



Examining the India, Brazil and South African (IBSA) Triangular Trading Relationship

by

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Summary and general conclusions from the analysis

Following a comprehensive examination of the most recent merchandise trade flows between the relevant countries this paper uses a computer model to look at the possible economic results from removing all merchandise¹ tariff barriers between the three partners of India, Brazil and South Africa/SACU. We have ignored the political complication of Brazil also belonging to a free trade agreement and we have not modelled the estimation and removal of non-tariff barriers, services trade or some of the more sophisticated but speculative gains from technological change or other dynamic effects. Recent research, some of which is cited in the paper, has highlighted that most of these fancier assumptions are misleading to policy makers.

The IBSA agreement is potentially good for all major parties with similar welfare gains of between one to one and a half billion dollars at 2015, but with this translating into larger gains for South Africa when measured as a percentage of real GDP as South Africa has a smaller economic base to work from. The gains to South Africa are spread across the contributing factors of allocative efficiency, labour's contribution, capital and the terms of trade gains from both (a) better relative prices between exports and imports and (b) more efficient use of capital. The biggest loser in dollar terms is the EU, with all other countries/regions except Nigeria losing. Unfortunately these losers include both Botswana and 'rest of SACU' or the model aggregation of Lesotho, Namibia and Swaziland combined, although these losses are not high and may be misleading given that intra-SACU trade and therefore any changes in this trade will not be picked up in the model's database given the poor quality of this trade data.

Another feature of the analysis is that we have used as our base for the simulation a trade picture that includes all the known global updates, and this includes simulating the effects of the Trade, Development and Cooperation Agreement with the EU in such a way that enables us to isolate these effects from the base. Results from this TDCA simulation suggest that a full and comprehensive IBSA FTA is of greater value (in fact about double the welfare gains) to South Africa than the partial TDCA as it now stands. This is mainly because (a) South Africa faces manufacturing tariffs that are modest, thus the preferences are not that significant, and, more importantly, (b) South Africa gains little preference into the highly protected European agricultural market from the TDCA. Conversely, for IBSA, South Africa

¹ We have used the interchangeable terms of 'merchandise', 'goods' and 'products' either together or separately in this paper. They generally refer to the actual physical items that are traded. The celebrated definition from the *Economist* magazine is that these are items that hurt when dropped on your foot, and the terms are used to preclude the trade in services.

is deemed to have gained comprehensive access into the relatively highly protected Indian market, thus gaining a considerable advantage over global competitors in both agricultural and non-agricultural goods.

In the first section of the paper we examine the current trade flows between the IBSA partners and hypothesise that the interesting results for South Africa may concentrate upon the sugar trade in agriculture and the motor vehicle trade in the non-agricultural sectors. Neither of these proved to be significant for South Africa. Sugar production actually declines in South Africa despite gaining better access into India, as this access is taken up by Brazil rather than the presumably less efficient South African production. Similarly for motor vehicles, where South African production declines by 1.6 percent in the face of more efficient production and consequently imports from Brazil in particular and to a lesser extent India.

Given the extent to which China has displaced South African domestic production of clothing with its dramatically increasing exports over the last few years, it should be no surprise that India, although currently not a major source of South African imports but a country with enormous production capacity perhaps second only to China, should compete strongly in South Africa if tariffs were to be eliminated. Clothing production declines by 8.7 percent, and this is a massive decline for an individual sector².

However, the major finding from this GTAP exercise, and one not anticipated from the trade data, is the massive gains to South Africa from attractive access into India from a zero rather than 15 percent duty on gold. This is a happy juxtaposition on the world's leading gold producer meeting a large jewellery exporter that enables both partners to prosper as India's costs are reduced. Indeed, it is this sector that is driving a considerable portion of the welfare gains to both South Africa and India, and the policy implication is very clear: reducing the Indian tariffs on gold is a win-win situation and must become a priority for negotiators.

Another major finding from this GTAP work is related to the employment closures, where the trade-offs between holding wages constant and increasing the supply of unskilled workers at one extreme and, conversely, holding the supply of workers constant and increasing wages are clearly demonstrated. The somewhat intermediate position of allowing the unskilled labour increase to be a function of the unemployment rate in each country has been adopted as the standard closure for the model, with these two extremes and another closure that

² Sandrey (2006c) in discussing the trade and economic implications of the South African restrictions regime on the imports from China provides extensive background to the background on the clothing imports into South Africa.

holds wage rate increases for unskilled workers to be in line with the inflation rate. There is no doubt that holding wages down and reflecting as much of the change in increasing unskilled workers entering the labour force is the best policy for South Africa. This increases welfare and lessens inflationary pressures quite substantially.

We have provided three alternative scenarios to judge the full and complete removal of merchandise tariffs. These are (a) a 50 percent tariff reduction rather than the full 100 percent, (b) a realistic Doha Round agreement, (c) a full 100 percent IBSA simulation post-Doha. Results for (a) show that this gives 43 percent of the gains for South Africa and a lesser 30 percent for Brazil but is much better for India who maintain 62 percent of their full gains as the relative prices move around and consequently the trade outcomes are not a linear 50 percent. Results for (b) show that gains from a possible Doha agreement are extremely modest for agriculture in particular for all parties once special and sensitive exemptions are made to tariff reductions globally. However, much larger global gains in non-agricultural sectors (NAMA) compensate for this disappointing agricultural outcome for South Africa. Results from (c) show that since the Doha results are modest, their diminution of the original IBSA 100 percent results are similarly modest for South Africa.

Results for the **agricultural sector** are modest. Initial agricultural products have been a very minor part of South Africa's exports into India's heavily protected market, while agricultural imports from India are concentrated in the duty-free imports of rice. Brazil has become a major global player in agricultural exports, and sends large quantities of soybean products and poultry meats, pork and beef to South Africa. Following the FTA South Africa increases **exports** to India by \$184 million and Brazil by an insignificant \$7 million. Overall some \$144 million of the increase is trade diversion from previous destinations and leaves a global increase of only \$46 million overall. Increases are in vegetable oils and fats (\$69m) and wool (29m) to India take place, while there are global reductions in exports of (a) vegetables, fruit and nuts and (b) other food products. For **imports**, there is a similar but slightly larger overall increase of \$93 million, driven mostly by increased imports from Brazil of \$75 million (other crops, other meats and vegetable oils and fats).

The implication for the **BLNS countries** of Botswana, Lesotho, Namibia and Swaziland are disquieting, as they see declines in their welfare. This mostly comes from terms of trade losses as the better access for South African non-agricultural goods into India consequently increases the relative prices for SACU imports from South Africa. Exports of sugar products (we presume from Swaziland) to India increase, but this is mostly at the expense of reduced exports to the EU overall. Exports from Botswana reduce marginally in the manufacturing

sector as their costs increase (but also marginally). Imports from India increase, but almost all of this is a substitution away from the traditionally-based South African source. There are very low and insignificant changes in the trade flows with Brazil. In agriculture, there are no (or almost no) changes to trade flows other than the sugar exports to India.

Finally, we undertake some alternative scenarios around the unskilled labour market closure assumptions in the primary model. We expand from the standard assumption that employment is fixed and the adjustment is through the wage rate to use the closure whereby unskilled labour supply is a function of the unemployment rates in each country and the adjustment therefore varies between changes in employment and the wage rate depending upon that initial unemployment rate. We also simulate a scenario where the closure has the real wage fixed and all adjustments must come through the number of unskilled persons employed. **Here the results are striking:** employment is up by 2.84 percent, welfare more than doubles from the primary model results to \$3,015 million and inflation is a significantly lower 0.47 percent. This dramatic result clearly highlights that if South Africa is serious about increasing both welfare and employment in the economy, the more policies move towards creating jobs rather than rewarding those actually in employment is a superior option for policy makers.

Introduction and background

In recent months the question of a closer trading relationship between India, Brazil and South Africa (the three IBSA partners) has occupied a lot of media attention. The objective of this paper is to focus upon the current merchandise trade and place this in perspective for a more cooperative approach. The analysis will extend to undertaking an advanced computer general equilibrium modelling study to assess what the gains may be from a trilateral free trade agreement (FTA) between the partners. The paper will note here at the beginning that such an FTA is conceptual only, as both Brazil and South Africa are members of their own FTAs (Mercosur and SACU respectively) and a country cannot be a member of more than one Customs Union. Nonetheless, an FTA sets the outer boundaries for an enhanced trading regime, and in recognition of South Africa's membership of SACU we will consider the implications of the IBSA agreement for the fellow SACU members of Botswana, Lesotho, Namibia and Swaziland (BLNS). All data in this first section of the paper is sourced from the commercially available World Trade Atlas³ (Dr John Brasher), which is in turn sourced from the official country sources.

³ World Trade Atlas at www.gtis.com.

The analysis will concentrate upon using the respective partners' import data, as this is generally more reliable than export data. Two points must be made here, though. The first is that imports are usually assessed using CIF (the value of the goods plus the costs of freight and insurance transporting them from the export dock to be unloaded at the import border) while exports are assessed as FOB (free on board, or the actual value of the goods at the export dock). This means that we are in effect inflating the import value as compared with the export value by including freight costs, and in the case of some bulk products, this is significant. However, importantly we note that South Africa is one of the few countries in the world that both reports on and assesses duty for imports without adding the costs of shipment and insurance. The second point is that export and import values seldom if ever agree, and we will introduce a reconciliation exercise to explore some reasons for this, with the CIF versus FOB values just one reason. **All data is expressed in US dollars.**

Overall all three partners share important and somewhat equal trading relationships.

Firstly, **South Africa's** major exports to the world are concentrated in minerals and related products. The major global exports by the general HS 2 Chapter⁴ has been precious metals and stones etc. (platinum, gold and diamonds), followed by iron and steel products, mineral fuels and motor vehicles, and these four products made up 55.6 percent of the total exports during 2005. The main export to India during 2005 was the one-off aircraft, followed by inorganic chemicals, iron and steel products and again precious metals and stones. These top four accounted for 65.5 percent of the total South African exports to India, and in addition we would note that Indian import data shows that precious stones, metals and minerals etc may be under-reported in the export data as South Africa does not generally disclose its export destinations for gold. Our analysis suggests that these exports face an average tariff of some 15.88 percent using Indian import data. The main exports to Brazil were iron and steel, organic chemicals, general machinery and mineral fuels, with these four comprising 63.3 percent of the total. Again, tralac analysis suggests these products faced an average duty of 8.95 percent during 2005, and that the proposed SACU/Mercosur FTA would make little difference to this rate.

⁴ Where HS is the Harmonised System of merchandise trade classification that operates in a sequentially more detailed level from internationally harmonised (hence the name) HS 2 to 4 and 6 levels, and often down to even HS 10 for individual countries. For example, the HS6 classification scheme contains about 5000 product groups, and this and often more detailed levels are used for specifying tariff schedules.

Secondly, **India's** main exports to the world are precious metals and stones, mineral fuels, clothing and organic chemicals, with these four making up a lesser 36.3 percent of the total. There is a direct linkage between India's exports of precious jewellery and South Africa's base metal exports, as India has become the main processing and trading centre globally for these often South Africa-sourced raw materials. Exports to South Africa were concentrated in mineral fuels, vehicles, cereals and iron and steel products, with these exports making up 52.9 percent of the total. Indian exports to Brazil were mineral fuels (49.6% of the total), organic chemicals, pharmaceuticals and miscellaneous chemical products, with the top four comprising 71.3 percent of the total.

Finally, **Brazilian** global exports are even more diversified than India's, with the top four of vehicles, machinery, iron and steel and ores, etc., comprising 32.0 percent of the total. Exports to South Africa are concentrated in vehicles and parts (31.8%), machinery, meats (poultry) and sugars. In fifth place is soybean oils and in sixth place is tobacco, reaffirming the importance of Brazil for South African agricultural imports. Exports to India feature sugars, soybean products, aircraft and beverages, with these making up 63.2 percent of the total. In agriculture, Mercosur in general provides around one-quarter of the global imports, and Brazil is highly competitive in the crucial beef, pig meat and poultry sectors with all three (along with sugar cane) receiving virtually no government supports.

It is noticeable that iron and steel products and vehicles and their associated parts feature in the top four global exports from both Brazil and South Africa, and these are ranked sixth and eighth respectively from India. There appears to be a degree of intra-industry trade among the three partners in these products as well, leading to the general conclusion that the gains from cooperation here may not necessarily be in 'new' trade but more sophisticated linkages in existing products. Brazil, as a major agricultural exporter, will remain a valuable source of both food for direct consumption in South Africa and imports such as the soybeans to provide the feedstuffs for the livestock sector.

The automobile sectors

Of particular interest to South Africa has to be the **automobile sector**, where the new international 'buzz word' acronym is 'BRIC' for Brazil, Russia, India and China. Analysts consider that the biggest breakthrough in global growth will come from these BRIC countries. They will shortly account for more than 40 percent of forecast global light vehicle assembly increases and represent around half of the industry's forecast global capacity expansion. Consequently, nearly all major global automakers are pursuing a BRIC strategy in some form

as they attempt to gain competitive advantage by linking a presence into these emerging markets⁵. South Africa could be poised to gain an advantage over several competitors should some form of preferential and cooperative trading agreement be formulated between IBSA.

The Brazilian sector in particular is very competitive, with excess capacity, high rates of taxation and interest and a weakening consumer demand. However, its technology in the flex-fuel engines which run on gasoline, ethanol or any blend of the two is likely to create a huge demand for this technology should global oil prices stay high. Similarly, India's annual automobile sector growth has been the highest in the world in recent years, with this accentuated by the shift in automobile production from the US and Western Europe to Asia, with India and China taking the lead. Consequently, India has become the largest manufacturer of tractors in the world, the second largest manufacturer of three-wheelers and two-wheelers, third largest manufacturer of commercial vehicles, and fifth largest manufacturer of cars. International companies are scrambling to establish themselves in this market in particular, and that presence includes establishing design and research centres in addition to India's more traditional lower cost production.

The agricultural sectors

Since the early 1990s **India** has undergone considerable economic policy reform, although agricultural reform has lagged behind other sectors. The general pattern of agricultural protection (as measured by the Producer Support Estimate (PSE)) is for support to rise when world prices are low and decline when they are high, making analysis very complex. Depending upon the method used to calculate these PSEs, they were near their highest in 2002 at 11.0 to 19.2 percent overall, while in 1996 they were negative (i.e., taxing the sector) at similar rates.

Agricultural exports have been a very minor part of South Africa's exports to India; during 2005 they were some 1.8 percent of the South African exports to India, a similar figure to 2003's 1.9 percent but below the 2004 figure of 3.5 percent when a larger export of sugar was made. Indeed, some 87 percent of the agricultural exports during 2005 were either sugar (50.2%) or wool (36.8%), while fresh fruits and cotton provided another 4.7 percent and 2.0 percent respectively. This pattern has changed little over the last ten years. Sugar appears to have potential for increased imports from South Africa under a less distorted

⁵Downloaded from
<http://www.pwc.com/Extweb/ncpressrelease.nsf/docid/7C7BE1A291BB6BD5852572040082059C>.

regime, notwithstanding the fact that India is the world's second largest producer of sugar after Brazil with around 15 percent of the global production. Between 2001 and 2003 India was a large exporter of sugar, but in 1999, 2004 and 2005 it has been an importer. Brazil is certainly more internationally competitive in sugar than India and even probably South Africa. Meanwhile, India's sugar regime is highly regulated, with an import duty of 100 percent plus a possible countervailing duty of another 850 rupees per ton, the sugar levy obligations, the sugar release quota system and other domestic regulations. Thus, there seems to be some scope for cooperation in this agricultural market in particular.

Brazil has virtually replaced Australia as the international champion for agricultural free trade globally. Its potential is enormous, with good land exceeded only by China, the US and Australia and a policy regime that has both contributed to and benefited from the radical economic reforms in Brazil over the last 15 years. Support to the sector is now minimal (PSE of around 3%, a figure even lower than South Africa's and not much above the radical agricultural reformers of New Zealand and to a lesser extent Australia). Overall production has similarly increased following the economic reforms, with technological change a key driver in this expansion, an expansion that has recently lead to concerns about the environmental consequences of agriculture moving into new lands. Brazilian agricultural exports have increased to the extent that they are now around 30 percent of total exports, and they moved dramatically away from the traditional tropical products of coffee and orange juice to being major global suppliers of soybeans, sugar and the grain-soybean feed for meats of chicken, beef and pork.

The structure of the paper is as follows. The first section will examine the current bilateral relationships sequentially, starting with (a) South Africa and India before examining (b) South Africa and Brazil and then (c) Brazil and India. A similar format will be followed for each of the three sectors, with analysis on current and recent merchandise trade flows that reports on assessed tariffs, growth rates and market share to put this trade in perspective before starting to examine the future with a 'trade chilling' analysis of potential trade products based on the current trade patterns for the respective partners. The second section of the paper will use the Global Trade Analysis Project (GTAP) international computer model to simulate the impacts of an FTA between the partners under different scenarios. The final section will compare and contrast sections one and two before making some general conclusions.

