A critical analysis of the Regional Trade Model for Southern Africa (RTMSA): implications for future research

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1. Introduction

The studies of Evans (1996, 1997a,b) appear to be the most analytically ambitious attempts to address, empirically, the question of the economic desirability of a southern African free trade area (FTA). Evans (1996) is apparently the only serious study available to date which gives detailed sectoral effects of the formation of a SADC FTA for each country. It thus appears to be the only available study which quantitatively addresses the critical questions currently occupying policy-makers and researchers in the region of the potential sectoral and distributional effects of the formation of the FTA.[1] Despite the criticisms levelled at this type of impact study, some quantification of the possible effects of the FTA is undoubtedly important, in order to determine whether there is likely to be a need for compensation within the union, and whether the benefits will be large enough for those who gain to compensate those adversely affected. The results of these studies, and the method by which they were derived, therefore warrant careful consideration.

Evans (1996) uses a static, partial equilibrium model to estimate the effects of the formation of a SADC FTA on output, trade, employment and customs revenue for 27 sectors in eight SADC countries, using data for the period 1990-92 or, in some cases, 1991-93.[2] The effects of the formation of the FTA are estimated for two scenarios: a "worst-case" or "no-growth" scenario, and an alternative scenario characterised by three percent growth in both SADC and the rest of the world (ROW), as well as a three percent reduction in tariffs faced by SADC exporters in ROW markets.[3]

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[1] Evans (1997a) undertook a subsequent simulation of the effects of a SADC FTA, with an improved database. Although the *detailed* simulation results for each sector were not reported in the second study, both simulations are considered in the discussion which follows.

[2] The BLNS countries were excluded from the 1996 simulation for data reasons. In the 1997 simulation, the SACU database had been completed, allowing the model to be estimated for the seven SADC countries outside SACU, and for SACU as a whole (Evans, 1997a: 3-4).

[3] In the "growth" scenario, the assumed three percent growth rate does not result from the formation of the FTA itself, and the estimated effects on output, trade and employment therefore do not seem to reflect the effects of the formation of the FTA as such.

In the "worst-case" scenario, Evans (1996: 9) finds that the formation of a SADC FTA results, in SADC as a whole, in only a 0.2 percent increase in total demand, a 0.1 percent fall in import-competing production, and has a negligible effect on employment.[4] Intra-regional imports increase by 16.9 percent and intra-regional exports rise by 11.9 percent.[5] SADC's imports from the ROW decrease by 1.3 percent overall, while exports to the ROW are unchanged. The overall SADC balance of payments position therefore improves, but there is a net loss of customs revenue for SADC as a whole of 8.4 percent (US$303.8 million).[6] On the basis of these results, Evans (1996) concludes, in contrast to many other studies, that the formation of the FTA will lead to strong intra-SADC trade creation effects. He therefore recommends a rapid transition to a FTA, with special provision for countries with particular adjustment difficulties.

Moreover, while the "growth" scenario also reflects the effects of a three percent reduction in tariffs faced by SADC exporters in ROW markets (presumably due to the implementation of the Uruguay Round), it involves no corresponding reduction in *SADC* tariffs faced by ROW exporters, despite the fact that the tariffs, which will be applied by SADC countries when the FTA is formed, will also be significantly different from those assumed in the 1996 simulation. Furthermore, Evans' own policy recommendations appear to be based on the results he obtains for the so-called "worst-case" scenario. The discussion below therefore focuses on this case.

[4] The corresponding results for the subsequent simulation were a 0.3 percent increase in demand, a 0.2 percent fall in import-competing supply, and a 0.09 percent increase in employment (Evans, 1997a: 11).

[5] These should, of course, be equal. However, in the 1996 report, Evans (1996: 7) notes that a country's recorded exports to its regional partners were not reconciled with the recorded imports from that country reported by those partners. Initial intra-regional imports and exports are given as US$2092.9 million and US$1721.6 million respectively (Evans, 1996: 9). In the subsequent 1997 simulation, import estimates were generally assumed to be correct, and exports were adjusted so that intra-SADC imports and exports in each sector were the same (Evans, 1997a: 3). Here, initial intra-SADC imports and exports are given as US$1099.8 million and US$1100 million respectively, both of which increase by 18.5 percent on formation of the FTA (Evans, 1997a: 11).

[6] In Evans (1997a: 11), there is a negligible change in the level of imports from the ROW (reported as 0.0 percent to one decimal place). However, there is a *worsening* of the overall SADC balance of payments position, which suggests an *increase* in imports from the ROW (albeit a small one), since exports to the ROW are not affected in the "worst-case" scenario. This important difference in the direction of change in ROW imports in the two simulations, which has implications for the trade diversion consequences of the FTA, will be considered further in Section 4. Evans (1997a: 11) reports a customs revenue loss of 6.0 percent for SADC as a whole.

Although the effect on SADC as a whole is important, the overriding consideration for SADC members is the impact of the FTA on individual countries and on "sensitive" sectors within SADC. The question of the *distribution* of the gains and losses resulting from the formation of the FTA is therefore arguably the more important issue, and will be the focus of the subsequent discussion. This has been stressed by Page (1997: 9), who notes that although the aggregate effects of the FTA may not be large, the effects for individual industries or producers in particular countries may be larger.

Given the interest of policy-makers in the refinement and development of the Evans Regional Trade Model for Southern Africa (RTMSA) in the short term, the aim of this paper is to provide a critical assessment of the results obtained to date, and of the conclusions drawn from these results regarding the desirability of the formation of a SADC FTA. In particular, the discussion will consider the implications of the underlying structure and assumptions of the model, with reference to similar empirical studies conducted for other regional groupings as well as the theoretical analysis of trade integration. Such an assessment of the RTMSA is made difficult by the fact that both the model itself and the database used in the simulations are already in the process of being refined and developed.[7] While some of the considerations raised in this paper are

[7] As noted by Evans (1997a: 3), the simulation results are obviously affected by the quality of the data used, as well as the assumptions made. While there were major data problems in the 1996 simulation which call this set of results into serious question, the database for the model is continually being improved, and the quality of the results of further simulations will be strengthened on this count. It is clearly of fundamental importance to develop an accurate database of disaggregated intra-SADC trade flows and of trade flows between SADC countries and the rest of the world (ROW), as well as appropriate sectoral output and tariff data.

likely to be addressed as this work proceeds, it is nonetheless useful to highlight the areas in which modifications and extensions appear to be most necessary.

Section 2 provides some background on the structure and assumptions of the RTMSA. The aim is to give some idea of the mechanics of the model, without becoming too technical. Section 3 examines the question of the appropriate tariff levels to use in the simulations, in the light of the tariff reductions currently under way as a result of the Uruguay Round of trade negotiations, and given the possibility that the ultimate outcome of the SADC Trade Protocol may be an asymmetrical preference agreement rather than a full-blown FTA. Section 4 considers the underlying structure and assumptions of the RTMSA, drawing on similar empirical studies which make less restrictive assumptions and may therefore provide some insight into the implications of the model's formulation. More specifically, the discussion will focus on whether the RTMSA assumptions bias the simulation results in any systematic way, so that the effects of the FTA appear to be more or less favourable than they would under alternative assumptions. Finally, Section 5 provides a preliminary analysis of the directions in which the model could usefully be extended to take account of some of the important factors relevant to an assessment of regional trade integration in southern Africa which have not been modelled to date. Section 6 provides the conclusion.

2. Background on the model

2.1 The import side

The import side of the RTMSA uses the Armington (1969) formulation where goods from different sources of supply are treated as imperfect substitutes (as opposed to the more standard trade specification where domestically and foreign-produced goods are perfect substitutes). This allows for product differentiation by country of origin, and hence two-way trade within a sector (Dervis *et al.*, 1982: 219-221, 233). The Armington methodology, in which the elasticity of substitution between different sources of supply is treated as constant, has been useful in estimating the effects of relative price changes (due, for example, to changes in trade policy) on the balance between imports and domestic production in import-competing sectors (Evans, 1996: 31).

