

## **Regional Integration and Employment in SADC**

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### **Abstract**

The Southern African Development Community (SADC) comprises 15 countries with the common objective of regional integration. Trade between the member countries has increased and is disproportionately high in processed and more sophisticated product. However, using a gravity model approach with cross country cross sectional data no evidence is found that low trade barriers is correlated with higher intra-regional trade. Employment effects of further regional integration are assessed using a global general equilibrium model. With data on skilled and unskilled labour use by sector, an assessment is made of the likely employment impacts within the region on labour use in specific sectors. The results vary considerably across countries and sectors, particularly in the sugar, textiles, motor vehicles, electronics and manufacturing sectors. Further regional integration is expected to increase real wages, although once again to varying degrees across countries. Zimbabwe currently has high tariffs on textiles, some manufactured goods and wood and paper products and would face substantial structural adjustment if these tariffs were eliminated. Workers in these industries would be obliged to seek work in the service sector. The results emphasise the importance of the labour market structure to minimise the costs of adjustment.

\* The views expressed are those of the authors and do not necessarily reflect those of the UNCTAD or partners of the ICITE initiative. David Vanzetti is also affiliated to Australian National University. Contact: Ralf.Peters@unctad.org

## **Introduction**

The Southern African Development Community (SADC) comprises 15 countries with the common objective of regional integration. The 15 countries are Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe. Some members have eliminated or reduced their tariff barriers between the member countries as early as 2000.

Using a gravity model approach with cross country cross sectional data no evidence is found that low trade barriers are correlated with higher intra-regional trade. However, intra-regional trade appears to be relatively higher in processed and more sophisticated products than exports which are relatively high in raw materials.

Not so obvious are the associated employment effects. One of the challenges for policy makers is to increase productivity without increasing unemployment. At a sectoral level it is clear that employment in some sectors has fallen as a result of integration. This is desirable if displaced workers are able to gain employment in more productive sectors, but less desirable if it leads to an extended period of unemployment, or employment in a less productive sector.

The purpose of this note is to examine the trade, output and employment effects of regional integration in the SDAC region. While trade and tariff data are readily available, there is relatively little information on non-tariff barriers and employment in each sector.

The next section provides a review of data on trade and employment in the SADC member countries. Sections 3 and 4 outline data and methodologies for analysing these effects. This involves using a gravity model to analyse the impact of regional integration on trade and a general equilibrium model to identify the likely employment effects of trade. The modelling is based on input-output tables, derived from national accounts, that specify the use of labour, capital, land and intermediate inputs in the production of final goods. In Section 5 a regional integration scenario is described, and the results of simulations are presented and discussed in Section 6. Implications are drawn in the final section. The conclusion from the CGE model is that trade is beneficial for employment, but the effects are uneven. Policies that promote internal migration, both within member countries and within SADC as a whole, are beneficial. We conclude that labour market policies rather than trade policies are best used to address labour market concerns.

## **History and Objectives of SADC**

SADC, formerly known as the Southern African Development Coordination Conference (SADCC) which was established in 1980, aims to strengthen socio-economic cooperation and integration as well as political and security cooperation of southern African states. Main objectives of SADC comprise achieving development and economic growth, alleviating poverty, promoting employment, enhancing the standard and quality of life, and supporting the socially disadvantaged through regional integration. To achieve these objectives, SADC shall inter alia support development of economic, social and cultural ties across the region, and of policies aimed at the progressive elimination of obstacles to the free movement of capital, labor, goods and services.

Regional integration in Southern Africa is specific due to the dominance of South Africa that accounts for about two-third of GDP. Smaller members hope to benefit from its prosperity by closer ties.

### Current situation

The fifteen SADC member countries have a population of 258 million with a GDP of US\$471 billion. The SADC regional integration programme includes the establishment of the FTA by 2008, a Customs Union by 2010, a Common Market by 2015, a monetary union by 2016 and a single currency by 2018. However, the timetable for a customs union by 2010 has not been met. This places in doubt the implementation of monetary union and a single currency by the due dates. Implementation of the SADC FTA began in 2000 following the signing of the SADC Trade Protocol (in 1996). The liberalization of tariffs has taken place at different rates. In general the developed countries have reduced tariffs at a faster rate. South Africa, Botswana and Namibia removed most tariffs between 2000 and 2005 (graph). Middle income countries such as Mauritius have gradually reduced their tariffs each year between 2000 and 2008. For least developed countries such as Mozambique and Zambia tariff reductions have generally been introduced during 2008-2009. Angola and DR Congo will be joining the FTA in the near future. Table 1 shows tariffs of those countries that have not yet removed their tariffs. Tariffs on imports from within the region are similar to tariffs on imports from outside the region.

Not all tariffs are to be removed immediately. The protocol called for liberalisation of 85 per cent of trade. Sensitive and excluded products include motor vehicles of various kinds (Chapter 87, 7.5 to 15 per cent tariffs), vehicle components (Chapter 98, 26 per cent tariffs) and some items of clothing such as worn overcoats (Chapter 63, 60 per cent tariffs).<sup>1</sup> These are scheduled to be removed by 2012, although it is not clear whether this timetable will be met.<sup>2</sup>

(<http://www.sadctrade.org/node/201>).

**Table 1 SADC tariffs in 2007**

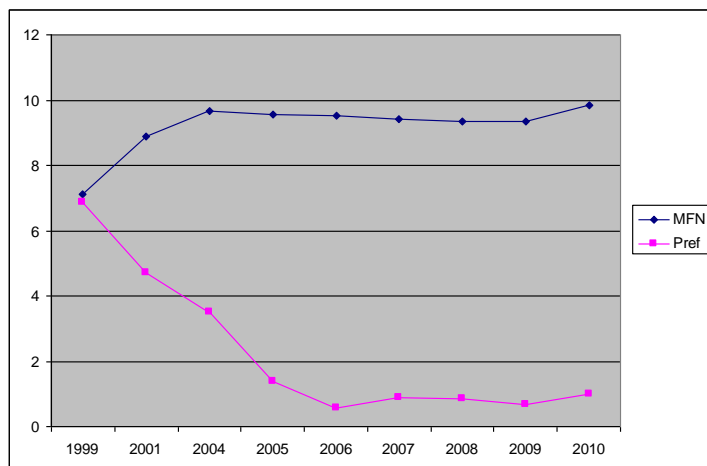
	<b>Tariffs on imports from SADC countries</b>	<b>Tariffs on imports from non-SADC countries</b>
	%	%
<b>DRC and Angola</b>	9.8	8.0
<b>Mozambique</b>	5.6	8.1
<b>Tanzania</b>	3.8	9.6
<b>Zambia</b>	6.7	7.8
<b>Zimbabwe</b>	15.2	14.8

Source GTAP v8 database. Trade weighted applied tariffs.

<sup>1</sup> SADC <http://www.sadctrade.org/files/SACU%202006.xls>

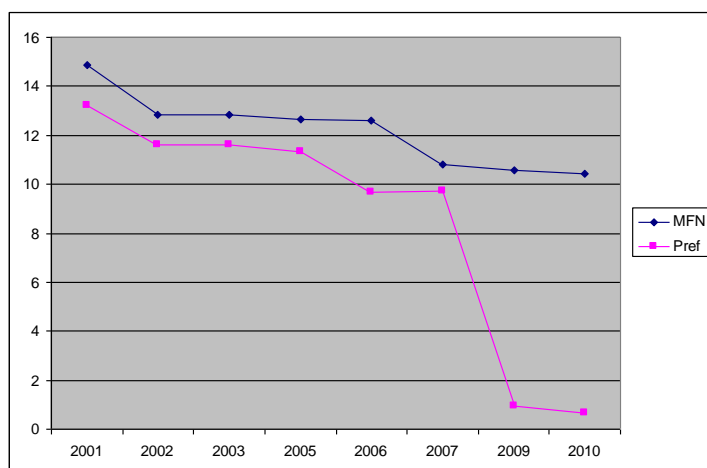
<sup>2</sup> The SADC secretariat has removed the individual country tariff schedules from its website, so it is difficult to gauge progress.