Section One: The trading relationships

The big picture

These three countries are emerging globally in that Brazil and India have both become crucial players in the world trading arena while South Africa is the important 'bridge' between the developed world and developing Africa. In terms of economic power, the World Bank ranks Brazil 10th, India 12th and South Africa 27th by traditional GDP, but all are higher by the more useful Purchasing Power Parity (PPP or what your money will buy) index. As a measure of import openness, Brazil collected import duties equivalent to 8.4 percent of total merchandise imports, while the similar figures for India and South Africa were 14.1 and 2.7 percent respectively. Thus South Africa could be regarded as being very open on average (with motor vehicles and clothing distorting that average) while India is relatively highly protected. Brazil is a major agricultural exporter with one-third of its total exports classified as agriculture (compared to India at 11.3% and South Africa at 7.9%), while agricultural imports range between 6.2 to 7.0 percent in all three cases.⁶

All three partners are also part of what may be described as 'second rung' trading nations, and all rank relatively closely together, with world ratings between 24th for both Brazil in world exports and India in world imports and 37th for South Africa in world exports. Examining the World Trade Atlas data shows global exports from Brazil, South Africa and India of \$118 billion, \$52 billion and \$100 billion respectively during 2005, and similarly imports of \$74 billion, \$55 billion and \$138 billion for the same countries. An analysis of the WTO Annual Report shows very similar but not always identical data; for South African imports, for example, the WTO reports \$67 billion rather than \$55 billion. We would hypothesise that the difference is that the World Trade Atlas does not report intra-SACU trade for South Africa. Table 1 shows the general trading relationships between the three countries, along with the bilateral rankings based upon individual destinations/sources (i.e. with the EU countries ranked on their own). The data confirms that the respective partners are (in not a derogatory manner) 'second rung' but still important trading partners ranging from 11th for South African imports from Brazil to 36th for Brazilian imports from South Africa.

⁶ WTO at www.wto.org.

Table 1: the bilateral trading relationships, US dollar million

Country	2005 rank	1999	2001	2003	2004	2005
South African exports to						
India	14	386	379	394	574	1,169
Brazil	30	155	275	177	242	317
South Africa imports from						
India	13	247	243	419	712	1,102
Brazil	11	225	383	714	1,001	1,306
Indian exports to						
South Africa	18	290	321	448	883	1,420
Brazil	25	128	227	383	542	976
Indian imports from						
South Africa	15	1,777	1,395	1,933	1,767	2,651
Brazil	28	306	267	306	662	879
Brazilian exports to						
South Africa	21	237	424	733	1,036	1,369
India	23	314	285	553	652	1,137
Brazilian imports from						
South Africa	36	172	286	202	268	342
India	17	170	543	486	556	1,203

Source: World Trade Atlas

Table 1 hints at some differences in the trade data between the respective partners and suggests why this paper uses import rather than export data to assess likely tariff rates, for example. This is not to say that one country's data is better than another, but rather that factors such as transshipment, adding the costs of freight and insurance to imports and a general comment that imports are likely to be more scrutinised than exports, all point towards using import data, especially when using the World Trade Atlas data for all three countries. Table 2 extracts the relevant data from Table 1 to enable this comparison to be made. For the South African exports/Indian import data there are significant differences, and this is explored later in this paper and in more depth in Sandrey (2006). Most other pairings are in the 'close enough' category. We would again note that, unlike most other countries, South Africa values imports and assesses the duty on what is called 'FOB' basis rather than the more normal 'CIF'. This can make a difference by increasing the value of imports by perhaps an average of around ten percent or more but in many cases much higher depending upon relative efficiencies at the port and the costs of shipping costs relative to actual of bulk

products like iron ore. Having noted these factors, since we are assessing the relationships from a South African perspective we will concentrate upon the South African data in general except when assessing tariffs at the partner border.

Table 2: The trade flow data from respective partners 2005, \$m

India exports	Brazil imports		Brazil exports	India imports
976	1,203		1,137	879
India exports	RSA imports		RSA exports	India imports
1,420	1,102		1,169	2,651
Brazil exports	RSA imports		RSA exports	Brazil imports
1,369	1,306		317	342

Source: World Trade Atlas

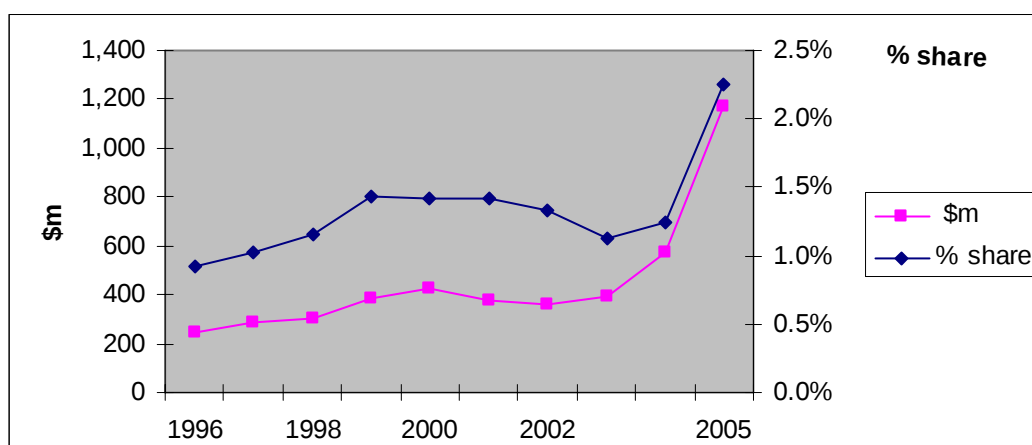
The South African/Indian relationship

This section presents a summary and the main points reported in earlier tralac research by Sandrey (2006a), and the reader is referred there for more details.

(a) South African exports/Indian imports

During 2005 South Africa exported merchandise worth \$1,169 million to India, almost doubling the 2004 figure of \$574 million. This represented some 2.3 percent of South Africa's global exports during 2005, a figure that similarly doubled from the previous year (and basically the ten year average). This is shown in Figure 1, with the big increase in 2005 obvious. Not shown is that India ranked as South Africa's 14th most important export destination; just behind Italy and Zimbabwe but ahead of France, Mozambique and Korea.

Figure 1: South African exports to India, \$million and % share



Source: World Trade Atlas data

The increase in 2005 was mostly aircraft (\$248m), virtually a new export line as only in 2003 (\$4.8m) had aircraft previously featured at all. Other main exports at the HS 2 Chapter level were inorganic chemicals (\$179.7m), iron and steel (\$170m), precious stones (\$168m) and fuels (also \$168m). Other than inorganic chemicals, all of these exports more than doubled from their 2004 values. Of particular importance are the exports of HS 28, inorganic chemicals. These exports are shown as predominantly HS 2809, diphosphorus pentaoxide; phosphoric acid, etc., and they comprise 91.2 percent of the total global exports of these chemicals from South Africa.

During 2005 the mirror of **imports into India from South Africa** totalled some US\$2,651 million, a figure that increased by 50.1 percent from 2004. In 'real' terms, this represented 1.9 percent of Indian global imports, a figure that has shown a downward trend over the last seven years. By commodities, the main imports were gold (\$1,846m), coal ((\$171m), and pentaoxide chemicals (\$149m). The average duty on these imports, calculated using the Indian Tariff Schedule, was 15.88 percent. These imports into India are highly concentrated, with the top four lines at the HS 2-chapter level accounting for 90.8 percent of the total trade, and in some of the main imports at the more detailed level, these imports held a significant share in the Indian market. South Africa is doing relatively well into India, with some 45.0 percent of the imports (the 'Stars') gaining market share in Indian import sectors that are themselves growing.

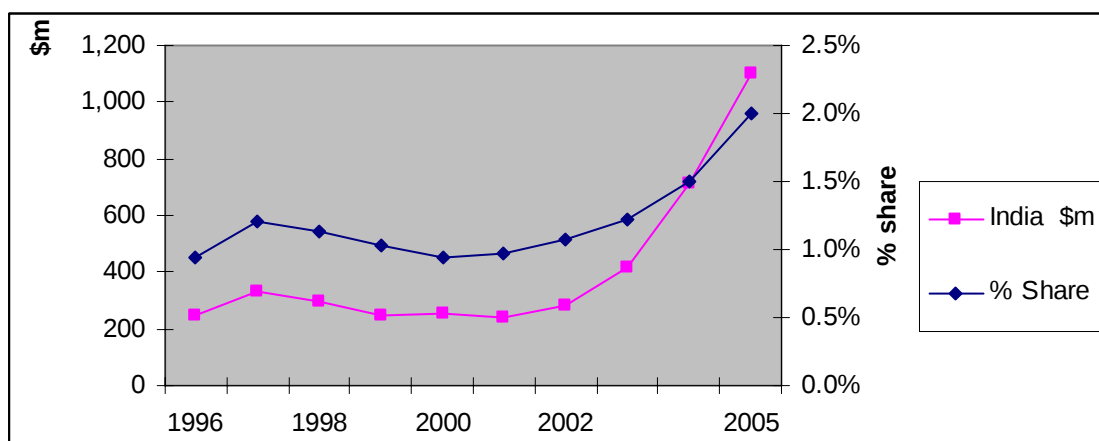
Data reconciliation shows that, as expected with South African imports into India valued at over double the reported exports from South Africa to India, there is little coherence in reconciling the trade flows to India. Some of this may be accounted for in the transport costs of the bulkier exports such as iron and steel products, given that imports are valued at CIF

and exports at FOB, while another large difference is that there are no reported exports of gold from South Africa but this is the major import into India. In addition, the largest export from South Africa (aircraft) is not reported in Indian import data. If we ignore this gold and aircraft trade then the overall reconciliation is remarkably accurate.

(b) Indian imports into South Africa

Indian imports into South Africa by December 2005 were \$1,102 million or 2.0 percent of the total global South African imports, with the latter figure increasing dramatically over the last three years (Figure 2). These Indian imports are not as highly concentrated as South African imports into India, with the top five HS chapters of motor vehicles, fuels, cereals, organic chemicals and pharmaceuticals making up a lesser 47 percent of the imports. Although 49.9 percent of the trade enters duty-free, the average duty that would have been assessed on these imports in the absence of any rebates was 11.01 percent. These duties are mostly paid by the 30 percent of the imports that enter where the duties are assessed at 20 percent or more, a grouping that contains motor vehicles and their parts, and textiles, clothing and footwear.

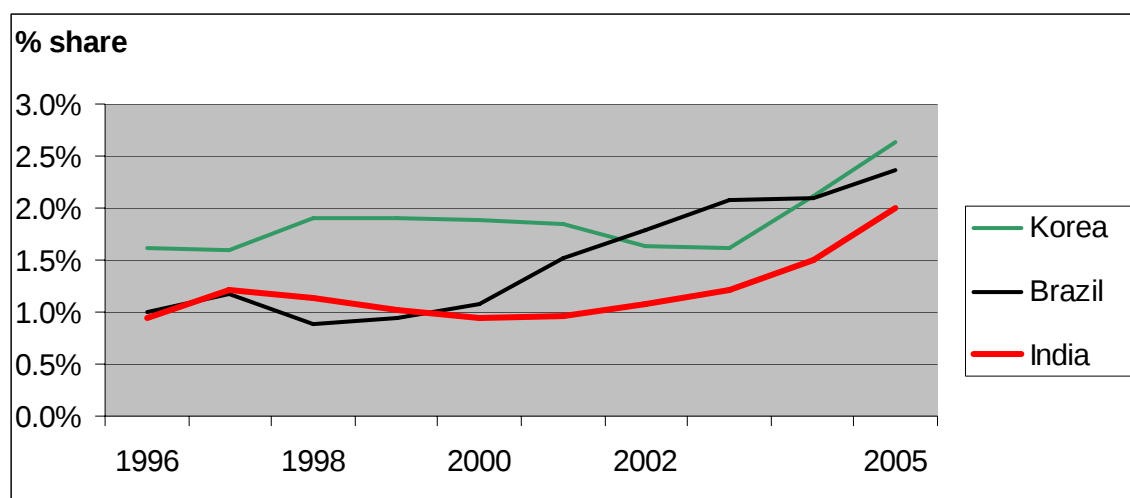
Figure 2: Indian imports into South Africa, \$ million and % share



Source: WTA

To set the scene for later analysis, India's performance in the South African market relative to Korea and Brazil is shown in Fig 3. India and Brazil were both slow starters, with a one percent share in 1996, but since 2000 Brazil has been consistently ahead of India. Korea has been consistently above India over the period.

Figure 3: Relative performance of India into South Africa, % market share



Source: World Trade Atlas

(c) Other features of the relationship

The relative performance of RSA imports into India – at the detailed level

A look at revealed comparative advantage shows that although around one-third of the Indian imports into South Africa are 'Stars' that are doing relatively well in a growth sector overall, another large share of the imports are 'new' imports (that is, imports that do not have enough of a 'track record' to assess in this manner) over the period. The data presented below has been assessed at the HS 6 line-by-line level. An assessment has been made on 525 lines. These lines are assessed on changes to market shares, and there are four possible categories for these 525 lines of the RSA imports.

- The first is the 'Stars', where the line has both an improved market share for 2005 above the South African average over the last six years and where the Indian imports for that line are also increasing at a rate above that for the average of Indian global imports.
- The second category is the 'Battlers' who are doing well where (a) RSA is gaining market share but (b) Indian imports are increasing at below the average rate in that line.
- The third category is the 'Strugglers' that could do better where imports from RSA are losing relative market share but where Indian imports are increasing above the average.

- The final category are 'Dogs' where RSA is losing market share in lines that are not dynamic growth ones into India.

These categories, of course, make no judgement upon the relative profitability on these lines or the reasons as to why the results are as they show. It may be, for example, that some of the 'Strugglers' or even 'Dogs' are losing market share in India because RSA exporters have found other more profitable markets. We would also note that there is a degree of arbitrariness in the analysis (the choice of the base period, for example), so the results are indicative only.

The **Stars** – shining in a growth market

1. 155 (of 525) lines with imports of \$1,193.2m, or 45.0 percent of RSA total; and
2. the main lines were non-monetary gold (\$755m), coal and iron and steel products.

The **Battlers** – working hard in a relatively declining market

1. 239 lines with imports of \$327.0, or 12.3 percent of RSA total; and
2. the main lines were the phosphoric acids (\$149m) and wood pulp.

The **Strugglers** – slipping in an Indian growth market

1. 28 lines with imports of \$7.4m, or only 0.3 percent of the total; and
2. the main lines were manganese ores and scrap metal.

The **Dogs** – losing ground in a relatively declining market

1. 103 lines with imports of \$1,122.4m, with 42.3 percent of the imports; and
2. the main lines were the main imports of gold (\$1,090.6m) and unwrought aluminium.

Overall, only an average picture with a solid group in the Stars, but the poor old Dogs represent a large group that detract from the overall performance. The Dogs are influenced by imports of gold.

The relative performance of Indian imports into RSA

As was the case for the South African imports into India, data for this exercise has been built up from the HS 6 line-by-line level to the HS 4 level in order to gather exact figures for the detailed lines where India is actually competing in the South African market. Note that these HS 4 lines will therefore not reconcile with total trade in those HS 4 lines overall, as the HS 6 groupings will exclude trade where India is not competing. From the detailed data,

information on the performance of individual lines can be assessed, and this can then be aggregated into a 'big picture' profile. An assessment has been made on 577 aggregated HS 4 lines, with these lines containing some 99.8 percent of the total imports from India. The cut-off point for these lines was where the import value from India during 2005 was US \$30,000 or more.

These lines are assessed on changes to market shares, and there are four possible categories for these 577 lines, and a fifth where there were no imports from India in 1996. This latter category could be because (a) India was not exporting that line globally, and/or (b) South Africa was not importing in that line in 1996 (12 cases) because either the HS codes have been changed or this is simply new trade. This category included imports of \$248.2 million or 22.5 percent of the total. By definition the Indian market share had increased in all cases, and in \$219.9 million of this trade the particular global imports into South Africa have increased above the average. This suggests that India is also doing well in these imports.

The **Stars** – shining in a growth market

- * 95 (of 406) lines with imports of \$393.0 million, or 35.7% of Indian total imports;

The **Battlers** – working hard in a relatively declining market

- * 200 lines with imports of \$354.0 million, or 32.2% of the Indian total;

The **Strugglers** – slipping in a South African growth market

- * 61 lines with imports of \$71.0 million, or 6.4% of the total;

The **Dogs** – losing ground in a relatively declining South African market

- * 50 lines with imports of \$24.7million, or 2.2% of the imports.

Note that a further \$248.2 million (22.5%) has been classified as 'new' trade, where there were no recorded imports from India in the base year. These could also be classified as either 'stars' or 'battlers', depending upon the relative growth of South African global imports in that sector.

For the 'big ticket' import lines, fuel (\$123m) is 'new', three lines of motor vehicles (\$160m) are 'stars', as is a pharmaceutical line (48.8m), while rice (\$73.9m) and heavy vehicles (\$27.8m) are both 'battlers'. If we modify the questions asked above and instead ask the question, 'Is India gaining market share in the South African imports of this particular line?' the answer is very different. For some 88 percent of the individual imports as assessed at

the HS line level into South Africa, India has actually gained market share over its competitors. That is a good performance, but of course it includes most of the 'new' trade as defined.

Other analytical tools from the kit-bag

'**Trade chilling**' suggests that there are few additional areas where South Africa could export to India and where an FTA could help. Analysis at the detailed level shows that where South Africa is active in the Indian market, the Republic is competing strongly, as those lines where South Africa has a market share of at least one percent account for 98.6 percent of the South African imports but only 17.1 percent of the Indian global imports. Thus, South Africa is doing very well given its global export mix and India's global import profile.

More specifically, the 'trade chilling' analysis was undertaken on a combination of (a) the 149 HS 4 tariff lines where global agricultural imports into India were at least \$100,000 during 2005 to represent the demand side, and (b) these were then compared with the respective HS 4 tariff lines exported to global markets from South Africa during 2005 to represent the supply side. From there, five categories were examined. These are⁷:

- 1) Where South African imports held at least a 1 percent market share in India;
- 2) Where at least 1 percent of South African exports went to India;
- 3) Where South Africa records positive exports to India in 2005 but India does not record positive imports from South Africa;
- 4) Where positive imports are recorded into India from South Africa but no exports from South Africa are reported;
- 5) Where there is at least \$1 million exported from South Africa globally but no reported imports of this trade into India from South Africa.