Evans (1996) introduces further substitution into the Armington formulation, whereby imports from within SADC and from the ROW are also imperfectly substitutable and responsive to relative price changes.[8] The Armington functions are therefore twice nested: at the first level, a composite import commodity M_i is defined which is made up of imports from within SADC and from the ROW, while at the second level, the composite import is then imperfectly substitutable for import-competing production. The latter stage defines a composite importable commodity D_i which is a constant elasticity of substitution (CES) aggregation of the composite import and import-competing production. As in Corado and de Melo (1986: 155), the elasticity of substitution between the two sources of imports on the one hand, and between aggregate imports and domestic production on the other, is constant, but not necessarily equal. Total domestic supply is then the sum of import-competing production and aggregate imports, while domestic demand is determined by a demand function in which the price of the composite goods and the income are arguments (Evans, 1996: 60). Once each variable has been defined in the base period, its variation in response to relative price changes resulting from the removal of intra-SADC tariffs can be determined.

In the case of a FTA, the removal of intra-SADC tariffs lowers the relative price of imports from SADC (P_{MSi}), increasing the ratio of imports from SADC to imports from the ROW (M_{Si}/M_{Ri}). The change in the source of import supply depends on the height of the initial tariff and the elasticity of substitution between imports from SADC and the ROW (σ_{Mi}). The latter is assumed to be 2.5 in the RTMSA, evidently for all sectors in all SADC countries.

[8] In this respect, the structure of the model is similar to the one developed by Corado and de Melo (1986) to analyse the impact of a country joining a customs union, which they apply to an *ex ante* examination of the effects of Portugal's accession to the European Community.

The removal of intra-SADC tariffs will also, in the FTA case, lower the average import price (P_{Mi}).[9] This, in turn, will alter the ratio of imports to domestically produced goods (M_i/S_{Mi}) at the second level of nesting in the RTMSA. The change in this ratio depends on the change in the relative price of domestic to foreign goods and the elasticity of substitution between composite imports and domestic production (σ_{Di}). Evans (1996: 34) assumes this substitution elasticity to be 0.5 for capital and intermediate goods, and 2.5 for "other" (mostly consumer) goods (once again, evidently across *all* SADC countries). This indicates that imports and domestic production are less substitutable (i.e. more complementary or "non-competing") in capital and intermediate good sectors than in other sectors.

Further, the price elasticity of domestic supply is assumed to be infinite, due to the assumption of excess capacity in the manufacturing sectors of the SADC region (Evans, 1996: 33-34). This feature of the model, which is considered more carefully in Section 4, implies that there will be no adjustment in the domestic price when tariffs are removed (Corado and de Melo, 1986: 155).

Given the assumption of excess capacity, then, the change in the ratio of imports to domestic production depends on the constant elasticity of substitution between composite imports and import-competing production (σ_{Di}) and the change in the composite import goods price (P_{Mi}). Since the average import price falls in the FTA case, the ratio of imports to domestic production will increase.[10]

In the model's final stage, changes in the actual levels of domestic demand, imports and import-competing supply when relative prices vary can be determined, given the increase in the ratio of imported to domestically

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[9] Assuming there is a tariff on goods i, the composite import price P_{Mi} will necessarily fall in the FTA case, because the initial tariff is retained on imports from the ROW. In the case of a *customs union*, the change in P_{Mi} will also be influenced by any difference between the level at which the common external tariff (CET) is set and the initial tariff level. Such a difference would affect the price of imports from the ROW (P_{MRi}), which may increase or fall, depending on whether the initial tariff on the goods is raised or lowered to meet the CET.

[10] Note, however, that this does not necessarily mean that import-competing production (S_{Mi}) falls (see Section 4 below).

produced goods and the assumption of perfectly elastic domestic supply.

2.2 The export side

The import side of the RTMSA captures the effects of the removal of the home country's tariffs on imports from SADC on the components of that country's domestic demand (import-competing production, imports from SADC and imports from the ROW), as well as on domestic demand in the aggregate. The export side, on the other hand, considers the impact on the home country's exports to SADC (E_{Si}), not the removal of tariffs by *other* SADC countries.[11]

The RTMSA retains the assumption of excess capacity on the export side, giving perfectly elastic export supply. The expansion of exports as the FTA is formed will consequently have no effect on import-competing production.[12]

Since intra-SADC imports of commodity i are initially equal to intra-SADC exports of commodity i, it follows that the change in the total level of intra-SADC imports of commodity i when a FTA is formed must equal the change in the total level of intra-SADC exports of that commodity (i.e. $dM_{Si} = dE_{Si}$). To calculate an individual country's change in exports to the rest of SADC when a FTA is formed, the change in total intra-SADC exports dE_{Si} is allocated between countries according to their initial market share (Evans, 1997b).

The implications of the structure of the export side of the RTMSA, in particular the use of constant market shares to calculate the impact of the removal of tariffs on a country's exports to SADC, will be considered further in Section 4.

3. Tariff levels

It is clearly of critical importance that the appropriate tariff levels are used in

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[11] The formation of the FTA itself does not alter SADC members' terms of access to ROW markets. Hence exports to the ROW (E_{Ri}) are unaffected in the "worst-case" scenario.

[12] The implications of this assumption are considered in Section 4.

the RTMSA in order to assess the implications of the formation of a FTA, particularly in view of the time period of at least eight years that will lapse between the ratification of the SADC Trade Protocol and the eventual elimination of import duties.

The tariff levels used for the 1996 simulation were based primarily on the sectoral tariffs reported in IDC (1995) for the early 1990s, adjusted (halved) in most cases to take account of the difference between the tariff levels recorded in the books and the actual tariffs paid, or "water in the tariff" (Evans, 1996: 7). The accuracy of some of this tariff data is questionable, however, even for SACU.[13] The tariffs used in the 1997 simulation of the effects of the FTA are based on the assumption that the Structural Adjustment Programmes (SAPs) undertaken by all SADC countries, except Angola, have reduced tariff levels to a rough equivalence with 1996 SACU tariffs, except where tariffs are lower than those of SACU (Evans, 1997a: 3).[14] While it is clearly important to use tariff levels which take account of the generalised liberalisation undertaken in most SADC countries since the years to which the IDC (1995) data refers, any results obtained in the absence of reliable recent tariff data from specific country sources should be treated with caution.

The tariff levels employed in the 1997 simulation apparently differ in another important respect from those used in Evans (1996). As a more recent technical appendix to the model (Evans, 1997b) illustrates, an Armington function is used to aggregate imports from other SADC countries of a given commodity into a particular SADC home country. It thus seems possible to take account of any

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[13] Alternative sources of sectoral tariff data for SACU include Holden (1996: 42) and GATT (1993: 181).

[14] In Evans (1997a), the effects of the SAPs themselves were simulated using the original tariff data from IDC (1995).

differences in tariff levels applied by the home country to imports from other SADC countries before the FTA is formed, and hence to recognise existing tariff concessions between SADC members in terms of bilateral trade agreements and CBI or COMESA tariff preferences. This is an important consideration, since the tariff levels which are actually applied between countries already involved in preference schemes in the region may differ quite markedly from those which apply more generally.

The 1997 simulation attempts to account for the generalised liberalisation undertaken as part of the SAPs, up to 1996. However, the tariffs which will apply more generally when intra-SADC import duties are finally eliminated, at least eight years after the signing of the August 1996 Trade Protocol, will differ considerably (particularly in the case of South Africa) from those which applied in 1996, given commitments made in the Uruguay Round of trade negotiations. It is therefore the tariffs that are going to apply at the *end* of the Uruguay Round implementation period which are important. To the extent that these tariffs are lower than those used in the model, the effects of the FTA will be different.

