziland
Area (sq km)	1,221,040	566,730	30,350	823,290	17,200
1965					
GNP per capita ($ curr)	520	80	60	..	180
Population ('000)	19,832	549	963	713	370
Shares of GDP					
Agriculture	10.14	36.04	65.24	..	34.66
Industry	41.39	20.45	4.81	..	32.99
Manufacturing	23.92	12.34	0.80	..	8.56
Services	48.48	50.00	29.95	..	32.36
1999					
GNP per capita ($ curr)	3,160	3,020	770	2,000	1,170
Population ('000)	41,457	1,450	1,980	1,545	900
Shares of GDP					
Agriculture	4.68	5.09	10.09	..	9.03
Industry	31.44	46.44	55.51	..	85.62
Manufacturing	24.06	3.97	18.10	..	36.30
Services	63.88	48.48	34.40	..	5.35

Source: World Development Indicators

Over and above these factors lies the matter of political status. As colonies with few resources and apparently little economic worth to the UK, the BLS countries had little or no say over the direction of the SACU. A situation that also applied to Namibia, who became a *de facto* member of the SACU when the RSA took political control under a League of Nations/UN mandate after the first world war. Consequently it is not surprising that the arrangements of the SACU were dominated by the RSA until the BLS countries gained independence.

The SACU provides for a common external tariff and complete free trade in commodities between the member states, whilst granting transit rights across the RSA for the other members. Tariff revenues are collected by the RSA and then distributed among the members according to a

5 Botswana has access by rail to the sea through Zimbabwe (on 'Rhodes's' railway) and since 1999 by road across the Kalahari to Walvis Bay in Namibia.

revenue sharing formula. The degree of integration is assisted by the use of a common currency, except in Botswana where the exchange rate is managed such that, to a substantial degree, the Pula tracks the Rand.

While the SACU remains an agreement between unequal states, there has been a substantial change since the late 1960s. The BLS countries gained independent political status in the 1960s, and this was undoubtedly a major factor behind the renegotiation of the SACU agreement in 1969, which produced a revised agreement that came into being on 1st March 1970. Similarly, when Namibia gained independence from the RSA, in 1990, it became an independent political force in the SACU. The ending of the apartheid regime in the RSA has heralded the start of a further renegotiation of the SACU agreement. While there is evidence that the revised institutional arrangements have been agreed and that a new revenue sharing formula has been provisionally agreed, other matters (see below) are blocking a final agreement (MFDP, 2001).

Table 1 indicates the degree to which the relative economic performances of the SACU members have changed over time. The RSA remains the dominant economic force, but this is increasingly a consequence of the size of its population and the relative strength of its industrial base rather than crude income per capita. Historially the RSA enjoyed carte blanche over the setting of tariff and excise duty rates for SACU, and used implicit threats, not least over transit rights, to reinforce its control. Consequently the development of trade policies within the SACU has been determined by the 'development' agenda of the RSA.

The post second world war saw the RSA adopt increasingly inward looking development strategies. The policies emphasised import substituting industrialization (ISI), the development of 'strategic' industries and downstream processing of mineral products. But unlike many other countries pursuing ISI style policies agriculture was heavily supported.[6] What is not clear is the extent to which the core economic policy vision was one of some form of ISI strategy as opposed to being driven by the political ideology of apartheid and subsequent responses to international opprobrium. Nevertheless it is clear that by the late 1980s the RSA, and hence SACU, had acquired a bewildering array of trade policy instruments; quantitative restrictions, multiple tariff lines, a multiplicity of forms of protection, all overridden by exemptions (see Holden, 1992, for a review). For agriculture these instruments were compounded by price controls, marketing boards, ordinances, statutes and regulations (see Vink and Kassier, 1992). The degree to which these trade policies were responsible for the two decades of stagnation and decline, and the three and half-year recession that the RSA experienced before the change of government in April 1994 will

6 The political influence of farmers (Boers) probably increased when the National Party came to power, but the protection of agriculture long predates that event, e.g., the 1913 Land Act (see Binswanger and Deininger, 1993, and Deininger and Binswanger, 1995).

probably never be fully known. It is difficult to believe that the trade policies made no contribution, but equally it is hard to argue a case that ignores the other policies of the apartheid era, especially those policies that contributed to the chronic shortage of skilled labour and how international ostracisation contributed to the confusing plethora of duty rates and instruments.

What cannot be disputed is that the BLNS countries were compelled, through membership of the SACU, to follow the trade policies of the RSA. Even before the change of government the protectionist policies had become unsustainable and the RSA embarked on a regime of progressive reform. Agricultural support policies were substantially dismantled, which given the dependence of the BLNS countries on food imports should have produced positive welfare effects.[7] Similarly other tariffs were reduced, but the SACU tariff structure remains complex (see Lewis, 2001).

3. The EU South Africa Free Trade Agreement

The trade relationships between southern and eastern African states are difficult to disentangle. A plethora of trade and economic cooperation agreements exist both between the states of the region and between states within the region and outside. The major multi lateral agreements are the SACU, the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), and the Cross-Border Initiative (CBI). How each is impacting upon the performance of any individual state is difficult to clearly articulate since the memberships of each agreement are not exclusive (see Lewis, 2001). Currently the most comprehensive organisation, in terms of membership, is COMESA but it appears to be somewhat fragile. In the longer term it may be that SADC emerges as the primary organisation among southern African states; the vision of the SADC agreement is a free-trade area with free movements of commodities, capital, labour and services. However progress towards those objectives seems to be slow with the majority of agreements being partial, e.g., trade concessions to Malawi, Mozambique, Tanzania and Zambia by the SACU under the SADC Trade Protocol.

At the moment therefore the SACU remains the only trade agreement in southern Africa that is fully functioning. In this context the EU South Africa Free Trade Agreement (EU RSA FTA) and the ongoing talks between RSA and MERCUSOR and Brazil[8] represent an interesting departure. In particular they raise the question of how long a customs union can continue to operate when one member engages in uni-lateral negotiations with third parties that will ultimately lead to changes in common tariff rates.

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7 There was also a move away from self-sufficiency to food-security within Botswana during the 1990s.

8 It appears that the BLNS countries were first informed of these talks and a possible RSA MERCUSOR FTA in September 2000.