Analysis of the data showed that there were only two classifications of interest, 1 and 5, as almost all the current trade was in category 1 and there was effectively no trade in categories 2, 3 and 4. The results therefore are:

- **South Africa has at least a 1 percent share in** all the major import lines into India. There are 13 HS 4 lines, and these imports accounted for 94.8 percent of South

⁷ Note that, in a direct comparison with China, India does not administer any Tariff Rate Quotas (TRQs) on agricultural products.

African agricultural exports to India and 95.8 percent of the total imports from South Africa into India during 2005. This also highlights that there is a reasonable degree of trade reconciliation between South African exports to India and Indian imports from South Africa.

- **Where India imports these goods and South Africa exported at least rand 1 million globally during 2005 but the twain did not meet** – this is potentially the important category for examination, as it clearly shows there are both supply and demand factors that are not, for whatever reason, meeting. However, a careful analysis shows that there are virtually no potential trade items in this category. Tobacco and tobacco products are one reasonable possibility, and at a stretch maybe sunflower oil. The only other possible products are milk powders, soya flour and corn maize, although South African global exports of these products are all under \$10 million and Indian imports are even lower at below \$1.4 million in each case.

In looking to the future and visualising a FTA between India and SACU/South Africa there appear to be some sectors where South Africa may gain, but this seems likely to be based entirely upon tariff preferences in a few selected lines only (with sugar the main one).

Finally, an analysis of the so-called **intra-Industry trade** between South Africa and India shows that, as expected between two developing countries, these index values are low at the 5.3 (out of a 100) level. This index compares trade between partners in like products, and is a feature of trade between developed countries. However, the more interesting feature is that these index values are steadily increasing from very low levels over the last ten years, suggesting an increasing sophistication in the trading relationship.

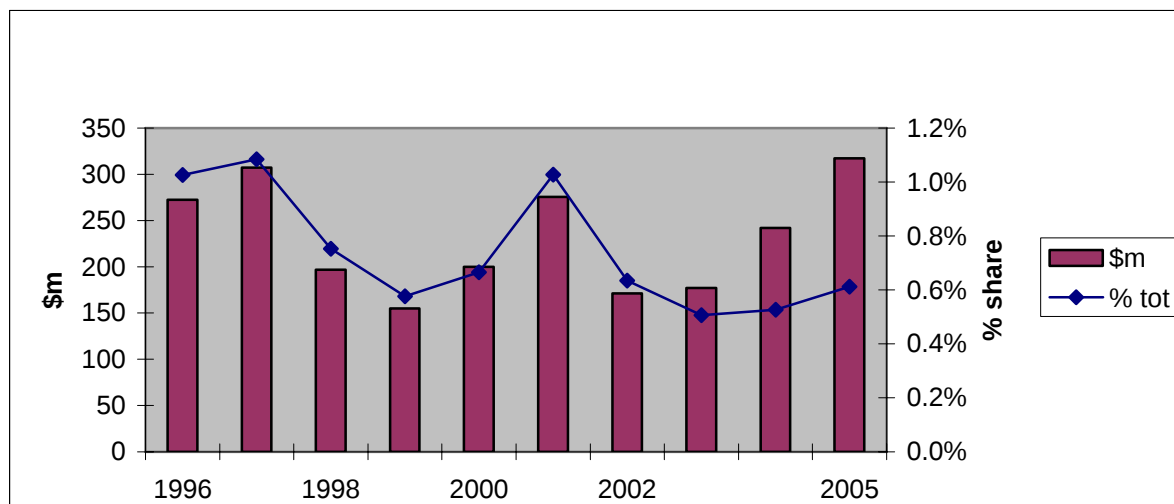
The South African/Brazilian trading relationship

(a) South African exports/Brazilian imports

During 2005 South Africa exported merchandise worth \$317 million to Brazil, a figure that has fluctuated over the last ten years but is very similar to the earlier 1997 figure of \$307 million. This represented some 0.6 percent of South Africa's global exports during 2005, a figure that similarly fluctuated but generally trended downwards over the period. This is shown in Figure 4, with US\$ million values on the bars using the left hand scale and the percentage share of South African global exports destined for Brazil shown with the lines set against the right hand scale. The graph is interesting in that from 1996 through to and including 2002 the relationship between the value of the exports to Brazil and their relative

share of South African global exports stayed almost exactly the same. From that 2003 this close relationship was broken as the values grew faster than the percentage, highlighting just how fast South African global exports were increasing.

Figure 4: South African exports to Brazil, \$ million and export share



Source: World Trade Atlas

Table 3 shows the main products that are exported to Brazil by the HS 4 level general category, with the list ranked by total exports over the last ten years. Coal has been the most consistent product, followed by the top 2005 export of ferroalloys, a product whose exports have consistently increased in the most recent two years, and the relatively consistent insecticides. Others such as ethyl alcohol and phosphoric acid were important in the early years, while still others such as aircraft and nickel plates have been more of a one-off or less consistent trade. An analysis of the export data reveals that there are only two instances where exports to Brazil at the HS 4 level are (a) above \$10 million and (b) represent at least 10 percent of South African exports. These are (i) HS 2934 nucleic acids, \$13.21 million and 45.8 percent of the exports and (ii) HS 5402 synthetic yarns, \$11.44 million and 13.2 percent of the exports. The tariffs that are faced by these products at the Brazilian border are examined later using Brazilian import data.

Table 3: South African exports to Brazil, \$ million

Description/Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total	272	307	197	155	200	275	171	177	242	317
coal	35.7	49.7	51.5	37.1	29.8	34.8	28.4	22.5	26.9	29.1
ferroalloys	9.5	9.1	6.7	5.2	8.9	12.7	12.5	25.3	50.3	50.6
insecticides etc	13.2	20.2	12.5	12.9	23.6	33.9	21.3	19.9	11.3	7.9
ethyl alcohol	73.7	60.0	0.0	1.2	5.7	0.2	0.0	0.0	0.0	0.0
aluminium plates	0.0	0.0	0.4	3.8	12.5	16.7	8.7	15.3	13.7	17.3
phosphoric acid	22.8	27.5	17.2	5.0	3.3	5.0	0.7	0.0	0.0	0.0
aircraft	0.0	0.0	0.3	1.4	0.0	66.1	4.7	0.0	0.0	0.4
synthetic yarn	3.3	9.7	5.3	4.6	7.2	6.5	6.0	6.4	8.4	11.4
nickel plates	0.0	0.0	8.1	14.2	17.7	6.9	6.2	0.0	0.0	1.5
ketones	4.0	1.8	1.0	2.9	3.7	2.3	3.2	6.0	7.7	10.5
engine parts	0.0	0.1	0.3	0.1	1.1	3.0	3.0	13.5	10.4	10.6
stainless steel	5.3	6.5	4.2	2.2	4.3	4.9	5.9	2.1	1.6	0.5
hydrocarbons	0.4	1.0	0.8	0.9	2.2	3.9	2.9	3.5	6.2	12.4
nucleic acid	2.9	3.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	13.2

Source: World Trade Atlas

As mentioned above, reconciliation of trade data is often a problem, so we have provided an alternative Brazilian view with their imports from South Africa over recent years. The annual totals by product are surprisingly consistent, with one notable exception. That exception is the reported imports of platinum, Brazil's second major import and a consistent import over the years is not matched by reported exports from South African data. An examination of Brazilian data shows that between 30 to 40 percent of the platinum imports over the last three years has been from South Africa with almost all the remainder from the EU. We would hypothesise that this is trans-shipment through Europe to Brazil.

Table 4: Brazilian imports from South Africa, \$ million

Description	1997	1999	2001	2003	2004	2005	total
Totals	351	172	286	202	268	342	2,318
coal	73.2	39.8	28.5	27.0	31.3	32.5	379.4
platinum	21.0	23.9	73.8	19.1	29.0	33.8	274.5
ferroalloys	9.7	4.5	11.8	20.9	38.2	56.9	170.5
insecticides	17.4	12.3	24.7	11.8	6.3	7.2	119.5
ethyl alcohol	71.3	2.7	2.9	0.0	0.0	0.0	85.7
aluminium	0.0	2.3	15.7	14.9	13.3	13.1	83.5
nucleic acids	8.9	0.0	11.7	7.8	13.7	13.2	81.8

Description	1997	1999	2001	2003	2004	2005	total
phosphoric acid	32.3	8.0	7.5	1.0	0.0	0.0	73.1
synthetic yarn	10.3	5.6	6.8	6.2	9.5	9.2	69.9
nickel	1.0	16.5	14.6	0.0	0.0	2.8	68.3
engine parts	0.0	0.0	2.4	12.5	10.0	8.0	36.2
ketones	1.5	2.0	2.3	4.0	7.7	9.5	36.1

Source: World Trade Atlas

Tariffs at the Brazilian border

We start this analysis by assessing the potential impact of the SACU/Mercosur FTA upon the tariffs using the limited data that is available. This analysis shows that during 2005 only 16.6 percent of the reported South Africa imports would be afforded tariff preferences, with almost all of this a complete elimination of the relevant but very selected tariff line. The products concerned are almost exclusively coal (duty-free anyway), hydrocarbons and the nucleic acids. Thus, the preferences under the SACU/Mercosur FTA seem very restricted at best⁸.

The more complete analysis of South African tariffs faced at the Brazilian border presented below is based upon Brazilian import data and the Brazilian tariffs as supplied from the MacMaps database -- with all analysis at the HS 6 line level. We note that the MacMaps tariff data is for 2001, but it is unlikely that much would have changed since then. The data shows that over the last three years (2003, 2004 and 2005) and using the 2001 tariff, duties on South African imports into Brazil would have been 8.07 percent, 7.81 percent and 8.95 percent respectively on average. Coal, the main import by value, is duty-free and furthermore it is the only import line of the top 59 lines with import values of at least \$1,000,000 that is duty-free. The details for the main imports are shown below in Table 5 by HS 2 Chapter. Duties range from 0.2 percent for coal to 16.2 percent for man-made fibres. Not shown is that some of the HS 2 Chapters face higher tariffs; beverages at 23.2 percent is the highest, while toys, etc., other fibres, shoes, clothing, leather and clocks, etc. all face rates between 20.0 and 21.5 percent.

⁸ We agree with Stern and Flatters who are particularly scathing on this agreement. They write that Mercosur conceded improved access into South Africa for 46 of there currently traded product lines, and that South Africa's imports of these products from Brazil and Argentina in 2004 'was a miserly R26m'. Overall, they considered that it would be hard to construct a less meaningful agreement, cited in *Business Day*, 07 November, 2005.
http://qed.econ.queensu.ca/faculty/flatters/writings/geekonomics_1.pdf.

Table 5: Main South African imports into Brazil, \$million and duty faced (%)

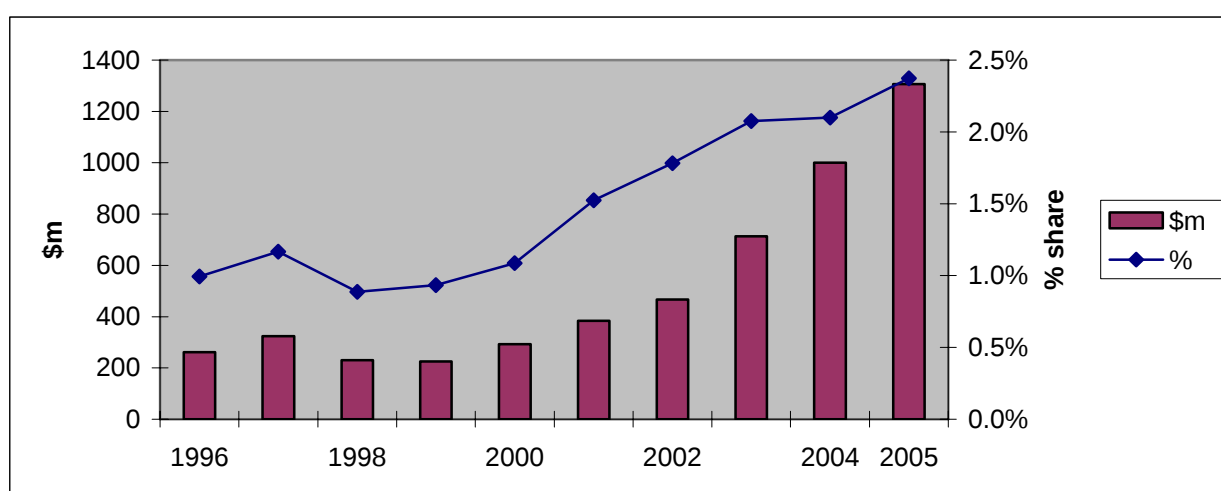
HS 2	Description	Imports \$ million			2005 Duty
		2003	2004	2005	Av %
72	Iron/steel	25.5	43.5	82.1	9.5%
29	Organic chemicals	20.6	33.3	42.8	9.9%
27	Coal	38.0	41.3	36.0	0.2%
84	Machinery	15.2	17.0	34.8	16.0%
71	Precious stones	19.1	28.0	33.9	3.5%
76	Aluminium	14.9	13.9	16.7	11.3%
26	Ores etc	4.8	14.2	16.7	3.5%
38	Chemical products	14.0	11.3	10.7	10.3%
81	Base metal product	5.2	7.1	9.9	6.0%
54	Man-made fibres	6.2	9.5	9.3	16.2%

Source: World Trade Atlas data and MacMaps tariffs

(b) Imports from Brazil into South Africa

Brazil was South Africa's 11th main individual country source of imports during 2005, one place ahead of Australia and two ahead of India. These imports have climbed from \$225 million in 1996 to \$1,306 million in 2005, or in 'real' terms from 1.0 percent to 2.4 percent. The data is shown in Figure 5, where the increase from 2000 can be seen.

Figure 5: South African imports from Brazil, \$ million and % market share



Source: World Trade Atlas

Table 6 shows that the increases in imports have been driven by the top three products of motor vehicles (HS 9801, with other vehicles also included in the table in the HS 87 codes), poultry meat and soybean oil. During 2005, ignoring rebates, an average duty of 14.86 percent would have been assessed on these imports, with the total (theoretical) duty bill being \$194.03 million. This duty is heavily influenced by the high rates on vehicles, although poultry meat, sugar confectionery and tobacco products all face high duties.

Table 6: South African imports from Brazil, \$ million and assessed duty %

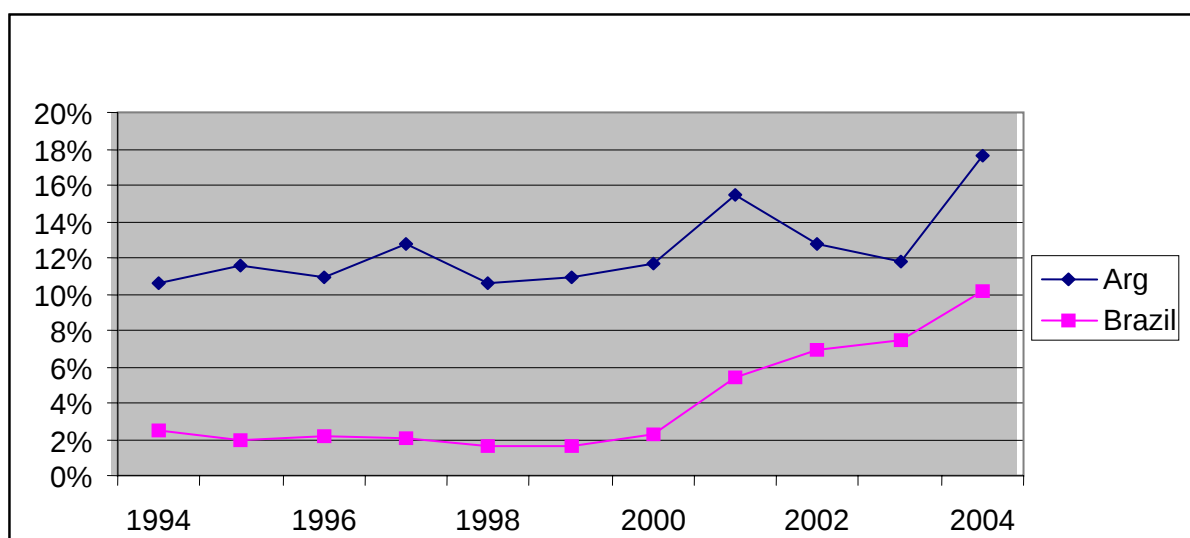
Descrip/yr	1996	1998	2000	2002	2003	2004	2005	Duty%
Total	262	230	292	467	714	1,001	1,306	14.9
vehicles	39.35	45.36	57.12	89.38	210.24	264.65	353.62	26.0
poultry	1.48	3.12	8.61	18.47	37.04	88.75	111.04	17.9
soybean oil	0.57	3.10	0.47	15.37	39.16	47.67	67.68	10.0
iron products	0.00	3.14	13.49	17.15	20.65	23.16	34.30	0.0
buses etc	3.41	1.63	2.41	14.74	20.42	24.72	31.35	22.5
pork	0.00	0.00	0.76	0.04	7.74	17.96	30.94	4.5
confectionary	0.04	0.66	3.02	3.37	9.38	19.55	27.50	25.0
vehicle parts	4.73	4.33	5.99	5.42	9.02	13.15	25.38	18.1
tractors	9.09	14.40	5.01	10.11	17.04	24.79	20.14	6.5
motor cars	0.18	0.01	0.07	0.06	0.01	0.18	19.96	31.1
tobacco	9.42	10.24	5.99	10.05	15.74	40.38	17.03	15.0
vehicles	0.02	0.00	0.00	2.41	2.10	8.41	15.84	18.4
computers	0.01	0.02	0.01	0.01	5.53	21.50	15.79	0.0
bulldozer etc	2.45	0.42	8.73	10.93	12.09	13.70	15.74	0.7
engine parts	7.98	5.50	10.13	11.58	11.56	12.62	15.30	0.0
sub total	79	92	122	209	418	621	802	

Source: World Trade Atlas data and tralac calculations

A feature of the South African **agricultural** imports in recent years has been the dramatic rise in imports from South America, and the percent share of these agricultural imports from both Argentina and Brazil are shown below in Figure 6. The imports from Brazil are mostly the soybean products and poultry meats, although pork and beef in the meat products and sugar confectionery have made dramatic increases over the last three years⁹. Agricultural imports from Argentina are focused on soybean oilcakes, wheat and soybean oil.