Grossman (1982: 271-272) notes that the question of whether generalised tariff reductions will erode the benefits of any particular preference scheme depends critically on the degree of substitutability between imports from partner and non-partner sources versus the degree of substitutability between imports and domestic production. Let's consider the point of view of a particular SADC exporting country such as Zimbabwe, for example. If the substitutability between imports from Zimbabwe and imports from the ROW into other SADC countries is lower than the substitutability between imports and domestic production in these countries, then trade creation (the replacement of home production by imports from Zimbabwe) is likely to be a more important source of export expansion for Zimbabwe when a FTA is formed than trade diversion (the replacement of imports from the ROW into these countries by imports from Zimbabwe). The relative magnitude of the substitution elasticity, in this case, implies that the preference recipient (Zimbabwe) will face greater competition from home-produced goods in other SADC countries than from ROW imports. Grossman (1982: 277) argues that, with this pattern of import competition, concern on the part of preference recipients about the erosion of tariff preferences as a result of generalised liberalisation would be largely unwarranted.

In the RTMSA, the elasticity of substitution between imports from SADC and imports from the ROW (σ_{Mi}) and the elasticity of substitution between imports and domestic production (σ_{Di}) are assumed to be equal in consumer goods sectors. However, in intermediate and capital goods sectors, imports from the two sources are assumed to be *more* substitutable than imports and domestic production.[15]

It may thus be argued that, in terms of Grossman's (1982) analysis, the effects of a SADC FTA in intermediate and capital good sectors will be felt more through trade diversion than through trade creation, given the comparatively high value assumed in the RTMSA for σ_{Mi} relative to σ_{Di} in these sectors.[16]

In consumer goods sectors, on the other hand, the assumption of equal elasticity of substitution between imports from the two sources and between imports and domestic goods produces the result that the proportionate reduction in imports from the ROW equals the proportionate reduction in import-competing supply when the FTA is formed.[17] Since the initial levels of import-competing production in these sectors tend to be much greater than imports from the ROW, the assumption of equal substitution elasticity will generally guarantee trade creation well in excess of trade diversion.[18]

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15 Recall that, in the first case, $\sigma_{Di} = \sigma s_{Mi} = 2.5$, while in the second case σ_{Di} is assumed to be 0.5, but σ_{Mi} remains 2.5.

16 The question of whether the relative magnitudes of the substitution elasticity assumed in the RTMSA is appropriate in the SADC context is considered further in Section 4 below.

17 This can be shown by using the model's equations to derive expressions for the proportionate change in imports from the ROW (M_{Ri}) and the proportionate change in import-competing supply (S_{Mi}) solely in terms of elasticity, shares and the change in the average import price P_{Mi}, then substituting $\sigma_{Mi} = \sigma_{Di}$ into the expression for the change in M_{Ri}.

18 This characteristic of the RTMSA is also a feature of the prominent study by Baldwin and Murray (1977), which examines the implications of most-favoured-nation (MFN) tariff reductions on developing country trade benefits under the Generalised System of Preferences (GSP). The Baldwin-Murray model has frequently been criticised for underestimating trade diversion as a result of the assumption of equal substitutability between imports from preferred and non-preferred sources and between imports and domestic production in the preference-donor country (Pomfret, 1988: 138-139; Sawyer and Sprinkle, 1989: 62).

Following Grossman's (1982) analysis, thus, it may be argued that in consumer goods sectors, in which regional export expansion is likely to take place through trade creation (given the assumptions of the RTMSA), the erosion of tariff preferences as a result of Uruguay Round tariff reductions need not be a cause for concern among regional exporters. On the other hand, in intermediate and capital goods sectors, where export expansion is more likely to be seen through trade diversion in the light of the model's assumptions, MFN tariff reductions will stimulate import competition from the ROW for regional exporters in SADC markets.[19]

On a more general level, to the extent that intra-SADC tariffs are lower than the tariffs used in the RTMSA simulations to date, when a FTA is finally formed, the increase in intra-SADC imports will be reduced, whether this increase takes place through trade creation or trade diversion. The expansion of intra-SADC exports will thus be correspondingly lower, so that individual members' exports to SADC receive a smaller stimulus. Improved market access to the ROW, as a result of Uruguay Round tariff reductions elsewhere, may stimulate export expansion to overseas markets, as in the Evans (1996, 1997a) "growth" scenario. However, as noted earlier, this aspect is largely distinct from the effects of the formation of the FTA as such, and will depend on factors such as export demand in the ROW and the substitutability between exports from SADC countries and competing exports from other countries, which would also face

[19] This discussion also suggests that the pain of adjustment to a SADC FTA in consumer goods sectors will be felt more acutely in home goods industries in SADC member countries than in export industries in the ROW (Grossman, 1982: 272). The costs of this adjustment may be eased, however, if there is scope for intra-industry specialisation in these sectors. The question of whether it is preferable for export expansion within the bloc to take place through trade creation rather than trade diversion will be examined further in Section 6 below.

lower trade barriers.

The implications of Uruguay Round tariff reductions for a SADC integration scheme will also depend on whether a full-blown FTA, in which tariffs are completely eliminated, or a preferential trade area (PTA), in which they are simply reduced, ultimately emerges in the region.[20] In the case of a PTA, generalised liberalisation will raise the partner country's relative margin of preference for as long as the absolute margin of preference can be maintained (that is, until the tariff on imports from the partner falls to zero). The partner country's relative preference increases because the duty payable on imports from the partner within the PTA becomes a smaller proportion of the normal duty. Whether the increase in the partner country's relative preference in the region would be sufficient to counter the effect of increased competition from exporters outside SADC when external tariffs are lowered, is an open question, and would require some assessment of relative levels of international competitiveness.[21]

Finally, while Evans (1996: 7) notes that the halving of the IDC (1995) tariff estimates in the 1996 RTMSA simulation could be viewed either as a rough attempt to capture the water in the tariff phenomenon, or as a lowering of tariffs by only 50 per cent to reflect a PTA rather than a full-blown FTA, he does not consider the possibility of an *asymmetrical* preference agreement. Such asymmetry could take two forms: firstly, tariffs could be reduced by different

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[20] To illustrate this, suppose that the normal rate of duty on a particular product in the home country is 30 percent. In the case of a FTA, with intra-SADC tariffs of zero, the SADC partner country's absolute margin of preference of 30 percent will necessarily fall as the home country's external tariffs are lowered (although a relative preference of 100 per cent will remain until external tariffs fall to zero). Consider, on the other hand, the case of a PTA in which the normal rate of duty is initially 30 percent, but in which the SADC partner country enjoys an absolute margin of preference of 15 percent. Imports from the partner country are therefore subject to a duty of 15 percent, and the partner has a relative preference of 50 percent. If the normal duty payable on the product is reduced from 30 percent to 20 percent, then, given the partner's absolute margin of preference of 15 percent in the PTA, the duty payable on imports from the partner will fall to five percent, and the partner's *relative* margin of preference will increase from 50 percent to 75 percent.

[21] It is uncertain, for example, whether an increase in the relative preference of Mauritius or Zimbabwe in the textiles sector within SADC would enable them to compete with exporters from the Far East in the context of more generalised liberalisation.

proportions in different sectors, and secondly, some countries could make larger concessions to the rest of SADC than others. South Africa, for example, may be persuaded to allow better access to its markets than it obtains in return, either generally, or in particular sectors. The idea of an asymmetrical preferential arrangement among SADC countries has frequently been raised in the literature on southern African trade integration, and a simulation of the effects of various possible scenarios could be of considerable use to policy-makers.

4. The assumptions of the RTMSA

Evans (1996: 3) notes that economic model users often have to assume "reasonable" values for important model parameters, such as elasticity, in the absence of suitable data which would otherwise allow their formal econometric estimation. Although the magnitude of the elasticity assumed critically affects the results of the simulation, there is no real basis given for some of the elasticity assumptions of the RTMSA. The purpose of this section is thus to consider whether these assumptions are plausible in the light of similar empirical studies, and whether they bias the simulation results in any systematic way. In order to derive inferences for policy from the results of such simulation exercises, it is also important to examine the realism of these assumptions in the southern African context.