The EU RSA FTA originated in 1995 in response to a proposal by the EU. It would seem that the RSA was initially primarily interested in acquiring full Lomé Convention membership, but when the RSA only achieved partial membership the prospect of gaining greater access to the EU market through a FTA seems to have been regarded as an attractive alternative. In light of the Cotonou agreement and the EU's subsequent commitment to seek regional trade agreements (RTA) with ACP (African, Caribbean and Pacific) countries and other developing countries, whilst phasing out the preferential commodity agreements, the EU's proposals to the RSA would seem to fit a pattern that has subsequently emerged.

Agreement on the EU RSA FTA finally came in 1999. The agreement covers the vast majority of commodities, although there are a number of contentious issues remaining particularly with respect to the EU retaining protection for certain 'sensitive' agricultural products. To all intents and purposes the EU agreed to phase out all trade barriers with the RSA over 10 years while the RSA reciprocated over 12 years. The programme of mutual liberalisation includes a banding of products according to the stage in the liberalisation process at which the trade barriers would be reduced; it has been suggested that the slow implementation of agricultural trade liberalisation, especially for products in which the RSA is expected to have export potential (vegetables, fruit, meat and some wines) mean that the RSA's gains might be limited. This argument is further supported by the more rapid liberalisation of trade in manufactured than agricultural commodities.

Despite the EU and the RSA reaching agreement on the FTA in 1999, it remains unratified by the BLNS countries. Beside the obvious political issue of how one member of a customs union can enter into a bilateral agreement with a third party that is binding on other members of the customs union, there are a number of important economic questions. Of particular concern to the BLNS countries is the question of how the EU RSA FTA will impact upon their economies. While several CGE studies using GTAP 4 data (Lewis *et al*., 1999; Penzhorn, 2000) have suggested that SACU as a whole would benefit, these studies have been constrained by the database to not address the issue of the distribution of gains and losses within SACU. One study (IDS and BIDPA, 1998) suggested that the BLNS countries would experience relatively minor effects in terms of trade flows, on the basis of a commodity flow model.[9] However it was noted that the revenue effects, principally for Lesotho and Namibia, may be appreciable, although Botswana would be relatively unaffected due to its low dependence on trade taxes.

9 The IDS and BIDPA (1998) study included results from a CGE model for South Africa. It is difficult to see how this model contributed to the analyses of the implications for the BLNS countries.

In many respects the issue of the potential benefits of the EU RSA FTA depends upon the dynamic effects of the agreement.[10] If the agreement fosters faster growth in the RSA then it could be argued that the BLNS countries would benefit by the trade creation effect of RSA growth. However, this presumes that the BLNS countries would capture an appreciable share of import expansion by the RSA, an outcome that may be doubtful given the currently low level of penetration of the RSA market by BLNS exports.

Ratification of the EU RSA FTA by the BLNS countries must almost certainly await a final agreement of a EU support and compensation package for the BLNS countries. A key problem with such a package will be quantification, which is the process to which this study sets out to contribute.

4. Data and Model

The data and model used for the analyses reported here derive from the Global Trade Analysis Project (GTAP). The heart of the GTAP is its database that contains a fully articulate record of trade transactions and duties between different regions for a range of commodities (see Gehlhar *et al*., 1997). The number of regions and commodities has increased steadily with each release of the database, such that GTAP 5, the fifth release, will have data for 66 regions and 57 commodities. Associated with the database is the GTAP model (see Hertel and Tsigas, 1997). This is a computable general equilibrium (CGE) model that incorporates one particular specification of behavioural relationships that are consistent with the data. As with all CGE models, this represents one of many possible specifications.[11] The GTAP model is typically solved in rates of change, although again this is a matter of preference rather than substance.[12]

Data

The trade transactions recorded in the GTAP database not only distinguish between commodities on the basis of their regions of origin and destination, but also on the basis of the agents (intermediate demand, and final demand by household, government and investment) that absorb the commodities in the importing economy. This provides a method for allowing for the varying

10 In view of the fact that the comparative static estimates of the gains from trade liberalisation are almost invariably small, this type of statement has become increasingly a refuge for those convinced of the benefits of liberalisation.

11 Lewis *et al*., (1999) reports results from an alternative specification of CGE model using data from GTAP 4.

12 Rutherford (2000) has produced a specification of the GTAP model that is solved in terms of levels using the GAMS software. The GTAP model uses the GEMPACK software.

import intensities by different agents within a region.[13] Trade tax data are recorded for each and every trade transaction.

The remaining data in the GTAP database are region specific and serve primarily to support the trade data and the trade focus of its intended applications. Domestic absorption is accounted for by intermediate demand, and final demand by the household, government and investment. Domestic agents not only pay import duties, but commodity purchases are also subject to sales taxes. Domestic supply is provided by activities that each produces a single characteristic commodity, which is either sold on the domestic market or exported. In addition to purchasing intermediate inputs, the activities also purchase combinations of five primary factors – land, capital, natural resources and skilled and unskilled labour – and pay indirect/production taxes.

The 'regional' household receives all income from factor sales. This income is then distributed to the single household,[14] savings and government. There are five different tax instruments – import and export duties, sales/commodity taxes and income taxes.[15] The capital account draws together savings by the household, government (internal balance) and the rest of the world (external balance), and disburses those funds to investment by commodity (domestic and imported).

The model used for this study uses data from pre-release 3 of the GTAP 5 database. Although the databases allows for 57 commodities and 66 regions the analyses reported here uses a 10 commodity (2 agriculture, 1 extraction, 4 manufacturing, utilities, construction and services) by 10-region (4 Africa, 2 Europe, 3 Americas, and Rest of World) aggregation. The commodity aggregation is a provisional aggregation that has been used because of known difficulties with pre-release 3 of GTAP 5 (see below), and will be revised subsequently. The regional aggregation reflects both the known patterns of trade and the various trade agreements that have been entered into or are anticipated for the RSA and the SACU; again this will be subject to revision pending the final release of GTAP 5. A distinctive feature of the regional aggregation is the identification of Botswana as a separate entity from the rest of SACU; it is this that allows the analyses to assess the intra-SACU implications of reform that Lewis *et al.*, (1999) and Penzhorn (2000) could not address.

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13 All known CGE models use variants of the Armington assumption (Armington, 1969) and therefore the results of policy experiments are sensitive to both substitution elasticities and trade shares (see de Melo and Robinson, 1989).

14 The single household specification means that GTAP models cannot provide directly meaningful information on the within country income distribution implications of policy changes.

