SAND IN THE WHEELS: NON-TARIFF MEASURES AND REGIONAL INTEGRATION IN SADC

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NON-TARIFF MEASURES
AND REGIONAL INTEGRATION IN SADC

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Abstract

The Southern African Development Community (SADC) comprises 15 countries with the common objective of regional integration. Member countries have been successful in reducing tariffs since 2000, but intra-regional trade has not increased as expected. One likely reason is that significant non-tariff measures (NTMs) remain. The most common NTMs in SADC are sanitary and phyto-sanitary restrictions, certification procedures, quantity control measures, other technical regulations, government procurement, investment restrictions and intellectual property rights. Some measures are legitimate, such as those relating to food safety and the introduction of invasive species, but other measures may be used to limit trade to protect domestic producers or trade restrictiveness unintentionally exceeds what is needed for the measure's non-trade objectives.

It is relatively simple to list the numerous non-tariff measures, but assessing their impact is more difficult. Two methods involve trying to measure the effect on quantity using a gravity model or by looking at the gap between world and domestic prices. Data on NTMs for the SADC region is incomplete and a greater effort at data collection is needed. However, to illustrate the methodology and potential impacts of reducing barriers, we assume SADC countries have similar NTMs as the average for Africa. The impacts on trade, output, employment and incomes of reducing these barriers are assessed using a global general equilibrium model. Depending on the initial trade flows and the magnitude and scope for removing the trade distorting effects of non-tariff measures, the increases in national exports are up to 2.2 per cent. National output, employment and incomes will also increase in all SADC countries.

Keywords: non-tariff measures, regional integration, welfare

JEL Classification: F14, F15, F16

Acknowledgements

Contents

1. INTRODUCTION

SADC comprises 15 countries with the common objective of regional integration.[2] Most members eliminated or reduced their tariff barriers between the member countries by 2012. Compared with other regional economic communities in Africa, the share of intra-SADC trade at 10 per cent of the region's total trade is relatively high, but this has not increased as the tariffs were reduced. Non-tariff barriers remain and their reduction or removal would make a significant contribution to trade within the region.

What are Non-Tariff Measures?

Non-tariff measures (NTMs) are policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both. A classification can be seen in table 1. NTMs may be legitimate, relating for example to food safety. Non-tariff barriers (NTBs), as distinct from non-tariff measures, refer to impediments that are designed to restrict trade for the benefit of domestic producers. NTBs may take the form of import quotas, subsidies, customs delays, technical barriers, or other systems preventing or impeding trade.

Table 1. Classification of non-tariff measures

Technical measures	A	Sanitary and Phyto-sanitary Measures (SPS)
	B	Technical Barriers to Trade (TBT)
	C	Pre-Shipment Inspection And Other Formalities
Non-technical measures	D	Contingent Trade-Protective Measures
	E	Non-Automatic Licensing, Quotas, Prohibitions And Quantity-Control Measures Other Than For SPS Or TBT Reasons
	F	Price-Control Measures, Including Additional Taxes And Charges
	G	Finance Measures
	H	Measures Affecting Competition
	I	Trade-Related Investment Measures
	J	Distribution Restrictions
	K	Restrictions On Post-Sales Services
	L	Subsidies (Excluding Export Subsidies Under P7)
	M	Government Procurement Restrictions
	N	Intellectual Property
	O	Rules Of Origin
Exports	P	Export-Related Measures

Source: UNCTAD MAST (http://unctad.org/ntm).

The UNCTAD MAST classification of NTMs is useful in assisting transparency. The distinctly neutral definition of NTMs does not imply a direction of impact nor a judgement about the legitimacy of a measure.

It notably comprises Sanitary and Phytosanitary (SPS) measures and Technical Barriers to Trade (TBT), which primarily have important objectives related to health and environmental protection and which may equally apply to domestic producers. Requirements include tolerance limits for additives or contaminants, quarantine requirements to eliminate pests, performance requirements and conformity assessments such as inspection or certification. These measures are referred to as "technical measures", as they define mandatory product characteristics rather than taking a quantitative or price-based approach. Technical measures still have an impact on trade and can become substantial barriers. Furthermore, the application can be abused to protect the local industry from competitive imports. SPS measures require 'scientific justification', according to WTO regulations, but this is somewhat subjective.

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[2] The 15 countries are Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, the United Republic of Tanzania, Zambia and Zimbabwe.

Countries are usually setting their own standards for SPS according to their particular environment. This leads to many disputes.

"Non-technical" measures comprise the instruments of trade policy that specifically aim to change quantities or prices of imported goods, such as quotas, price controls or contingent trade-protective measures (anti-dumping, safeguard and countervailing duties). These measures are often termed NTBs due to their unequivocally discriminatory and protective nature.

SADC NTMs

The most common NTMs in SADC are sanitary and phyto-sanitary restrictions (SPS), non-automatic licensing requirements, export restrictions and technical regulations, according to Kalaba and Kirsten (2012) (see figure 1). Most of the SPS measures apply to agricultural products. In terms of products, the most common application of NTMs appears to be to fruits (over 400 measures), meat (over 250), and dairy products (over 200). Fruits are prone to be carrying insects such as fruit fly whereas meat and dairy products can contain bacteria (e.g. salmonella and listeria) that are dangerous to human health. In addition, food can also contain contaminants such as lead, mercury or pesticides. There are also a large number of measures applying to livestock. These are to restrict the spread of debilitating diseases, such as Foot and Mouth Disease in cattle or the spotted stemborer (*Chilo sacchariphagus)* in sugar cane. Hence, it is obvious that the appropriate applications of NTMs have significant benefits.

Figure 1. Incidence of NTM restriction in SADC by type, number of measures
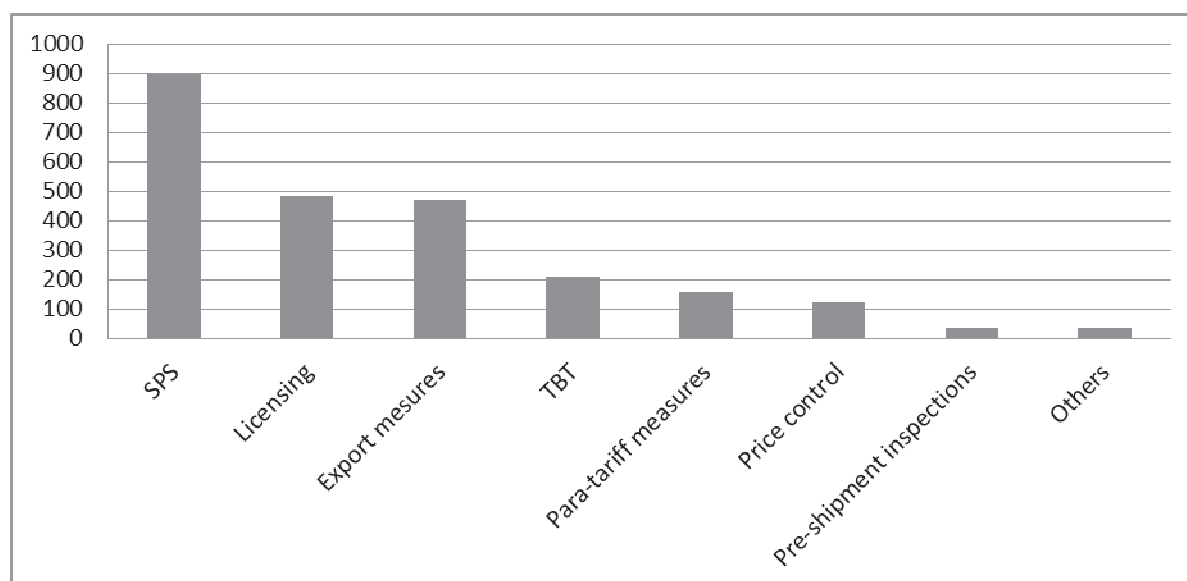
Source: Kalaba and Kirsten (2012).