By allowing for imperfect substitutability between alternative sources of supply, and hence product differentiation by country of origin, the Armington formulation adopted by Evans (1996, 1997a) provides a realistic compromise between the two extreme assumptions of perfect substitutability and perfect complementarity between imports from different sources and between imports and domestically produced goods (Dervis *et al.*, 1982: 221). However, the degree of substitutability would be likely to vary between countries, and, perhaps more importantly, across sectors. Evans (1996, 1997a) appears to assume the same elasticity of substitution between imports from SADC and imports from the ROW (σ_{Mi}) for all sectors in all SADC countries. Although different elasticity of substitution between imports and domestic production (σ_{Di}) is specified for intermediate and capital goods on the one hand (which are assumed to be more complementary) and consumer goods on the other (which are more substitutable), the elasticity is the same for *all* intermediate

and capital goods in all countries, and for all consumer goods.[22]

Corado and de Melo (1986) present a similar but more general structural *ex ante* model to analyse the effects of a country joining a customs union, and apply it to Portugal's accession to the European Community. Their econometric estimation of the elasticity of substitution in each sector allows for a wider range of values for σ_{Di} and σ_{Mi}, and therefore a more varied pattern of change in the key economic variables than is possible in the RTMSA. They recognise, as Evans (1996, 1997a) does, that joining a FTA or customs union involves both the elimination of home tariffs on imports from partner countries and the elimination of tariffs in partner countries facing home exports. However, their model relaxes the assumption that domestic goods are in an infinitely elastic supply (which follows from the assumption of excess capacity in the RTMSA), so that adjustments in the domestic price (P_{SMi}) when tariffs change are taken explicitly into account.

The implications of the different assumptions in these two models, as well as those of other empirical studies, are considered in the rest of this section.

4.1 Substitutability between imports and domestic production, and the elasticity of supply and demand

There are two opposing influences on the direction of change in import-competing production in the RTMSA when intra-SADC tariffs are removed. The first is a substitution effect, whereby the fall in the average import price induces a substitution of imports for domestic production. This is a negative influence. However, Dervis *et al.* (1982: 237) note that the demand for domestically produced goods is a derived demand, since it enters the CES aggregation function at the second level of nesting in the RTMSA. Therefore, the fall in the import price, which lowers the price of composite goods P_{Di}, induces an increase in demand for composite goods D_i, which implies an increase in

[22] The same applies to the price elasticity of composite demand ε^d_i.

demand for domestic goods S_{Mi}. This second effect, termed a "price effect" by Dervis *et al.* (1982: 237), exerts a positive influence on S_{Mi}.

The net effect of a FTA on import-competing production thus depends on whether this price (or demand) effect outweighs the substitution effect or *vice versa*, which in turn depends on the relative magnitude of the price elasticity of demand for composite goods ε^d_i and the elasticity of substitution between imports and domestic production σ_{Di} (Dervis *et al.*, 1982: 240). If the substitution elasticity outweighs (the absolute value of) the demand elasticity, the substitution of imports for domestic production will outweigh any tendency for import-competing production to increase in response to the rise in demand for composite goods D_i. The net effect in this case is a fall in import-competing production. This will occur in consumer goods sectors in the RTMSA, for which the parameter assumptions are $\sigma_{Di} = 2.5$ and $\varepsilon^d_i = 1.3$.

In intermediate and capital goods sectors, however, the elasticity of substitution between imports and import-competing production (0.5) is assumed to be less than the absolute value of the price elasticity of demand for composite goods (0.8). Therefore, both composite imports and import-competing production increase in these sectors when the FTA is formed.

Import-competing sectors can thus be divided into import complements and import substitutes, depending on the degree of substitutability between domestic and foreign goods as well as on the sectoral elasticity of demand for composite goods (Dervis *et al.*, 1982: 240).[23] In intermediate and capital goods sectors where $\sigma_{Di} < \varepsilon^d_i$, the formation of a FTA will cause import-competing production to *increase* when composite imports rise, and foreign and domestic goods can be seen as complements or non-competing. For other sectors, where $\sigma_{Di} > \varepsilon^d_i$, import-competing production falls when a FTA is formed, and foreign and domestic goods are substitutes.

These effects do not, however, result in a change in the domestic price P_{SMi}, because of the assumption of excess capacity. It may therefore be useful to

[23] According to Dervis *et al.* (1982: 240), this "reflects the traditional distinction between competitive imports and non-competitive imports, but ... allows for variations in the degree of substitutability rather than the simple and extreme classification that treats imports as either perfect substitutes or perfect complements for domestic production".

consider the implications of allowing the domestic price to vary for the predicted changes in some of the key variables, for any given set of demand and substitution elasticity.

The direction of change in the domestic price in import-competing sectors when a FTA or customs union is formed will depend on the relative magnitudes of σ_{Di} and ε^d_i. In Corado and de Melo (1986: 158) and Dervis *et al.* (1982: 240), for sectors classified as import substitutes (in which $\sigma_{Di} > \varepsilon^d_i$), a fall in the import price due to a tariff cut leads to a fall in the domestic price P_{SMi}. For sectors classified as import complements (where $\sigma_{Di} < \varepsilon^d_i$), a fall in the import price leads to an increase in the domestic price. This may be explained via the effect of the tariff reduction on import-competing supply. As noted above, the fall in the import price as a result of the removal of tariffs will reduce import-competing production in sectors classified as import substitutes, because the substitution of imports for domestic production will outweigh the increase in domestic production in response to a higher demand for the composite good. If domestic supply is less than infinitely elastic, the contraction in import-competing supply will lower the domestic price P_{SMi}. Similarly, in sectors classified as import complements, the demand effect outweighs the substitution effect, so that import-competing production expands and the domestic price increases.

The magnitude of the change in the domestic price depends on a number of factors, considered by Dervis *et al.* (1982: 239). Firstly, the higher the elasticity of supply, the smaller the change in the domestic price required to restore equilibrium.[24] Secondly, for sectors where the import share is low, the responsiveness of the domestic price to a change in the import price will be small. Thirdly, the size of the elasticity of demand for exports is also important in determining the responsiveness of domestic prices to changes in the tariff rate, especially when the share of exports in domestic production is large. The higher the export demand elasticity, *ceteris paribus*, the lower the domestic price change resulting from the removal of tariffs.

This third aspect illustrates an interesting contrast between the RTMSA and the

[24] In the RTMSA, since the supply elasticity is infinite, no adjustment in the domestic price is thus required.

formulations of Dervis *et al.* (1982) and Corado and de Melo (1986), and highlights the implications of the assumption of excess capacity for the treatment of exports in the RTMSA. As noted earlier, if imports and domestic production are substitutes, the fall in the import price following the removal of tariffs will reduce import-competing production, and, if supply is less than perfectly elastic, the domestic price P_{SMi} will fall. The fall in the domestic price has a feedback effect on the demand for exports, which will increase as the export price (expressed in foreign currency units) falls (Dervis *et al.*, 1982: 234). The expansion in export demand leads to an inward shift of the supply curve of the domestic product for domestic use. The net effect of the removal of the tariff on the domestic price will be less than it would have been in the absence of a feedback effect via exports. The less the adjustment in the domestic price, the easier the substitution of domestic production from the domestic market to foreign markets (i.e. the higher the export demand elasticity).[25]

In the RTMSA, the assumption of a perfectly elastic supply (due to excess capacity) thus implies that there is no feedback effect on the demand for the home country's exports when home country tariffs are eliminated, since there is no change in the domestic price. The basis of a home country's export expansion in the RTMSA thus appears to rest only on the elimination of tariffs in other SADC countries facing home country exports. As noted in Section 2.2, export expansion is determined by allocating the change in total intra-SADC exports (derived from and equal to the change in total intra-SADC imports) between countries, according to initial market share. With excess capacity, export expansion may occur without affecting home production for the domestic market.

In view of this, the important question is whether the excess capacity assumption is a reasonable one to apply to all sectors in all SADC countries. Evans (1997a: 4) notes that the assumption of infinite supply elasticity is a particularly restrictive feature of the model, and that for sectors operating close to full capacity, the supply response predicted by the RTMSA will be

[25] In the case of sectors in which imports and domestic production are complements, the removal of tariffs will raise the domestic price, since import-competing production increases, and export demand will fall. Once again, however, the net effect of the removal of the tariff on the domestic price will be less.

exaggerated.[26] It should be stressed, thus, that in consumer goods sectors, for example, the contraction of domestic industry predicted by the RTMSA when a FTA is formed will be overstated if the relevant supply elasticity is, in fact, less than perfectly elastic. This would, in turn, tend to exaggerate the extent of trade creation predicted by the model. It would, however, also suggest that the pain of adjustment to the FTA in domestic industries could be less.