15 The recorded income tax rates are minimal, even for regions where income taxes represent a substantial component of government income.

Table 2 Model Commodities and Regions

Model Commodities	Model Region
Crop Agriculture	Botswana
Animal Agriculture	Rest of South African Customs Union
Fuels & Minerals	Rest of SADC
Food Products	Rest of Africa
Textiles	EU
Heavy Manufacturing	NAFTA
Light Manufacturing	MERCUSOR
Utilities	Rest of Europe
Construction	Rest of America
Services	Rest of the World

There are known problems with the trade data for Southern Africa. These problems are particularly severe for Botswana; not only are the aggregate patterns of trade by commodity and region with Botswana widely divergent from the Batswana trade statistics, so also are the patterns of commodity trade with individual regions. As a consequence Botswana's highly polarised patterns of trade by commodity and region were not reflected in pre-release 3 of GTAP 5 (see McDonald, 2000, for comments on pre-release 2).

Model

The model used for these analyses is an adaptation of the standard/GTAP comparative static CGE model. As with all such trade-focused CGE models the defining feature of the model is the modelling of trade transactions by way of the Armington 'assumption' of imperfect substitution between domestic and traded goods. Since descriptions of that model are widely available, e.g., Hertel and Tsigas (1997), the comments here will refer to the adjustments made rather than the basic model.

The first major change concerns the treatment of tariff revenue by the members of SACU. While SACU members impose common tariff rates they do not receive the revenue directly, rather the revenue is pooled and distributed according to the formula mentioned above. In the GTAP model all tariff revenue earned by a country accrues to that country. Hence the model was revised to include a tariff revenue pool; the revenue to which was then allocated across the SACU members according to a revenue sharing formula. The initial shares of tariff revenue were calculated from the data in GTAP 5, wherein the total tariff revenue of the SACU region was divided amongst Botswana and rest of SACU in the proportions 5.4% and 94.6% respectively. The proportions were adjusted to reflect the revenue sharing formula, i.e., 3.1% and 96.9% respectively, and then the database was shocked using the 'altertax' closure due to Malcolm

(1998). The 'altertax' closure and parameter files are designed so as to minimise the effect of the shock on the database.[16]

Closure

The second major change is a set of adjustments to the model closure rules (see Pyatt, 1988, on the central role of closure rules). The standard closure rules for the GTAP model were adjusted to provide a better reflection of the economies in southern Africa. Three fundamental changes were made to the closure: the first, was related to fixing the trade balance, the second to employment of unskilled labour and the third to the prices and quantities on the world market of certain special commodities. These three changes in closures are discussed below.

1) The trade balance for Botswana was fixed so as to mirror the policy of running a trade surplus. The purpose of this is to counter the effects of large diamond exports. Since diamond exports account for about 35% of world production, and an even larger proportion of gem quality production, it might be expected that Botswana would face a downward sloping export demand curve. However, Botswana is a core member of the Central Selling Organisation (CSO)[17] and therefore both the price and quantity of diamond exports are effectively fixed, and hence are fixed in the model (see point 3 below). In examining the EU RSA FTA the ratio of the trade balance to income was fixed for all the African economies and the rest of world. In order to fix the ratio of the trade balance to income the percentage change in the rates of return of these countries were permitted to differ from those in the other regions.
2) Alterations were also made to more accurately reflect the labour markets of the African economies (and also the Rest of World). In these countries there is often a large excess supply of unskilled labour, which can be drawn on by industries in the event of increased production. Hence, an assumption of full employment is inappropriate for these countries. In all the African regions and the rest of world the wage rate was fixed exogenously and the supply of labour was endogenised. This allowed us to take account of the effect on unemployment within Africa of the EU RSA FTA.
3) The final group of changes made to the standard GTAP closure relate to specific industries in the Botswana economy; including the mining industry, animal products and crops. Each of these is discussed in turn below:

16 The alertax closure minimises the effect on the database of the shock by: (a) fixing the trade balances of all but one country; (b) setting the CES and CET elasticities to 1 and (c) altering the substitution (set to 0) and expansion (set to 1) parameters in the CDE system used in determining private consumption.

17 The so-called de Beers cartel.

i) As mentioned above, Botswana is a large producer of diamonds and through its membership of the CSO both the price and quantity of diamond exports are effectively fixed. In addition, the mining industry in Botswana is capital intensive, highly profitable and not susceptible to changes in the volumes of labour or capital that it employs. In light of this, and the output constraints, it is necessary to tightly restrict the input substitution possibilities; in this case Leontief technologies were assumed.

ii) Similarly Botswana has a long-standing preferential trade agreement with the EU under the auspices of the Lomé Convention, whereby fixed quantities of chilled, boneless beef can be exported duty free to the EU. To partially capture this relationship the quantity and price of animal products from Botswana to the EU were fixed.

iii) Finally, to reflect the fact that Botswana is dependent on crop imports and, for climatic reasons, cannot realistically expand crop production; the possibility of export of crops from Botswana was also excluded. This reflects the low potential and limited capacity for diversification in Batswana agriculture; halving the input substitution elasticities captured this characteristic.

In the course of the analyses conducted so far a number of variations in these closure rules have been explored. The results from these explorations suggest that the results from these analyses are sensitive to the choice of closure rules. The implications of these issues are not explored further in this paper, in part because of the current data limitations, but nevertheless the results derived to date do suggest the desirability of giving further consideration to closure rules now that the GTAP database contains far more detail about developing regions.

5. Analysis

THE RESULTS PRESENTED HERE MUST NOT BE REGARDED AS MEANINGFUL. UNTIL A FINAL VERSION OF GTAP 5 IS AVAILABLE ALL RESULTS MUST BE PRELIMINARY: THESE MORE THAN ANY OTHERS BECAUSE OF KNOWN PROBLEMS WITH PRE RELEASE 3 OF GTAP 5.

Policy Experiment

The policy experiment whose results are reported below is very simple; the full liberalisation of trade between the EU and the RSA is implemented in a single step. Hence the analyses ignore the potentially important question of the sequencing of the policy reforms. The analyses are

comparative static; hence any potential dynamic benefits from trade liberalisation are not examined. The results are therefore only indicative of what might be achieved. The results are presented in a deliberately parsimonious manner since, in light of the issues raised by the data, there is no real justification for analysing model results in depth.