The SADC region was scheduled to develop a Customs Union by 2010, but this has not yet occurred. The next step, a SADC common market, is one of the primary objectives. A common market would remove the need for internal border controls, the source of many complaints impeding trade. The most common complaints when crossing borders include unrecorded fees (bribes) and the discriminatory application of regulations regarding weights and measures on roads.[3] Other complaints relate to labelling and standards. Angola requires for example that all imports into the country are labelled in Portuguese. Other examples include a ban in Zambia on dairy imports from neighbouring countries, and a requirement that sugar imports be fortified with Vitamin A.[4]

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[3] Examples of complaints regarding NTMs at SADC borders are documented by the Trademark Southern Africa. See: http://www.tradebarriers.org/active_complaints.

[4] http://www.thestandard.co.zw/2012/08/26/non-tariff-barriers-threat-to-sadc-regional-integration/

There is not much trade between SADC members. It is possible that the reason the shares of trade between members is low is because the NTMs are prohibitive or very restrictive, and removing them may increase trade greatly. However, in computable general equilibrium models, low levels of initial trade may imply that reducing NTMs will little impact on trade, particularly if the ad valorem equivalent of the NTMs is in the order of 10-20 per cent.

Table 2. SADC country merchandise exports and share to members

	Total exports	Share to SADC
	$m	%
Botswana	5149	6
Madagascar	2140	3
Malawi	1566	21
Mauritius	3278	13
Mozambique	3661	23
Namibia	4689	17
South Africa	93550	11
United Republic of Tanzania	4106	6
Zambia	11324	8
Zimbabwe	2154	31
Angola *and* Democratic Republic of the Congo	46392	6
Lesotho *and* Swaziland	2066	7

Source: GTAP database V9.1. Trade data for 2011. Excludes Seychelles.

SADC tariffs have practically been eliminated with the exception of Zimbabwe, Angola and Democratic Republic of the Congo. Zimbabwe has an average tariff of around 16 per cent on imports from South Africa. However, the share of intra-regional trade has not increased in proportion as the tariff have been reduced. It is currently around 10 per cent. An obvious candidate restricting trade is NTMs.

2. METHODOLOGY

UNCTAD, in collaboration with others, has developed a classification of NTMs (table 1) and is compiling country by country a listing of measures and the products they affect. This process is currently incomplete for the SADC region. However, after a listing of measures the next step is to analyse the potential impact of their removal, notwithstanding some NTMs should not be removed.

General equilibrium modelling

We make use of a general equilibrium model to capture the interactions in the whole economy by linking all the sectors through input-output tables and by linking all countries through trade flows. The general equilibrium model used here is GTAP[5], a well-documented, static, multiregional, multisector model that assumes perfect competition, constant returns to scale and imperfect substitution between foreign and domestic goods and between imports from different sources. By examining non-tariff changes at an industry level, it is possible to make a reasonable estimate as to their likely effects on the industry's prices, production and employment, consumption and trade. The key step is to determine the size and nature of the shock, the ad valorem equivalent of the non-tariff measures. The model is static, with no phasing in of reforms or underlying growth in the economy. The results show the impact of the policy change at a given point in time.

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[5] For information on GTAP, see www.gtap.org.

In this application we use the standard closure, with the exception of allowing for a change in total employment of unskilled labour in developing countries.[6] Here we assume that unskilled labour is so abundant that any increase in demand for unskilled labour can be met through a rise in both the price and quantity of labour. Thus adjustment occurs in wages and employment of unskilled labour. This assumption is more realistic than fixed employment, but it raises the question of what response can be expected. In the absence of definitive data, an elasticity of one is assumed. This means the change in employment in the economy is approximately equal to the change in the real wage. The assumption has some implications for labour markets such as the employment. Workers may also move without cost between sectors. This assumption has implications for the welfare effects of a policy change because the use of previously unemployed factors of production has a much greater impact on output than merely shifting resources from one sector to another.[7]

There are two approaches to measuring the impact of non-tariff measures on trade, i.e. ad valorem equivalents (AVEs).[8] This involves measuring the deviation in quantities or in prices from what might be expected.

2.1. THE QUANTITY APPROACH

The first method is a gravity model to estimate what level of bilateral trade can be expected in the absence of measures. Bilateral trade is thought to depend positively on the income levels of the two countries and negatively on the distance between them. Incomes, a proxy for the size of the markets, are commonly measured by GDP and distance is considered a proxy for transport costs. The traditional equation, expressed in logs, looks something like this:

$$\ln(X_{ij}) = +\beta_0 + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(D_{ij})$$

where X_{ij} is the trade flow between countries *i* and j, GDP is national output in the respective countries, D_{ij} is the distance between them and β_s are estimated coefficients. This relationship does not hold exactly of course, so there are many attempts to estimate it econometrically by identifying other factors that might influence bilateral trade such as tariffs and a common border, currency or language.[9]

If trade is less than might be expected, the difference may be attributed to non-tariff measures. From this, it is possible to estimate a tariff equivalent, a tariff that would have the same effect on trade flows as the non-tariff measure. Kee et al. (2009) provide an example of this approach. This requires an estimate of elasticity of demand for imports. Given an elasticity, the procedure involves finding an equivalent tariff that would restrict trade to the observed level.

This approach is dependent on an appropriate specification of the model, because the NTM is assumed to correspond to the residual. If they model is mis-specified, due perhaps to unobserved variables, the estimate of NTMs will be biased. A second difficulty is that the estimate reflects the combined impact of several measures, some of which may be binding and some not. For example, if a tariff rate quota is non-binding, its removal will have no effect.

2.2. THE PRICE-GAP APPROACH

A second approach involves measuring the price gap between domestic and border (CIF) prices, as followed by Cadot and Gourdon (2012). The 'law-of-one-price' stipulates that in the absence of transport costs and other barriers, an identical product should sell for the same price in different locations.

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[6] Closure refers to the choice of exogenous and endogenous variables.

[7] Mashayekhi et al. (2012) assess the impact of different labour market assumptions on the results in a study on regional integration in SADC.

[8] The impact of NTMs on trade is frequently expressed as a tariff equivalent that would have the same trade restrictiveness.

[9] See Deardorff 1998 for a discussion of gravity models.

The price gap approach is based on this concept. This approach requires an adjustment for transport and quality differences. This is less difficult for homogeneous primary products like rice or sugar but may be more complex for manufactured goods. Typically there is a problem of comparing domestic prices across countries and there are also difficulties in measuring a reference (international) price. The difficulties with this approach can be seen by comparing prices received by maize producers in several African countries for which FAO has data. Ideally, prices should vary by no more than transport costs, but there is an 80 per cent difference between South Africa and Niger. In SADC, maize prices in Madagascar and South Africa are very similar, but there is a two-fold difference in banana prices (not shown) between South Africa ($481) and Madagascar ($272). Unfortunately, the coverage of data is insufficient for a more sophisticated comparison.