**Graph: South Africa**



Source: UNCTAD Trains

**Graph: Mozambique**



Source: UNCTAD Trains

**Trade**

Exports of SADC countries are concentrated on the EU and other high income OECD markets though this concentration is diminishing. The share of intra-regional SADC trade has increased only slightly during the integration period to reach 15.5 per cent of total exports in 2010 (table). Exports of non-agricultural products to Brazil, Russia, India and China (BRIC) have increasing significantly between 2005 and 2010.

Table : Total trade Exports from SADC

	1990	1995	2000	2005	2010
World	100	100	100	100	100
SADC	9.3	12.1	15.3	15.0	15.5

other SSA	1.8	1.7	2.3	3.3	3.9
EU27	51.3	30.3	38.1	39.2	27.1
other HiOECD	24.0	18.4	19.2	25.7	25.8
BRIC	0.5	3.1	3.2	5.3	15.6
ROW	13.0	34.4	21.8	11.5	12.1

Table : Agriculture

	1990	1995	2000	2005	2010
World	100	100	100	100	100
SADC	8.0	17.9	24.5	24.3	23.5
other SSA	1.2	1.5	3.9	4.1	6.1
EU27	50.6	50.6	37.6	40.6	34.4
other HiOECD	25.9	5.2	12.6	12.8	9.9
BRIC	0.3	4.4	4.8	5.0	9.2
ROW	13.9	20.4	16.6	13.1	17.0

Table : NAMA

	1990	1995	2000	2005	2010
World	100	100	100	100	100
SADC	14.6	15.2	15.5	13.8	14.5
other SSA	4.2	2.3	2.3	3.2	3.6
EU27	53.7	35.5	42.8	39.1	26.1
other HiOECD	16.7	21.3	22.7	27.5	27.8
BRIC	1.4	3.9	3.3	5.3	16.5
ROW	9.4	21.7	13.3	11.0	11.5

Source : UN Comtrade

Export markets vary considerably between SADC members. While more than 60 per cent of Botswana's exports go to the EU this share is low for Swaziland, Tanzania and Zambia.

Table : Total exports by country and distribution by destination, 2007 - 2010

	WLD exports (mill US\$)	SADC	other SSA	EU	other HiOECD	BRIC	RoW
Botswana	4'543	20.9	0.1	62.0	10.2	2.9	3.9
Madagascar	1'297	4.0	2.4	58.3	18.4	5.5	11.3
Malawi	1'000	24.7	2.0	39.3	12.7	6.4	15.0
Mauritius	2'061	10.9	1.6	64.1	10.1	1.1	12.2
Mozambique	2'364	22.6	0.5	45.3	1.5	4.8	25.2
Namibia	4'385	40.9	0.3	36.2	14.2	4.3	4.2
Seychelles	350	0.8	0.1	47.4	1.3	0.1	50.3
South Africa	65'800	12.0	4.3	29.5	27.7	12.9	13.6
Swaziland	1'113	85.0	0.0	13.9	0.5	0.0	0.6
Tanzania	3'073	16.8	14.2	15.9	26.3	17.6	9.2
Zambia	5'307	20.4	0.9	5.2	50.0	12.1	11.4
Zimbabwe	2'618	65.2	1.3	16.1	5.5	4.7	7.4
SADC	90'700	15.8	3.8	30.7	25.6	11.4	12.7

World exports are 12 per cent in raw material, 21 per cent in intermediate goods, 31 per cent in consumer goods and again 31 per cent in capital goods. SADC exports are much more concentrated on raw material (29 per cent) and intermediate goods (41 per cent) than on consumer and capital goods (17 and 12 per cent, respectively). Within SADC trade, however, is disproportionately high on intermediate, consumer and capital goods (table). ILO, 2010 analysis the effects of integration in the ECOWAS region and uses a similar methodology. They also finds different revealed comparative advantages by trading partners.

Table : SADC countries' exports by destination and product group, average 2007 - 2010

County	Product group	Total exports	SADC	other SSA	EU	other HiOECD	BRIC	RoW
			%	%	%	%	%	%
Botswana	Raw materials	2'979	2.6	0.0	59.1	0.5	2.1	1.2
Botswana	Int. goods	1'027	8.9	0.0	1.3	9.1	0.8	2.5
Botswana	Cons. goods	391	6.5	0.0	1.4	0.5	0.0	0.1
Botswana	Capital goods	127	2.6	0.0	0.1	0.0	0.0	0.0
Botswana	Total	4'543	20.9	0.1	62.0	10.2	2.9	3.9
Madagascar	Raw materials	225	0.3	0.1	11.6	1.5	2.9	1.0
Madagascar	Int. goods	107	0.7	0.4	2.9	0.2	1.3	2.8
Madagascar	Cons. goods	851	2.0	0.5	41.9	15.3	0.6	5.3
Madagascar	Capital goods	91	0.9	0.4	1.5	1.4	0.8	2.0
Madagascar	Total	1'297	4.0	2.4	58.3	18.4	5.5	11.3
Malawi	Raw materials	724	10.7	0.3	32.2	10.3	4.9	13.9
Malawi	Int. goods	128	5.6	0.8	4.2	0.5	1.2	0.4
Malawi	Cons. goods	129	6.8	0.7	2.8	1.8	0.2	0.6
Malawi	Capital goods	19	1.6	0.0	0.1	0.1	0.1	0.0
Malawi	Total	1'000	24.7	2.0	39.3	12.7	6.4	15.0
Mauritius	Raw materials	128	0.3	0.1	2.3	1.3	0.5	1.7
Mauritius	Int. goods	468	3.7	0.5	15.7	1.9	0.2	0.7
Mauritius	Cons. goods	1'245	6.1	0.8	44.6	7.0	0.2	1.7
Mauritius	Capital goods	97	0.7	0.2	1.5	-0.1	0.2	2.1
Mauritius	Total	2'061	10.9	1.6	64.1	10.1	1.1	12.2
Mozambique	Raw materials	395	3.0	0.0	5.9	1.0	3.1	3.7
Mozambique	Int. goods	1'409	11.9	0.2	28.3	0.1	1.7	17.3
Mozambique	Cons. goods	166	5.4	0.1	0.5	0.1	0.0	0.9
Mozambique	Capital goods	102	2.1	0.1	0.5	0.3	0.0	1.2
Mozambique	Total	2'364	22.6	0.5	45.3	1.5	4.8	25.2
Namibia	Raw materials	2'203	10.3	0.0	26.6	9.6	3.1	0.5
Namibia	Int. goods	930	4.4	0.1	8.2	4.3	1.2	3.1
Namibia	Cons. goods	1'009	22.4	0.1	0.2	0.1	0.0	0.2
Namibia	Capital goods	222	3.4	0.0	1.1	0.1	0.0	0.4
Namibia	Total	4'385	40.9	0.3	36.2	14.2	4.3	4.2
Seychelles	Raw materials	2	0.1	0.0	0.2	0.0	0.0	0.4
Seychelles	Int. goods	51	0.1	0.1	12.4	1.4	0.1	0.9
Seychelles	Cons. goods	95	0.4	0.0	27.0	0.1	0.0	0.3
Seychelles	Capital goods	5	0.2	0.0	1.0	0.1	0.0	0.1
Seychelles	Total	341	0.9	0.1	40.9	1.8	0.1	56.1
South Africa	Raw materials	18'400	1.0	0.4	9.8	3.8	8.3	4.6
South Africa	Int. goods	27'200	3.4	1.6	9.8	17.2	4.0	5.2