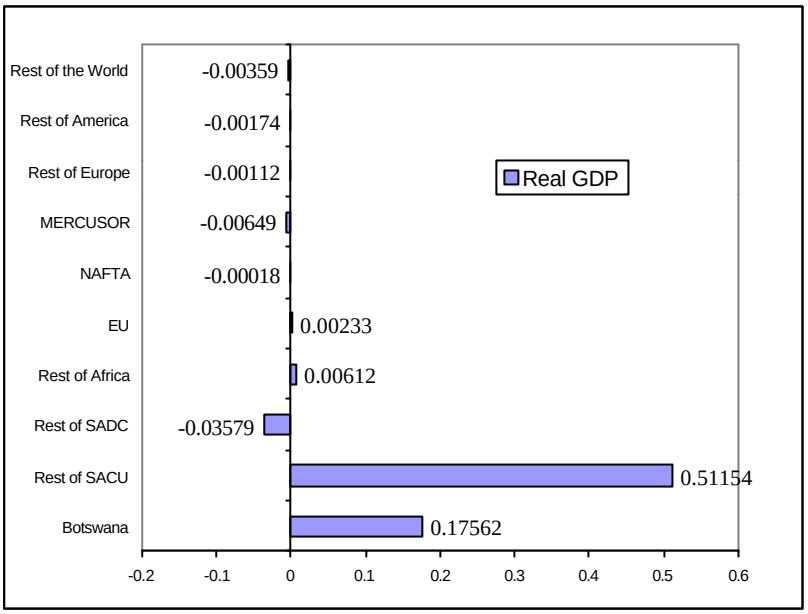
One important consideration is the treatment of the distribution of the tariff revenue pool. The proportions distributed to each member of the SACU could be fixed at the proportions indicated by the base data, or alternatively the proportions could be updated to reflect changes in import patterns by each member of SACU, and hence changes in the trade shares. The analyses were carried out assuming the latter, i.e., the proportions were updated during the simulation period to reflect actual imports.

Results

The real GDP changes suggest that the main beneficiaries of the EU RSA FTA will be the SACU regions, i.e., the rest of SACU and Botswana, and the EU. These results are similar to those found by Lewis *et al*., (1999), and reflect the relatively high proportion of SACU trade accounted for by the EU, and the relative low proportion of EU trade accounted for by the SACU. There is some suggestion of a 'beggar my neighbour outcome' through the negative impact of the FTA on the rest of SADC. For the other regions the proportionate changes in GDP are minimal, with all regions other than the rest of Africa losing out.

The estimated welfare changes (the first column of results in Table 3) display the same pattern of benefits, but, because they are in monetary terms, serve to highlight the absolute magnitude of the estimated benefits. Botswana has a small increase in welfare, due to an improvement in allocative efficiency and a positive terms of trade effect, resulting from a more efficient allocation of resources within Botswana and changes in the prices of traded commodities. The endowment effect however offsets some of these gains in welfare. This endowment effect takes into account the loss of welfare resulting from the increase in unemployment in Botswana, which stems from a 1.24 percent reduction in the employment of unskilled labour. The capital goods effect is similar to the terms of trade effect. It measures the price of purchasing capital goods at home relative to the regions price of saving in the world market.

Figure 1 Changes in Real GDP (%)



Source: Model Estimates

In (absolute) terms the welfare of the rest of SACU and the EU gain appreciably from the EU RSA FTA. What is particularly interesting is how the gains for the EU and SACU arise in different ways. The welfare gain for the Rest of SACU is dominated by the endowment effect, 522.7, coupled with a sizable allocative efficiency effect, 183.1, whereas the welfare gain for the EU arises equally from an allocative efficiency effect, 185.5, and a terms of trade effect, 175.1. It is also interesting to see how the gains for the Rest of SACU differ from those for Botswana and the Rest of SADC. Botswana reaps a proportionately very much larger allocative efficiency, 24.6, and terms of trade, 35.7, effects, but loses employment, whereas the Rest of SADC lose employment, an endowment effect of –12.9, but experience neither of the positive allocative efficiency and terms of trade effects.

While Botswana sees a rise in real GDP it is interesting to examine the patterns of change for commodity output (Figure 2) and value added (Figure 3). Only three sectors witness commodity output increases – Crop Agriculture, Heavy Manufacturing, Construction and Services – while the other sectors see small proportionate declines in commodity output, except for Food which experiences an appreciable reduction in output.[18] The changes for the Rest of SACU offer an interesting contrast; both Crop and Animal Agriculture experience appreciable expansions of output as does Food, but elsewhere output declines. For all commodities the changes predicted for the EU are all minimal, indeed only the 0.3 percent decline in Animal Agriculture output

18 The Food production in Botswana is dominated by the meat industries. It will prove interesting to examine how separating out Meat Products from Other Food Products affects these results.

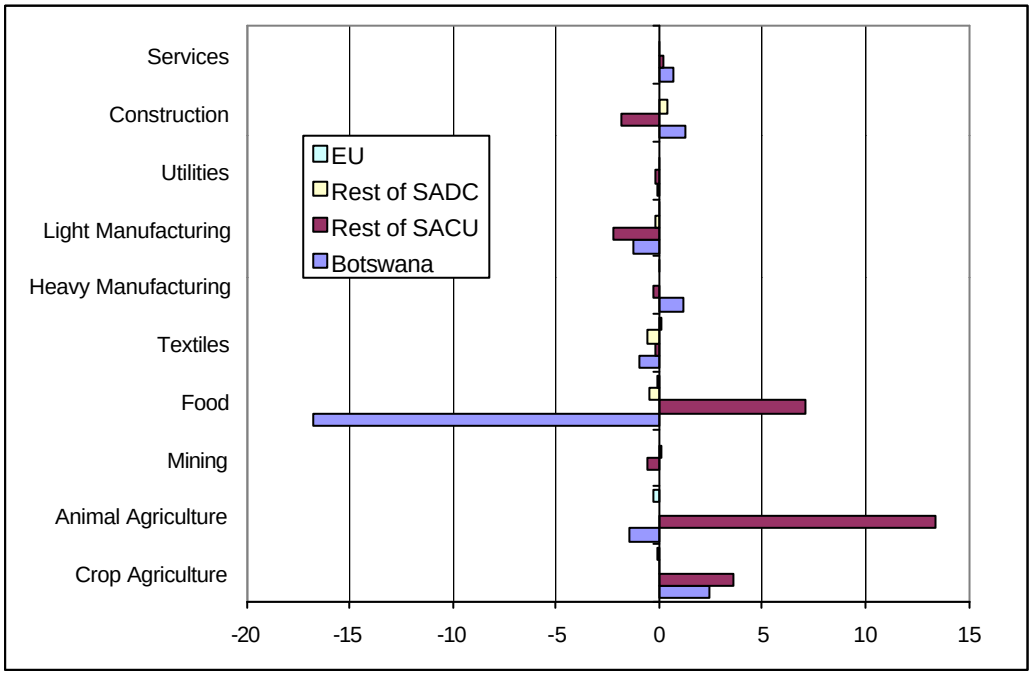
registers on the graphic. In contrast for the Rest of SADC the only positive output effect registered is for Construction, although Mining is also recorded as achieving a small positive effect, 0.08 percent.