Figure 2. Prices of maize in selected African countries, 2011, in USD per tonne
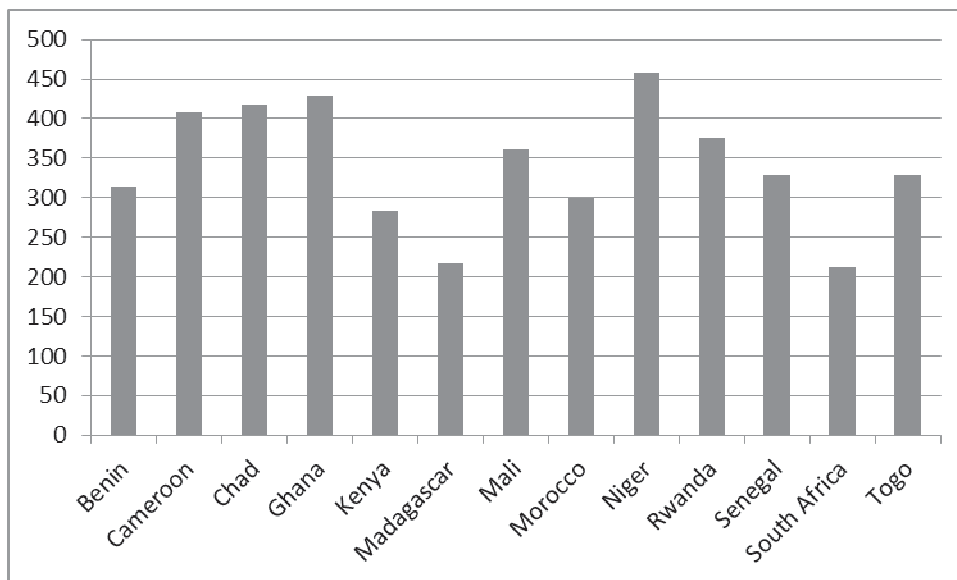
Source: FAOSTAT (2014)

The two approaches should point in the same direction. Low trade volumes should correspond with significant price differences. If there is little observed difference in prices it is unlikely that non-tariff measures are impeding trade.

Both approached have advantages and disadvantages. An advantage of the price-gap approach to calculate AVEs used in CGE models is that AVEs can directly be calculated from the coefficients without requiring an import demand elasticity. This can be problematic when the elasticities used in the CGE model differ from the ones used for the AVE calculation. In both cases the methodology used to obtain the AVEs can be inconsistent with the GTAP modeling approach. The reduced form used for the AVE calculation could be different from a reduced form derived from GTAP.

2.3. FEEDING NTMS INTO A CGE MODEL

Due to the wide range of types of NTMs, NTMs may generate different kinds of economic effects such as protection effects as well as supply- and demand-shifting effects (Fugazza and Maur, 2008).

Three approaches to feeding NTMs into a general equilibrium model such as GTAP have frequently been used. Perhaps the most common approach is as a tariff equivalent. This implies that the tariff revenue is collected by the Government, and removal of the NTM will lead to a fall in tariff revenue. The policy generates rents which are transferred when the measure is reduced, just as with the removal of a tariff. This is appropriate where the rents from the NTM are captured by the importing economy, such as a licensing arrangement.

Other approaches are applicable if the rents are captured by the exporter or dissipated in rent-seeking behaviour. An export tax equivalent is appropriate when the exporter captures the rents. This would be the case when exporters are allocated quotas, such as under the Multi-Fibre Agreement (on textiles and clothing) or exports of beef from some SADC countries to the European Union. Liberalisation means the importer gains from lower prices and the exporter loses the rents.

The third approach is a productivity shock. This is applicable where there are no rents captured, such as many SPS, TBT and other regulatory measures which create efficiency losses. Andriamananjara et al. (2003) refer to this as institutional frictions or 'sand in the wheels'. Regulatory convergence reduces the costs of compliance with the SPS and TBT requirements.[10]

We apply a combined approach where costs associated with compliance with SPS measures and TBT are modelled as efficiency losses and trade barriers stemming from other NTMs such as contingent trade-protective measures are modelled as a tariff equivalent. This reflects the assumption that technical measures raise costs of compliance which may equally apply to domestic producers. In GTAP, a productivity shock can be modelled bilaterally allowing simulating regulatory convergence through harmonization or mutual recognition between two countries. Non-technical measures have an unequivocally discriminatory and protective nature.

The simulation results are sensitive to the modelling approach of NTMs in CGEs. Fugazza and Maur (2008) conduct a sensitivity analysis and obtain different results under different model specifications. CGE models are mostly designed to assess effects of trade policy changes stemming from changes in taxes such as ad valorem tariffs on imports and not changes of NTMs. For example, the presence of an NTM does not indicate whether the measure is indeed a binding constraint, nor what the impact on trade of its removal might be. An import quota, such as South Africa's quotas on beef, pork, sheepmeat and poultry, for instance, is a transparent NTM, but if the quota is not filled the impact of its removal will be negligible. Although we conduct a sensitivity analysis with different NTMs modelling approaches results have to be interpreted with care.

The shocks can be implemented bilaterally or multilaterally depending on whether the barrier affects all countries or can be specified bilaterally.

Because NTMs have benefits, for example in limiting the spread of infectious diseases and pests, it is unrealistic to remove them completely. That leads to a decision of what proportion of the barriers to remove. This may depend on how different the standards are from international standards, if these exist. For example, there are maximum residue limits for aflatoxins in peanuts. The EU standard is 8μg/kg. The NTM to be reduced should depend on the distance between the two levels. Unfortunately, this is not to suggest that an MRL of 16μg/kg is twice as dangerous, nor would it lower the costs of production by a predictable amount. These relationships are non-linear.

3. DATA

The applied tariffs in the SADC countries are shown in table 3, along with MFN tariffs for comparison. With the exception of the United Republic of Tanzania and Malawi, intra-regional tariffs are very low. There is a large margin of preference over MFN partners, up to 20 per cent. Although there may be some tariff peaks in SADC, it seems reasonable to conclude that tariffs are not the main barrier to trade in the SADC region.

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[10] Webb et al. (2015) develop an alternative approach and propose indices to measure the extent to which potential fruit and vegetable imports from individual countries into New Zealand are constrained by the absence of import health standards for some of their exports.

Table 3. MFN and preferential tariffs in SADC countries

	Applied MNF tariff	Applied SADC tariff
	%	%
Angola	9.8*	na
Botswana	8.5	0
Democratic Republic of the Congo	11**	na
Lesotho	8.6	0
Madagascar	14.6	0.11
Malawi	18	7.23
Mauritius	0.9	0.41
Mozambique	13.8	na
Namibia	8.6	0
Seychelles	na	na
South Africa	8.4	1.18
Swaziland	8.6	0
United Republic of Tanzania	20	13.88
Zambia	19	0.19
Zimbabwe	23.4	na

Source: WTO (2014). *2011 for Angola. ** 2010 for the Democratic Republic of the Congo.

Recent ad valorem equivalents of non-tariff measures for SADC do not yet exist. Instead, to illustrate the potential use of such data, we use estimates for Africa as a whole estimated by Cadot et al. (2015) using a price gap approach as described above. We assume the NTMs estimated for Africa are applicable to each SADC country. The absence of country specific data means each country has the same value for a given product or sector.

The AVEs have been estimated separately for SPS measures, TBT and other NTMs. This allows the combined approach of feeding NTMs into CGEs as discussed in section 2.3. Unfortunately, the sector aggregation used in Cadot et al. (2015) and GTAP is not identical.

The estimated ad valorem equivalents are fed into GTAP, a global general equilibrium model designed for preferential trade policy analysis, and reduced in a counterfactual simulation. The difference between the baseline and a counterfactual simulation reveals the trade impact of the non-tariff measures.

Table 4. Ad valorem equivalents of non-tariffs measures in Africa

	SPS	TBT	Other
	%		
Animals	9.5	4.2	4.6
Vegetables	14.2	2.7	2.3
Fats & oils	7.8	0.2	3.9
Beverages and tobacco	11.4	5.8	2.9
Minerals	4.6	8.2	1.8
Chemicals	5.6	5.8	2.9
Plastics	0.1	8.1	1.3
Leather	5.4	5.5	3.6
Wood products	4.3	6.7	0.6
Paper	0	9	0.8
Textile and clothing	0	6.4	2.5
Footwear	0	9.2	3.3
Stone and glass	0	8.3	4.3
Pearls	0	3.1	6.2
Metals	0	9.6	4.8
Machinery	0	11.3	10.4
Vehicles	0	9.2	4
Optical and medical	0	11.1	6.1
Arms	0	5.9	9.5
Miscellaneous	0	12.6	3.9

Source: Cadot et al. (2015).