The values assumed in the RTMSA for the elasticity of substitution between imports and domestic production (σ_{Di}) and the elasticity of composite demand (ε^{d}_{i}) may also be briefly considered in the light of other empirical studies. Corado and de Melo (1986: 161-162), for example, obtain econometric estimates of σ_{Di} for 26 sectors in their study of Portugal's accession to the European Community. They find, as expected, that σ_{Di} generally exceeds unity in consumer good sectors, but that it is low for most sectors with a relatively high import share, indicating complementarity between imports and domestic production in sectors such as iron and steel, machinery, and non-ferrous metals. This pattern for σ_{Di} broadly agrees with that in the RTMSA, although Corado and de Melo (1986) are able to apply sector-specific estimates to their model.

The assumed magnitudes of σ_{Di} in the RTMSA can also be compared to those employed by Dervis *et al.* (1982: 257-287) in a "stylised" nineteen-sector model of a semi-industrialised country (Turkey), used to explore the effects of changes in trade policy on resource allocation. The important feature of this study is that, as in the RTMSA, a lack of data precluded the econometric estimation of important model parameters, which therefore had to be defined by the model users. In view of this, Dervis *et al.* (1982: 258) argue that it is essential to investigate the sensitivity of the model's results to different assumptions about key parameter values. More particularly, their study examines the sensitivity of their model to systematic variations in some of the key elasticity parameters specified.

Dervis *et al.* (1982: 263-264) choose a range of substitution elasticity for their

[26] The assumption of infinite supply elasticity is retained on the export side of the model. The validity of assuming perfectly elastic export supply from developing countries has been questioned by Grossman (1982: 275) and Pomfret (1988: 140).

sensitivity analysis such that a "high" σ_{Di} is three times the size of a "low" one. Differences in the range which σ_{Di} can adopt across sectors roughly reflect the extent of product differentiation in a given sector, due to differences in quality and the degree of product homogeneity.[27] A comparison of the elasticity of substitution between imports and domestic production in the two studies reveals that, in general, for consumer goods, the RTMSA substitution elasticity of 2.5 just exceeds the "high" values of 2.25 assumed by Dervis *et al.* (1982: 263). For intermediate and capital goods, the RTMSA values for σ_{Di} (0.5) fall in between the "low" and "high" elasticity indicators in the other study. It thus appears that, in the case of σ_{Di}, the values specified for the RTMSA are of the same general order of magnitude as those in similar empirical studies. Further, while sector-specific estimates are not available, the RTMSA allows for the distinction between sectors which are import substitutes and those that are import complements.

It would nonetheless be useful to conduct sensitivity tests on the RTMSA in order to explore the sensitivity of the model's results to variations in the assumed elasticities. This is particularly important when the relative magnitudes of σ_{Di} and the elasticity of composite demand ε^d_i are considered, since their relative size determines whether import-competing production is likely to contract or expand when tariffs are removed. Dervis *et al.* (1982: 272) note that output changes are very sensitive to the specified value of σ_{Di} in their study, since sectors switch from being import substitutes to import complements quite easily when substitution elasticities are lowered. Partial equilibrium estimates of ε^d_i in Dervis *et al.* (1982: 263) yield demand elasticities well below those of the RTMSA, which vary not only between broad economic categories, but also within them.[28]

Dervis *et al.* (1982: 239) suggest that it will be difficult to predict when σ_{Di} is likely

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[27] The highest elasticity of substitution is therefore seen in agriculture and petroleum products (which are assumed to be the most homogeneous) and traditional non-durable consumer goods (which are assumed to be more substitutable in use than other manufactures).

[28] The reason for this may be that the expression from which these elasticity estimates are derived takes account of intermediate, consumption and investment demand (Dervis *et al.*, 1982: 265). In the RTMSA, the different components of domestic demand are not considered separately.

to be less than ε^d_i because, in general, the elasticity of substitution tends to be low for sectors such as intermediates, which at the same time tend to have a low elasticity of demand. Capital goods generally have low substitution elasticity, so the outcome depends on the elasticity of demand, which in turn depends on how responsive aggregate investment is to price changes. In the RTMSA, both σ_{Di} and ε^d_i are assumed to be lower in intermediate and capital goods sectors than in other sectors, but their relative magnitudes are such that σ_{Di} (0.5) is less than ε^d_i (0.8) in the former, while σ_{Di} (2.5) exceeds ε^d_i (1.3) in the latter.[29]

4.2 Substitutability between imports from partner and non-partner countries

As in the case of the change in import-competing production, there are opposing influences on the direction of change in imports from the ROW (M_{Ri}) when a FTA is formed. These have important implications for the trade diversion consequences of a FTA.

The demand for imports from the ROW is also a derived demand, since it enters the CES aggregation function at the first level of nesting in the RTMSA. Therefore, although the removal of intra-SADC tariffs will induce a substitution of M_{Si} for M_{Ri}, there is also a "price" effect similar to that in Section 4.1, whereby the fall in the price of imports from SADC, which lowers the composite import price P_{Mi}, induces an increase in demand for composite imports M_i. This influence tends to *increase* the demand for imports from the ROW (M_{Ri}).

Despite these opposing influences, it can be shown that, given the magnitude of the elasticity assumed, the net effect of the formation of a FTA will be a decrease in imports from the ROW.[30] This essentially follows from the

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[29] It is interesting to note that partial equilibrium estimates of sectoral elasticity of *supply* by Dervis *et al.* (1982: 263), assumed to be infinite in the RTMSA, yield output supply elasticity for Turkey of below 0.81 in all but four manufacturing sectors: textiles (2.12), clothing (1.88), wood products (1.87) and metal products (1.59). Supply elasticity depends on factor shares and substitutability, and is greatest in labour-intensive sectors with high substitution elasticity between capital and labour (Dervis *et al.*, 1982: 264-265).

[30] This can be done using the expression derived earlier for the proportionate change in imports from the ROW (M_{Ri}) in terms of elasticity, shares and the change in the average

assumption of a relatively high elasticity of substitution between imports from SADC and imports from the ROW (σ_{Mi}) of 2.5 in all sectors.[31]

The likely pattern of trade creation and trade diversion in the different sectors, given the assumptions of the RTMSA, may be summarised as follows. In consumer goods sectors, the removal of intra-SADC tariffs should result in an increase in imports from SADC (M_{Si}), a fall in import-competing production (S_{Mi}), and a fall in imports from the ROW (M_{Ri}). Given the assumption of equal substitutability between imports from the two sources and imports and domestic production ($\sigma_{Mi} = \sigma_{Di} = 2.5$), it follows that, for sectors in which the initial level of import-competing production exceeds imports from the ROW, trade creation will outweigh trade diversion. According to the data in Evans (1996: 37-44), initial S_{Mi} outweighs M_{Ri} in most consumer goods sectors.

In intermediate and capital goods sectors, imports are complements to domestic production ($\sigma_{Di} < \varepsilon^d_i$), so that import-competing production increases when a FTA is formed. These sectors still exhibit trade creation, however, since there is still some substitution of imports for domestic production, although this effect is weak ($\sigma_{Di} = 0.5$). However, the substitution effect between M_{Si} and M_{Ri} is as strong as before ($\sigma_{Mi} = 2.5$), so that, in these sectors, trade diversion is likely to outweigh trade creation.

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import price P_{Mi}.

31 In the 1996 simulation, M_{Ri} falls in most sectors, or shows no change, but never increases (Evans, 1996: 37-44). However, some of the aggregate country results in the 1997 RTMSA simulation show, peculiarly, a slight increase in M_{Ri}.