South Africa	Cons. goods	10'400	4.0	1.1	3.3	5.1	0.2	2.2
South Africa	Capital goods	9'851	3.6	1.2	6.5	1.6	0.5	1.6
South Africa	Total	65'800	12.0	4.3	29.5	27.7	12.9	13.6
Swaziland	Raw materials	63	5.6	0.0	0.0	0.0	0.0	0.0
Swaziland	Int. goods	856	62.5	0.0	13.8	0.1	0.0	0.0
Swaziland	Cons. goods	150	12.9	0.0	0.1	0.4	0.0	0.0
Swaziland	Capital goods	43	3.8	0.0	0.0	0.0	0.0	0.0
Swaziland	Total	1'113	85.0	0.0	13.9	0.5	0.0	0.6
Tanzania	Raw materials	1'222	0.7	1.4	10.8	8.4	14.1	4.3
Tanzania	Int. goods	1'249	11.4	4.6	2.3	16.7	3.1	2.6
Tanzania	Cons. goods	439	3.7	6.5	1.8	0.9	0.2	1.1
Tanzania	Capital goods	121	0.9	1.6	0.7	0.2	0.1	0.4
Tanzania	Total	3'073	16.8	14.2	15.9	26.3	17.6	9.2
Zambia	Raw materials	754	6.3	0.1	1.6	4.9	1.1	0.2
Zambia	Int. goods	4'052	9.0	0.7	2.4	43.2	10.2	10.8
Zambia	Cons. goods	389	3.6	0.1	0.7	1.8	0.8	0.4
Zambia	Capital goods	87	1.4	0.0	0.1	0.1	0.0	0.0
Zambia	Total	5'307	20.4	0.9	5.2	50.0	12.1	11.4
Zimbabwe	Raw materials	1	11.6	0.2	7.5	0.5	3.9	6.4
Zimbabwe	Int. goods	1	27.2	0.3	1.9	2.7	0.4	0.3
Zimbabwe	Cons. goods	1	21.8	0.7	6.2	1.9	0.3	0.3
Zimbabwe	Capital goods	0	4.6	0.0	0.5	0.4	0.1	0.3
Zimbabwe	Total	3	65.2	1.3	16.1	5.5	4.7	7.4
SADC	Raw materials	26'700	2.0	0.3	12.2	3.8	7.0	4.1
SADC	Int. goods	37'200	5.4	1.4	8.9	16.3	3.8	5.2
SADC	Cons. goods	15'400	5.2	1.0	4.5	4.3	0.2	1.8
SADC	Capital goods	10'800	3.2	1.0	4.9	1.2	0.4	1.3
SADC	Total	90'700	15.8	3.8	30.7	25.6	11.4	12.7

Source : UN Comtrade, average 2007 - 2010

Labour intensity of exports varies across countries. Botswana, for example has a higher labour intensity of exports to SADC than those to the rest of the world. South Africa's labour intensity of exports is, however, higher on exports to the rest of the world.

### Labour intensity

	Exports to	
	SADC	RoW
Botswana	0.67	0.23
Madagascar	0.22	0.27
Mozambique	0.35	0.22
Mauritius	0.30	0.25
Malawi	0.31	0.26
Tanzania	0.12	0.27
Zambia	0.19	0.07
Zimbabwe	0.18	0.20
South Africa	0.12	0.16
Rest of South African Customs	0.25	0.24





country specific effects on bilateral flows (income, population, per-capita income etc) we need to drop all these variables in order to estimate the equation.

Another problem zero trade flows between pairs of countries. Since the log of zero is undefined, a log-linear specification is not suitable. One alternative is using a Poisson estimation method which allows zero values in the right hand side series. Nevertheless, the Poisson method relies on non-linear estimation methods and convergence could become an issue.

Table 1 summarizes the cross-section OLS estimates. The equation explains 80 per cent of the variation in bilateral trade flows. By taking the average of country specific fixed effect coefficients we can compare the intercept term in the gravity equation, which measures country specific factors such as income and population, across SADC and non-SADC countries. Non-SADC countries have the higher intercept term both as an exporter and an importer followed by SADC insiders (first column). After controlling for fixed effects, SADC-insider and SADC-outsider dummies have negative sign, though some of them are insignificant. Among the other control variables, only common border is statistically significant at 5% while common language, common colonizer, transportation costs and tariffs are not.

The second column in Table 1 is the reduced form of the OLS estimates after dropping the insignificant coefficients from the equation. Common border among SADC members seems to capture bilateral trade flows between SADC members while SADC dummies (surprisingly) have negative sign. Perhaps, in our cross-section method, common border captures not only the border effect but also SADC effect.

In the first column of Table 1, SADC trade agreement may operate through SADC dummies as well as tariff series. One may expect tariff and SADC dummies to be correlated, since SADC-insiders already lowered their tariffs to other members. We also estimated the same gravity equation without SADC dummies (see third and fourth columns). Our results did not change and common border remained the only significant variable. Indeed, countries with a common border tend to have 1.2 percent more trade with each other than the ones who don't.

**Table 1: OLS Coefficient Estimates**

	OLS with dummies		OLS with tariffs	
Fixed Effect (exporters)				
SADC-insider	3.23	2.63	2.20	2.32
SADC-outsider	2.13	1.78	1.28	1.41
Non-SADC	4.09	4.19	3.86	3.94
Fixed Effect (importers)				
SADC-insider	3.05	2.55	1.69	1.85
SADC-outsider	1.91	1.36	1.18	1.28
Non-SADC	3.84	3.70	3.61	3.69
SADC dummies				
D10	-0.37			
D11	-1.98**	-0.79*		
D12	-1.25**			
D20	-0.13			
D21	-1.99**	-1.09**		

D22	-0.97			
D01	-0.70**	-0.63**		
Border	1.40**	1.18**	1.12**	1.17**
Lang	0.49		0.26	
Col	0.09		-0.23	
Ltcost(1)	2.95*		2.56	
Ltariff(2)	-1.50		-0.83	
R2	0.80	0.79	0.79	0.79
SBC	3.77	3.69	3.71	3.66

\*: significant at 10% level. \*\* significant at 5% level.

(1)  $ltcost = \log(1 + \text{transport cost}/100)$

(2)  $ltariff = \log(1 + \text{tariffs}/100)$

We also estimated the gravity model by using Poisson method (Table 2) which allowed us to use zero trade observations in our estimation results as well. The Poisson estimates produce rather similar results as the OLS estimates, although the explanatory power is much greater and sizes of coefficient estimates may differ. SADC dummies have unexpected negative signs but border effect is stronger. Zero trade statistics are reported mostly between SADC countries, thus Poisson estimates amplify the negative SADC coefficients. Border dummies rather than tariffs seem to be explaining bilateral trade flows among the SADC countries.