4. SCENARIOS

Given the lack of good data on NTMs for many of the SADC countries, any scenario can only be illustrative. We use the AVEs presented in table 4 and reduce them by a quarter to reflect that some but not all of the costs and trade barrier effects related to NTMs can be reduced. The reduction level is based on assumptions from other regional integration analysis (e.g. Francois et al., 2013).

We present three scenarios, which vary according to whether we assume the NTMs have bilateral or multilateral effects on trade.

The first scenario assumes the liberalising impacts are only bilateral, within the SADC region. This means the removal of NTMs does not benefit countries outside SADC. In fact, they lose because of trade diversion.

The second scenario assumes the SPS and TBT NTMs are multilateral and their reduction lowers the cost of imports into SADC from all sources, including non-SADC members. This is important because 90 per cent of SADC trade is with non-members. In this scenario, NTMs treated as tariff equivalents are assumed to reduce the cost of trade between SADC members only. The non-SADC exporters do not undertake any reforms.

Finally, the third scenario assumes all NTMs benefit multilateral trade.

Table 5. Alternative scenarios for SADC NTM liberalization

		Distribution of impacts
1	Bilateral	Bilateral benefits for technical and non-technical NTMs
2	Mixed	Multilateral benefits for technical NTMs and bilateral benefits for non-technical NTMs
3	Multilateral	Multilateral benefits for technical and non-technical NTMs

Note: There are no rents attached to technical (SPS and TBT) NTMs. For non-technical NTMs, rents are captured by the importers.

The SPS and TBT NTMs are treated as cost-shifting with no rent attached. These are modelled as a productivity shift. Costs are reduced along the production chain. The reduction of corresponding AVEs by 25 per cent reflects the assumption that that a quarter of the costs of compliance can be reduced through regional integration. There are no tariff revenue effects or rents to be re-allocated.

The other NTMs, column 3 in table 4, are treated as tariff equivalents. This implies that rents previously captured by the importer are transferred to consumers through lower prices. Dead weight losses are removed. This is the source of the efficiency gains. There are also terms of trade effects which sum to zero and effectively redistribute the efficiency gains across countries. AVEs are reduced by 25 per cent reflecting again the assumption that not all burdensome NTMs can be eliminated.

The thinking behind scenario 2 is that the SPS and TBT standards are likely to be multilateral, so that South Africa would apply the same standards on aflatoxins in cashew nuts from Mozambique as it would on nuts from Vietnam. However, this need not apply to the non-technical measures in table 1, such as discretionary licensing, where rents captured by the importer provide an incentive not to liberalise too widely.

The Annex contains a sensitivity analysis. It indicates the impact of several assumptions: (a) labour market (adjustment in both the price and quantity of unskilled labour versus fixed real wages of unskilled labour), (b) degree of reduction of AVEs (25 per cent and 50 per cent), and (c) alternative modelling approaches of NTMs in the CGE model (scenario 2 above versus both technical and non-technical NTMs modelled as tariff equivalents).

5. RESULTS

The results are presented for ten individual SADC countries plus two regions that include: (i) Angola and the Democratic Republic of the Congo; and (ii) Lesotho and Swaziland. Seychelles is excluded from the analysis because of the aggregation in the GTAP database. First we show welfare results when SADC members remove restrictions on trade between members, the intra-SADC scenario. This is compared with scenarios where the reforms open up trade with all trading partners. This can make four or five fold difference in welfare, depending on the amount of trade with non-members.

5.1. WELFARE AND NATIONAL INCOME FOR THE REGION

The estimated benefits to each economy in value terms depend on the initial trade flows and the size of the NTMs removed. For the intra-SADC (Bilateral) scenario, the welfare gains for the SADC economies amount to $1,312 million (figure 3). The increase in national income is about 1 per cent. When the technical (SPS and TBT) barriers are reduced on trade with the rest of the world, (Mixed scenario) the gains increase dramatically to $5,868 million. Finally, reducing non-technical barriers on imports to the world has additional effects. The welfare gains are $5,720 million. This is reduced slightly compared to the

mixed scenario because South Africa experiences a negative terms of trade effect on exports of precious metals.

The large gains stem from removing SPS and TBT barriers on imports from the whole world. Removing NTMs on trade with all countries makes a huge difference because most SADC countries have a high share of trade beyond the region. Removing barriers on trade with the European Union, the USA and Japan for example leads to large gains. For individual countries these gains may be four or five times those of the intra-SADC (Bilateral) liberalisation. In this scenario the SADC country trading partners are not undertaking any reform. There are no gains from improved market access. Most of the gains are from unilateral reforms.

Figure 3. Change in SADC welfare from reduction in NTMs, in USD million
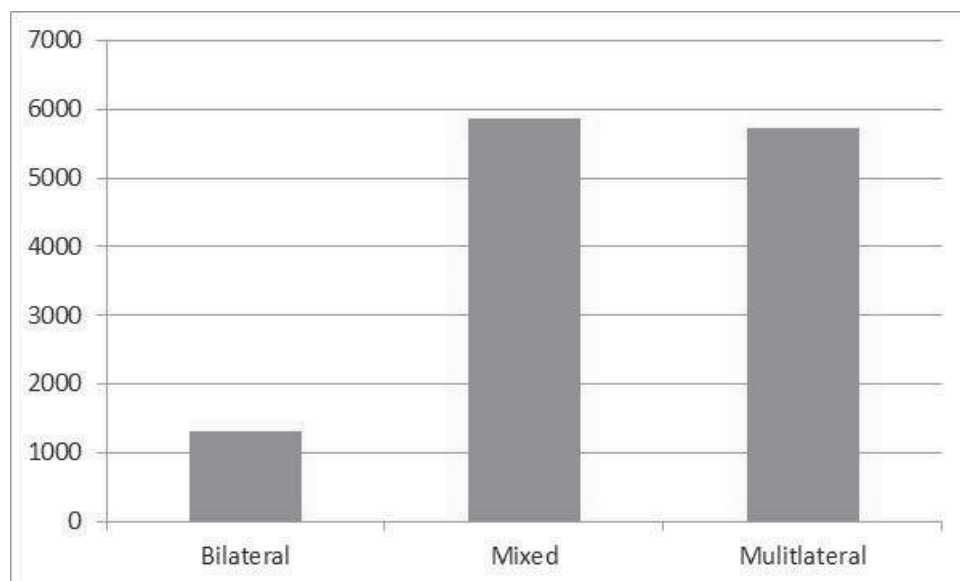
Source: GTAP simulations.

The source of welfare gains for SADC is essentially fourfold:

- allocative efficiency gains from using resources more productively;
- labour market effects from using labour that was previously unemployed or underutilised;
- technical productivity effects from reducing trade costs; and
- terms of trade effects, that may be positive or negative (they sum to zero globally).

These effects are shown in figure 4 for the three scenarios. As noted earlier, most of the gains are from removing SPS and TBT barriers to trade on imports from the world. For the Bilateral scenario, the efficiency and labour market effects make a sizeable contribution. The terms of trade effects can be positive or negative, depending on the market share of individual exports.