Table 3 Welfare decomposition ($US)

Region	Welfare	Of which			
		Allocative Efficiency	Capital goods effect	Endowment Effect	Terms of Trade Effect
Botswana	46.8	24.6	3.2	-16.7	35.7
Rest of SACU	754.0	183.1	12.9	522.7	35.3
Rest of SADC	-18.5	-0.3	0.2	-12.9	-5.4
Rest of Africa	26.7	14.3	0.3	8.3	3.9
EU	357.7	185.5	-2.9	0.0	175.1
NAFTA	-114.2	-16.3	-11.8	0.0	-86.1
MERCUSOR	-141.0	-73.6	-16.3	0.0	-51.1
Rest of Europe	-40.4	-7.9	0.9	0.0	-33.4
Rest of America	-21.9	-6.5	-4.1	0.0	-11.4
Rest of the World	-377.6	-93.0	17.6	-239.9	-62.3

Source: Model Estimates

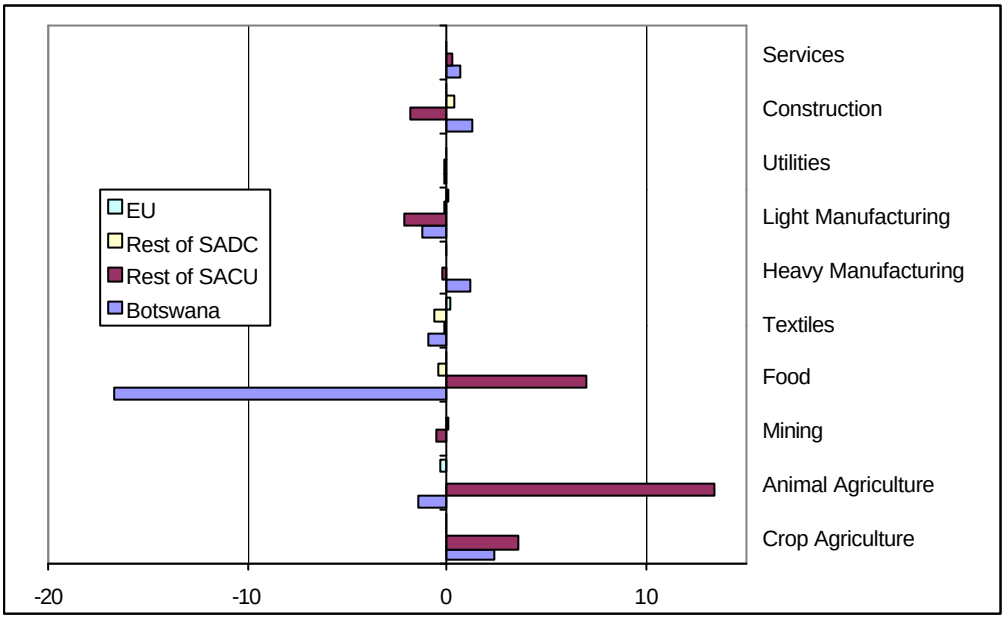
Figure 2 Changes in Commodity Output (%)



Source: Model Estimates

These results are, or course, consistent with the recorded changes in sectoral value added, Figure 3. What is however particularly interesting is the extent to which they reflect an increase in the polarisation of commodity output between the 'developed' and 'developing' regions, with the Rest of SACU experiencing growth in agriculture and food with the EU gaining in manufacturing and vice versa. This is even more pronounced for the Rest of SADC where manufacturing industries experience the most pronounced declines in output.

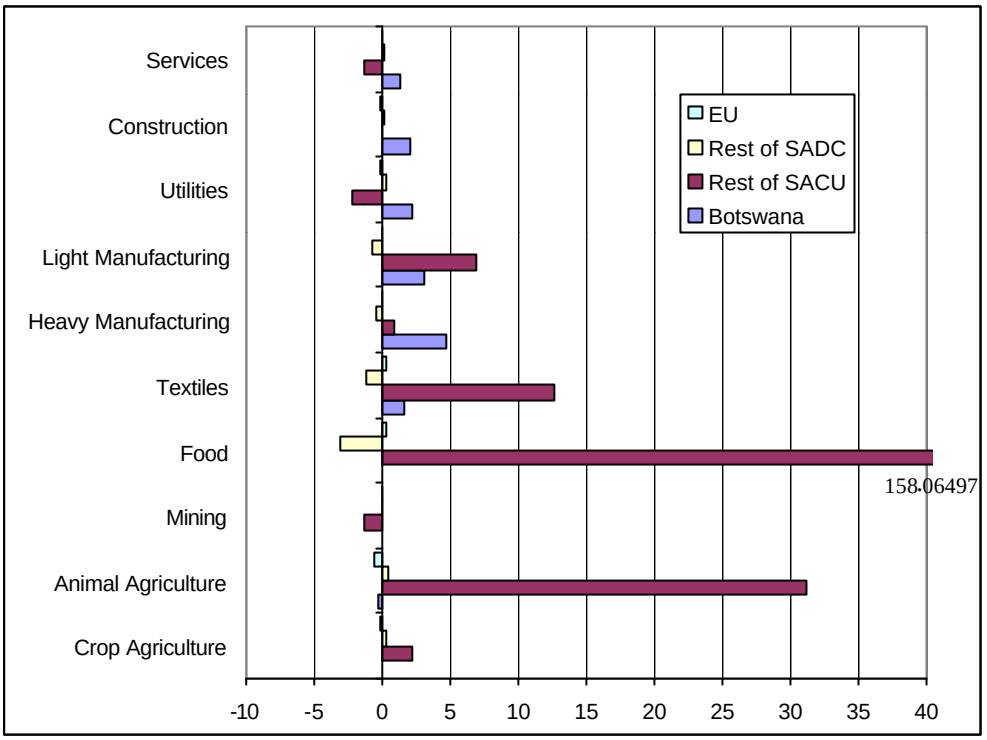
Figure 3 Changes in Sectoral Value Added (%)