⁹ On the latter three, we would not that there has been double-digit growth in the South African imports of sugar products and pork over the period 1996 to 2005, while the imports of beef actually declined by 1.4 percent over the same time. This suggests that the beef is merely import displacement.

Figure 6: Brazil and Argentina, % of South African agricultural imports



Source: South African Revenue Service data

SACU and Mercosur have recently negotiated a preferential trade agreement, and this marginally reduces some of the duties on imports into South Africa/SACU. Tralac's calculations show that overall this agreement would have reduced the duties assessed at the South African border by a modest \$6.88 million to an average of 14.33 percent. Detailed analysis reveals that these reductions are focused (in order of duty reductions) on refrigerators, plastic sheets, generators, dental products, pork, coffee, food preparations not specified, nuts, ceramic tiles and engine parts. These products in total account for 64 percent of the tariff reductions, and the scope and magnitude of these reductions suggests that the SACU/Mercosur trade agreement cannot be heralded as a major trade policy breakthrough.

As in the case of exports to Brazil, we again examined imports to assess where imports from Brazil at the HS 4 level are (a) above \$10 million and (b) represent at least ten percent of South African imports. The first two products on the list are poultry products and soybean oils, where there are both significant imports and Brazil has a dominant market share, while the third, a particular line of iron products, is sourced exclusively from Brazil. Thus, Brazil is again by this measure more important to South Africa as an import source than an export destination.

Table 7: Brazilian share of South African imports, % share and % million

product/yr	Brazilian share RSA imports			Brazilian imports \$m		
	2003	2004	2005	2003	2004	2005
poultry	49.8%	78.0%	75.4%	37.0%	88.8%	111.0%
soybean oil	60.0%	47.0%	61.5%	39.2%	47.7%	67.7%
iron products	92.5%	99.4%	99.8%	20.6%	23.2%	34.3%
buses	66.5%	64.6%	33.9%	20.4%	24.7%	31.3%
pork	42.9%	53.9%	65.4%	7.7%	18.0%	30.9%
confectionary	42.5%	40.8%	56.2%	9.4%	19.6%	27.5%
tractors	8.5%	10.7%	11.3%	17.0%	24.8%	20.1%
tobacco	20.3%	34.6%	21.9%	15.7%	40.4%	17.0%
tiles	28.0%	24.6%	20.6%	10.7%	14.5%	15.2%
generators	11.0%	10.8%	12.3%	8.8%	10.8%	14.4%
frozen beef	40.8%	52.0%	45.9%	3.5%	10.4%	13.6%

Source: World Trade Atlas

(c) Other features of the relationship

The ‘trade chilling’ analysis above suggested that there are few additional areas where South Africa could export to India and where an FTA could help. Analysis at the detailed level shows that where South Africa is active in the Indian market, the Republic is competing strongly, as those lines where South Africa has a market share of at least one percent account for 98.6 percent of the South African exports but only 17.1 percent of the Indian global imports.

We undertook this analysis by firstly matching all HS 6 lines where:

- o **(a) South Africa exported at least \$1 million to the world during 2005 and**
- o **(b) Brazil imported at least \$1 million from the world in the same year.**

This gave a total of 1,844 trade lines. We consider that an export of at least \$1.0 million is a good indication of export competitiveness on the supply side, and similarly an import of at least the same value is also a good indication for the demand side. Note that as this is a first approximation we have not extended the analysis to an historical series. From there:

1. There were 922 lines where at least one percent of these South African exports went to Brazil. This represented (a) some 83 percent of the South African exports to Brazil and a (b) lesser 72 percent of the Brazilian imports from South Africa.
2. There were 897 lines where South Africa held at least a one percent share in the Brazilian market. This represented (a) some 83 percent of the South African exports to Brazil and (b) a greater 89 percent of the South African imports into Brazil. Note that this category will include, as discussed above, Brazilian imports of platinum that are not reported as South African exports.
3. Combining (1) and (2) gives a total of 960 lines (there are many duplicates where both (a) and (b) hold), for (a) 92.6 percent of the South African exports and (b) 90 percent of the Brazilian imports from South Africa. Thus, the overall pattern is that South Africa is competing strongly in the Brazilian market.
4. Where a positive **import value is reported into Brazil from South Africa**, but (i) where this trade that may or may not be reported as exports from South Africa and (ii) where the South African market share is less than one percent of the Brazilian market and less than one percent of the South African exports are destined for Brazil. This is a small (only 1.7% of the imports and a lesser 1.2% of the exports) and rather eclectic mix of exclusively non-agricultural products where South Africa could possibly be doing better.
5. Where a positive **export value is reported from South Africa to Brazil**, but where this trade that may or may not be reported as imports from South Africa and where again both market shares are less than one percent (i.e. very small values in any case). This represents only 0.83% of the exports, and these products are a rather eclectic mix of exclusively non-agricultural products where South Africa could possibly be doing better.

The final category is where (a) Brazil imports these goods from other global sources to the value of at least \$5 million **and (b)** South Africa similarly exported at least \$5 million globally during 2005 **but (c)** the twain did not meet. This is **potentially the important category for examination**, as it clearly shows there are both supply and demand factors that are not, for whatever reason, meeting. This set constituted some 23 percent of South African global exports and a lesser 13 percent of Brazilian imports. This is a significant finding, as it indicates that there are favourable conditions on both the supply (South African exports) and demand (Brazilian imports) sides that are not being matched by commercial transactions. There are of course multiple reasons why this may be the case, but it does point to clear opportunities on the South African side at least (as we have not undertaken the similar analysis for Brazilian exports to South Africa). There are a large number (142 HS 6 lines) of

again all manufacturing products covered here that represent a very wide range of broad categories. Many of these have what could be termed 'asymmetrical trade' in that either South African global exports are very large and imports small or conversely Brazilian imports are very large and South African global exports are minor, but there are some areas such as motor vehicles in particular and chemicals where both countries are big traders but not with each other.

The Indian/Brazilian trading relationship

Table 8 replicates the relevant parts of Table 1 to show the aggregate data for this relationship. As this 'triangular' trading relationship is of lesser importance to South Africa we report only the general picture here. It is replicated here to remind the reader as to the relative importance to both Brazil and India of their bilateral trade flows and thus place the potential FTA in perspective for these two countries.

Table 8: The bilateral trading relationships, US dollar million

Country	2005 rank	1999	2001	2003	2004	2005
South bound – India to Brazil						
India export	25	128	227	383	542	976
Braz import	17	170	543	486	556	1,203
North bound – Brazil to India						
India import	28	306	267	306	662	879
Braz export	23	314	285	553	652	1,137

Source: World Trade Atlas

Indian imports from Brazil

Table 9 shows the main Indian imports from Brazil at the HS 4 level. Three agricultural products are at the top; sugar, soybean oil and ethyl alcohol. Sugar imports have varied, while soybean oil has been consistent and ethyl alcohol a new import. Many of the next major imports are ores and chemical products, although there are some manufacturing products such as pumps and refrigerators there as well.

Table 9: Indian imports from Brazil, \$million

Description	1999	2000	2001	2002	2003	2004	2005
Total	305.6	181.2	266.8	332.5	306.4	661.9	879.1
sugar	96.2	35.2	0.0	0.8	0.0	127.9	186.5
soybean oil	97.2	23.0	104.0	145.9	121.1	151.4	179.1
ethyl alcohol	0.0	0.0	0.0	2.1	5.1	99.6	147.3
iron ores	2.5	0.0	5.0	9.4	14.9	37.3	27.9
pumps	0.5	0.8	0.5	0.9	1.1	6.8	23.7
nickle	0.9	6.4	8.7	21.4	8.9	9.2	18.7
precious stones	5.6	6.5	4.1	8.6	8.0	11.8	17.0
asbestos	8.6	7.4	5.0	5.8	5.3	6.8	14.8
hydrocarbons	7.5	0.0	1.9	0.0	6.7	6.3	14.2
rubber	1.3	3.4	1.5	5.2	9.3	13.5	12.7
nitrile compounds	0.8	0.0	10.1	11.5	8.3	5.5	10.7
hydrocarbons	1.1	0.0	0.1	0.5	3.2	0.2	10.5
special	0.4	1.4	10.0	1.7	0.0	1.9	10.0

Source: World Trade Atlas

Brazilian imports from India

The main products imported into Brazil from India are shown in table 10 below, again at the HS 4 level. These products are also concentrated in the fuels and chemical products, with oil being the dominant import.

Table 10: Brazilian imports from India, \$ million

Description	1997	1999	2001	2003	2004	2005
Total	216	170	543	486	556	1203
oil	0.0	0.0	249.8	212.7	162.9	618.0
medicants	0.5	1.6	20.5	27.1	40.5	48.9
nucleic acids	0.5	2.4	19.2	11.1	19.4	46.3
synthetic yarn	3.8	2.2	3.0	16.7	28.0	38.9
antibiotics	11.1	10.2	11.7	22.9	30.7	37.5
heterocyclic	8.8	16.5	16.4	17.8	24.0	27.6
polyether	0.0	0.0	0.5	2.2	2.3	18.4
coloring agents	5.7	6.5	7.5	12.8	15.7	17.8
plastic sheets	2.0	4.1	6.1	3.8	8.4	15.1
coal/coke	0.0	0.0	0.0	0.0	8.2	14.7
carboxyyamide	0.9	1.2	33.9	5.3	5.6	13.2
amine comps	6.5	5.0	7.3	8.2	8.1	11.1
cyclic alcohols	2.7	1.3	2.2	4.5	10.3	9.4

Source: World Trade Atlas

Data reconciliation

During this section we have only reported on the import data for each partner, and this short section will comment upon the relationships between this import data and the export data as supplied by the other partner. Depending upon how the value of transport and insurance associated with getting goods to market is assessed, we would expect that imports would be ten percent or more above the relevant export figure. This is the case for 'southbound' (Indian exports to Brazil – Brazilian imports from India) trade but not 'northbound trade' (the converse of Brazilian exports to India and Indian imports from Brazil).

For the 'southbound' trade (Indian exports, Brazilian imports), the value of imports at \$1,202.7 million is some 27 percent above the Indian export figure of \$976 million as shown above. Brazilian imports of HS 29, organic chemicals, are vastly under-reported as exports from India to Brazil, and this seem to be a big factor in influencing the overall total.

For 'northbound' trade (Brazilian exports, Indian imports) the Indian import figure is only 77 percent of the Brazilian export figure. Examination of the data reveals that two of the five main exports from Brazil, aircraft and fuel, represent some \$210 million of exports but are not

reported as imports into India. This makes a big difference in rectifying the overall data. We would note that aircraft are not an infrequent cause of data problems, as sometimes confusion may exist between one country classifying the transaction as an exports and another as a lease, with the latter not included in merchandise trade data¹⁰. Of the other main exports, sugar is under-reported into India (or over-reported from Brazil?) while soybean oils are also inclined that way but the ethyl alcohol trade looks about right. We have not examined quantity data.

Overall conclusions

All three partners share important and somewhat equal trading relationships.

Firstly, **South Africa's** major exports to the world are concentrated in minerals and related products. The major global exports by the general HS 2 Chapter has been precious stones etc (platinum, gold and diamonds), followed by iron and steel products, mineral fuels and motor vehicles, and these four products made up 55.6 percent of the total exports during 2005. The main export to India during 2005 was the one-off aircraft, followed by inorganic chemicals, iron and steel products and again precious stones. These top four accounted for 65.5 percent of the total South African exports to India, and in addition we would note that Indian import data shows the precious stones, metals and minerals, etc., may be under-reported in the export data. Our analysis suggests that these exports face an average tariff of some 15.88 percent using Indian import data. The main exports to Brazil were iron and steel, organic chemicals, general machinery and mineral fuels, with these four comprising 63.3 percent of the total. Again, tralac analysis suggests these products faced an average duty of 8.95 percent during 2005, and that the proposed SACU/Mercosur FTA would make little difference to this rate.

Secondly, **India's** main exports to the world are precious metals and stones, mineral fuels, clothing and organic chemicals, with these four making up a lesser 36.3 percent of the total. There is a direct linkage between India's exports of precious jewellery and South Africa's base metal exports, as India has become the main processing and trading centre globally for these often South Africa-sourced raw materials. Exports to South Africa were concentrated in mineral fuels, vehicles, cereals and iron and steel products, with these exports making up 52.9 percent of the total. Indian exports to Brazil were mineral fuels (49.6% of the total),

¹⁰ We understand that this is probably what happened. In 2005, SAA leased an almost brand-new Airbus to an Indian airline.

organic chemicals, pharmaceuticals and miscellaneous chemical products, with the top four comprising 71.3 percent of the total.

Finally, **Brazilian** global exports are even more diversified than India's, with the top four of vehicles, machinery, iron and steel and ores, etc. comprising 32.0 percent of the total. Exports to South Africa are concentrated in vehicles and parts (31.8%), machinery, meats (poultry) and sugars. In fifth place is soybean oils and in sixth place is tobacco, reaffirming the importance of Brazil for South African agricultural imports. Exports to India feature sugars, soybean products, aircraft and beverages, with these making up 63.2 percent of the total.

It is noticeable that iron and steel products and vehicles and their associated parts feature in the top four global exports from both Brazil and South Africa, and these are ranked sixth and eighth respectively from India. There appears to be a degree of intra-industry trade among the three partners in these products as well, leading to the general conclusion that the gains from cooperation here may not necessarily be in 'new' trade but more sophisticated linkages in existing products.

For the agricultural sector, Brazil is a major agricultural exporter and will remain a valuable source of both food such as poultry, pork and beef for direct consumption in South Africa and imports such as the soybeans to provide the feedstuffs for the livestock sector. As the world's major cane sugar producer, Brazil will also set the benchmark for South Africa's aspirations in the global market place, and as an unsubsidised agricultural producer this statement becomes more critical and can be extended to the agricultural sector in general for South Africa (witness the increases in red meat exports, for example). India remains a relatively higher protected agricultural producer and suffers from internationally competitive pressures as a result. It consequently may become a more important market for South Africa should meaningful preferences be negotiated, but is unlikely to expand much as an agricultural imports source. There are however intriguing potential dynamics for all three countries in the sugar market as the world's main producer (Brazil) is potentially linking with both India and South Africa, two other major producers, and in the case of India, a periodic importer in a trilateral where the protectionist markets of India and South Africa may be opened.

The BLNS Countries

The current trading relationship

These trading relationships are shown in Table 11, using the Indian and Brazilian trade data for 2005. We have found in other trade data analyses that (a) the BLNS data is not generally as up-to-date as the World Trade Atlas data, and (b) there is a degree of consistency using BLNS country data but not really a good one-to-one mapping. We have therefore used the Indian and Brazilian data only, but recognise of course that imports in particular are entering the BLNS countries via South Africa.

Table 11: India/Brazil trade with BLNS, \$m and main HS 4 lines 2005

	Indian Imports from		Indian exports to	
	\$m	Main lines	\$m	Main lines
B	0.4	radar equip, machines	11.7	medicine, rubber, alumin.
L	0.0	none	16.1	fabric, tractors, pumps
N	3.2	scrap iron, engines, balloons	14.1	medicine, motorcycles
S	3.7	gold, electrical parts, acids	4.0	medicine, chemical,
	Brazilian imports from		Brazilian exports to	
	\$m	Main lines	\$m	Main lines
B	0	na	2.3	tyres, stoves, ceramics
L	0.05	t-shirts	1.3	fabric (only exp)
N	0.02	car parts	12.9	furniture, cement, bulldozer
S	0.31	converters machinery	0.5	pump, tubes, confectionary

Source: World Trade Atlas

Direct imports into Brazil from the BLNS are very low, while the comparable imports into India are also very low to very modest (\$3.7 m being the highest). Indian exports to BLNS are higher, with medicines and vehicles being prominent, while Brazilian exports to Namibia are the only significant trade in that direction. Trade data from the BLNS is somewhat consistent with these figures, although Botswana's exports to India are reported to be some \$12.1 million for 2005 (mostly gold).

In general, these direct reported flows are low, but of course there is no way of knowing what the value of imports in particular into BLNS that are transiting through South Africa may be. These low reported values will almost by definition ensure that an IBSA trade agreement will have limited direct gains for the BLNS.

Section Two: The simulation

Introduction

Model, database and scenarios

The analysis undertaken in this paper is based upon a variant of the Global Trade Analysis Project (GTAP)¹¹ model to simulate the impact of possible multilateral market access reforms resulting from an FTA between the SACU, India and Brazil. The database is the most recent Version 6 GTAP database with the base year 2001 (Dimaranan et al., 2005), where the 2001 tariff data originated from the Market Access Maps (MacMap) database has been used with some verification and minor modifications made. The main unskilled labour market closure of the model has been changed so that the supply of unskilled labor is endogenously determined by the labor supply elasticity. We believe this is more relevant to a labour-surplus economy like South Africa's, although we do sensitivity analysis around this closure to highlight the policy implications of alternative labor policies.

Like any applied economic model, this model is, of course, based on assumptions, both in terms of theoretical structure as well as the specific parameters and data used. Regional production is generated by a constant return to scale technology in a perfectly competitive environment, and the private demand system is represented by a non-homothetic demand system (a Constant Difference Elasticity function)¹². The foreign trade structure is characterised by the Armington assumption implying imperfect substitutability between domestic and foreign goods.