Figure 4. Decomposition of SADC welfare gains, in USD million
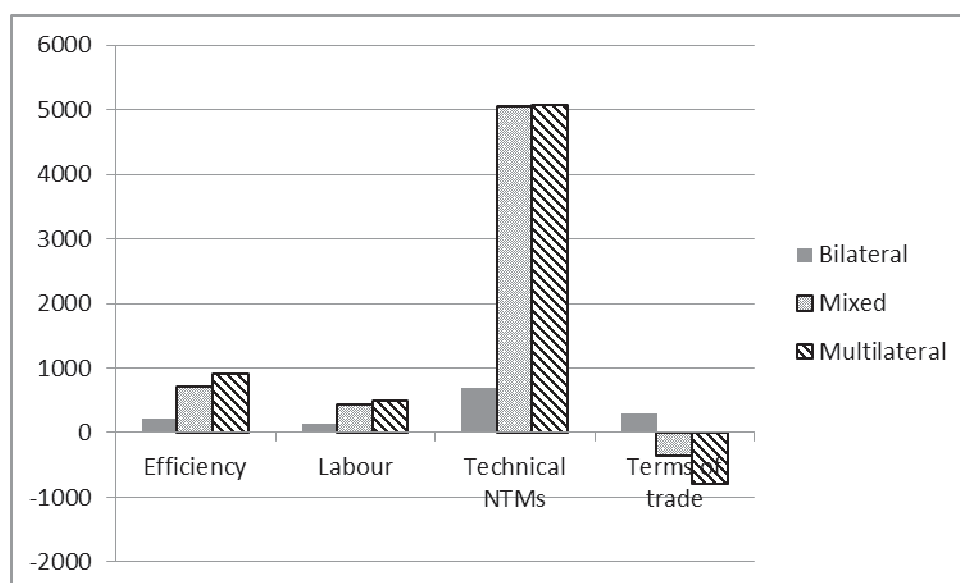
Source: GTAP simulations.

The results for welfare under different assumptions are in table A1 in the Annex. All scenarios lead to positive overall welfare gains though the magnitude varies and few countries experience a negative welfare effect in two scenarios. The change of the employment closure does almost not make any difference for the other variables (Mixed and SA1). Increasing the reduction of AVEs to 50 per cent indicating a higher potential for regulatory convergence and reduction of NTBs roughly doubles the welfare gains (SA1 and SA2). To the best of our knowledge, no assessment of the level of reduction of trade distortions from regulatory convergence has been conducted. This is a gap in the literature and has implications for the interpretation of the results. In particular, the magnitudes of welfare and employment gains have to be interpreted with caution. Moving away from modelling technical measures as efficiency losses and non-technical measures as tariff equivalents towards having all NTMs expressed as tariff equivalents reduces the welfare gains significantly. Some countries may experience a negative welfare change as they could lose rents associated with the barrier effect. This confirms the general sensitivity to the assumptions made on NTMs in CGE models.

Overall, results remain however positive. Furthermore, SPS measures and TBT are unlikely to only have a protection effect. Therefore, the assumptions for scenarios Mixed, SA1 and SA2 appear more realistic. We will use the Mixed scenario as our reference scenario since it is considered having the most realistic assumptions.

5.2. THE DISTRIBUTION OF IMPACTS ACROSS SADC COUNTRIES

The distribution of gains across SADC countries is heavily weighted toward South Africa, which accounts for more than half of the SADC economy. This is shown in figure 5 for the Mixed scenario. However, South Africa is not the only beneficiary. All the changes are positive. No country is worse off from the reforms.

Figure 5. Distribution of welfare gains within SADC, in USD million
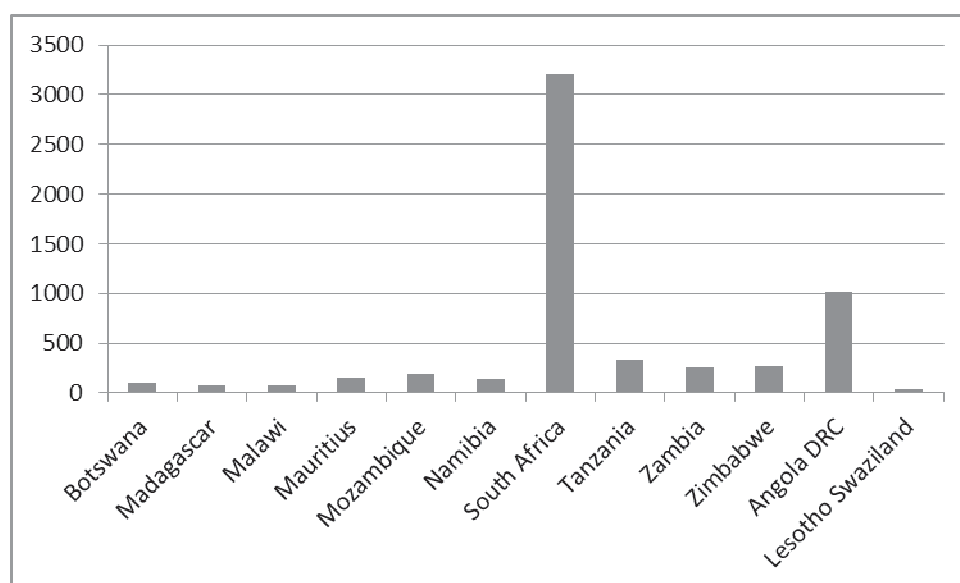
Source: GTAP simulation. Mixed scenario.

The percentage changes in national income for individual countries following the Mixed scenario are shown in figure 6 and range from 0.7 per cent to 2.4 per cent. These differ because of the composition of trade in each country. The NTMs are assumed to be the same for each country for a given commodity group, so the impact on trade depends on the initial trade flows. For example, there are high NTMs on grains and other crops, chemicals, rubber and plastics and machinery, so the countries that import a large volume of these products, e.g. Zimbabwe, are likely to gain proportionately more. South Africa gains most because it has a relatively large economy. These results do not hold so well for the Bilateral scenario because of differing trade shares. For example, Madagascar does not trade much with SADC members so does not benefit greatly from liberalisation in those only countries.

Figure 6. Change in income from reduction in NTMs in SADC, in per cent
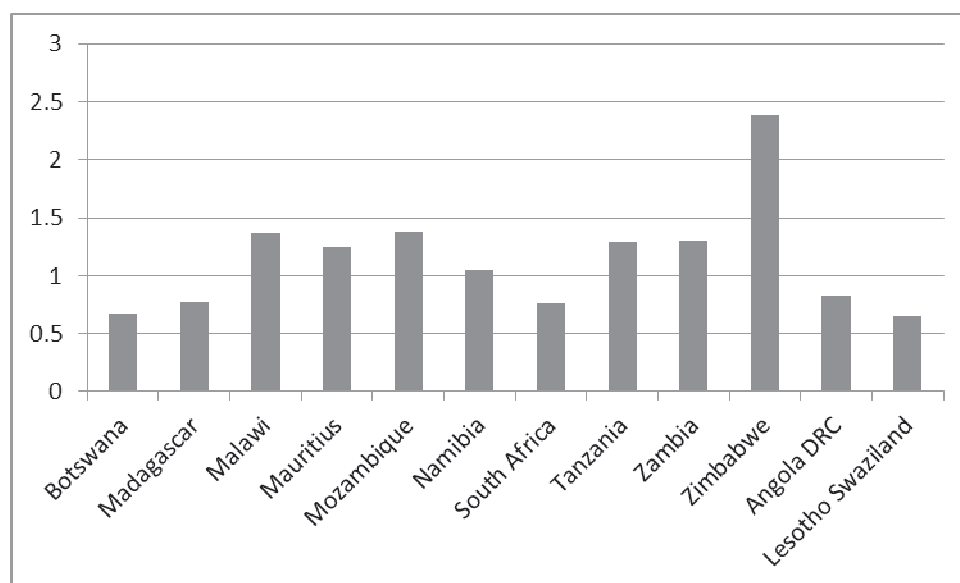
Source: GTAP simulation. Mixed scenario.