In Corado and de Melo (1986), trade creation is accompanied by trade diversion in most sectors (as in the RTMSA), conforming to the traditional "expected" pattern of response (Truman, 1975: 6). However, Corado and de Melo (1986) obtain econometric estimates for the elasticity of substitution between imports from different sources (σ_{Mi}), so that this elasticity varies across sectors, unlike in the RTMSA. More particularly, they find that, in some sectors, σ_{Mi} is quite low.[32] In these cases, imports from the partner and non-partner are complementary, and imports from *both* sources may increase when a FTA is formed. This results in a pattern of "double trade creation" (internal and external), rather than trade creation accompanied by trade diversion (Corado and de Melo, 1986: 160). However, as argued above, despite the aggregate country results of Evans (1997a: 11), the value of σ_{Mi} assumed across sectors in the RTMSA (2.5) is too high to allow imports from the two sources to be classified as complements. A pattern of double trade creation should therefore not be possible in this model, given the magnitude of the elasticity that has been assumed.[33]

4.3 The relative magnitude of the elasticity of substitution

[32] Lower values of σ_{Mi} are found for chemical products, non-electrical machinery, paper and printing, other non-metallic mineral products, and other food products.

[33] Double trade creation may occur when a FTA is formed if a country's external tariffs against the ROW are simultaneously lowered. While this is a plausible scenario, given tariff cuts being implemented in terms of Uruguay Round commitments, the RTMSA does not model the *simultaneous* reduction of external tariffs in the FTA simulations. Note that if a customs union rather than a FTA is formed, double trade creation may occur in countries or sectors in which external tariffs are *lowered* to meet the union's common external tariff wall.

The discussion in the previous sub-section raises the question of whether, in the SADC context, one should expect greater substitutability between imports and domestic production, or between imports from partners and non-partners. In the RTMSA, as noted earlier, σ_{Di} is assumed to equal σ_{Mi} in consumer goods sectors, whereas imports from the two sources are far more substitutable than imports and domestic production ($\sigma_{Mi} > \sigma_{Di}$) in intermediate and capital goods sectors. Corado and de Melo (1986: 162) suggest that it may be expected, in general, that the elasticity of substitution between imports from the partner and non-partner countries σ_{Mi} would be greater than the elasticity of substitution between imports and domestic production σ_{Di}. However, this question appears to be controversial.

In his study of import competition from developed and developing countries in the US domestic market, Grossman (1982) finds that for sectors with a high import share, in which the share of imports from developing countries in total US imports is significant, imports from both developed countries and developing countries are relatively close substitutes for domestic US production, but quite imperfect substitutes for each other. This implies σ_{Mi} less than σ_{Di}, in contrast to Corado and de Melo (1986) and the RTMSA. A detailed examination of the goods within each product group, by ranking them according to quality or technological sophistication, suggests an explanation for Grossman's (1982) results. The goods imported by the US from developed countries are found to be largely distinct from those imported from developing countries, with the former being more "up-market" and the latter more "down-market". In each case, it was found that home firms produce both types of goods.[34] This implies substitutability between each import source and domestic production, but non-substitutability between different sources of imports.[35]

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[34] An illustrative example is the leather industry. Leather from cattle hide may be heavy (for making shoe soles or machine belting) or light (for shoe uppers, clothing or other high-quality leather products). Calf or kip leather is also light. Imports from developed countries consist mostly of finer cattle hide leather, and calf and kip leather, whereas imports from developing countries are predominantly cattle hide leather. Domestic leather tanneries produce both types of leather. The two types of imported leather therefore tend to be complements rather than substitutes (e.g. shoe uppers and shoe soles), and domestic industry faces competition from both types of imports (Grossman, 1982: 278).

[35] Grossman (1982: 280) argues that these findings are consistent with the product cycle theories of Vernon (1966) and Hufbauer (1970), which suggest that imports from developing

Grossman's (1982) findings do not support the assumption of *equal* substitutability between imports and domestic production and imports from different sources, made generally by Baldwin and Murray (1977), and for consumer goods sectors by Evans (1996, 1997a). However, they do support the conclusion of Baldwin and Murray (1977), implicit in Evans (1996, 1997a) for consumer good sectors, that the effect of tariff preferences for developing countries will be seen more through trade creation (replacement of domestic industry) than trade diversion (replacement of imports from the ROW).

Other studies, however, suggest that it is more likely for the elasticity of substitution between imports and domestic production (σ_{Di}) to be smaller than that between competing imports (σ_{Mi}) (Ahmad, 1978; Verdoorn and Schwartz, 1972). This pattern of substitution possibilities, also found to be most common by Corado and de Melo (1986), and which is characteristic of intermediate and capital goods sectors in the RTMSA, suggests that the effects of tariff preferences will be seen more through trade diversion than trade creation.

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and developed countries will be poor substitutes for one another. The US domestic industry, on the other hand, produces the entire spectrum of products, perhaps continuing to compete with developing country producers with the aid of protection (even after product cycle considerations would suggest otherwise).

In the southern African context, the discussion in this sub-section highlights the difficulties of assuming the same magnitude for this elasticity in all countries, given the highly unequal levels of development among SADC members. From South Africa's point of view, for example, it is probably unrealistic to expect a high degree of substitutability between imports from the ROW and imports from the rest of SADC. On the other hand, in the case of SADC countries whose imports from the region come largely from South Africa, it may be more plausible to assume a greater substitutability between imports from South Africa and the ROW than between imports and domestic production, at least in some sectors. A detailed analysis of the imports of SADC member countries from the region and the ROW, as well as an examination of the degree and type of differentiation within product categories along the lines of Grossman (1982), would be required before any conclusion could be drawn.

5. Refining and extending the RTMSA

It was noted in the introduction that any assessment of the RTMSA is complicated by the fact that the model is in the process of being developed to take account of a variety of aspects which have not been included to date. Nevertheless, an attempt will be made in this final section to highlight some of the directions in which the model could usefully be extended.

As acknowledged by Evans (1996: 5), the RTMSA is a partial equilibrium model, and therefore does not include income generation and investment. It does not incorporate capital and does not consider income distribution effects. While the analysis is comparatively static, and is thus unable to take account of the potential dynamic effects of the formation of a SADC FTA, it is often argued that these effects are inadequately defined and not readily quantifiable (Robson, 1987: 32-33). Further, the impact of the removal of non-tariff barriers (NTBs) has not been included for data reasons (Evans, 1996: 6-7; Evans, 1997a: 3). Given the widespread perception that NTBs constitute a major constraint on intra-regional trade (ADB, 1993: 24; Maasdorp and Whiteside, 1993: 18-19), the implication of their elimination or reduction calls for some consideration.[36]

[36] In Brown *et al.*'s (1992) empirical study of NAFTA, NTBs are incorporated by finding the *ad valorem* tariff rate that will maintain imports covered by NTBs in a particular product category

The focus in this section, however, will be on issues relating particularly to the trade creation-trade diversion consequences of a SADC FTA, and the question of the potential benefits of economies of scale and intra-industry specialisation.

The discussion in the previous sections of this paper suggests that the RTMSA could be used to estimate trade creation and trade diversion at the sector level in each country.[37] It is also important to calculate the benefits to each country of export expansion to its partners. Whether this represents trade creation or trade diversion from the partner's point of view is irrelevant to the exporting country's gain. This gain is derived from the opportunity of exporting on more favourable terms than would otherwise be possible, and is equivalent to the income loss that would have been incurred if the product had been sold domestically or to the ROW (Robson, 1987: 249). The method of calculation of export expansion in the RTMSA is questionable, however, and should be modified to account for the tariff benefits obtained by a particular country in each export market.

Despite allowing for product differentiation by country of origin, the RTMSA is based on the assumption of constant returns to scale, and therefore disregards the implications of scale economies in production. Work is apparently under way at present to incorporate scale into the model. This would require some identification of sectors in which economies of scale are likely to be important, and, for these sectors, an estimation of the cost-reduction effect of integration (Corden, 1972), taking account not only the effect of market enlargement, but also any predicted increase in demand as a result of the FTA itself.[38]

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at a pre-determined level. The *ad valorem* tariff rate in this product category is then an average of the NTB tariff-equivalent rate and the nominal tariff rate, with the NTB tariff-equivalent weighted using the NTB coverage ratio (Brown *et al.*, 1992: 16).