**Table 2: Poisson Coefficient Estimates**

	With dummies		With tariffs	
Fixed Effect (exporters)				
SADC-insider	4.94	4.65	3.65	3.52
SADC-outsider	4.78	4.10	3.09	2.87
Non-SADC	4.82	4.39	4.81	4.57
Fixed Effect (importers)				
SADC-insider	5.46	4.96	4.00	3.76
SADC-outsider	4.73	4.43	3.43	3.22
Non-SADC	5.42	4.78	5.18	4.90
SADC dummies				
D10	-0.24			
D11	-2.26**	-1.82**		
D12	-1.76**	-1.80**		
D20	-0.67			
D21	-2.91**	-2.47**		
D22	-2.90**	-2.50**		
D01	-0.19			
Border	1.54	1.61**	0.85*	0.95*
Lang	0.73		0.59	
Col	-0.24		-0.46	
Ltcost	-2.59		-3.35	
Ltariff	-1.40		-0.69	
R2	0.96	0.96	0.96	0.96
SBC	165.8	172.7	191.4	197.3

\*: significant at 10% level. \*\* significant at 5% level.

- (1)  $l_{cost} = \log(1 + \text{transport cost}/100)$   
(2)  $l_{tariff} = \log(1 + \text{tariffs}/100)$

In sum, our estimates indicate that the SADC agreement did not necessarily create trade between the member states, most of which can be explained by county fixed effects such as GDP and distance and having a common border. On this evidence, joining the agreement does little to enhance trade. It is notable that transport costs and tariffs do not seem to explain trade flows.

## General Equilibrium Model

### Data and methodology

#### *Labour-output ratios*

Table A6 shows labour-output ratios by sector for most SADC members using data taken from the Global Trade Analysis Project (GTAP) version 8 database. These data are based on the value of labour, not numbers of workers, so the value of labour does not reflect the number of workers where wages are below average. The data are taken from input-output tables derived from the national accounts of the individual countries. Although these are the latest numbers available through version 8 of the GTAP database, the primary data vary in age, as the accounts are based on a census taken at intervals.

It is clear that primary agriculture is a labour intensive industry in the SADC region. Mozambique, Tanzania and DRC are examples of countries with high labour-output ratios in primary agriculture. Given that wages are low in the agricultural sector, which is characterised by an informal labour force, it is apparent that productivity per worker is low relative to the rest of the economy. The extractive industries (e.g. mining) have low labour-output ratios. The service industries also tend to have relatively high labour-output ratios.

The impacts of trade on employment operates through changes in output. To the extent that trade influences output, changes in employment can be related to trade. However, there are many other factors affecting output other than trade, including domestic consumption, production shocks caused by droughts and floods, and a range of domestic policies. In addition, the link between output and employment is not fixed, with wages and interest rates, technology and labour market policies having an influence. Therefore, it is difficult to derive a direct link between trade policy, such as regional integration, and employment.

#### *Previous research (more here)*

However, the absence of sound data in the past limits the scope of analysis to link trade and employment. Chinembiri (2010) used econometric analysis to conclude that import penetration had had a significant negative effect on employment in the primary and secondary sectors in South Africa, but export openness and wages were found not

to be significant. Other studies (Edwards and Behar 2006) have found conflicting results, or results that change from one period to another.

### **Methodology**

One way to gauge the link between regional integration and employment would be to look at sectoral trade employment in 2000 before tariff reduction within the region and now, when integration is well advanced. For example, prior to removing tariffs South Africa exported virtually nothing to Namibia and imported \$200,000 in just 15 of 99 HS chapters, mainly fish (HS chapter 3) and other products of animal origin (HS chapter 5). By 2007 imports amounted to \$131 million from 27 chapters. However, some 99 per cent of these imports were pearls, precious stones, metals, coins, etc, (HS 71). Diversification may have increased, but so had concentration.

Unfortunately, trade data does not tell us much about production and employment. For this we turn to a general equilibrium model that links trade flows to production and the use of labour, capital and land. The link between trade and employment is assessed here by using the GTAP version 8 database with 2007 tariffs and simulating removing these the remaining tariffs within the region, imposed by the countries listed in table 1 as shown earlier. This shows the expected trade and employment effects in each member country of removing the tariffs alone.

The GTAP model is used to measure the impact of changes in trade policy following regional integration on real wages and employment. GTAP is ideal for modelling preferential trade agreements because it contains bilateral trade and tariff data. It is a multi-country and multi-sectoral computable general equilibrium (CGE) model and fully documented in Hertel and Tsigas (1997). For each country or region, there are multistage production processes which combine primary factors of land, labour, capital and natural resources with intermediate inputs assuming a constant elasticity of substitution technology. Returns to factors, i.e. income, are taxed by the government, saved or spent by the single representative household. While there is no substitution between intermediate inputs and primary factors or among the intermediate inputs, there is substitution between different sources of intermediate inputs, namely domestic and imports from each region. The regions are linked together by imports and exports of commodities. Similar commodities, which are produced by different countries, are assumed to be imperfect substitutes for one another. The degree of substitution is determined by the Armington elasticities.

The degree of substitution between primary factors (capital, labour, land, etc) varies between sectors, with primary agriculture characterised by low substitutability, and manufacturing much higher. The elasticities are shown in table 2. For a given sector, such as rice, the elasticity is the same between all primary factors and across all countries. The substitutability between labour and capital is the same as between skilled and unskilled labour.<sup>3</sup> Table 2 also shows the elasticity of substitution between imports and domestic goods, the Armington elasticity.

**Table 2 Elasticity of substitution**

	<b>Between primary factors</b>	<b>Between domestic and imported goods</b>
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<sup>3</sup>

Rice	0.53	3.60
Other crops	0.26	2.78
Vegetables	0.26	1.85
Sugar	0.72	2.70
Plant based fibres	0.26	2.50
Livestock	0.26	2.22
Fishing	0.2	1.25
Resources	0.26	3.32
Meat	1.12	4.15
Other processed agriculture	1.12	2.14
Textiles	1.26	3.82
Wearing apparel	1.26	3.70
Chemicals	1.26	3.30
Metal manufactures	1.26	3.55
Wood & paper products	1.26	3.10
Manufactures	1.26	3.58
Electronics	1.26	4.40

Source. GTAP database v8.

In this application, the standard model is used with the exception that alternative labour market closures, described below, are used for unskilled labour. Skilled labour and capital are assumed to be mobile in each country but in a fixed supply, with no international mobility. Labour cannot move across borders. This is the standard GTAP assumption.

There is no attempt to phase in the tariff changes nor trace the time profile of the impacts. Thus, we ignore changes such as growth in trade that may have occurred over the implementation period. The focus here is on removing the existing tariffs, ignoring the exemptions and exclusions. To this extent we overestimate the gains. In the other hand, we ignore non-tariff barriers and other quantitative restrictions such as import bans or quarantine restrictions.

#### *Simulations with alternative labour market assumptions*

In this analysis we are interested in the labour market effects of trade liberalisation. To gauge this we use three alternative closures or assumptions about how the labour market works. The standard (fixed) closure assumes that the quantity of skilled and unskilled labour in each country is fixed. In other words, there is no change in unemployment. Thus, all the adjustment occurs in real wages. An alternative (flexible) closure assumes real wages of unskilled labour are fixed and the adjustment occurs in employment. The final (rigid) assumption is a combination of the two, with some adjustment in both the price and quantity of unskilled labour. This assumption is undoubtedly more realistic, 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 real wage. The three scenarios are listed in table 3.