5.3. EXPORTS

Reducing the cost of trade by removing barriers increases trade flows (trade creation) but the gains are not evenly shared. Some sectors or even countries may experience a decrease in trade because of increased competition. Where liberalisation is preferential, and only benefits member countries, there is an element of trade diversion. Trade increases between members but this is partially offset by a reduction in trade with non-members. In the case of Botswana, for example, under the Bilateral scenario the increase in trade is 17 per cent with SADC members but only 0.46 per cent nationally. The bulk of Botswana's trade is mineral (diamonds) exports to the European Union.

The change in each country's national exports for the Mixed scenario is shown in figure 7. The changes range from -0.1 to 2.2 per cent. Countries that export little to other SADC members gain little from the removal of barriers, and have to compete with non-member countries. This is the case of Malawi, which exports mainly sugar and tobacco crops to the European Union. There are no gains to be had there, because non-SADC countries are not reducing their barriers.

Figure 7. Change in national exports, in per cent
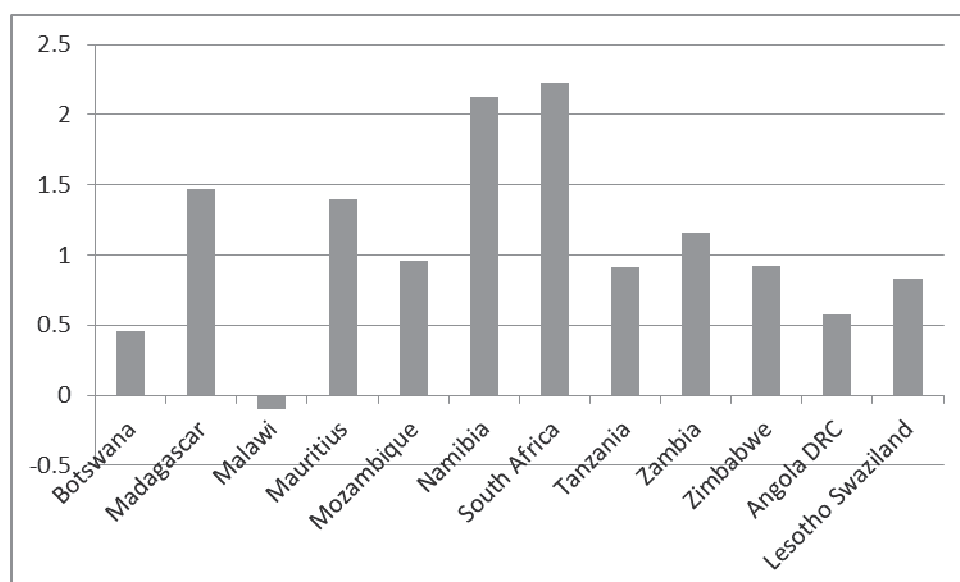
Source: GTAP simulation. Mixed scenario.

5.4. EMPLOYMENT

The estimated changes in employment of unskilled labour are positive in all countries and range from 0.5 to about 3 per cent (figure 8). The greatest change is in Zimbabwe due to its large share of trade with South Africa. Countries that are less influenced by what happens within SADC, e.g. Madagascar, experience lower employment effects. Wage for unskilled labour increases are roughly in the same range.

The quantity of employment of skilled labour is assumed fixed. However, real wages are estimated to rise by between 0.8 and 4 per cent. The pattern is somewhat similar to the changes in employment for unskilled workers, with Zimbabwe showing the greatest change. The reasons are similar, except that the adjustment occurs in prices (i.e. wages) rather than quantities (i.e. employment).

Figure 8. Change in employment, in per cent
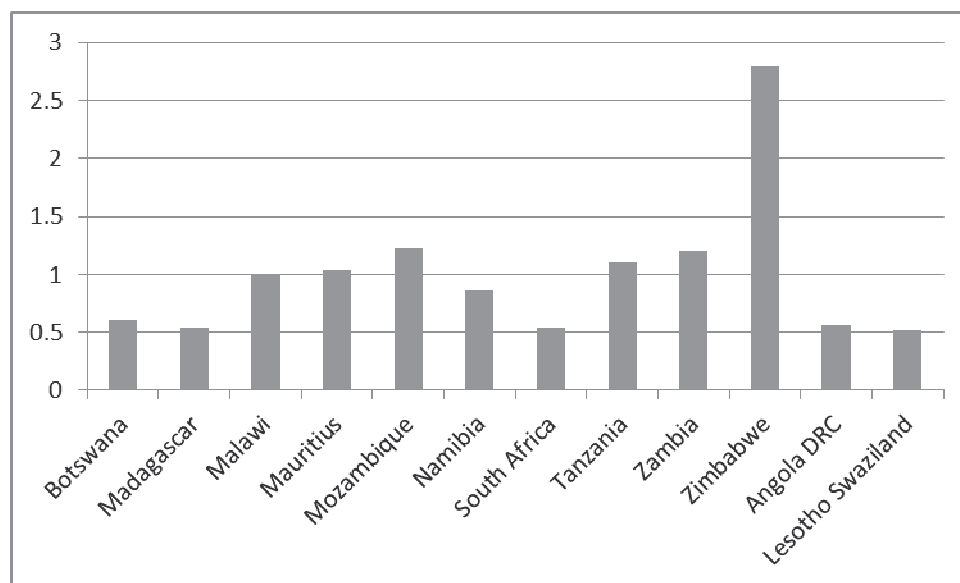
Source: GTAP simulation. Mixed scenario.

5.5. SECTORAL IMPACTS

The impacts of a reduction in NTMs by sector or commodity depend on the size of the barriers that are removed and the initial trade flows. From table 4 it can be seen that most of the NTM tariff equivalents are between 10 and 20 per cent. There is little variation between product groups, at least at this level of aggregation.[11] Trade flows within the regions vary greatly, from Madagascar sending 3 per cent of its exports to the SADC region, to Zimbabwe with a 31 per cent share. Trade flows by product show greater variability. Furthermore, the particular barriers in South Africa are of greater importance. In the absence of specific data, it is reasonable to expect that South Africa, given its level of development, may have greater SPS measures than the African average and somewhat lower barriers in other areas.[12]

The changes in exports by country and sector are shown in Appendix table A2. The sectoral results seem to indicate diversification, with a small reduction in a major commodity that dominates trade with non-members, and larger increases in a wide range of commodities. For Botswana there is a small reduction in mining exports. These are exports of diamonds to the European Union. The reduction in NTMs within SADC provides an opportunity for Botswana to export more agricultural and industrial products to SADC members. The percentage changes can be somewhat deceptive because many of these changes are off a low base. Nonetheless, the opportunity to trade locally implies that labour and capital are withdrawn from the mining sector and reallocated to other sectors.

The changes in imports by commodity are shown in Appendix table A3. There is quite a spread of positive and negative changes, although in general imports tend to increase. The major increases are in meat and dairy products, reflecting the regulatory convergence of SPS measures. There is a fall of imports in petroleum and coal products, where NTMs are quite low. Although barriers are reduced in this and

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[11] These estimates are not specific to SADC members, but were derived for Africa as a whole (Cadot et al. 2015). More specific data would probably show greater variation.

[12] This is based on the observation that developed countries tend to have more measures on agricultural products and fewer on industrial products than developing and least developed countries. This is because there is a greater concern about food safety and the environment. Furthermore, more developed countries tend to have more technical measures while less developed countries tend to have relatively more non-technical measures (UNCTAD, 2013).

other sectors, imports decline because there is a greater reduction in impediments to trade in other sectors. This is a general equilibrium effect. All traded goods compete with one another.

Given the changes in imports and exports, the resulting changes in output by sector are shown in Appendix table A4.[13] In each country there is an increase in national output, but there are negative changes. Most of these are small, but in the 252 sector by country combinations, there are 20 instances where the contraction is greater than 5 per cent.[14] Most of the larger contractions are concentrated in grains and petroleum and coal products, reflecting the changes in demand for imports following the reduction in barriers.