Source: Model Estimates

The changes in sectoral value added (Figure 3) are suggestive of substantial structural changes post the EU RSA FTA. While these changes are most substantial for Botswana and the Rest of SACU, those for the Rest of SADC are not insubstantial. In combination they are large enough to suggest an appreciable transformation process in Southern Africa. The changes in commodity output and value added are suggestive of forces moving the economy away from manufacturing towards food production, both directly from within agriculture and through food processing activities. For regions with legitimate aspirations to diversify their economies and industrialise, these results do not represent outcomes that will be politically attractive.

Figure 4 Changes in Commodity Exports (%)

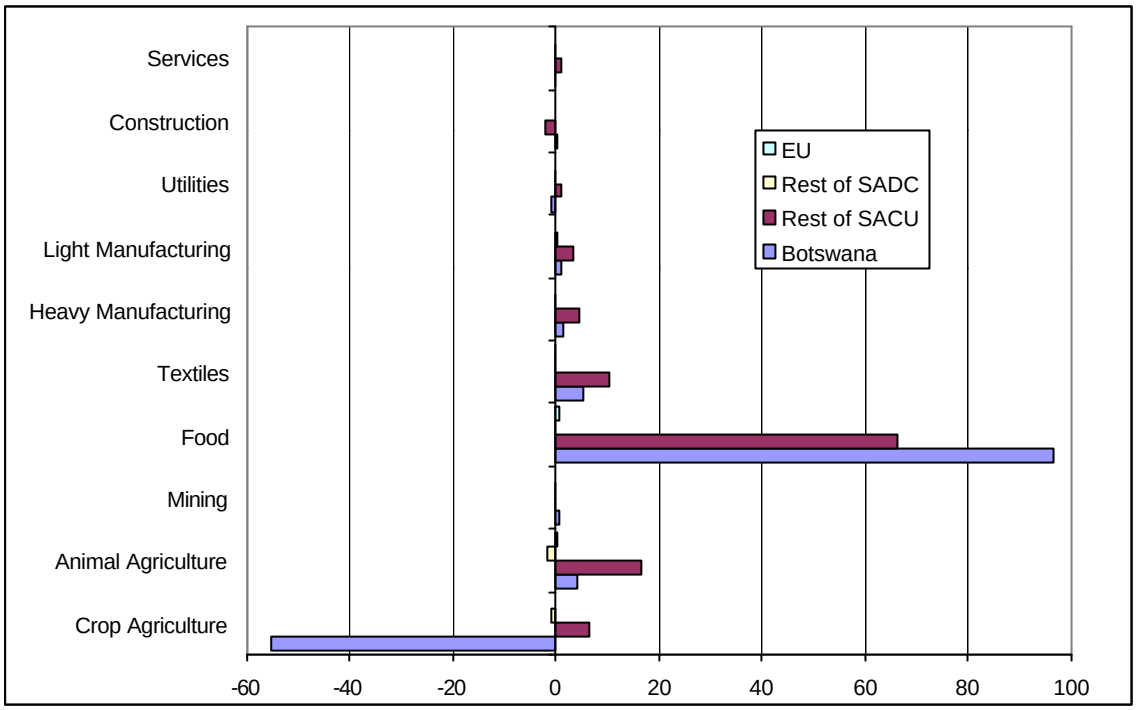


Source: Model Estimates

The trade results indicate why the Rest of SACU might be enthusiastic about the EU RSA FTA. Export growth is predicated to be strong in Animal Agriculture, Textiles and Light Manufacturing and exceptionally large in Food. For Botswana the predicted growth in exports is concentrated in manufacturing,[19] whereas for the Rest of SADC manufacturing exports decline and agricultural exports increase. At the same time the Rest of SACU is predicted to receive substantial increases in imports of agricultural and food products, with smaller but still noticeable increases in imports of manufactured products. It is less easy to understand why Botswana and the Rest of SADC would necessarily be enthusiastic about the EU RSA FTA.

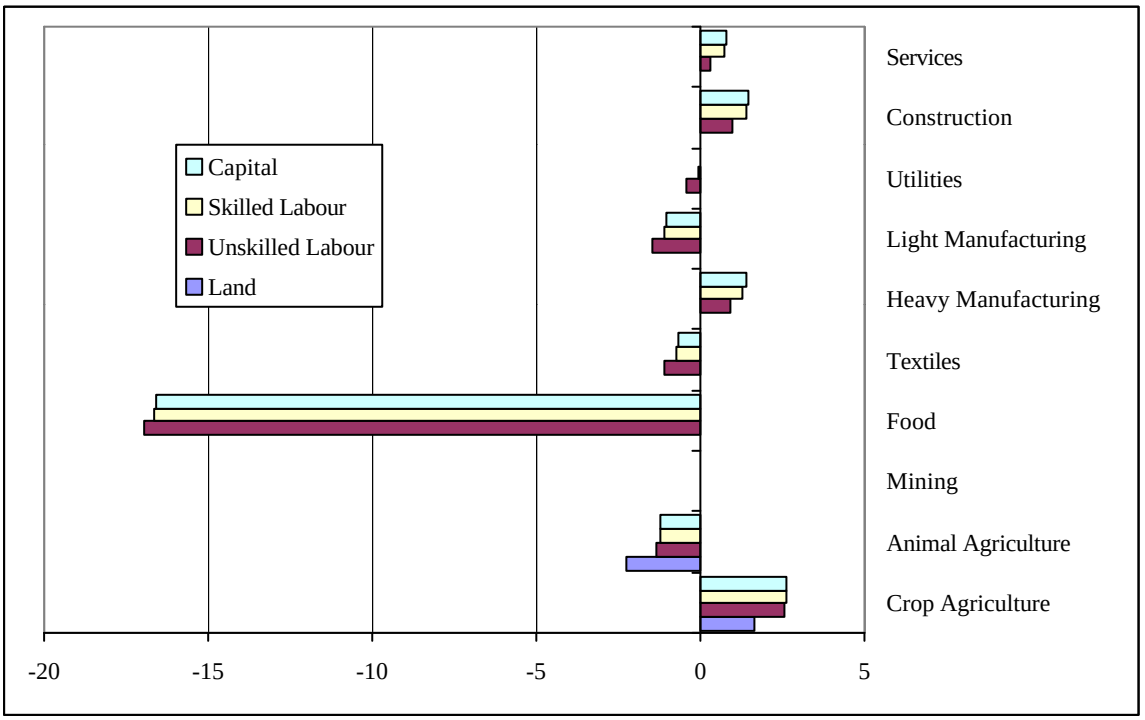
19 A results that obviously owes much to the closure rules imposed on the model.