**Table 3 Estimated impacts for elimination remaining intra-regional tariffs**

Scenario	Closure	Assumption
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Fixed	Quantity of labour is exogenous	No change in employment
Flexible	Real wages of unskilled labour is exogenous	Surplus unskilled labour is available. No change in skilled labour.
Rigid	Real wages and employment endogenous	Real wages and employment of unskilled labour can adjust

## Results

Trade liberalisation in developing countries can be expected to lead to an increase in demand for labour intensive goods and hence the demand for labour increases. If the supply of labour is fixed, the increase in demand is expressed in an increase in real wages. If labour is in surplus, the increase in employment has a significant effect on national welfare (table 3). This is because the resource base of primary factors is increased, rather than merely reallocated to better use. The flexible scenario generates the greater welfare gains because real wages are fixed and the increase in demand for labour is assumed to be totally accommodated by changes in employment rather than in real wages.

The contribution to welfare of the increase in employment is shown in table 5. There is no contribution under the Fixed scenario, but significant contributions under the flexible and rigid scenarios. For example, one third of Mozambique's welfare gains of \$303 million are explained by increased employment under the rigid scenario. However, labour doesn't capture all the gains. Total welfare increase \$147m over the Fixed scenario although the contribution of labour is \$109 million. Holding down real wages benefits consumers and owners of other factors such as capital and land.

**Table 4 Welfare. Estimated annual impacts for elimination of remaining intra-regional tariffs under alternative labour market assumptions**

	Fixed \$m	Flexible \$m	Rigid \$m
Botswana	-12	12	0
Madagascar	-2	-1	-2
Mozambique	156	445	303
Mauritius	-1	4	1
Malawi	-43	-32	-37
Tanzania	-5	8	1
Zambia	-24	34	5
Zimbabwe	425	821	631
South Africa	418	693	555
Rest of South African Customs	31	55	43
DRC & Ang	-74	-4	-38

Source GTAP v8 simulations.

**Table 5 Endowment effects. Contribution of increase in employment to welfare**

	<b>Fixed</b>	<b>Flexible</b>	<b>Rigid</b>
	\$m	\$m	\$m
Botswana	0	21	10
Madagascar	0	1	0
Mozambique	0	217	109
Mauritius	0	5	3
Malawi	0	7	3
Tanzania	0	10	5
Zambia	0	49	24
Zimbabwe	0	289	146
South Africa	0	155	77
Rest of South African			
Customs	0	21	11
DRC & Ang	0	44	22

Source GTAP v8 simulations.

The changes in wages for unskilled and skilled labour are shown in table 6. The greater the degree of liberalisation undertaken, the greater the wages increases. For most countries, these changes are positive, although Malawi is an exception. In the Fixed scenario, wages of skilled and unskilled tend to move together. This doesn't happen under the Flexible employment scenario because there is no change in wages for unskilled workers by assumption.

**Table 6 Real wages for skilled and unskilled labour.**

	<b>Unskilled</b>			<b>Skilled</b>		
	<b>Fixed</b>	<b>Flexible</b>	<b>Rigid</b>	<b>Fixed</b>	<b>Flexible</b>	<b>Rigid</b>
Botswana	0.1	0.0	0.0	0.0	0.3	0.1
Madagascar	0.0	0.0	0.0	0.0	0.1	0.1
Mozambique	5.4	0.0	2.6	6.6	9.9	8.3
Mauritius	0.1	0.0	0.1	0.1	0.2	0.1
Malawi	0.3	0.0	0.2	-0.8	-0.6	-0.7
Tanzania	0.1	0.0	0.1	0.2	0.3	0.3
Zambia	0.8	0.0	0.4	1.2	1.5	1.4
Zimbabwe	18.0	0.0	8.0	24.2	30.6	27.6
South Africa	0.1	0.0	0.1	0.2	0.2	0.2
Rest of South African						
Customs	0.3	0.0	0.2	0.3	0.4	0.4
DRC & Ang	0.1	0.0	0.1	0.2	0.3	0.3

Source GTAP v8 simulations.

### *Labour use by sector*

Perhaps of greater interest is employment by sector in each country. This is shown for unskilled and skilled labour for the Rigid scenario in tables Appendix A7 and A8. The most striking estimate is that for manufacturing employment in Mozambique, which rises six fold. This comes from a very low base. Manufacturing accounts for less than 1 per cent of output in Mozambique and the value of labour employed in the sector amounts to only \$14 million. It appears that the manufacturing sector relocates from Malawi and Zimbabwe, where employment in the sector falls by a quarter and a half respectively. Zimbabwe has high tariffs (164 per cent) in this sector, especially on imports from Mozambique, across the border. The tariff of most significance appears to be HS630900 “Worn Clothing And Other Worn Textile Articles Traded In Bulk Or In Bales, Sacks Or Similar Bulk Packings”.

**Table: Change in Employment, unskilled labour**

	<b>Rigid</b>
Botswana	0.28
Madagascar	0.01
Mozambique	4.30
Mauritius	0.10
Malawi	0.28
Tanzania	0.09
Zambia	0.63
Zimbabwe	-
South Africa	0.13
Rest of South African	
Customs	0.25
<u>DRC &amp; Ang</u>	<u>0.13</u>

Source: Calculation based on GTAP 8 data,

Also of interest is the employment of unskilled labour in agriculture, as it is this group that includes many of the rural poor. In Mozambique there are falls in rural employment as these workers move out of sugar production and migrate to the manufacturing sector. In other countries there is not much movement in primary agriculture except perhaps in the ‘Other crops’ sector in Malawi and South Africa. There are increases in employment in processed agriculture in Zimbabwe and South Africa. There are similar percentage changes in skilled labour but these don’t amount to much in absolute terms because the initial level of skilled labour in agriculture is low.

The apparel sector sees significant gains in Mozambique and Malawi while Tanzania increases employment in textiles. Apparel is generally considered to be more labour intensive and less skilled than textile production, although it is further down the supply chain. However, the input output data does not show that for SADC countries.

The electronics industry is one where employment is likely to increase in Malawi, Botswana and Zimbabwe.



Because percentage changes can be deceptive, absolute changes in unskilled employment, by value, are shown in table A9. The greatest changes are in Mozambique manufacturing and Zimbabwe metals manufacture. There are also large changes in the services sector as jobs diminish elsewhere in the economy.

The results are not sensitive to values of the elasticity of substitution between primary factors. For example, doubling the sugar elasticity in table 2 from 0.72 to 1.44 increases the change in the use of unskilled labour in the sugar sector in Malawi from 15.29 per cent to 15.65 per cent. Nor are the results sensitive to the elasticity of substitution between intermediate inputs. Increasing this from 0 to 1 for sugar leads to a change in employment of 14.71. Welfare increases only marginally.

### **Implications and conclusions**

The CGE results suggest that where high tariffs are removed, substantial changes in production and employment in a specific sector may occur. These changes bring benefits, but will inevitably result in temporary dislocation and some adjustment costs. No attempt has been made here to measure the costs of adjustment, but it is worth noting that the tariff changes are generally phased in over a number of years, and that during that time the economy might grow significantly. An economy growing at 7 per cent a year will double in ten years.

The alternative closures emphasize the importance of using all available resources. Unemployed resources impose a significant opportunity cost on the economy. Governments can play a role by implementing labour market policies that enhance mobility from . This includes education, training, infrastructure, and providing information about where new jobs are likely to be. This analysis goes some way to indicating where the demand for skills is likely to be following tariff reductions.

This approach has its limitations. Apart from the usual concerns about data quality, the analysis is dependent on input output tables that quickly become out of date in a growing economy. Parameter values that are applied globally may not be specific to individual countries.

Furthermore, no account is taken here of whether employees in one occupation, such as agriculture, could be productive in another specific occupation, such as apparel. Some jobs are gender specific, and don't lend themselves to mobility.