6. POLICY IMPLICATIONS AND CONCLUSIONS

The SADC region has made good progress in eliminating or substantially reducing tariffs but intra-regional trade has not reflected this progress. While poor transport links are a problem, the existence of non-harmonized technical NTMs and NTBs is an ongoing concern. The analysis presented here illustrates the potential benefits of regulatory convergence and removing NTBs in SADC but highlights the need for specific data relating to the particular impediments faced by SADC exporters.

The NTM estimates used here, provided by Cadot et al. (2015) are for Africa as a whole. Just as average tariffs hide the peaks, average NTMs may well hide specific cases where the barriers are much higher, indeed prohibitive. For example, Kalaba and Kirsten (2012) produce estimates for the SADC dairy and meat sector as high as 400 per cent.

Using a continental average means that for a given commodity, each SADC country faces the same impediments. This is unlikely to be the case. Figure 2, showing the price of maize, suggest that prices vary significantly across Africa, indicating that individual countries face different barriers. Transport costs may account for some of these differences, and some of the barriers may be quite legitimate, limiting the spread of diseases and pests for example. While there is anecdotal evidence about barriers, a systematic data collection effort is needed.

One of the limitations of estimating NTMs for a commodity is the lack of direction for policy makers. While it may be clear that the quantity of trade between two countries is low, or that prices differ greatly, it is not obvious which of many possible NTMs is binding. Hence, removal if one impediment may not improve trade at all. It is necessary to identify the binding constraint.

Nonetheless, there is plenty that can be done and learned. Rules of origin (RoO), which determine where a product comes from and the relevant treatment, are a major impediment. In some RTA agreements, RoO can amount to dozens if not hundreds of pages. SADC rules are based on process requirements, as opposed to the value added criterion used in other African RTAs. These could be replaced. Cumulation should be permitted across the whole of Sub-Saharan Africa.

Many of the NTMs in SADC are technical NTMs and in particular SPS measures (figure 1). Many of these are sensible and cannot be replaced. However, they must be applied in a transparent and non-discriminatory manner. Using a set of international standards, where they exist, may be helpful, as opposed to national standards. Some TBTs may be removed but in order to protect consumers and the environment most are likely to stay. Again, international standards should be used to the maximum extent and regulatory convergence within SADC would contribute significantly to regional economic integration with positive consequences for development. Export licenses and trade permits could be largely removed.

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[13] This analysis is static, and ignores growth that may occur over the implementation period. In an expanding economy, sectors may merely grow at a slower rate rather than contracting. This eases the burden of structural adjustment.

[14] This analysis can be somewhat misleading because the aggregation of sectors is arbitrary. More disaggregated sectors, say at the HS6 level, would result in greater variation in output.

Export taxes and local content requirements, such as those applied to the Namibian livestock sector in 2004 to encourage local slaughtering (Gillson 2010), are likely to do more harm than good.

This study has shown positive effects of regulatory convergence for all SADC countries. Welfare and employment gains are significant. Gains are higher where countries outside of SADC also benefit from regulatory convergence indicating that the use and development of regional standards leads to positive gains but is a second best compared to international standards.

Limitations of CGE modelling should be kept in mind and results interpreted with care. In particular, assumptions about how NTMs are modelled have been shown to be sensitive for the results. More research is needed to robustly assess the impact of NTMs in CGE settings. In our analysis, alternative approaches lead to generally positive effects of regional regulatory convergence. Finally, here we have modelled NTMs as affecting intra-regional trade or international trade. In reality, it is likely that some measures, such as discriminatory licensing, affect bilateral trade and others affect imports from all countries. Since most countries in SADC trade mainly with countries outside the region, it would be a useful step to try to separate out in greater detail than what we have done here the NTMs that belong to each group. The simulations presented here show vastly different welfare gains. To the extent that the reforms benefit imports from all countries, not just SADC, the intra-SADC scenario severely underestimates the welfare gains. UNCTAD is attempting to collect more information on NTMs to identify whether the effects of reforms are regional or multilateral.

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Table A1. Sensitivity Analysis

	Mixed	SA1	SA2	SA3	SA4
Labour market closure	Adjustment wages and employment	Adjustment through employment	Adjustment through employment	Adjustment through employment	Adjustment through employment
NTM modelling	SPS/TBT efficiency losses, NTB tariff equivalent	SPS/TBT efficiency losses, NTB tariff equivalent	SPS/TBT efficiency losses, NTB tariff equivalent	All NTMs as tariff equivalent	All NTMs as tariff equivalent
AVE reduction	25%	25%	50%	50%	50%
Geographic	Mixed	Mixed	Mixed	Bilateral	Multilateral
	$m	$m	$m	$m	$m
Botswana	105	115	228	27	157
Madagascar	81	88	174	-10	31
Malawi	82	87	171	31	47
Mauritius	148	165	329	32	-4
Mozambique	189	214	422	-13	28
Namibia	136	153	306	76	159
South Africa	3208	3518	7049	1222	1065
United Republic of Tanzania	332	369	731	28	76
Zambia	261	307	605	86	325
Zimbabwe	269	313	613	-167	-312
Angola *and* Democratic Republic of the Congo	1014	1063	2113	351	1190
Lesotho *and* Swaziland	43	47	94	20	64
Total	5893	6464	12886	1734	2878

Source: GTAP database V9.1. Trade data for 2011. Excludes Seychelles.

Table A2 Change in exports from reduction in NTMs in SADC

	Botswana	Madagascar	Malawi	Mauritius	Mozambique	Namibia	South Africa	United Rep. of Tanzania	Zambia	Zimbabwe	Angola and Dem. Rep. of the Congo	Lesotho and Swaziland
	%	%	%	%	%	%	%	%	%	%	%	%
Cattle & sheep	6.0	0.2	-3.5	1.7	-1.4	4.0	1.5	-0.7	-5.1	3.3	1.4	0.5
Meat products	1.9	0.5	-2.4	1.4	-0.8	-0.9	4.6	-1.5	-3.9	-2.1	3.6	1.5
Dairy	1.0	0.7	9.2	21.6	12.5	7.1	11.0	5.3	-2.2	-0.5	2.6	1.7
Grains	7.3	0.3	-0.6	15.5	-1.9	11.3	2.8	2.2	0.4	19.6	7.0	11.7
Other crops	2.0	0.1	-1.3	-0.2	-0.4	2.5	2.2	0.5	0.0	2.2	1.7	0.5
Fats & oils	1.4	0.2	-0.1	3.6	-0.7	-0.4	1.6	-0.4	-4.6	3.6	3.0	0.2
Other food products	3.9	0.5	2.2	2.9	5.3	-0.2	2.3	1.0	-1.4	2.5	2.4	0.7
Beverages and tobacco	2.4	0.1	0.3	0.5	2.1	1.1	0.7	0.7	0.4	-0.1	0.5	0.7
Chemicals	1.6	2.3	0.6	-1.9	1.8	0.1	2.9	5.4	-2.9	0.2	3.3	2.3
Fish & forestry	0.5	-1.7	-4.9	-0.1	-2.2	-0.1	1.0	-1.2	-3.1	-6.7	1.0	0.6
Mining	-0.2	0.4	1.0	0.7	0.7	2.5	1.1	-0.1	5.4	2.3	0.2	0.2
Textiles and clothing	5.6	4.5	-0.9	3.9	2.3	1.7	3.7	2.4	-0.5	0.8	2.4	1.7
Leather	7.0	2.4	1.8	5.7	0.8	4.9	4.1	0.5	1.9	-0.7	3.2	2.9
Wood products	5.0	1.5	7.0	9.5	0.9	0.5	3.0	-0.6	-3.2	-2.1	2.2	1.4
Paper products	5.4	1.7	5.9	1.0	3.1	1.2	2.2	1.3	2.9	-5.4	2.5	0.9
Petroleum, coal prod	-3.4	0.4	-0.1	0.0	-1.9	-3.6	6.7	-0.8	2.5	1.9	0.2	-1.8
Vehicles	7.4	8.8	3.9	-1.7	5.4	4.8	3.8	2.8	-1.9	1.4	3.3	2.1
Mineral products	6.6	5.2	17.9	7.2	5.6	5.0	2.8	1.5	0.0	1.5	2.6	3.5
Metals	2.4	3.7	6.7	10.8	0.9	4.6	1.4	1.7	1.5	0.7	3.7	1.4
Machinery	14.7	17.6	10.9	-1.9	21.5	17.2	6.7	6.3	-3.1	7.3	7.3	1.5
Other manufactures	1.5	3.6	7.1	5.8	9.3	1.5	4.0	4.3	-6.5	-0.2	9.4	1.3