The macroeconomic closure is a neo-classical closure where investments are endogenous and adjust to accommodate any changes in savings. This approach is adopted at the global level, and investments are then allocated across regions to equalise the marginal rate of return in all regions. Although global investments and savings must be equal, this does not apply at the regional level, where the trade balance is endogenously determined as the difference between regional savings and regional investments. This is valid as the regional savings enter the regional utility function. The quantity of endowments (land, skilled labour and natural resources) in each region is fixed exogenously within the model, although, as discussed, alternative unskilled labour market assumptions are investigated. The capital

¹¹ See the GTAP website at <https://www.gtap.agecon.purdue.edu/> for a full introduction to the model.

¹² Hence, the present analysis abstracts from features such as imperfect competition and increasing return to scale, which may, however, be important in certain sectors. We are therefore using what can be thought of as a base GTAP structure.

closure adopted in the model is based on the theory where changes in investment levels in each country/region become on-line instantly, updating the capital stocks endogenously in the model simulation¹³. Finally, the numeraire used in the model is a price index of the global primary factor index.

The global database combines detailed bilateral trade, transport and protection data characterising economic linkages among regions, together with individual country input-output data bases which account for intersectoral linkages within regions. The database contains 96 regions and 57 sectors, and we have aggregated these to 12 regions and 41 sectors in order to keep the model within computational limits and focus on the individual member countries/regions of the FTA. These 12 regions are (a) the main IBSA parties of South Africa (ZAF), Botswana (BWA) and Rest of SACU (also called XSC in the model, with Lesotho, Namibia and Swaziland combined as they are in the GTAP database), India and Brazil, and (b) another seven country/region grouping of the EU, USA, China, Japan, Nigeria (NGA), Rest of Africa (RAF) and the Rest of the World (ROW).

The trade data is based upon actual 2001 flows, although tralac has checked and updated these where practical to 2005 flows. The applied ad valorem equivalents (AVEs) tariff data found in the standard GTAP version 6 database originate from the Market Access Maps (MacMap) database, which is compiled from UNCTAD TRAINS data, country notifications to the WTO, AMAD, and from national customs information (Bouet et al., 2005). The MacMap database contains bound, MFN and bilateral applied tariff rates (both specific and ad valorem) at the 6-digit Harmonised Systems (HS6) level. These are then aggregated to GTAP concordance using trade weights compiled from the COMTRADE database.

Baseline projection 2001 – 2015

A meaningful evaluation of an anticipated policy change can be obtained by comparing the liberalisation scenario with a non-liberalisation (business as usual) base scenario. This base must contain projections of the macro-economy and incorporate the effects of important policy changes other than specific policy changes to be analysed. Our business-as-usual baseline features a number of important policy initiatives by the EU and others that must be set in place first. These are (as shown in Box 1):

¹³ This capital closure adopted in the model is the so called Baldwin closure as documented in GTAP technical paper no. 7.

- a stylised implementation of the Agenda 2000 and the Mid-Term Review Reform of the CAP
- the South Africa EU TDCA agreement
- the abolition of export quotas on textiles and apparel shipped to the EU and the USA
- the accession of China to the WTO
- the final implementation of the UR commitments for developing countries
- the enlargement of the EU with 12 new member countries
- the EBA agreement between LDCs and the EU
- an update of India's applied MFN rates to the latest year available 2005.¹⁴

Box 1. Assumptions shaping the baseline 2001-2015

Projections

Shocks to GDP, factor endowments and population

Total factor productivity endogenously determined

Trade Policy changes

Implementation of the TDCA agreement between South Africa and the EU

Abolishment of export quotas on textiles and apparel shipped to the EU and the USA

Final implementation of the UR commitments for developing countries

Accession of China to the WTO

Enlargement of the EU customs union and the extension of the EFTA to include the new member countries

EBA agreement between LDCs and the EU

EU Agenda 2000 and MTR Reform

All direct payments deflated by two per cent per year (max budgetary outlays fixed in nominal terms)

Adjusted hectare and livestock premiums (direct payments)

Decoupling of direct payments to a single farm payment

Sugar and milk quotas unchanged

Reductions in intervention prices modelled by reducing export subsidy rates

USA agricultural subsidies

Agricultural expenditure fixed in nominal terms at its 2001 level

¹⁴ In the process of updating the Indian MFN tariffs it was observed that South Africa exports of coal was classified as import under HS6 code 270112 Bituminous coal in the initial 2001 MacMaps HS6 digit tariff data, while in 2001 to 2005 South Africa was not reporting exports under this code. Therefore the initial MacMaps databases MFN tariff on South African coal exports to India was adjusted to reflect South Africa's reporting of HS6 digit codes on coal exports.

As always, we apply shocks to GDP, population, labour force, and capital to project the world economy to the baseline year of 2015 – a year when the market access reforms are assumed to be completed. The projection of the world economy uses the exogenous assumptions listed in Table 4, and is important in shaping the baseline scenario. The general sources for these assumptions in Table 12 are given as a footnote to the table, and they represent the best estimates of the possible future path of these data. The GTAP model then determines changes in output through both an expansionary and a substitution effect in each country/region of the model. This expansionary effect represents the effects of growth in domestic and foreign demand shaped by income and population growth and the assumed income elasticities, while the substitution effect reflects the changes in competitiveness in each country/region shaped by changes in relative total factor productivity, cost of production as well as any policy changes. Thus, the GTAP model uses this set of macroeconomic projections to generate the ‘best estimate’ of the global production and trade data as it will be in 2015. Therefore the relative growth rates between each country/region for GDP, population, labour, capital and total factor productivity play an import role in determining the relative growth in output of the commodities when projecting the world economy from 2001 to 2015, and we can now take the resulting data set from this baseline simulation as the new base for our IBSA scenarios. A simulation scenario measures the difference between our baseline model output at 2015 in the absence of the IBSA against what it would be if IBSA outcome was introduced **with all other factors held constant**. Therefore the assumptions do not really affect the scenario, as the scenario is measured against the baseline that is built using these assumptions.

Table 12: Macroeconomic projections, annual growth rates, 2001 – 2015

	Real		Labour Force				
	GDP	Pop.	Total	Unskilled	Skilled	Capital	TFP*
South Africa	3.2	0.4	1.3	1.2	1.9	3.2	0.5
Botswana	4.7	0.5	1.4	1.2	7.0	4.7	0.5
Rest of SACU	3.8	1.1	1.9	1.8	3.0	3.8	0.5
India	5.8	1.3	1.8	1.6	4.7	5.8	1.2
Brazil	3.3	1.1	0.9	0.6	3.5	3.3	0.5
Nigeria	3.1	1.9	2.9	2.8	3.5	3.1	0.4
Rest of Africa	4.0	2.0	2.6	2.5	3.6	4.0	0.4
China	6.9	0.6	0.9	0.8	4.1	6.9	1.2
Japan	1.8	-0.1	-0.2	0.2	-0.7	1.8	0.6
EU	2.2	0.0	0.2	0.2	0.2	2.2	0.5
USA	3.2	0.8	1.2	1.4	1.0	3.2	0.7
Rest of World	3.7	1.2	1.8	1.6	3.6	3.7	0.4

Sources: World Bank forecasts, Walmsley (2006) and own assumptions.

Note: *The annual growth rate in Total Factor Productivity is determined endogenously – determined by the exogenous variables (GDP, unskilled, skilled labour force, capital), the model and the associated database.

TDCA simulation; results for South Africa and the TDCA and IBSA in perspective

As outlined above and shown in Box 1, we have modelled the full implementation of the TDCA agreement between South Africa (SACU)¹⁵ and the EU as an essential part of generating the new baseline for subsequent IBSA FTA analysis. This was done as the TDCA is a 'known' policy change in the same way as the other components in Box 1 are, but it was done in such a way that it enabled us to examine the implications of the TDCA as a simulation in its own right from a similar (but not exact, as the TDCA itself changes the South African economy) basis as we then sequentially examine the IBSA FTA. Before the simulation the tariff rates from MacMaps between the TDCA partners of South Africa and the EU were slightly modified to give a better fit to the initial pre-TDCA rates and the so-called end period preferences, a slightly elastic time around 2010 to 2112 when all preferences are fully implemented. Earlier tralac analysis shows that the 2006 SACU tariff schedule is around a half-way point between the initial and end period rates.

¹⁵ We note that while the TDCA is technically an agreement between South Africa and the EU, for all practical purposes it is between the EU and SACU for imports into SACU but does not cover the BLNS exports into the EU. In subsequent IBSA analysis we effectively model SACU rather than South Africa in the FTA in line with the conditions of the new SACU agreement.

Results from this TDCA simulation suggest that the welfare gains to South Africa are around \$495 million, while those to the EU are a greater \$838 million. Botswana gains by some \$41 million, while the rest of SACU loses by around \$16 million. Later in the paper we will present and discuss results from the IBSA simulations, but here we will introduce the fact that the model is saying that a full and comprehensive IBSA FTA is of greater value (in fact about double the welfare gains) to South Africa than the partial TDCA. This is mainly because (a) although South Africa gains comprehensive and almost duty-free access into the EU for non-agricultural products, in general these manufacturing tariffs are modest, thus the preferences are not that significant, and (b), more importantly, South Africa gains little preferences into the highly protected European agricultural market from the TDCA. Conversely, for IBSA South Africa is deemed to have gained comprehensive access into the relatively highly protected Indian market in particular, thus gaining a considerable advantage over global competitors.

Of particular interest from the TDCA simulation is the implications for the motor vehicle sector in South Africa. Here South African production increases by 4.8 percent from the base, with exports to the EU increasing by 12 percent in response to close to duty-free access but imports from the EU increasing by a much smaller three percent as there are almost no preferences granted from South Africa to Europe. Not surprisingly, there is no discernable production response in Europe to this increased trade. A more comprehensive report on the TDCA will be given in subsequent tralac research once the actual 2006 trade data becomes available, as we wish to apply a comprehensive set of analytical tools to this FTA rather than just a GTAP simulation. Meanwhile, the TDCA is a known fact as far as South African trade policy is concerned, so it is important to examine the IBSA from that starting point (although we note that the TDCA is currently being reviewed and may or may not subsequently change somewhat, but that is another and unknown factor).

IBSA FTA scenarios

The FTA **primary** scenario considered in this paper entails the result from the removal of trade barriers between India, Brazil and the member countries of the SACU as measured in the year 2015 in a world shaped by the **baseline** scenario. This implies that all *ad valorem* tariffs and *ad valorem* equivalent of specific tariffs between all participating countries India Brazil and the SACU (IBSA) are abolished. Differences between the so-called **baseline** scenario and this so-called **primary** scenario are therefore the results of implementation of the IBSA FTA. Note that we are not modelling reductions in either services or any non-tariff barriers.

In addition, it is always possible to do an almost endless number of 'what if' scenarios. For this study we have limited these to two basic assumptions/possible outcomes. **One** is that there will be a successful conclusion to the Doha Development Round of the WTO, and we have modelled this using the G20 proposal for agriculture and the NAMA 11 groups suggestions to formula our Non-Agricultural Market Access reform. Our assumptions used are:

- In the **agricultural** case we use:
 - the tiered market access formula suggested by the G20 allowing developed countries take out two percent of their tariff lines as sensitive products while developing countries are allowed to exclude three percent of their tariff lines.
 - all agricultural export subsidies found in the GTAP are eliminated, while there is no change to domestic support in our Doha scenario.
 - the EU has already implemented its MTR reform of the CAP during the base line while the assumption is made that the few remaining countries that need to make adjustments can do so by lowering administered prices used in their Aggregate Measurement of Support (AMS) calculation notified to the WTO without it having any effect on domestic product.
- With regard to the **NAMA** reform we use:
 - the simple Swiss formula with coefficients 5 and 20 for respectively developed and developing countries, including newly acceded members.
 - Developing countries and newly acceded countries are allowed to exclude up to 5 percent of their tariff lines if it does not exceed five percent of their value of imports.
 - Non bound tariff are bound by adding 20 percentage points (mark up) to the MFN rate.
 - The so-called Paragraph 6 countries and small vulnerable countries are not required to make any reductions in their applied tariffs but have to bind all their tariffs so that the simple average of all NAMA tariff lines does not exceed 28.5 and 22 percent respectively on average.
 - Less developed countries are not required to do anything but gain duty-free access into developed countries markets.

The **second** assumption is that the IBSA negotiators will fail to negotiate a fully comprehensive FTA, and we have proxied this possibility by assuming the outcome will be a

50 percent cut in bilateral tariff rates (S2 below). In reality, it is more likely that sensitive sectors for either party will be isolated from any final agreement, but we have opted for this blanket 50 percent option. To complete the picture we have combined these latter two scenarios into a combined one of a successful WTO Doha round increasing multilateral market access and the bilateral IBSA FTA.

Operationally, these are represented as follows:

- Firstly, scenario S1 (the **primary** scenario) is run to simulate the effects of the comprehensive FTA in a post UR environment where all other known international commitments are fully implemented.
- Scenario S2, implements the partial FTA with a 50 percent reduction in applied AVE tariffs between the IBSA countries
- Then Scenario S3 is run. This is an implementation of a stylised outcome of a possible DDA round of the WTO using the assumptions outlined above.
- Next Scenario S4 extends S3 by also including the post-Doha FTA between IBSA countries with a 100 per cent removal of AVE tariffs between the FTA countries.

In order to find the isolated effects of creating the FTA in a post DDA round, scenario S3 is subtracted from scenario S4, quantifying the effect of the FTA. Therefore the results shown later for the FTA (in an environment where the DDA has been completed) are technically the results of scenarios (S4 – S3).

Before we introduce the results of the simulations, we will present Table 13 with the tariffs faced by South Africa into both India and Brazil and by both India and Brazil into South Africa to give a perspective of the relative protection levels by GTAP sectors. This information is reproduced in Annex Tables A1 and A2 along with the changes in trade flows as a result of IBSA. Note that these tariff rates are as used within the GTAP model, and reflect the differences in individual products within a particular GTAP sector and are therefore not directly comparable in the case of imports into South Africa. Note that we have not displayed the zero tariff levels for paddy rice, cane and beet sugar, and raw milk, as these products are effectively non-traded. The table highlights that there are several sectors in all countries that have relatively high initial levels of tariff protection.

Table 13: Initial tariff levels as at the baseline by GTAP sector (%)

	Tariffs faced, South Africa into		Tariffs faced into RSA by	
Primary	India	Brazil	India	Brazil
Wheat	100.0	5.8	2.0	2.0
Other grains	70.0	5.4	9.1	30.1
Vegetables/fruit	45.4	11.5	4.3	0.5
Oil seeds	31.3	5.2	8.6	0.0
Plant fibres	5.0	8.1	5.6	14.5
Other crops	32.3	9.1	6.2	14.0
Cattle	31.0	0.0	0.0	0.0
Other agr products	0.0	4.5	0.0	0.0
Wool	15.0	9.5	0.0	0.0
Secondary and Natural Resources				
Beef/sheep meat	35.0	11.2	20.0	17.4
Other meat	30.0	7.5	23.5	8.8
Vegetable oils	51.6	11.0	3.0	9.8
Dairy products	30.0	15.5	53.3	0.0
Processed rice	75.0	14.3	0.0	0.0
Sugar	60.0	17.5	0.0	0.0
Other food	39.6	13.4	12.6	17.0
Beverage tobacco	41.0	21.7	31.4	145.8
Fish	30.0	10.3	5.9	0.0
Forestry	5.7	8.2	0.3	0.0
Coal	15.0	0.0	0.0	0.0
Other minerals	8.6	4.5	0.1	0.0
Manufacturing				
Textiles	16.1	16.7	21.5	15.1
Wearing apparel	15.0	17.4	39.1	11.1
Leather goods	23.8	16.3	12.4	13.2
Wood products	13.0	11.3	16.8	8.4
Paper products	10.5	13.6	4.8	5.4
Petroleum coal products	12.9	2.5	4.2	2.0
Chem rubber plastic	14.9	9.6	3.6	3.0
Mineral products (oth)	15.0	11.6	7.8	13.7
Iron steel	19.9	11.1	3.9	1.2

	Tariffs faced, South Africa into		Tariffs faced into RSA by	
	India	Brazil	India	Brazil
Primary				
Other metals	15.0	6.6	4.0	0.7
Other metal products	15.1	17.3	9.9	8.1
Motor vehicles etc	16.3	17.5	15.9	23.6
Other transport equip	6.8	1.2	0.1	0.0
Electrical goods	2.1	10.0	8.6	18.9
Other machinery	12.7	14.8	4.2	4.6
Other manufactures	15.0	16.3	5.5	13.3

Results: the implications of the IBSA FTA

The big picture

Table 14 shows the changes in welfare¹⁶ from the FTA assuming a complete 100 percent reduction in merchandise tariffs, with the data expressed in US\$ million as one-off increases in annual welfare at the assessed end point of 2015. South Africa's gains are \$1.437 million, a figure very close to Brazil's \$1,484 million but nearly 50 percent above India's \$1,010 million. Note that both Botswana and Rest of SACU actually lose in welfare terms, and this results mainly (a) because there is little reported trade between these SACU partners¹⁷ and either India or Brazil in order to generate increases (with this reflected in the terms of trade losses) and (b) there is a considerable downside for these countries in that tariff revenue is being lost for the SACU pool¹⁸. The biggest loser in dollar terms is the EU,

¹⁶The **interpretation of results** from a model is not straightforward. In the standard type of CGE such as GTAP model these results are expressed as welfare measures that show how much better off a country/region and the world are as a result of the particular change. Usually these results are expressed in a manner that takes account of net income transfers globally to take into account the costs of servicing capital transfers, but not always. There is no indication of the time-path of the welfare gains in a static model, so a welfare gain of say \$10 million to South Africa means that South Africa is \$10 million better off at the final year than it otherwise would have been in the absence of that change. There is also little said about the distributional aspects of these gains as there is only one 'representative household' in GTAP, and there are no guarantees that these gains will continue (although they are likely to, but with diminishing returns).