The Gravity model does not find a significant effect of SADC regional integration on intra-regional trade. The approach can be refined by using panel data that takes changes over time into account.

The impact of regional integration is likely to have a positive impact on structural change since intra-regional trade of processed and more sophisticated products is significantly higher than external exports. The labour intensity of intra-regional and external trade varies across countries so that employment effects of further regional integration are likely to vary by country.

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## Annex I: Gravity Model

Its theoretical underpinnings are based on Newtonian gravity model in which the attraction between two objects depends positively on their mass and negatively on the distance between them. Applied to trade, bilateral flows between country-pairs are mainly determined by their economic sizes (GDP) as well as distance between the two countries. This contrasts with other explanations of trade flows, such as the [Heckscher-Ohlin model](#) in which trade is determined by relative factor abundances.

The general form of the gravity model can be written as follows:

$$T_{ij} = A \frac{Y_i^\alpha Y_j^\beta}{D_{ij}^\theta} \quad (1)$$

In equation (1)  $T_{ij}$  denotes trade flow between country  $i$  and  $j$ ;  $Y_i$  and  $Y_j$  represent levels of GDP in country two countries; and  $D_{ij}$  is physical distance between country pairs. Lastly,  $A$  refers to all other variables that can affect bilateral trade flows. GDP is a measure of the size of the market, whereas distance is a proxy for transport costs. Other variables, captured by  $A$ , include a common border, linguistic similarity, colonial links, or member ship of a preferential trade agreement.

Since GDP and distance attempt to explain the pattern of trade, any variation in this pattern must to attributable to other factors. The modeler's task is to estimate the contribution of these other factors. The method is especially useful in studying significance of bilateral, regional or multilateral trade agreements on creating trade flows among signatory countries.

In this section we will follow a similar avenue and examine the effects of SADC agreement on member states' trade flows with insider and outsider countries by using the gravity model approach.

By taking logs of the both sides of equation (1) we obtain a log-linear form of the gravity model. Albeit there are many different forms of the gravity model, here we estimate the following equation.

$$\ln(M_{ij}) = \alpha_1 + \alpha_2 \ln(Y_i) + \alpha_3 \ln(Y_j) + \alpha_4 \ln(D_{ij}) + \alpha_5 \ln(A) + \varepsilon_{ij} \quad (2)$$

In this equation  $M_{ij}$  is imports of country  $i$  from country  $j$  while  $\varepsilon_{ij}$  is the error term with standard normal distribution.  $A$  is a set of variables includes common border, colonizer, language as well as SADC membership dummy variables. In order to define the SADC dummies, countries/regions in our study are grouped into three categories, SADC insider, SADC outsider and others. SADC countries are divided

into insiders and outsiders in order to differentiate trade flows of SADC countries who have already liberalized trade flows (Botswana, Madagascar, Mauritius, South Africa, Lesotho, Namibia and Swaziland) from other members who haven't (Angola, Mozambique, Malawi, Tanzania, Zambia, Zimbabwe and Democratic Republic of Congo) by 2008. More specifically, the SADC dummy is defined as:

,  
 $D_{ij}^{11} = 1$  if both countries are SADC insiders (zero otherwise).

$D_{ij}^{12} = 1$  if importer is SADC insider but exporter is SADC outsider (zero otherwise).

$D_{ij}^{10} = 1$  if importer is SADC insider but exporter is from rest of the world (zero otherwise).

Similarly:

$D_{ij}^{21} = 1$  if importer is SADC outsider but exporter is SADC insider (zero otherwise).

$D_{ij}^{22} = 1$  if both countries are SADC outsiders (zero otherwise).

$D_{ij}^{20} = 1$  if importer is SADC outsider but exporter is from rest of the world (zero otherwise).

Similar dummies can be constructed for the non-SADC countries.

**Table A1 Mozambique tariffs on imports from SADC members by sector**

	<b>Botswa na</b>	<b>Madaga scar</b>	<b>Mozam bique</b>	<b>Mauriti us</b>	<b>Malawi</b>	<b>Tanzani a</b>	<b>Zambia</b>	<b>Zimbab we</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Ang</b>
	%	%	%	%	%	%	%	%	%	%	%
Rice	0	0	0	0	7.5	0	0	0	3.77	0	0
Other crops	0	0	0	0	0.48	0	5.1	0.54	6	9.93	0
Vegetables	0	0	0	0	17.99	18.27	0	20	18.98	11.27	0
Sugar	0	0	0	0	7.5	6.12	0	7.5	7.5	0	0
Plant based fibres	0	0	0	0	0	0	0	0	0	0	0
Livestock	0	0	0	0	10.11	19.8	9.72	6.65	10.33	3.43	0
Fishing	0	0	0	0	0	0	0	0	4.54	0	0
Resources	0	0	0	5.47	0.91	1.96	1.4	0.22	1.04	0	0
Meat	19.4	0	0	0	0	0	0	19.99	18.18	19.91	0
Other processed agriculture	0	0	0	8.55	9.56	17.49	18.64	18.11	16.38	18.06	0
Textiles	19.98	4.45	0	20	8.11	19.35	7.43	11.51	14.13	7.21	14.39
Wearing apparel	20	12.65	0	20	20	20	0	20	19.95	20	0
Chemicals	2.55	11.43	0	16.97	14.9	11.79	18.5	4.85	6.97	6.41	0
Metal manufactures	0	10.68	0	7.88	9.63	10.2	6.77	0.01	5.35	7.3	0
Wood & paper products	0	9.46	0	8.08	2.36	12.99	0	6.69	9.25	9.68	0
Manufactures	8.61	3.13	0	6.23	6.22	4.98	2.61	8.68	6.22	10.18	7.46
Electronics	13.32	11.56	0	11.56	8.87	11.06	0	12.94	8.6	10.33	11.56

Source. GTAP V8

**Table A2 Tanzania tariffs on imports from SADC members by sector**

	<b>Botswa na</b>	<b>Madaga scar</b>	<b>Mozam bique</b>	<b>Mauriti us</b>	<b>Malawi</b>	<b>Zambia</b>	<b>Zimbab we</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Angola</b>
	%	%	%	%	%	%	%	%	%	%
Rice	0	0	0	7.5	0	0	0	3.77	0	0
Other crops	0	0	0	0.48	0	5.1	0.54	6	9.93	0
Vegetables	0	0	0	17.99	18.27	0	20	18.98	11.27	0
Sugar	0	0	0	7.5	6.12	0	7.5	7.5	0	0
Plant based fibres	0	0	0	0	0	0	0	0	0	0
Livestock	0	0	0	10.11	19.8	9.72	6.65	10.33	3.43	0
Fishing	0	0	0	0	0	0	0	4.54	0	0
Resources	3.76	0	5.47	0.91	1.96	1.4	0.22	1.04	0	0
Meat	0	0	0	0	0	0	19.99	18.18	19.91	0
Other processed agriculture	0	0	8.55	9.56	17.49	18.64	18.11	16.38	18.06	0
Textiles	0	0	20	8.11	19.35	7.43	11.51	14.13	7.21	14.39
Wearing apparel	0	21.98	20	20	20	0	20	19.95	20	0
Chemicals	0.79	0	16.97	14.9	11.79	18.5	4.85	6.97	6.41	0
Metal manufactures	3.55	1.56	7.88	9.63	10.2	6.77	0.01	5.35	7.3	0
Wood & paper products	0	4.42	8.08	2.36	12.99	0	6.69	9.25	9.68	0
Manufactures	1.37	4.59	6.23	6.22	4.98	2.61	8.68	6.22	10.18	7.46
Electronics	0	0	11.56	8.87	11.06	0	12.94	8.6	10.33	11.56