[37] Rearranging the model's expression for the proportionate change in imports from SADC (M_{Si}) when tariffs are removed, appears to allow the distinction between that part of the change in M_{Si} which reflects trade creation and that which reflects trade diversion.

[38] Owen (1983), for example, has calculated the scale-related cost reductions resulting from intra-European Community trade creation, although his approach has been criticised for failing to establish a causal link to trade liberalisation (Pomfret, 1988: 133). Pearson and Ingram (1980) use individual firm data to estimate the cost reduction benefits from economies of scale in a customs union among developing countries in their study of the welfare effects of integration between Ghana and the Ivory Coast.

In Brown *et al.*'s (1992: 15-16) empirical study of NAFTA, sectors are classified as perfectly competitive or monopolistically competitive depending on the degree of scale economies in production.[39] Products in both types of industry are characterised by some degree of product differentiation: in perfectly competitive sectors, products are differentiated by country of origin, as in the RTMSA, while in monopolistically competitive sectors they are differentiated by firm. This allows for consideration of the gains from intra-industry specialisation and trade, including the benefits of increased variety for consumers and, in the case of monopolistically competitive sectors, the exploitation of economies of scale.[40]

Since the RTMSA does not currently model imperfect competition, it is not possible at this stage to investigate the benefits of intra-industry specialisation resulting from the exploitation of scale economies *per se*. However, the RTMSA could, in principle, be used in its present form to consider the extent of intra-industry versus inter-industry specialisation on formation of a FTA, from which inferences could be drawn about possible gains from increased consumer variety and the likely costs of adjustment to the FTA.

The detailed simulation results of Evans (1996: 37-44) report the percentage changes in imports from SADC and exports to SADC in each three-digit ISIC category for each country. If trade, output and employment data were available at a more disaggregated level (at least at the four-digit ISIC level) then, for a given SADC country, the presence of both increased exports to and imports from the rest of the region within a particular sector would suggest some degree of intra-industry expansion. Further, instead of treating a country's imports from SADC in a given sector as a single aggregate which is substitutable with imports from the ROW, each source of SADC supply could be

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[39] All manufacturing sectors, as well as mining, are characterised by monopolistic competition, while agriculture is designated as perfectly competitive.

[40] The simulation results of Brown *et al.* (1992: 24-26) show the percentage change in industry output and the percentage change in the number of firms in each monopolistically competitive sector. The difference between these two yields the percentage change in *firm* output. It is found that firm output increases in all sectors in the US and Canada, and in most sectors in Mexico. This suggests widespread benefits from economies of scale in NAFTA (Brown *et al.*, 1992: 28-29).

considered separately (Evans, 1997b). This would facilitate the simulation of *bilateral* trade changes in each sector, as in Brown *et al.* (1992), so that the pattern of inter-sectoral versus intra-sectoral specialisation between each pair of SADC countries could be investigated.[41] More specifically, to determine the pattern of specialisation within the bloc fully, it seems that cognisance would have to be taken of substitutability between different SADC sources of supply, as well as the actual tariff benefits obtained in each SADC export market for a particular exporting country.[42]

In their analysis of NAFTA, Brown *et al.* (1992: 27) find that both the US and Canada increase imports from each other in most sectors, suggesting a marked expansion of intra-industry trade. On the other hand, although Mexican imports from its two partners increase in all categories, its exports are strongly concentrated in a small range of sectors, suggesting a far greater degree of inter-sectoral specialisation for Mexico when the FTA is formed.[43] The implication is that the benefits of liberalisation between Canada and the US arise mostly from increased product variety rather than inter-sectoral specialisation (Brown *et al.*, 1992: 27). The costs of adjustment to the FTA are therefore likely to be easier for these countries.[44]

What inferences can be drawn from this for SADC? It may be suggested that if both factor endowments and *per capita* income levels are more similar among southern African countries (or among a subset of southern African countries) than between these countries and their trading partners in the rest of the world, then regional liberalisation could provide benefits from intra-industry specialisation which may not be readily attainable through multilateral

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41 In Brown *et al.* (1992), each of the NAFTA members is modelled individually.

42 As noted earlier, the current treatment of exports in the RTMSA does not recognise this latter aspect (see Evans, 1996: 13).

43 The US, for example, reduces its imports from Mexico in a wide range of industrial products. A fall in imports from a particular partner country cannot be captured in the RTMSA since, as noted above, imports from the bloc are considered as a single aggregate.

44 It is widely argued that the costs of adjustment to trade liberalisation are likely to be less if tariff reductions lead to intra-industry rather than inter-industry specialisation (Balassa, 1979: 267; Krugman, 1981, 1982; Greenaway, 1982: 52; Behar, 1991: 532-533).

liberalisation.

To examine this further, the current extent of intra-industry trade between SADC members in relation to the levels of intra-industry trade between SADC countries and their external trading partners may be considered, particularly since the bulk of intra-regional trade takes place in manufactures where intra-industry trade tends to be more prevalent. The most complete sets of disaggregated bilateral trade flows between SADC members are those involving SACU or Zimbabwe (IDC, 1996; Zimtrade, 1996). Since South Africa and Zimbabwe have the most similar industrial structures in the region (Holden, 1996: 59), it may be of particular interest to consider the prevailing levels of intra-industry trade between them.

Using four-digit ISIC data, unadjusted Grubel-Lloyd (1975) indices of intra-industry trade have been calculated for SACU and Zimbabwe, and for SACU and the ROW. The results for selected sectors are shown in Table A-1. The discussion of these indices is somewhat tentative for the following reasons. Firstly, it is problematic to compare intra-industry trade ratios between SACU and Zimbabwe with those between SACU and the ROW, because of the significantly larger *relative* trade imbalance in manufactures between SACU and Zimbabwe, shown by the Grubel-Lloyd indices for manufacturing as a whole (Table A-1). Secondly, the problems of using an unadjusted index to measure intra-industry trade are well documented. The index should preferably be adjusted to account for categorical aggregation and, it is sometimes argued, for overall trade imbalance.[45] Thirdly, the index itself does not reflect the significance of trade in a particular sector. For example, it is of little consequence that intra-industry trade in pottery between SACU and Zimbabwe is 95 percent if the absolute trade flows in this sector are extremely small.

Nevertheless, the results suggest that intra-industry trade between SACU and Zimbabwe exceeds intra-industry trade between SACU and the ROW in a number of sectors in which SACU-Zimbabwe bilateral trade is important. There is significant intra-industry trade with Zimbabwe relative to the ROW in some

[45] A detailed analysis of issues relating to the measurement of intra-industry trade is beyond the scope of this paper. For further discussion, see Simson (1987: 76-81), Parr (1994: 397-399) and Greenaway and Milner (1983).

foodstuffs and textiles sub-sectors. More interesting, perhaps, are the levels of intra-industry trade in sectors with significant bilateral trade flows such as iron and steel, non-ferrous metals, some metal products and machinery sub-sectors, as well as transport equipment. There is noticeably little intra-industry trade with Zimbabwe in chemical products, except for medicinal and pharmaceutical preparations.

According to Greenaway (1991: 166), intra-industry trade is more likely to be recorded in capital-intensive than labour-intensive product lines. In this regard, the factor intensity of a SADC country's trade with the rest of the region may be compared to the factor intensity of its trade with the ROW. A preliminary investigation for SACU and Zimbabwe suggests that SACU's (effectively South Africa's) comparative advantage in the region lies in more capital-intensive manufacturing sectors, while Zimbabwe's regional comparative advantage is concentrated in labour-intensive sectors (Cattaneo, 1998: 222-223). It is perhaps likely, therefore, that despite their relative similarity of industrial structure in the southern African context, the adjustment to free trade between South Africa and Zimbabwe would primarily take the form of inter-sectoral resource reallocation, as between Mexico and its partners in NAFTA. There could, however, be intra-industry specialisation of some significance in particular manufacturing sectors.