¹⁷A well-known weakness of a trade model is that it is not able to provide any insights into potential new areas of trade (or changes in trade from a very low base) that may develop from an FTA, for example, and this development of new trade (or increased trade from that minimal base) has been shown to be an important part of the potential gains from an FTA. This is one aspect of the TDCA that Tralac will explore when assessing the GTAP TDCA results as discussed above.

¹⁸We note that this revenue loss is incompletely covered in our version of the model and therefore the welfare losses may represent an underestimate of the potential losses to the BLNS given their reliance on the SACU tariff pool for total government revenues. For an in-depth discussion of this aspect of South African/SACU trade policy, see Sandrey et al. (2006) and Sandrey (2006b).

with all other countries/regions except Nigeria (NGA) losing. The gains to South Africa are spread across the contributing factors of increased allocative efficiency (\$328m), employment (\$173m), capital stock (\$461m) and the terms of trade gains from better relative prices between exports and imports. Note in particular that for the labour markets South Africa has the highest total contribution for any of the countries shown and this is because of the labour market closure which is a function of the available unskilled labour proxied by the unemployment rates. This aspect of the results will be discussed in more detail later in the paper.

Table 14 Change in welfare (EV of income) due to IBSA, \$ mill at 2015

		Allocative			Term of
	Total	Efficiency	Labour	Capital	Trade
South Africa	1,437	328	173	461	476
Botswana	-18	1	-1	-5	-13
Rest SACU	-15	0	-1	-4	-10
Nigeria	40	3	1	6	30
Rest Africa	-22	-23	1	-24	23
EU	-1,283	-410	-40	-429	-404
USA	-337	-111	-33	-46	-147
India	1,010	-275	35	1,495	-246
China	-285	-32	-10	-97	-147
Brazil	1,484	402	71	562	449
Japan	-287	-72	-14	-56	-144
Rest world	-889	-355	-42	-621	129
Total	836	-544	140	1,242	-3

Source: GTAP results

In further examining the GTAP results we are able to decompose the results to find that:

- South Africa's gains of \$1,437 million overwhelmingly come from gains through better access into India of \$1,313 million, followed a long way back by better access into Brazil of \$112 million, while Brazil's access into South Africa results in gains to South Africa of \$33 million. There are losses to South Africa from India's enhanced access into both Botswana and Rest of SACU of \$8 million and \$6 million respectively.
- India's gains of \$1,010 million are dominated by gains of \$719 million from increased imports from South Africa into India. This story is 'pure gold' and will be discussed

later. India also gains \$161 million from better market access into South Africa and \$509 million from better access into Brazil (and \$17m from better access into Botswana), but loses some \$398 from better Brazilian access into India (in direct contrast from gaining from South African penetration of its market).

- The story for Brazil is different in that most (\$1,216m) of its gains of \$1,484 million result from better market access into India. South Africa is less important as far as Brazil is concerned, although it does gain \$199 million from better access into South Africa. Other than gains of \$64 million from India gaining access to Brazil and a lesser \$8 million from South Africa gaining better access to India, the other values (including the impact of South African access to Brazil) are close to zero.
- The EU loses some \$1,283 million, with \$406 million of this as a result of South Africa displacing the EU in India (in the sectors where South Africa makes gains into India) and another \$628 million from Brazil displacing it in the same Indian marketplace. It also loses another \$70 million and \$81 million as firstly India and then Brazil displace it (the EU) in the South African market (recall that this is post-TDCA).
- Most (\$257m) of China's \$285 million loss results from Brazil displacing it into India, although it also loses \$18 million and a minor \$5 million as Brazil and India respectively gain better access to South Africa (note that the latter small figure is despite India making a large increase in clothing trade into South Africa).
- The Rest of the World (ROW) loses mainly because of Brazil displacing it in the Indian market.
- Botswana's losses are mostly from a \$34 million loss from South Africa gaining better access into India, increasing South Africa's export prices which results in a term of trade loss for Botswana, thus changing the relative position for Botswana, although it gains some \$14 million in compensation as India obtains better market access into Botswana.
- For XSC, rest of SACU or Namibia, Lesotho and Swaziland combined, the \$15 million loss is from a loss of \$19 million as South Africa gains increased market access into India increasing its export prices resulting in a terms of trade loss also for the rest of SACU.
- For the total, GTAP is saying that IBSA is welfare-enhancing for the world, as world welfare increases by \$836 million (and, as shown in Table 13, this is mostly from increased capital stock in that the IBSA FTA increase regional income, which increases savings/investments, resulting in increased global capital stocks).¹⁹

¹⁹ With the creation of the IBSA FTA regional income will initially increase through possible allocative efficiency, terms of trade and increased employment gains in the economy. This increased income causes savings and investments to increase in the economy which result in an expansion of the

Before moving on it behoves us to say more about the '**golden story**'. As mentioned above, both South African and Indian gains are dominated by gains from allowing better access from South Africa into India. Examining both the GTAP output and bilateral trade flows in detail allows us to trace this through this effect to one of allowing South African gold to enter India duty-free as distinct from the 15 percent duty that it would normally carry. Looking at Indian import data for 2005 we find that gold is the second main import behind fuel, with an import value of \$11.74 billion. Of this, some \$5.97 billion is from Switzerland²⁰, followed by \$2.13 billion from South Africa and \$1.84 billion from Australia. Thus, given the huge 15 percent advantage to South Africa, there is a doubling in trade here, and as the Indian Input-Output (I-O) table that drives GTAP shows this import has a large flow-on effect through Indian production and consequently jewellery exports. As jewellery (HS 7113) is the fourth main export globally from India with a 3.19 percent share (and diamonds are the main export with a 11.12 percent share) this gives a massive boost to Indian trade in jewellery. Overall, the gains for India of \$1,010 million are dominated by gains of \$660 million from the metals n.e.c sector, and examining the Indian capital flows in detail confirms this as the main point of interest in the IBSA.

From a policy perspective this is a win-win situation for both South Africa and India, and if trade negotiators have to focus on one key point, lowering the tariffs for South African gold into India is that one point. Here is a meeting of one of the world's main gold producers with the major jewellery producing and exporting nation. In the GTAP database and model South Africa is exporting the aggregated GTAP commodity NFM (metal n.e.c.) to India which is mainly gold metal in some form. The South African NFM industry uses minerals mined in South Africa as an input into its production of metals which come from the GTAP mining sector OME (minerals n.e.c.). In the analysis undertaken in this paper we have not extended the GTAP analysis to see exactly what natural resources (minerals) other than gold is being mined in South Africa. Gold certainly dominates, although it does include others such as platinum that does not feature in either South African exports to India or Indian imports from South Africa. In the model, the amount of natural resources being mined is fixed exogenously, so there can be no change in the quantity, and this model closure does not make any distinction as to what type of mineral is being mined -- gold or iron ore in the OME

capital stock. This increase in capital stock cause regional income to increase even further. The model finds a new equilibrium capital stock where the marginal return to capital is equal to the depreciation rate of capital. At this point regional income would fall if the economy expands its capital stock further.

²⁰ We would note in passing that there are few people actually digging gold out of the ground in Switzerland, and as a leading global gold producer the effective transfer of gold from South Africa to India is likely to be higher than Indian imports show. During 2005 South Africa was the leading individual country in gold production with an 11.8 percent share (<http://www.goldsheetlinks.com/production.htm>).

GTAP sector. Therefore the expanding NFM (metals not elsewhere classified) sector in South Africa is pushing up the price of natural resources (minerals), and increasing the cost of production in other South African sectors/commodities like the motor vehicle sector. If South Africa chose to mine a larger quantity it would lower the price of natural resources (minerals) in South Africa, lowering the production cost in both the NFM sector but also other sectors which use OME (machinery and equipment not elsewhere classified) as inputs into their production (e.g. motor vehicles). This would of course increase the production of NFM and exports to India even further. This necessitates changing the structures of the GTAP model that we are using, and even then changing the amount of mining done opens up further questions about the maximisation of resources in the ground through time: more minerals from the mine today or wait until some time in the future? We consider that this wider analysis is beyond the scope of the present paper.

Table 15 expands upon the welfare gains to show on the left hand side what the actual changes are, while the right hand side provides some insights into where the contributions to these welfare changes are coming from. In column three, real GDP, South Africa gains by some 0.88 percent, while both Botswana and the rest of SACU lose by around 0.10 percent (both India and Brazil gain by around 0.2%). These results flow in large part from Table 14 above, as the allocative efficiency, labour and capital contributions are essential components of the real GDP changes with resources being better used within the economy. South Africa gains more in percentage terms as, although the welfare gains are similar in dollar values, the relative size of the three main economies is not. Similarly for the terms of trade (TOT), expressed as dollar millions above in Table 14 but in percentage terms in Table 15 below.

Table 15. Percentage change in terms of trade, real GDP and factor income, 2015

			Total	Of which contributions from				
		Real	Factor		Unskilled	Skilled		Natural
	TOT	GDP	income	Land	Labour	Labour	Capital	resources
ZAF	1.05	0.88	2.05	0.03	0.72	0.34	0.65	0.31
Botswana	-0.49	-0.10	-0.22	0.01	-0.08	-0.05	-0.11	0.01
RSACU	-0.24	-0.11	-0.02	0.09	-0.06	-0.03	-0.03	0.02
India	-0.20	0.17	0.32	-0.01	0.10	0.03	0.17	0.03
Brazil	0.52	0.21	0.70	0.13	0.19	0.13	0.25	0.00

On the right hand side of Table 15 the relative contributions to total factor income are shown, and indeed these must add to equate with the total factor income percentages shown. Thus,

for South Africa's 2.05 percentage increases in total factor income, 0.03 percent is coming from better land use, 0.72 percent from enhanced unskilled labour, 0.34 percent from skilled labour, 0.65 percent from capital and the final 0.31 percent from the natural resource base. Note that for land, skilled labour and natural resources, the quantities are fixed in the GTAP model, so the increases are coming from price increases as their values are bidded up, while for both unskilled labour and capital where the quantities are not fixed there is both a price and a quantity effect. The unskilled labour story will be examined in more detail later under alternative model closures, as these policy options for (a) holding unskilled labour fixed and raising the wage rate, (b) holding the wage rate fixed and increasing the people in employment and (c) some intermediate position are crucial policy questions for South Africa. Currently we are using a closure of (c) as discussed earlier.

Changes in trade flows

The details of changes to South Africa's trading patterns are shown in Annex A, with exports in Annex Table A1 and imports in Annex Table A2 respectively. These tables split the GTAP sectors into primary and secondary agriculture, natural resource and manufacturing before displaying (a) the AVE or the initial pre-FTA average *ad valorem* tariff facing either South African exports in the partner market for exports or partner tariffs into South Africa for imports, and (b) the change in either South African exports or imports into or from the respective country/regions in response to reducing these border tariffs to zero. These trade flow changes are given in both US dollar values and percentage changes from the base to put them in perspective. The markets for exports from and sources of imports into South Africa are provided as India, Brazil, the rest of SACU (with Botswana and XSA combined) and the rest of the world with all others combined rather than the ROW used in the model. There are also two columns on the right hand side showing the total overall changes by value and percentage change.

Table 16 shows the aggregate overall changes to trade flows for the partner countries in 2015, expressed as percentage changes for both exports and imports and then in US\$ million for the trade balance. The clear gainer is South Africa, with increased exports globally, once all markets are accounted for of \$251 million, while India and Brazil faces losses of some \$392 million and \$54 million respectively as increased exports are less than the import changes. Botswana has a deteriorating trade balance of \$4 million²¹, while the

²¹ Note that Table 14 refers to a deteriorating terms of trade (TOT) for Botswana, while Table 16 shows the actual trade flows. They are different concepts, as TOT is the relative indicator price of exports and imports.

change for the rest of SACU, while negative, does not register on the table in terms of a trade balance that is expressed in millions.

Table 16: Percentage change in the quantity of total implexp & trade balance, 2015

	South Africa	Botswana	RSACU	India	Brazil
Exports	2.1	-0.2	-0.2	2.3	1.0
Imports	3.6	-0.7	-0.4	2.9	1.6
Trade balance mill US\$	251	-4	0	-392	-54

Source: GTAP results

Table 17 extends this analysis to look at the agricultural sector changes. Recall that the factors of production of land, skilled labour and natural resources are fixed, while unskilled labour and capital can increase in both price and quantity. We can see that for all SACU partners the impacts upon agricultural factor income are positive, and for both South Africa and RSACU in particular. Land prices are increasing here in all SACU, and unskilled labour prices are increasing in South Africa and RSACU. Thus, IBSA is good for the SACU agricultural sector. Brazilian land prices are increasing by nearly two percent (as a result of better access into India rather than South Africa), while India's marginally declines.

Table 17. Percentage change in primary agricultural factor income, 2015

	Agricultural	Of which contributions from					
	Factor		Unskilled	skilled		Natural	
	income	Land	Labour	Labour	Capital	resources	
South Africa	1.21	0.61	0.45	0.01	0.14	0.00	
Botswana	0.22	0.20	0.00	0.00	0.02	0.00	
RSACU	1.09	0.81	0.15	0.00	0.13	0.00	
India	0.01	-0.04	0.05	0.00	0.00	0.00	
Brazil	2.44	1.84	0.23	0.01	0.35	0.00	

The specific sector results

This section will discuss the production, trade and relative prices changes in the GTAP sectors. **The following series of tables examining the changes to South African trade flows is largely drawn from the Annex A tables.**

We will start with the agricultural and natural resource sectors to keep the analysis manageable, and these are shown in Table 18. Keep in mind that these are percentage changes, and some of these may be off low bases. Further analysis of the results (see Annex Table A1) shows that in the **agricultural sector** South Africa increases **exports** to India by \$184 million and Brazil by a much lesser \$7 million, but overall some \$144 million of this is at the expense of exports to other SACU (\$4 million less) and the rest of the world. Thus, the total increase is only \$46 million. Of the total increase, most is in vegetable oils and fats (\$69m) and wool (29m) where big increases to India take place, while there are global reductions of \$18 million each in exports of (a) vegetables, fruit and nuts and (b) other food products. For imports, there is a similar but slightly larger overall increase of \$93 million, driven mostly by increased imports from Brazil of \$75 million (other crops, other meats and vegetable oils and fats). In the **natural resources** sector, there is an increase of \$190 million globally, dominated by coal products of \$179 million as the percentage changes shown in coal are off large bases. Exports of coal to India increase by some \$824 million (over 500%) as the duty rates of 15 percent are slashed, and this necessitates imports into South Africa from the rest of the world as South Africa's relative price increases domestically²². **In summary, there is little action in either exports or imports in the agricultural sectors, and therefore limited production changes, while only coal products show increased trade in the natural resources sectors.**

The interpretation of Table 18 is as follows, using wheat as an example. The table shows that real wheat prices actually increase by 0.8 percent (right hand column). This however does not seem to be enough to attract resources into wheat production as other sectors (in both agriculture and NAMA) become relatively more profitable. Consequently, imports of wheat rise by 2.3 percent and exports decline by 2.0 percent. This leads to a final decline of 0.8 percent in South African wheat production as a result of IBSA.

²² Once again the quantity of coal being extracted from the mines in South Africa is fixed exogenously in the model, therefore the increased demand of coal by India increases the South African coal price but with no change in the quantity mined.

Table 18: Relative changes in the South African agricultural and natural resource sectors, %

	Change	Change	Change	Change in
	in quantity	quantity of	quantity of	Real price
	output	exports	imports	of output
Paddy rice	0.4	2.9	2.6	1.1
Wheat	-0.8	-2.0	2.3	0.8
Cereals grains	-0.2	-1.5	6.2	0.9
Veg, fruit, nuts	-0.9	-1.8	1.2	0.8
Oil seed	0.9	-2.5	5.6	1.2
Sugar cane & beet	-0.8	-3.9	-0.6	0.8
Plant based fibres	-1.7	-1.9	1.1	0.6
Crops n.e.c.	0.4	2.9	4.5	1.0
Bovine cattle	0.5	-2.7	1.8	1.0
Animal products n.e.c.	0.1	-1.9	0.6	0.9
Raw milk	0.2	-6.4	3.5	1.0
Wool, silk cocoons	13.9	18.6	10.7	3.4
Fishery	0.0	-2.7	1.8	1.3
Forestry	0.3	2.3	1.8	1.1
Coal prod	0.0	1.5	2.9	1.5
Minerals n.e.c	1.0	-4.2	6.4	3.1
Beef	0.5	-2.9	3.9	0.9
Other meat	-1.1	-4.0	11.2	0.8
Vegetable oils	7.8	64.7	7.1	0.7
Milk	-0.1	-4.0	3.7	0.9
Processed rice	-0.4	-1.6	1.8	0.9
Sugar products	-1.1	-2.8	1.8	0.8
Other foods	0.1	-2.2	3.2	0.8
Beverages -tobacco	0.5	-1.1	1.8	0.7

Source: GTAP results

Of particular interest from Table 18 is the sugar sector, as Brazil and India, and to a lesser extent South Africa, are major global players. South African production declines by 1.1 percent as resources are displaced to slightly more profitable sectors (in both agricultural but more particularly non-agricultural sectors as we shall see next). Analysis of the detailed GTAP trade data results show imperceptible changes to the trade flows here despite the high sugar tariffs into India. However, South Africa has no initial trade with India in the GTAP database, so the removal of the 60 percent tariff may have a large percentage increase in the quantity of exports to India but as the base is nearly zero the change in value of exports is minimal. Our earlier trade chilling analysis suggested that this sector held potential for South African exports to India, and this highlights the need to undertake trade analysis 'outside of the model'.