Source. GTAP V8

**Table A3 Zambia tariffs on imports from SADC members by sector**

	<b>Botswa na</b>	<b>Madaga scar</b>	<b>Mozam bique</b>	<b>Mauriti us</b>	<b>Malawi</b>	<b>Tanzani a</b>	<b>Zimbab we</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Angola</b>
	%	%	%	%	%	%	%	%	%	%
Rice	0	0	0	0	0	0	0	0	0	0
Other crops	0	0	3.63	0	0	1.18	0	8.56	0	0
Vegetables	5.25	0	0	0	0	5	0	5.73	0	0
Sugar	0	0	0	0	0	5	0	5	5	0
Plant based fibres	0	0	5	0	0	0	0	0	0	0
Livestock	0	0	0	0	0	3.66	3.29	1.91	0	0
Fishing	0	0	0	0	0	0	0	2.11	0	0
Resources	0.01	0	2.85	0	0	0.01	1.15	2.69	0	0
Meat	0	0	0	0	0	0	0	5.84	0	0
Other processed agriculture	4.94	0	3.58	0	0	13.73	37	18.34	5.66	0
Textiles	6.07	0	1.91	0	0	20.83	12.85	14.19	13.67	0
Wearing apparel	12.73	0	5	0	0	25	25	23.2	19.02	0
Chemicals	1.9	0	1.43	0	0	4.86	0.92	2.39	4.65	0.1
Metal manufactures	3.1	0	0.09	0	0	4.58	3.81	1.86	4.82	4.19
Wood & paper products	3.52	0	1.83	0	0	11.86	1.87	7.22	3.2	4.98
Manufactures	5.42	0	2.18	0	0	2.17	1.89	3.24	3.03	0.89
Electronics	5	0	5	0	0	2.56	0	2.03	2.24	5

Source. GTAP V8.



**Table A4 Zimbabwe tariffs on imports from SADC members by sector**

	Botswana	Madagascar	Mozambique	Mauritius	Malawi	Tanzania	Zambia	South Africa	Rest of SACU	DRC & Angola
	%	%	%	%	%	%	%	%	%	%
Rice	12.49	0	15	0	0	0	0	12.36	10	0
Other crops	4.84	0	5.62	0	0	50	0	11.94	0	0
Vegetables	17.14	0	22.88	0	0	0	0	24.92	0	0
Sugar	0	0	24.97	0	0	0	0	20.04	0	0
Plant based fibres	0	0	2.5	0	0	0	0	2.5	0	0
Livestock	5	0	28.48	0	0	0	0	9.79	16.82	0
Fishing	0	0	17.96	0	0	0	0	13.88	6.52	0
Resources	5.57	0	9.19	0	0	5.02	0	23.82	7.5	0
Meat	8.38	0	40	0	0	35	0	22.56	32.83	0
Other processed agriculture	33.29	0	18.89	0	0	24	0	27.89	10.36	0
Textiles	89.82	0	18.5	0	0	36	0	24.14	35.63	24.92
Wearing apparel	55	0	60	0	0	58	0	57	40	58
Chemicals	6.19	0	3.14	0	0	17.13	0	9.84	12.76	8.36
Metal manufactures	5.02	0	12.78	0	0	15.02	0	15.91	20.09	21.27
Wood & paper products	8.18	0	23.77	0	0	19.18	0	23.11	11.46	21.44
Manufactures	27	0	163.99	0	0	11	0	16.29	19.57	30.93
Electronics	19	0	16	0	0	12	0	13.16	13	5

Source. GTAP V8.

Comment [DV1]: revise

**Table A5 DRC and Angola tariffs on imports from SADC members by sector**

	<b>Botswana</b>	<b>Madagascar</b>	<b>Mozambique</b>	<b>Mauritius</b>	<b>Malawi</b>	<b>Tanzania</b>	<b>Zambia</b>	<b>Zimbabwe</b>	<b>South Africa</b>	<b>Rest of SACU</b>
	%	%	%	%	%	%	%	%	%	%
Rice	0	0	0	0	10	0	0	0	6.7	4.15
Other crops	0	0	2.93	0	6.95	0	2	8.22	5.47	4.7
Vegetables	0	0	12.27	0	15.33	0	0	15.33	12.51	13.95
Sugar	0	0	14.29	0	20	16.88	0	0	4.96	2.67
Plant based fibres	0	0	2	0	0	0	0	0	2	0
Livestock	0	0	0	0	0	0	6.74	4.61	6.17	5.09
Fishing	0	0	0	0	0	0	0	0	19.39	19.58
Resources	1.55	14.97	0.57	0	0	0	0	5.14	17.98	23.36
Meat	13.57	0	0	0	0	0	0	9.4	10.43	12.83
Other processed agriculture	6.55	0	15.75	0	10	17.12	19.3	18.78	22.38	22.01
Textiles	20	0	6.2	6.93	14.27	12.86	0	18.83	8.13	13.47
Wearing apparel	20	0	14.88	19.64	0	19.65	0	15.58	14.34	14.11
Chemicals	11.18	0	8.75	7.3	8.97	15.47	9.71	15.75	9.03	11.99
Metal manufactures	8.74	0	4.2	10.85	14.34	2.51	4.14	8.48	11.02	6.88
Wood & paper products	14.87	0	7.33	13.36	17.91	9.01	14.54	19.64	13.51	15.05
Manufactures	3.54	6.3	6.05	4.04	7.39	5.07	1.18	10.15	3.17	7.29
Electronics	5.3	0	8.38	11.91	5	10.54	4.86	5	3.97	7.76

Source. GTAP V8

**Table A6 Labour output ratios for SADC members by industry**

	<b>Botswa na</b>	<b>Madaga scar</b>	<b>Mozam bique</b>	<b>Mauriti us</b>	<b>Malawi</b>	<b>Tanzani a</b>	<b>Zambia</b>	<b>Zimbab we</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Ang</b>
Rice	20	29	43	0	31	30	18	0	6	15	0
Other crops	18	66	54	39	32	46	45	12	14	27	50
Vegetables	25	62	49	52	49	50	51	11	16	30	55
Sugar	0	31	14	23	16	13	21	6	7	16	25
Plant based fibres	0	57	40	0	48	26	42	11	7	25	58
Livestock	24	31	49	32	37	47	29	11	10	18	46
Fishing	0	16	23	13	47	45	5	0	10	7	8
Resources	8	16	63	10	28	64	19	11	10	14	12
Meat	23	18	4	27	10	29	13	1	4	23	22
Other processed agriculture	19	18	15	19	11	10	17	13	10	21	20
Textiles	38	14	14	21	9	9	9	19	14	21	24
Wearing apparel	41	15	21	26	14	6	12	8	18	27	28
Chemicals	23	14	20	49	10	3	34	0	7	51	44
Metal manufactures	80	12	10	13	29	4	2	11	12	14	11
Wood & paper products	26	14	17	29	13	15	22	39	15	29	30
Manufactures	23	14	16	17	21	4	11	15	9	20	16
Electronics	11	0	0	18	11	4	22	17	9	19	16
Transport & communications	26	20	13	19	29	23	31	23	16	22	20
Business services	35	49	27	34	51	24	33	25	24	34	32
Services and activities											
NES	33	18	27	45	37	20	24	30	31	46	45
Total	30	23	27	29	31	25	22	18	19	29	31

Source: GTAPv8 database. Various years. Rest of SACU includes Namibia, Lesotho and Swaziland.