Table A3 Change in imports from reduction in NTMs in SADC

	Botswana	Madagascar	Malawi	Mauritius	Mozambique	Namibia	South Africa	United Rep. of Tanzania	Zambia	Zimbabwe	Angola *and* Dem. Rep. of the Congo	Lesotho *and* Swaziland
	%	%	%	%	%	%	%	%	%	%	%	%
Cattle & sheep	5.5	3.9	7.8	-0.6	2.3	1.5	3.6	5.5	9.9	5.9	1.1	3.1
Meat products	11.4	8.0	10.3	6.3	10.5	7.1	6.1	9.8	14.2	13.5	2.2	9.3
Dairy	12.0	8.0	4.0	-1.3	4.4	4.9	8.5	8.7	19.1	12.6	8.2	12.0
Grains	-0.7	10.0	1.7	-3.6	0.5	-3.5	1.8	6.5	11.2	-2.1	2.7	5.0
Other crops	5.8	6.5	1.8	1.1	6.6	4.4	4.8	4.2	10.2	4.1	4.5	3.3
Fats & oils	3.3	1.6	2.4	1.9	4.0	5.3	0.9	2.3	8.0	2.7	1.5	4.3
Other food products	3.9	1.6	0.5	1.1	1.5	4.1	3.2	3.8	8.1	3.9	1.2	4.8
Beverages and tobacco	1.0	1.2	2.0	0.4	0.7	1.5	0.7	0.4	1.9	3.7	0.5	1.1
Chemicals	2.4	3.6	-1.3	3.3	-0.3	3.0	2.5	-1.0	-0.6	-2.4	1.4	3.8
Fish & forestry	0.5	3.8	6.6	2.2	5.6	1.7	1.1	4.0	4.6	1.5	2.4	2.3
Mining	4.4	11.6	-2.3	5.0	13.9	6.5	0.6	12.3	0.5	9.6	12.0	12.7
Textiles and clothing	0.2	1.6	4.2	3.2	2.4	4.8	2.6	1.4	6.0	7.1	3.1	1.5
Leather	1.2	5.9	5.7	1.0	3.9	3.3	4.1	0.7	8.8	10.3	3.5	4.3
Wood products	4.6	4.8	4.3	-2.0	6.4	4.2	2.9	2.7	7.8	11.1	1.0	7.2
Paper products	3.1	2.7	2.1	2.7	1.0	3.9	3.0	-0.6	4.9	8.9	1.4	2.9
Petroleum, coal prod	-2.8	-1.7	-2.7	-1.6	-3.2	-2.8	-1.4	-2.5	-0.2	-1.6	-1.0	-1.6
Vehicles	-1.0	-2.2	0.3	2.0	0.3	3.3	1.0	-0.8	-0.4	2.1	1.1	1.0
Mineral products	1.8	-0.9	-1.3	0.2	1.2	4.0	3.1	2.1	4.0	4.2	0.9	5.1
Metals	3.0	1.8	4.5	0.3	-2.0	4.7	3.7	1.2	-0.4	2.1	1.0	7.1
Machinery	-1.6	-2.6	-1.0	1.8	0.6	4.2	3.3	-1.1	0.3	4.2	0.4	6.9
Other manufactures	6.2	5.6	0.6	3.8	1.4	5.2	4.0	-0.5	5.8	10.4	1.2	4.2

Table A4 Change in output from reduction in NTMs in SADC

	Botswana	Madagascar	Malawi	Mauritius	Mozambique	Namibia	South Africa	United Rep. of Tanzania	Zambia	Zimbabwe	Angola and Dem. Rep. of the Congo	Lesotho and Swaziland
	%	%	%	%	%	%	%	%	%	%	%	%
Cattle & sheep	0.0	0.6	1.7	-2.7	0.7	0.5	-0.5	1.2	0.9	1.8	-0.3	-0.9
Meat products	-0.2	0.2	0.6	-0.7	-1.0	-3.3	0.1	1.0	0.5	-0.4	-2.7	-1.6
Dairy	-1.3	-1.8	-0.1	3.0	-6.0	0.5	0.3	-1.4	-0.5	-1.0	-0.1	0.0
Grains	-9.1	-1.3	-4.4	15.9	-4.4	-9.2	-6.5	-3.8	-1.9	-9.5	-4.5	-2.5
Other crops	-0.6	-0.2	-1.0	-1.0	-0.7	-1.1	-0.4	-0.6	0.0	0.5	-0.6	-0.3
Fats & oils	-0.8	-0.7	0.6	-0.7	-0.5	-0.5	0.3	-0.2	-0.9	-0.6	-0.2	-0.2
Other food products	0.1	-1.4	-0.4	0.6	0.3	-0.6	0.1	0.3	0.2	-2.4	-1.8	0.0
Beverages and tobacco	0.0	0.3	1.0	-0.3	0.7	0.2	0.4	0.4	-0.1	0.6	0.1	0.0
Chemicals	-3.1	-2.0	-2.2	-3.7	-6.0	-1.7	-1.4	-0.4	-7.5	-7.0	-2.9	0.5
Fish & forestry	0.0	0.5	0.9	-0.1	0.7	0.0	-0.1	0.2	0.2	1.9	0.0	0.0
Mining	-0.4	0.0	0.3	-0.1	0.2	-0.3	0.0	-0.5	-3.4	-0.5	0.1	-0.1
Textiles and clothing	2.3	3.2	-1.6	2.8	-1.7	-1.7	-0.6	-0.1	-0.1	0.4	0.0	0.5
Leather	-5.5	-0.9	-3.8	2.3	-4.9	-0.9	-2.3	-4.4	-1.4	-2.2	-2.9	-5.6
Wood products	-1.6	-0.6	1.4	0.6	-0.2	-1.8	-1.4	-3.4	-2.2	-0.9	-2.5	-0.1
Paper products	-0.4	-0.9	-0.1	-1.2	-3.0	-1.7	-0.3	-2.2	-1.0	-0.6	-1.4	-0.9
Petroleum, coal prod	-7.0	-4.3	-7.7	-4.6	-4.6	-6.7	1.8	-7.4	-1.1	-2.3	-2.3	-4.4
Vehicles	7.7	5.5	-1.9	-2.3	-3.3	0.4	0.3	-2.2	-8.1	-2.8	-1.9	-3.0
Mineral products	-0.9	4.5	10.6	1.6	-1.1	-0.4	-0.4	-0.8	-1.3	-2.8	-1.2	-0.8
Metals	-0.7	-2.1	-1.9	1.6	1.0	3.6	0.0	0.0	1.6	-2.9	-1.9	-1.0
Machinery	8.5	18.9	-3.2	-5.1	-3.4	-2.3	-1.3	-4.3	-10.3	-11.2	-4.9	-1.7
Other manufactures	-0.8	-1.8	-5.9	0.1	-3.1	-2.1	-1.8	-3.6	-9.3	-4.1	-0.6	-2.9

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