We now turn our attention to the **manufacturing** sectors, where the story is completely different and there is a large response for South Africa. This is shown in Table 19, where the 'golden story' of the large response in other metals dominates. Note that Table 19 is best read in conjunction with Table 20, which shows the bilateral changes to South African manufacturing exports as a result of IBSA. While the same data is available for South African imports, it is not shown but rather discussed for the main sectors impacted by imports.

Table 19: Relative changes in the South African manufacturing sectors, %

	Change in quantity output	Change quantity of exports	Change quantity of imports	Change in Real price of output
Textiles	-1.0	2.7	5.9	0.6
Wearing apparel	-8.7	-1.9	12.9	0.1
Leather	-2.9	-2.7	5.4	0.7
Wood products	-1.6	-4.5	3.4	0.9
Paper products	-0.1	-1.4	2.9	0.8
Petroleum, coal prod	0.3	-1.1	2.9	0.7
Chem, rubber plastic	1.6	6.2	3.5	0.9
Other mineral prod	-1.2	-2.5	4.0	1.1
Iron/steel	-1.4	-0.5	2.5	1.1
Other metals (gold)	15.5	16.9	14.1	1.1
Metal products	-1.8	-4.1	6.8	0.8
Motor vehicles	-1.6	-1.8	4.3	0.5
Other transport	-2.5	-4.2	2.1	0.8
Electronics	-5.3	-7.6	1.5	1.0
Machinery equipment	-2.8	-4.7	2.9	0.9
Other manufactures	-6.8	-7.8	3.1	1.1
Services	1.0	-3.5	3.1	1.0

Source: GTAP results

Table 20 shows that manufacturing exports to India increase by a huge \$2,764 million, with \$2,213 million of this in the metals n.e.c (mostly gold) sector as exports to India double. Other big gainers are the chemical, plastics and rubber sector where exports to India increase by \$318 million. The lesser gains of \$242 million to Brazil are more dispersed, but concentrated in the metals n.e.c. sectors again: chemicals, rubber and plastics; machinery and equipment; and textiles (possibly wool?). The big increases in exports to India are responsible for South Africa increasing its global exports of manufacturing goods by \$1,596 million despite declines to other destinations. Note on the right hand column of Table 19 (and also Table 18) that the resource price in all sectors is increasing by at least a small positive amount and most around one percent.

Table 20: Changes in South African bilateral exports for manufacturing products, \$m and %

	To India			To Brazil		
		change	% change		change	% change
	AVE	value	quantity	AVE	value	quantity
	tariff	mill us\$	of exports	tariff	mill us\$	of exports
Manufacturing						
Textiles	16.1	14	193	16.7	23	197
Wearing apparel	15.0	0	180	17.4	0	206
Leather products	23.8	5	416	16.3	1	218
Wood products	13.0	0	120	11.3	2	99
Paper products, publishing	10.5	21	71	13.6	9	104
Petroleum, coal products	12.9	20	62	2.5	0	8
Chemical, rubber, plastic	14.9	318	132	9.6	64	70
Mineral products n.e.c.	15.0	6	111	11.6	3	77
Ferrous metal	19.9	92	170	11.1	18	71
Metals n.e.c.	15.0	2,213	98	6.6	71	50
Metal products	15.1	9	169	17.3	14	194
Motor vehicles and parts	16.3	11	103	17.5	15	142
Transport equipment n.e.c.	6.8	0	66	1.2	3	3
Electronic equipment	2.1	0	10	10.0	0	112
Machinery and equipment	12.7	49	143	14.8	18	181
Manufactures n.e.c.	15.0	6	162	16.3	1	185
Total Manufacturing		2,764			242	

Source: GTAP results

Not shown is the companion table to Table 20 for imports. Here the two big changes are in (a) clothing imports of an increased \$222 million from India and (b) increased imports of \$210 million in motor vehicle imports from Brazil. If we look at Table 19 we see that clothing production in South Africa declines by a large 8.7 percent from IBSA, and it is Indian imports that are driving this reduction. Not shown also is that imports into South Africa from SACU are also displaced by India, (and India is making inroads into SACU) and this is the largest overall change in that trade profile. **These changes in the clothing sector resulting in an overall decline for South Africa are a lesser replication of the results from a China FTA as discussed in Jensen and Sandrey (2006), and confirm the possible expansion of Indian imports into South Africa as discussed in Sandrey (2006c) in response to the restrictions recently placed upon Chinese imports into South Africa.**

There are several factors in play with respect to the South African motor vehicle (MHV) sector. Global **imports** increase by \$145 million, mostly through increases from Brazil (\$210m) and India (\$41m) in response to South African tariffs on current trade of 33.6 and 15.9 percent for Brazil and India respectively going to zero. This new IBSA trade displaces some \$103 million in imports from the rest of the world. Conversely, since the initial **export** values to India and Brazil were low, there are limited compensating exports to India of \$11 million and Brazil \$15 million that do not match the declines to the rest of the world of \$65 million. Overall **production** in the motor vehicle sector declines by 1.6 percent, as shown in Table 18. Importantly, the main cause of this 1.6 percent decline is the increased export (production) of NFM to India pushing up the price of the intermediate inputs (especially OME) and endowments (labour capital) into the MHV sector which then reduces MVH production by 1.3 percent. This leaves a reduction of a lesser 0.3 percent by other effects. This increased price of the intermediate inputs and endowments in the MVH sector increasing production prices in South Africa also explains the reduction in exports to the Rest of the World due to increase production costs. This does not necessarily mean that the South African MVH industry is less efficient than India's or Brazil's, but rather that the industry now has to pay a higher price domestically for inputs.

The labour market closure and alternative scenarios

We believe that this particular section of the GTAP analysis of IBSA potentially makes an important contribution to the nexus between trade policy and welfare redistribution in South Africa. The results in this paper are driven from the labour market assumption as displayed in rows (B) in Table 21 below, with the mathematical derivation of the equation shown in Annex B to ensure readers that it is both mathematically correct and economically sensible.

The simulation results as presented above are those given in section (B) of Table 21, where the welfare gains for South Africa are some \$1,437 million and the increased real GDP is 0.88 percent. Not shown earlier is that IBSA, all other things held constant, will contribute a further 0.69 percent to South Africa's CPI or inflation rate. This is of course having an impact upon the whole economy and results in South Africa losing some competitive advantage globally. The key employment story is that shown in the centre of the table under ZAF, where the South African story on unskilled labour is told (recall that the supply of skilled labour is held fixed). Under this closure whereby the unskilled labour supply is a function of the unemployment rate the employment of unskilled labour increases by 0.46 percent and the real wage rate by 1.28 percent. To the right of this we see that both employment and the

wage rate declines in both Botswana and rest of SACU, while employment increases only marginally in India and Brazil but the wage rate increases by 0.37 percent in India and 0.50 percent in Brazil as there is much less reported unemployment in these latter two countries.

Table 21: Unskilled labour market closure, percentage change employment/real wage

South Africa									
EV	QGDP	CPI					Rest of		
mill US\$	%	%			ZAF	Bots	SACU	India	Brazil
1,134	0.64	0.73	Fixed	Employment	0.00	0.00	0.00	0.00	0.00
(A)			employ.	Real wage	1.53	-0.20	-0.14	0.38	0.53
1,437	0.88	0.69	<u>U</u>	Employment	0.46	-0.05	-0.04	0.02	0.05
(B)			(1-U)	Real wage	1.28	-0.16	-0.09	0.37	0.50
2,307	1.56	0.57	<u>R. Wage</u>	Employment	1.77	-0.49	-0.47	0.33	0.39
(C)			CPI	Real wage	0.57	0.08	0.22	0.09	0.33
3,015	2.11	0.47	Fixed	Employment	2.84	-0.24	0.02	0.44	1.05
(D)			R. Wage	Real wage	0.00	0.00	0.00	0.00	0.00

Source: GTAP results based upon alternative closure assumptions

Section (A) in Table 21 shows what may be thought of as a general COSATU position seeking to protect those already in employment. In this extreme position the level of employment is fixed and all adjustments must take place within the wage rate. This is, as expected, good for those in work, as their wage rate increases by 1.53 percent. It is not so good for either those not in work or the economy, as the welfare gains reduce to \$1,134 million and GDP is a lesser 0.64 percent higher while the CPI increases to 0.73 percent. Botswana and the rest of SACU find that there is no employment loss but this needs the real wage to decline even more to compensate for the fixed employment closure.

At the other extreme we have section (D), where the real wage is fixed and all adjustments must come through the number of unskilled persons employed. **Here the results are striking:** employment is up by 2.84 percent, welfare more than doubles to \$3,015 million or 2.11 percent of real GDP and inflation is a significantly lower 0.47 percent. This is a dramatic result which clearly highlights that if South Africa is serious about increasing both welfare and employment in the economy then the more policies move towards creating jobs rather than rewarding those actually in employment is a superior option for policy makers.

This is confirmed by alternative (C), where the real wage rate is pegged to the inflation rate (recognising of course that this inflation rate is itself a function of the labour market closure).

Here the welfare gains are some \$2,307 million or 1.56 percent of real GDP with the real wage increase set at the inflation rate of 0.57 percent. The employment increase of 1.77 percent is similarly around a half-way position between the closure that we are using and the extreme position of fixing the real wage.

Other sensitivity analysis through the scenarios

The 50 percent reduction

As outlined earlier, the second scenario undertaken was to simulate an across-the-board 50 percent reduction in all IBSA tariffs to assess one variant of a less than comprehensive FTA.

The welfare results for South Africa are now \$625 million (43% of the original), while those for India are also \$625 million (a greater 62% of the original), but Brazil's gains shrink to \$444 million or just 30 percent of the original. For South Africa, all the gains/losses are of a similar magnitude to the 43 percent overall figure (including the main gain from better access into India) except for the \$3 million loss from better Indian access into South Africa which now turns into a modest \$19 million gain for South Africa (although the Indian gains from better access into South Africa remain at 52 percent of the original). At the sector level the reduction in South Africa's clothing sector is now 2.95 percent, only 34 percent of the full reduction of 8.7 percent, while the reduction in motor vehicle production is 0.66 percent or 41 percent of the original reduction. In the 'golden sector' South African production of other metals is up by 6.80 percent or 44 percent of the increase from the full FTA.

For India much of the relative gain over the full FTA is that Brazil now makes limited inroads into India, and the large loss resulting from this is almost neutralised, and for the same reason Brazil's overall gains are reduced by more than a straight-line 50 percent as its gains in the Indian market are sharply reduced from \$1,216 million to \$307 million with partial access into India.

A possible Doha simulation

The general assumptions regarding a possible Doha Round outcome are outlined in the earlier section discussing the model and assumptions used in this paper. We tried to model an outcome that is relatively close to the South African position in the Round, but of course recognising that in a negotiation one does not always get what one strives for. In this section we will just present the main features, as the full results will be presented (along with other analysis) in later tralac work on agricultural policies. Recall that sensitive and special products have been modelled, and this has been shown to dramatically reduce welfare gains globally. The welfare results from the Doha simulation are shown in Table 22.

Table 22: Changes in welfare (EV) from Doha agreement, \$million

Country/region	Total EV, \$m	Export Subsidies	Agr market access	NAMA
Total	48,988	-49	4,116	44,922
South Africa	405	18	90	296
Botswana	-12	-2	-5	-5
Rest SACU	132	2	70	59
Nigeria	194	-59	2	252
Rest Africa	1,044	-294	241	1,097
EU	5,156	1,003	160	3,992
USA	-1,581	370	806	-2,756
India	1,480	-1	57	1,424
China	10,120	-117	-122	10,350
Brazil	2,539	77	574	1,889
Japan	6,691	-19	1,495	5,215
Rest world	22,820	-1,027	738	23,109

Source: GTAP results, where agricultural results are split between export subsidy and other agricultural results.

- Overall global welfare gains are \$49 billion, with only \$4 billion of this coming from agriculture and the remaining \$45 billion from NAMA;
- South African gains of \$405 million are concentrated in NAMA but there are still worthwhile gains in agriculture;
- Botswana loses marginally in both agriculture and NAMA;
- But the other SACU countries of an amalgam of Lesotho, Namibia and Swaziland gain significantly in both agriculture and NAMA;

- The rest of Africa gains overall. The losses in agriculture from the abolition of export subsidies are balanced by gains from better agricultural market access, and there are gains from NAMA reforms;
- The EU is a big gainer, with a significant amount of this from the abolition of its own export subsidies;
- Surprisingly, the USA is an overall loser, with losses in NAMA greater than the gains from agriculture reform;
- Both India and Brazil are big winners, with most of India's gains coming from NAMA and Brazil making significant gains from agricultural reform;
- China is the biggest winner, with large gains in NAMA more than dominating losses in agriculture;
- Japan is also a significant gainer in both agriculture and NAMA; and
- The rest of the world loses from the abolition of export subsidies but makes large gains in NAMA to become a clear overall winner.

For South Africa there is a production increase in apparel (4.8%), motor vehicles (1.1%) and the 'IBSA golden sector' of other metals of 1.0 percent in industrial goods, and declines of 3.0 percent in sugar production but increases of around three percent in both beef and milk production in the agricultural sectors. Importantly, in agriculture there is a 29 percent increase in wheat production, providing evidence that it is hampered by agricultural distortions elsewhere. For market prices the split is clear: increases for all agricultural products except beverages and tobacco, but declines for all manufacturing prices.

Post-Doha IBSA analysis

The general welfare changes to IBSA following a modest but successful Doha outcome are shown below in Table 23. The welfare gains for South Africa are reduced by 11 percent: from \$1,437 billion to \$1,279 billion. A cursory analysis of the results shows that the 'golden sector' output still increases but by a lower 13.96 percent (15.5% before) but apparel production declines by a lesser 6.8 percent (8.7% before) and vehicles are practically unchanged with a decline of 1.53 percent (1.6% before). From the model we can see that in agricultural products South Africa is deemed to be sheltering its sensitive/special products of sugar and milk products in agriculture and textiles/apparel and motor vehicles in the NAMA sectors.

Table 23: IBSA, post versus pre Doha outcome EV in \$million and % difference

Country	Initial IBSA EV \$m	Post Doha EV \$m	Difference, \$ m
South Africa	1,437	1,279	\$158m or 11%
Botswana	-18	-15	\$3m or 17%
Rest of SACU	-15	-12	\$3m or 20%
India	1,010	857	\$153m or 15%
Brazil	1,484	1,245	\$239m or 16%

Source: GTAP results

Thus, while all gains are lower, South Africa loses relatively less than India and Brazil, and the other SACU partners are better off.

The Implications for the BLNS countries

Table 24 replicates the relevant parts of Table 14 with the results for the BLNS countries. As discussed, Botswana is a country in its own right, but Lesotho, Namibia and Swaziland are aggregated into one region XSC in the GTAP model. Thus, we are really unable to make definitive statements about XSC as their economies are totally different. Nonetheless, we can say that IBSA leads to welfare losses for both Botswana and XSC.

Table 24 BLNS Change in welfare (EV of income) due to IBSA, \$ mill at 2015.

			Allocative			Term of
	Total		Efficiency	Labour	Capital	Trade
2 BWA	-18		1	-1	-5	-13
3 XSC	-15		0	-1	-4	-10

Source: GTAP results (Table xx)

In further examining the GTAP results we are able to decompose the results to find that:

- Botswana's losses are mostly from a \$34 million loss from South Africa gaining better access into India, increasing South Africa's export prices, which results in a term of trade loss for Botswana, thus changing the relative position for Botswana, although it gains some \$14 million in compensation as India obtains better market access into Botswana.

- For XSC, rest of SACU or Namibia, Lesotho and Swaziland combined, the \$15 million loss is from a loss of \$19 million as South Africa gains increased market access into India increasing its export prices resulting in a terms of trade loss also for the rest of SACU. As for Brazil, there is a limited effect from having Brazil in the FTA.

Lesotho, Namibia and Swaziland (XSC)

For XSC increased trade with India is the main story, where **exports** increase by \$15.2 million in sugar products and \$17.2 million overall. Elsewhere, exports increase to Brazil by \$2.2 million and South Africa by \$2.7 million but decrease by \$3.3 million to the rest of the world. The main increases in exports to South Africa are in paper and paper products (possibly wood pulp from Swaziland), NFM, and cattle, while the main decreases in exports to South Africa are in textiles and wearing apparel. Overall, this translates into increased exports of sugar (5.1%), NFM (3.5%) and wood pulp and paper products (1.3%), with decreases of 4.0 percent in wearing apparel. Relating these and other export changes back to dollar values, sugar increased by \$12.6 million (mostly to India), pulp and paper by \$4.4 million (to South Africa), NFM by \$3.3 million (to South Africa) and live cattle²³ by \$1.4 million (to South Africa). This resulted in an overall increase of \$0.8 million once increases of \$17 million to India, \$1.8 million to Brazil and \$2.6 million to South Africa are balanced against substitution export declines of \$12 million to the EU, \$2.8 million to 'rest of the world', \$2.6 million to 'rest of Africa' and \$2.2 million to the US are factored in.

For **imports**, many sectors change marginally, with few sectors standing out. Overall imports however increase by \$1.7 million, with this hiding increases from India of \$32.7 million, the EU of \$3.9 million and Brazil of \$3.6 million from the large decline of \$45 million from South Africa as that source is displaced. The biggest change in value is metal products where an increase of \$2.7 million takes place once increases to India of \$15.4 million are set against declines to South Africa of \$11.7 million. Other increases are \$1.3 million in petroleum and coal products and \$0.5 million in NFM (South Africa's 'golden' sector), while losses take place in reduced textile imports of \$1.2 million as Indian displaces some of the domestic apparel production. Slight increases in agricultural prices result in increases of \$0.3 million in both wheat (from the US) and fruit and vegetables (from South Africa).