Balassa's (1979: 258) suggestion, that there may be greater scope for intra-industry expansion in a regional union among countries which are at lower but more equal levels of development, may apply to a subset of SADC countries. Further research is necessary into the factor intensity of production and trade in the region, the extent and type of product differentiation, and the prospects for exploiting economies of scale in a regional market before any conclusions can be drawn. Greenaway (1991: 167) notes, however, that as industrialisation proceeds and *per capita* income increases, intra-industry trade will become more important in the trade of developing countries. Integration in the SADC region could thus be aimed at stimulating intra-industry rather than inter-industry trade expansion.

6. Conclusion

This paper has attempted to provide a critical assessment of the RTMSA, the

model underlying the only serious study to date, which provides quantitative estimates at the sub-sectoral level of the impact of a SADC FTA on the individual members of SADC.

Evans' (1997a) results suggest that the formation of a SADC FTA will result primarily in trade creation, with little or no trade diversion. However, the discussion in this paper illustrates that, in consumer goods sectors, the excess capacity assumption and the assumption of equal elasticity of substitution between imports from SADC and the ROW and between imports and domestic production in the RTMSA tend to exaggerate the likely trade creation effects of a SADC FTA. Further, the absence of any reduction in imports from the ROW at the country level in the 1997 simulation, except in the case of Mauritius, and the marginal increase in ROW imports for some members appear to be anomalous results, given the magnitude of the assumed elasticity in the RTMSA. In contrast to the 1996 simulation, Evans' (1997a: 11) results reflect little or no trade diversion when a FTA is formed. Taken together, these factors appear to make the FTA look more favourable from the point of view of an orthodox static customs union theory, which assesses the welfare implications of integration on the basis of the balance between trade creation and trade diversion, than would perhaps be expected.

The inferences drawn by Evans (1996, 1997a) from the simulation results of the RTMSA are, firstly, that the formation of a SADC FTA will, on balance, be trade creating, and therefore beneficial to SADC member countries. Secondly, the gains from export expansion will be significant and widespread, while the costs of adjustment will be concentrated in only a few adversely affected sectors and in countries experiencing a marked reduction in government revenue. An adversely affected sector is defined in the 1996 study as one which experiences a greater than two percent fall in import-competing production. It is, however, the net effect of the change in import-competing production *and* exports resulting from the FTA that will determine the impact on gross output and hence employment in a given sector. It seems necessary, then, to look at comparative *absolute* changes in import-competing supply and exports to ascertain the net impact on gross output.[46] It appears, therefore, that the

[46] For example, in Malawi's textiles sector, import-competing production falls by 1.6 percent, so that the sector is not considered to be adversely affected by the formation of the FTA. However, while exports to SADC expand by 34.4 percent, the resulting absolute increase in exports to SADC is not large enough to offset the absolute reduction in import-competing

incidence of adverse sectoral effects on formation of a SADC FTA may be more widespread than the study suggests (Cattaneo, 1998: 196-201). Such effects appear to be concentrated in sensitive sectors such as textiles and clothing, as well as in food and agriculture, all of which are sectors with relatively significant shares of both import-competing production and employment in most countries.

In the orthodox analysis of the costs and benefits of regional trade integration, a reduction in import-competing supply reflects the production effect of trade creation, and is thus considered to be welfare-improving. However, while adjustment costs are ignored in the comparative static analysis of customs unions, they should be included in any complete welfare appraisal of the effects of integration (Robson, 1987: 44). As Behar (1995: 18) notes, prospective partners in a regional union of developing countries are likely to be concerned "by the costs of managing th[e] adjustment more than by some hypothetical change in national income". Further, the contraction of domestic industry accompanying trade creation may not be considered to be welfare-improving, particularly for a developing country wishing to pursue industrialisation (Cooper and Massell, 1965). In terms of this analysis, it may indeed be preferable for trade expansion within the bloc to take place through trade diversion rather than trade creation, if the latter is reflected by the contraction of domestic industry in some SADC member states. According to the ADB (1993: 29, 37), for example, it would be more desirable for South Africa's increased penetration of the regional market to take place via the replacement of imports from the ROW (that is, through trade diversion) than via the displacement of other regional exporters or of domestic production for the domestic market in these countries, to avoid serious negative consequences for existing regional industry. In this view, assessing the desirability of a SADC FTA simply in terms of the conventional criterion that trade creation should outweigh

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production. Gross output therefore contracts, as does employment. Indeed, the decline in the actual level of employment in this sector exceeds that in any of the sectors in Malawi identified by Evans (1996) as adversely affected.

trade diversion would seem inadequate.

On the other hand, the possible benefits of a SADC FTA may be understated in the RTMSA, to the extent that the model is currently unable to estimate the potential benefits from the exploitation of economies of scale and intra-industry specialisation in a regional market. A major obstacle to the use of the RTMSA in its present form to distinguish the role of factor endowments and product variety in determining the pattern of trade and specialisation which may follow the formation of a SADC FTA appears to be the treatment of a particular country's imports from SADC and exports to SADC in a given sector as a single aggregate. This aspect, together with the method of calculation of a country's export expansion in a given sector, seem to mask the likely pattern of specialisation between individual countries within the bloc. An extension of the model to allow the estimation of bilateral trade changes in each sector would clarify the possible inter-sectoral and intra-sectoral patterns of specialisation resulting from the removal of intra-SADC tariffs.

Table A-8: Indices of intra-industry trade between SACU and Zimbabwe and SACU and the rest of the world for selected sectors, 1994 (percentage)

Sector	SACU-ROW	SACU-Zim
Meat processing	42.7	92.32
Dairy products	83.21	26.27
Fruit and vegetable canning	13.3	72.58
Vegetable and animal oils and fats	30.33	10.96
Grain mill products	51.97	72.41
Confectionary	70.52	74.99
Food products nec	59.52	57.55
Prepared animal feed	59.93	68.87
Soft drinks and carbonated waters	11.91	39.66
Spinning and weaving of textiles	62.7	65.45
Made-up textile goods	48.29	17.10
Knitting mills	54.47	75.62
Clothing	93.42	37.53
Sawmills	78.46	27.68
Wooden containers	87.61	71.42
Wood and cork products nec	71.36	51.94
Wooden furniture and fixtures	30.57	26.75
Pulp, paper and paperboard	46.36	13.89
Paper containers	11.43	57.20
Industrial chemicals	88.22	4.50
Fertilizers and pesticides	88.67	7.22
Synthetic resins and plastic materials	37.06	2.90
Paints, varnishes and lacquers	56.41	29.17
Medicinal and pharmaceutical preparations	10.58	46.54
Other chemical products	26.36	10.02
Miscellaneous products of petroleum and coal	51.9	85.90
Tyres and tubes	60.93	32.88
Other rubber products	18.23	26.23
Other plastic products	36.89	13.42
Other non-metallic mineral products	98.00	58.81
Iron and steel basic industries	21.33	31.64
Non-ferrous metal basic industries	39.66	42.45
Cutlery, hand tools and general hardware	39.97	18.36
Furniture and fixtures of metal	54.25	83.80
Structural metal products	27.84	85.25
Other fabricated metal products	72.25	88.56

Engines and turbines	22.75	17.93
Agricultural machinery	17.97	82.47
Special industrial machinery	21.23	12.57
Office and accounting machinery	8.35	18.83
Other non-electrical machinery	29.48	7.76
Electrical industrial machinery	16.36	10.47
Radio, television and communication equipment	11.68	27.36
Electrical appliances and housewares	15.67	29.91
Other electrical apparatus	27.97	53.96
Railroad equipment	48.18	37.73
Motor vehicles	22.82	15.66
Motorcycles	23.26	60.78
Transport equipment nec	12.19	37.10
Total manufacturing	74.41	49.25

Source: **Own computations from IDC (1996).**

Note: **The unadjusted Grubel-Lloyd index is given by $B_i = ((X_i+M_i) - |X_i-M_i|)/(X_i+M_i) \times 100$.**

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