Figure 5 Changes in Commodity Imports (%)



Source: Model Estimates

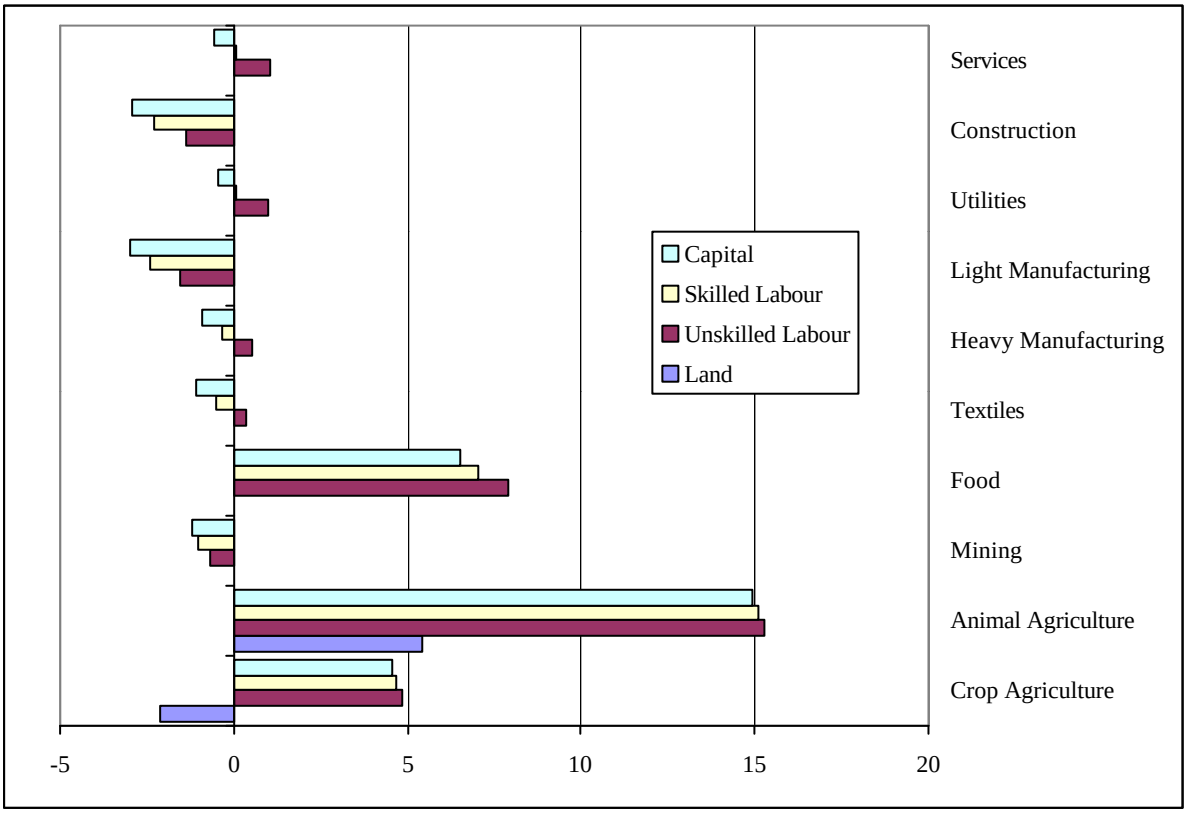
Figure 6a Factor Demand by Activity for Botswana



Source: Model Estimates

In light of the patterns of changes in output and value added it is instructive to examine the changes in the patterns of factor demand within Southern Africa that are predicted by the model, Figures 6a, 6b and 6c. Despite the small (relative) changes in GDP and welfare Botswana and the Rest of SACU are predicted to experience substantial adjustments in the patterns of factor demand. Such substantial changes in the patterns of employment would understandably raise concerns in Botswana, especially in light of the declining employment in manufacturing industries. On the other hand the Rest of SACU might be sanguine, the increase in employment in Food will offset the small declines in employment by other manufacturing while there is a substantial increase in agricultural employment that might assist with rural income redistribution objectives. The changes for the Rest of SADC are all relatively minor, but also indicate a move of employment away from manufacturing that may not be welcomed by governments.