**Table A7 Change in unskilled labour use for SADC members by industry, Rigid scenario**

	<b>Botswana</b>	<b>Madagascar</b>	<b>Mozambique</b>	<b>Mauritius</b>	<b>Malawi</b>	<b>Tanzania</b>	<b>Zambia</b>	<b>Zimbabwe</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Ang</b>
	%	%	%	%	%	%	%	%	%	%	%
Rice	0	0	-7	0	3	0	0	1	4	0	3
Other crops	0	0	-2	0	5	0	0	1	1	1	0
Vegetables	0	0	-2	0	0	0	-1	5	0	1	0
Sugar	0	-1	-13	0	15	0	3	3	0	-2	0
Plant based fibres	-1	0	-11	0	4	4	-1	0	-1	-3	0
Livestock	0	0	-2	0	1	0	0	5	0	0	0
Fishing	-0.04	-0.04	1.74	0	-1.68	0.04	-1.23	18.47	0.07	1.6	-0.06
Resources	-0.58	0.07	-6.35	0.01	3.27	-0.05	0.47	-0.92	0.02	-1.34	0.51
Meat	-0.17	-0.01	-6.12	-0.05	-1.27	0.17	-0.17	13.66	0.39	-0.46	0.83
Other processed agriculture	0.2	0.04	-3.69	-0.11	-1.17	-0.18	-0.36	11.18	1.11	3.6	-1.36
Textiles & apparel	38.51	0.18	-20.7	0.18	0.71	8.62	-2.46	-18.52	0.28	-1.59	0.05
Wearing apparel	-1	0	-11	0	3	1	-2	6	0	-3	0
Chemicals	0	0	-12	0	2	1	-5	4	0	0	-1
Metal manufactures	-2	0	-18	1	-6	0	4	32	-1	-3	1
Wood & paper products	0	0	-1	0	1	-1	-3	-11	1	6	-1
Manufactures	-1	0	654	0	-29	1	-4	-50	0	2	1
Electronics	30	1	5	0	4	8	-3	35	2	5	0
Transport & communications	0	0	9	0	1	0	1	26	0	0	0
Business services	0	0	7	0	-1	0	1	20	0	-1	0
Services and activities NES	0	0	5	0	-1	0	2	33	0	1	0

**Table A8 Change in skilled labour use for SADC members by industry, Rigid scenario**

	<b>Botswana</b>	<b>Madagascar</b>	<b>Mozambique</b>	<b>Mauritius</b>	<b>Malawi</b>	<b>Tanzania</b>	<b>Zambia</b>	<b>Zimbabwe</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Ang</b>
	%	%	%	%	%	%	%	%	%	%	%
Rice	-0.13	0.02	-9.3	-0.46	3.18	-0.26	-0.25	-7.88	3.69	-0.29	2.61
Other crops	0.19	0.06	-3.03	0.01	5.18	-0.12	-0.5	-3.42	1.07	0.62	-0.01
Vegetables	0.08	0	-2.94	0.04	0.65	-0.02	-0.92	0.83	0.17	0.71	-0.52
Sugar	0.38	-0.68	-16.16	0.07	15.99	-0.35	1.89	-8.34	0.39	-2.5	-0.2
Plant based fibres	-0.88	-0.03	-12.64	0.4	4.39	3.49	-0.95	-3.9	-1.49	-3.25	-0.06
Livestock	-0.06	-0.05	-3.72	0.05	1.36	0.25	-0.55	0.8	0.22	-0.31	0.02
Fishing	-0.06	-0.04	0.65	-0.01	-1.52	0	-1.42	14.59	0.04	1.56	-0.09
Resources	-0.61	0.06	-7.63	-0.01	3.5	-0.1	0.22	-5.04	-0.01	-1.4	0.47
Meat	-0.29	-0.06	-11.63	-0.12	-0.33	-0.03	-1.23	-5.66	0.24	-0.7	0.62
Other processed agriculture	0.08	0	-9.34	-0.18	-0.23	-0.38	-1.43	-7.72	0.96	3.34	-1.56
Textiles & apparel	38	0	-26	0	2	8	-4	-34	0	-2	0
Wearing apparel	-1	0	-17	0	4	1	-4	-14	0	-3	0
Chemicals	0	0	-18	0	3	1	-6	-16	0	0	-1
Metal manufactures	-2	0	-23	1	-5	0	3	7	-1	-3	0
Wood & paper products	0	0	-7	0	2	-1	-4	-28	0	6	-1
Manufactures	-1	0	605	0	-28	0	-5	-60	-1	2	1
Electronics	30	1	-2	0	5	7	-5	10	1	5	0
Transport & communications	0	0	0	0	2	0	0	-3	0	-1	0
Business services	0	0	0	0	0	0	0	-2	0	-1	0
Services and activities NES	0	0	-2	0	1	0	1	6	0	0	0

**Table A9 Absolute change in unskilled labour use for SADC members by industry, Rigid scenario**

	<b>Botswa na</b>	<b>Madaga scar</b>	<b>Mozam bique</b>	<b>Mauriti us</b>	<b>Malawi</b>	<b>Tanzani a</b>	<b>Zambia</b>	<b>Zimbab we</b>	<b>South Africa</b>	<b>Rest of SACU</b>	<b>DRC &amp; Ang</b>
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
Rice	0	0	-3	0	0	0	0	0	0	0	0
Other crops	0	0	-11	0	18	-1	-2	1	5	1	0
Vegetables	0	0	-5	0	0	0	-1	0	2	1	-7
Sugar	0	-1	-1	0	2	0	1	0	1	-1	0
Plant based fibres	0	0	-2	0	1	1	0	0	0	0	0
Livestock	0	0	-3	0	1	1	0	1	1	0	1
Fishing	0	0	1	0	0	0	0	0	0	0	0
Resources	-1	0	-19	0	2	-1	1	-1	1	-3	9
Meat	-0.2	0	-0.18	-0.01	-0.08	0.21	-0.05	0.14	1	-0.3	1.21
Other processed agriculture	0.24	0.09	-4.11	-0.14	-0.44	-0.54	-0.92	10.22	28.06	11.57	-9.62
Textiles & apparel	26.26	0.14	-1.35	0.31	0.03	1.37	-0.64	-8.14	2.83	-1.72	0.11
Wearing apparel	-0.57	0.13	-0.86	0.38	0.24	0.26	-0.63	0.2	5.14	-3.66	-0.33
Chemicals	-0.01	0.03	-2.13	0.67	0.59	0.16	-1.51	0.02	10.03	-0.72	-7.11
Metal manufactures	-15.07	0	-26.48	0.27	-1.58	0.09	2.4	50.03	-58.85	-5.87	2.17
Wood & paper products	0.16	0.07	-0.13	-0.03	0.13	-0.54	-2.84	-6.29	13.83	6.45	-2.85
Manufactures	-0.84	0.02	138.04	0.05	-14.47	0.14	-3.52	-42.73	-20.33	4.15	6.43
Electronics	0.44	0	0.02	-0.04	0.03	0.05	-0.49	0.57	3.71	0.89	0.2
Transport & communications	-0.37	0.15	11.56	0.17	0.58	0.86	7.45	23.96	-2.06	-0.89	4.68
Business services	0.16	0.27	12.09	0.21	-0.92	0.68	5.6	14.69	24.79	-2.85	9.43
Services and activities NES	1.96	0.13	48.04	0.46	-2.9	3.86	23.43	143.52	80.77	6.51	20.34