Figure 6b Factor Demand by Activity for Rest of SACU



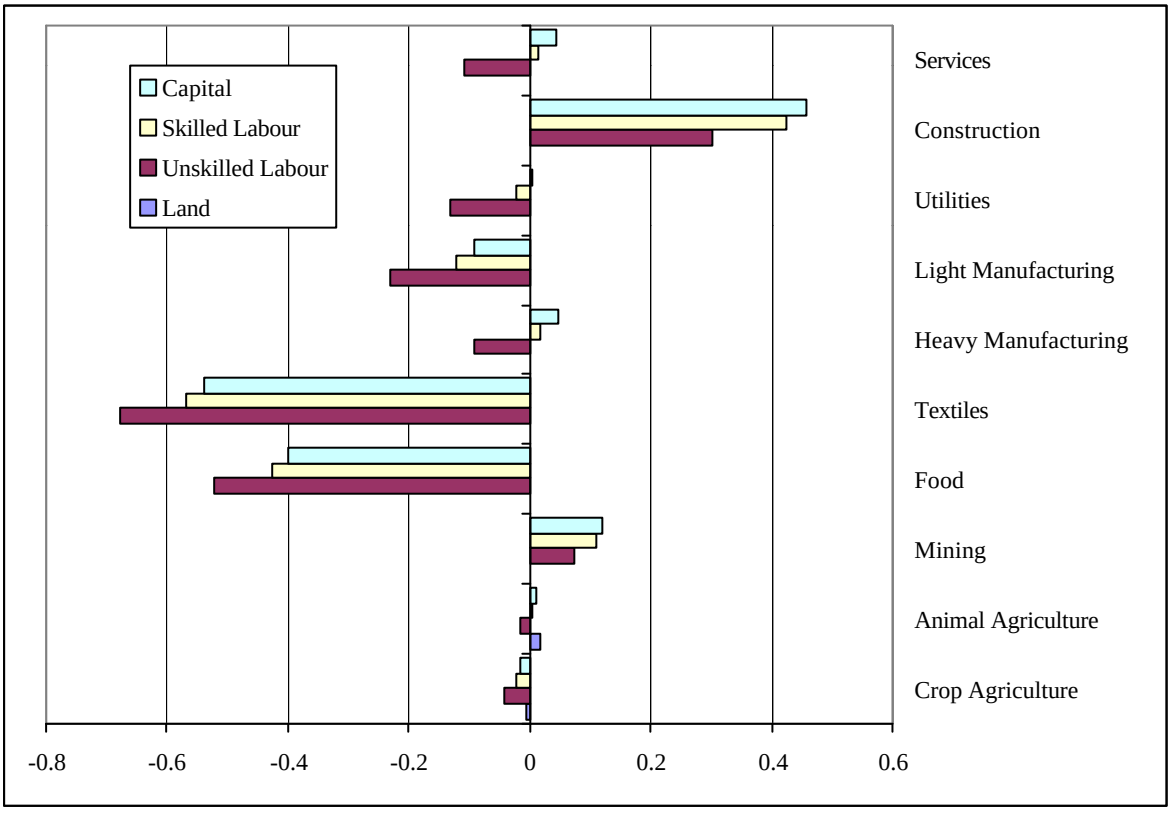
Source: Model Estimates

6. Concluding Comments

It will prove interesting to compare these results with those produced using the final version of GTAP 5. While it is difficult to give credence to the results produced here, the exercise has not

been without benefits. In particular it has raised substantive questions about how a GTAP based model should be tuned to provide results relevant to the smaller and less developed countries of the world; considerations brought more into the debate by the extension of GTAP 5 to provide more information about (southern) African economies. Some, not altogether systematic, experiments with model closure rules have demonstrated the ease with which qualitatively and quantitatively different results can be generated.[20] It is suggested that substantive consideration must be given to the identification and specification of model closure rules that capture the reality of economic policy formation in developing and least developed economies (see Rattso and Torvik, 1998, on macro closure in a model of Zimbabwe).

Figure 6c Factor Demand by Activity for Rest of SADC



Source: Model Estimates

Another major benefit has arisen from looking more closely at trade and regional policies in southern Africa. It is difficult not to believe that substantial benefits would emerge from simplification and harmonization. However, it is not clear how well the economies of southern Africa could respond to the revised incentives. But in a world of uncertainty and change it is

20 Lewis *et al*., (2001) report results using a different model with different closure rules and a different aggregation that had different signs on some of the key results.

evident that small changes for the OECD countries may presage large changes for the least developed countries, and thereby impose substantial burdens of transformation. With the increased potential for the developing countries of the African continent to influence global trade negotiations, the extension of the GTAP database to include African regions in their own right is timely.

References

Armington, P.S., (1969). 'A Theory of Demand for Products Distinguished by Place of Production', *IMF Staff Papers*, Vol 16, pp 159-178.

Binswanger, H.P. and Deininger, K., (1993). 'South African Land Policy: The Legacy of History and Current Options', *World Development*, Vol 21, pp 1451-1475.

Deininger, K. and Binswanger, H.P., (1995). 'Rent Seeking and the Development of Large-Scale Agriculture in Kenya, South Africa, and Zimbabwe', *Economic Development and Cultural Change*, Vol 43, pp 493-522.

Gehlhar, M., Gray, D., Hertel, T.W., Huff, K.M., Ianchovichina, E., McDonald, B.J., MacDougall, R., Tsigas, M.E., and Wigle, R., (1997). 'Overview of the GTAP Database', in Hertel, T.W., (ed). *Global Trade Analysis: Modeling and Applications*. Cambridge: Cambridge University Press.

Hertel, T.W. and Tsigas, M.E., (1997). 'Structure of GTAP', in Hertel, T.W., (1997). *Global Trade Analysis: Modeling and Applications*. Cambridge: Cambridge University Press.

Lewis, J.D., (2001). 'Reform and Opportunity: The Changing Role and Patterns of Trade in South Africa and SADC', *Africa Region Working Paper Series No. 14*. World Bank: Washington.

Lewis, J.D., Robinson, S. and Thierfelder, K.,, (1999). 'After the Negotiations: Assessing the Impact of Free Trade Agreements in Southern Africa', *Trade and Macroeconomic Division Working Paper No* 46. IFPRI: Washington.

Lewis, J.D., Robinson, S. and Thierfelder, K.,, (2001). 'After the Negotiations: Assessing the Impact of Free Trade Agreements in Southern Africa', paper presented at the *Development Economic Study Group Annual Conference*, Nottingham, March.

Lucas, R.E.B., (1985b). 'Migration amongst the Batswana', *Economic Journal*, Vol 95, pp 358-382.

Lucas, R.E.B. and Stark, O., (1985a). 'Motivations to Remit: Evidence from Botswana', *Journal of Political Economy*, Vol 93, pp 901-918.

Malcolm, G., (1998): *Adjusting Tax Rates in the GTAP Database*, *GTAP Technical Paper No* 12, Center for Global Trade Analysis, http://www.agecon.purdue.edu/GTAP/techpapr /index.htm

McDonald, S., (2000). 'An Evaluation of the Data for Botswana in GTAP 5', *TIPS/GTAP Symposium on GTAP 5 Database*, Johannesburg, South Africa, September.

de Melo, J. and Robinson, S., (1989). 'Product Differentiation and the Treatment of Foreign Trade in Computable General Equilibrium Models of Small Economies', *Journal of International Economics*, Vol 27, pp 47-67.

Stark, O. and Lucas, R.E.B., (1988). 'Migration, Remittances, and the Family', *Economic Development and Cultural Change*, Vol , pp 465-481.

Vink, N. and Kassier, W.E. (1991). Agricultural policy and the South African State. In: M. de Klerk (ed.). *A Harvest of Discontent: The Land Question in South Africa*. IDASA, Cape Town.