²³ Cattle meat (beef) is a different sector from live cattle, and in CMT (beef) there is a reduction of \$0.66 million in imports overall as increased exports of \$0.69 million to South Africa only partially offset the reduction of \$1.17 million in beef to the EU. This translates to a reduction of 0.7 percent in production but an increase in price of 0.4 percent once all the relationships are cleared.

The end result of the trade changes is that **production** of wearing apparel declines by 3.8 percent in the face of increased Indian competition while sugar production increases by 4.8 percent and non-ferrous metals by 2.2 percent.

Botswana

Here the story is less one of less direct change in **exports**, with an overall loss of some \$8.3 million. Overall, this is coming via three sectors: clothing (\$2.9m), vehicles and their parts (\$2.4m), and surprisingly as resources move marginally into other sectors and Botswana's costs increase very marginally, the manufactures n.e.c (down \$7.1m), a sector that contains diamonds and makes up nearly three-quarters of Botswana's global exports. For clothing and vehicles and parts, the exports to South Africa reduce, while for diamonds the reduction is to the almost exclusive EU market. Changes in the agricultural sector are minor, but include an increase of \$0.65 million in milk exports to India and around \$0.3 million in beef and other meats to South Africa and India respectively.

For **imports**, the picture is that overall increases of \$40.6 million from India and \$1.5 million from Brazil largely displace South African imports (down by \$45.7m) for an insignificant overall change of \$2.3 million less than without IBSA. Much of this change takes place in the general machinery and other equipment sector, where India and to a lesser extent Brazil displace South African imports. India generally makes some inroads in most of the manufacturing sectors, with this at the expense of not only South Africa but also the EU, China and the rest of Africa. There are no changes of interest to the agriculture imports other than a decline in milk products from South Africa that matches the increase to India (a change that results in no extra production).

The **production** of both motor vehicles and their parts and clothing is down (by 3.6% and 10.4% respectively). Very modest increases are seen in most other sectors with the exception of the crucial diamond sector (manufactures n.e.c. – although as mining production is fixed in the model this may be somewhat misleading in a similar manner that the gold story in South Africa is complex as discussed earlier).

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Annex Table A1: South African Changes in Exports with IBSA FTA, Initial average tariff and changes in exports by \$ million and percentage

	India			Brazil			Rest SACU (inc Botswana)			ROW		total		ROW
		Change	% change		change	% change		change	% change	change	% change	change	% change	
	AVE	in value	quantity	AVE	in value	quantity	AVE	in value	quantity	in value	quantity	in value	quantity	AVE
	tariff	US\$ mill	of exports	tariff	US\$ mill	of exports	tariff	US\$ mill	of exports	US\$ mill	of exports	US\$ mill	of exports	tariff
Primary														
1 pdr	80.0	0	33,559	11.1	0	175	0.0	0	-1.8	0	-9.8	0	2.9	3.7
2 wht	100.0	5	29,376	5.8	0	55	0.0	0	-3.9	-6	-5.9	-1	-2.0	132.9
3 gro	70.0	0	279	5.4	0	14	0.0	0	-0.5	-2	-1.9	-2	-1.5	43.8
4 v_f	45.4	6	289	11.5	0	48	0.0	0	-0.6	-24	-2.2	-18	-1.8	6.5
5 osd	31.3	0	257	5.2	0	58	0.0	0	-0.1	-1	-2.7	-1	-2.5	8.8
6 c_b	0.0	0	-4	9.5	0	60	0.0	0	-0.5	0	-4.1	0	-3.9	0.9
7 pfb	5.0	0	25	8.1	0	47	0.0	0	-1.1	-1	-2.4	-1	-1.9	0.9
8 ocr	32.3	27	459	9.1	4	70	0.0	0	-1.7	-15	-5.3	16	2.9	10.6
9 ctl	31.0	0	182	0.0	0	-2	0.0	0	-1.3	0	-3.5	0	-2.7	3.5
10 oap	0.0	0	-2	4.5	0	11	0.0	0	-0.7	-2	-2.2	-2	-1.9	2.6
11 rmk	0.0	0	-6	0.0	0	-2	0.0	0	-5.6	0	-6.5	0	-6.4	0.0
12 wol	15.0	63	292	9.5	0	141	0.0	0	-20.8	-34	-33.2	29	18.6	1.0
		102			5			0		-86		20		
Secondary														
17 cmt	35.0	2	768	11.2	0	118	0.0	0	-2.8	-3	-5.8	-2	-2.9	54.7
18 omt	30.0	1	765	7.5	0	81	0.0	0	-1.7	-5	-6.1	-5	-4.0	10.5
19 vol	51.6	71	966	11.0	0	111	0.0	0	-1.0	-2	-3.3	69	64.7	11.4
20 mil	30.0	1	533	15.5	0	176	0.0	-1	-2.5	-7	-5.5	-7	-4.0	26.2
21 pcr	75.0	0	1,621	14.3	0	94	0.0	0	-0.6	0	-3.5	0	-1.6	10.5

	India			Brazil			Rest SACU (inc Botswana)			ROW		total		ROW
		Change	% change		change	% change		change	% change	change	% change	change	% change	
	AVE	in value	quantity	AVE	in value	quantity	AVE	in value	quantity	in value	quantity	in value	quantity	AVE
	tariff	US\$ mill	of exports	tariff	US\$ mill	of exports	tariff	US\$ mill	of exports	US\$ mill	of exports	US\$ mill	of exports	tariff
22 sgr	60.0	1	813	17.5	0	132	0.0	0	-3.4	-10	-3.1	-9	-2.8	30.6
23 ofd	39.6	5	267	13.4	0	62	0.0	-2	-1.5	-21	-2.9	-18	-2.2	16.1
24 b_t	41.0	0	117	21.7	1	55	0.0	0	-0.8	-4	-1.4	-3	-1.1	21.2
		82			2		0.0	-4		-54		26		
Natural resources														
13 fish	30.0	0	88	10.3	0	24	0.0	0	-1.0	-1	-2.8	-1	-2.7	8.1
14 for	5.7	10	26	8.2	0	42	0.0	0	-1.6	-4	-5.0	5	2.3	3.4
15 coal	15.0	824	550	0.0	-11	-17	0.0	-1	-13.2	-676	-17.2	137	1.5	1.6
16 omn	8.6	10	10	4.5	0	2	0.0	0	-1.9	-41	-4.6	-31	-4.2	0.5
		844			-11			0		-723		110		
Manufacturing														
25 tex	16.1	14	193	16.7	23	197	0.0	-6	-8.3	-15	-4.4	16	2.7	7.2
26 wap	15.0	0	180	17.4	0	206	0.0	-4	-4.7	-1	-0.8	-5	-1.9	7.8
27 lea	23.8	5	416	16.3	1	218	0.0	-2	-3.7	-10	-5.0	-6	-2.7	3.9
28 lum	13.0	0	120	11.3	2	99	0.0	-2	-2.2	-35	-5.1	-34	-4.5	2.3
29 ppp	10.5	21	71	13.6	9	104	0.0	-1	-1.4	-37	-4.3	-9	-1.4	4.7
30 p_c	12.9	20	62	2.5	0	8	0.0	1	-0.4	-36	-2.1	-14	-1.1	7.6
31 crp	14.9	318	132	9.6	64	70	0.0	-3	-1.4	-120	-5.3	259	6.2	5.9
32 nmm	15.0	6	111	11.6	3	77	0.0	-1	-1.9	-16	-5.3	-8	-2.5	6.6

	India			Brazil			Rest SACU (inc Botswana)			ROW		total		ROW
		Change	% change		change	% change		change	% change	change	% change	change	% change	
	AVE	in value	quantity	AVE	in value	quantity	AVE	in value	quantity	in value	quantity	in value	quantity	AVE
	tariff	US\$ mill	of exports	tariff	US\$ mill	of exports	tariff	US\$ mill	of exports	US\$ mill	of exports	US\$ mill	of exports	tariff
33 i_s	19.9	92	170	11.1	18	71	0.0	-1	-2.0	-96	-5.7	13	-0.5	3.1
34 nfm	15.0	2213	98	6.6	71	50	0.0	-2	-11.8	-532	-8.3	1750	16.9	0.9
35 fmp	15.1	9	169	17.3	14	194	0.0	-14	-7.7	-42	-5.9	-35	-4.1	4.2
36 mvh	16.3	11	103	17.5	15	141	0.0	-5	-1.7	-65	-2.7	-44	-1.8	5.2
37 otn	6.8	0	66	1.2	3	3	0.0	-1	-4.9	-18	-6.4	-16	-4.2	2.1
38 ele	2.1	0	10	10.0	0	112	0.0	-5	-6.3	-18	-8.3	-22	-7.6	6.2
39 ome	12.7	49	143	14.8	18	181	0.0	-37	-6.1	-171	-6.6	-141	-4.7	3.7
40 omf	15.0	6	162	16.3	1	185	0.0	-2	-6.1	-114	-8.3	-109	-7.8	2.0
		2764			242			-85		-1325		1596		
41 srv	0.0	-1	-3.3	0.0	-1	-2.8	0.0	-2	-3.7	-127	-3.8	-131	-3.5	0.0
Total		3790			236			-91		-2314		1622	2.1	

Annex Table A2: South African Changes in Imports with IBSA FTA, Initial average tariff and changes in exports by \$ million and percentage

	India			Brazil			Rest SACU (inc Botswana)			ROW		total		ROW
		Change	% change		change	% change		change	% change	change	% change	change	% change	
	AVE	in value	quantity	AVE	in value	quantity	AVE	in value	quantity	in value	quantity	in value	quantity	AVE
	tariff	US\$ mill	of imports	tariff	US\$ mill	of imports	tariff	US\$ mill	of imports	US\$ mill	of imports	US\$ mill	of imports	tariff
Primary														
1 pdr	0.0	0	3	0.0	0	-9	0.0	0	0.2	0	3.0	0	2.6	0.0
2 wht	2.0	0	22	2.0	0	16	0.0	0	1.1	3	2.3	3	2.3	2.0
3 gro	9.1	0	20	30.1	4	85	0.0	0	-5.3	-2	-4.6	3	6.2	6.3
4 v_f	4.3	0	19	0.5	0	0	0.0	0	-0.0	1	1.5	1	1.2	5.2
5 osd	8.6	0	61	0.0	0	-5	0.0	0	3.8	1	5.5	2	5.6	0.6
6 c_b	0.0	0	3	0.0	0	-2	0.0	0	-3.4	0	3.1	0	-0.6	1.2
7 pfb	5.6	0	27	14.5	3	77	0.0	0	-4.2	-2	-3.1	1	1.1	8.1
8 ocr	6.2	0	44	14.0	22	113	0.0	0	-5.9	-9	-3.5	13	4.5	4.8
9 ctl	0.0	0	4	0.0	0	-1	0.0	2	1.7	0	3.1	2	1.8	0.0
10 oap	0.0	0	1	0.0	0	-2	0.0	0	-0.1	1	0.8	1	0.6	0.3
11 rmk	0.0	0	3	0.0	0	-6	0.0	0	-0.3	0	3.6	0	3.5	0.0
12 wol	0.0	0	12	0.0	0	-46	0.0	0	6.1	2	10.7	2	10.7	0.1
		1			30			2		-5		27		
Secondary														
17 cmt	20.0	1	318	17.4	1	238	0.0	1	1.2	2	4.1	4	3.9	22.3
18 omt	23.5	3	550	8.8	15	88	0.0	0	-7.4	-4	-4.3	13	11.2	9.8
19 vol	3.0	0	23	9.8	15	70	0.0	0	-2.5	-1	-0.6	15	7.1	12.6
20 mil	53.3	0	2,222	0.0	0	-1	0.0	0	1.7	1	3.8	2	3.7	33.8
21 pcr	0.0	1	2	0.0	0	-1	0.0	0	2.1	3	2.1	4	1.8	0.0

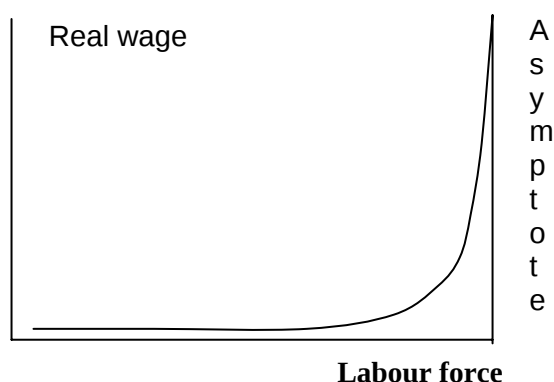
	India			Brazil			Rest SACU (inc Botswana)			ROW		total		ROW
		Change	% change		change	% change		change	% change	change	% change	change	% change	
	AVE	in value	quantity	AVE	in value	quantity	AVE	in value	quantity	in value	quantity	in value	quantity	AVE
	tariff	US\$ mill	of imports	tariff	US\$ mill	of imports	tariff	US\$ mill	of imports	US\$ mill	of imports	US\$ mill	of imports	tariff
22 sgr	0.0	0	3	0.0	0	1	0.0	1	0.4	2	3.4	3	1.8	0.0
23 ofd	12.6	3	62	17.0	12	86	0.0	1	0.3	6	1.1	22	3.2	4.9
24 b_t	31.4	0	90	145.8	1	692	0.0	0	0.7	2	1.2	3	1.8	4.6
		8			45			2		10		66		
Natural resources														
13 fish	5.9	0	16	0.0	0	1	0.0	0	1.6	0	2.0	1	1.8	5.0
14 for	0.3	0	2	0.0	0	-1	0.0	0	0.9	0	2.5	0	1.8	
15 coal	0.0	0	4	0.0	0	2	0.0	1	1.2	178	2.9	179	2.9	
16 omn	0.1	0	7	0.0	1	6	0.0	1	5.7	8	6.5	11	6.4	
		0			1			2		187		190		
Manufacturing														
25 tex	21.5	92	305	15.1	6	166	0.0	-3	-5.2	-43	-5.5	51	5.9	14.6
26 wap	39.1	222	547	11.1	0	20	0.0	-11	-42.8	-155	-43.2	55	12.9	25.5
27 lea	12.4	27	143	13.2	14	150	0.0	0	-6.9	-20	-5.6	21	5.4	10.5
28 lum	16.8	3	188	8.4	5	72	0.0	0	0.9	5	1.4	13	3.4	3.8
29 ppp	4.8	2	35	5.4	2	37	0.0	5	1.7	17	2.8	26	2.9	1.4
30 p_c	4.2	1	21	2.0	0	10	0.0	0	1.3	1	1.5	3	2.9	3.7
31 crp	3.6	34	30	3.0	10	23	0.0	2	1.2	100	2.6	146	3.5	1.9
32 nmm	7.8	9	56	13.7	21	109	0.0	0	-0.3	5	0.5	35	4.0	3.7
33 i_s	3.9	14	25	1.2	1	5	0.0	0	-1.2	-4	-1.0	12	2.5	1.4
34 nfm	4.0	3	68	0.7	1	19	0.0	4	12.8	116	13.8	123	14.1	0.2
35 fmp	9.9	68	100	8.1	2	70	0.0	0	-4.2	-22	-3.5	47	6.8	4.1

	India				Brazil			Rest SACU (inc Botswana)			ROW		total		ROW
		Change	% change		change	% change		change	% change		change	% change	change	% change	
	AVE	in value	quantity		AVE	in value	quantity	AVE	in value	quantity	in value	quantity	in value	quantity	AVE
	tariff	US\$ mill	of imports		tariff	US\$ mill	of imports	tariff	US\$ mill	of imports	US\$ mill	of imports	US\$ mill	of imports	tariff
36 mvh	15.9	41	122		23.6	210	213	0.0	-3	-4.0	-103	-3.2	145	4.3	26.1
37 otn	0.1	0	3		0.0	0	0	0.0	0	1.5	22	2.2	22	2.1	0.2
38 ele	8.6	13	111		18.9	9	353	0.0	0	0.4	22	0.8	44	1.5	1.4
39 ome	4.2	81	45		4.6	25	42	0.0	0	0.5	63	1.2	170	2.9	1.7
40 omf	5.5	20	51		13.3	2	150	0.0	0	-0.9	0	0.1	22	3.1	4.2
		631				309			-6		4		936		
41 srv	0.0	1	2.8		0.0	0	1.6	0.0	0	3.0	149	3.1	151	3.1	0.0
Total		641				385			0		345		1370	3.6	

Annex B: The Unskilled Labour closure.

In the standard GTAP model the total labour supply is fixed exogenously. In other words, the model assumes that there is full employment in all countries/ regions of the world. This is a very simple assumption which is of course not always correct and especially so in the case of South Africa with its large unemployment rate of around 30 percent. Therefore we have extended the standard model so that the total unskilled labour supply is modelled using a labour supply curve which specifies the relation between labour supply and the real wage in each region. This is shown in Figure B1.

Figure B1. Labour supply curve determining employment level and the real wage



In each region/country we assume that the unskilled labour supply curve will have the shape above according to the following mathematical equation:²⁴

$$l = a - b/\text{real wage}$$

Where l is the amount of employed unskilled labour, $a > 0$ is an asymptote interpreted as the maximal potential amount of available unskilled labour force and b is a positive parameter determining the curve in Figure 1. The labour supply elasticity E in respect to the real wage is equal to:

$$E = b/[(a \times \text{real wage}) - b]$$

But the labour supply elasticity can also be expressed as a function of the unemployment rate using the fact that

²⁴ The assumed mathematical equation depicting the labour supply curve is taken from work done by van Meijl *et al.* (2006) in modelling land use in the GTAP model.

$$\text{Unemployment rate} = 1 - l/a$$

So that the labour supply elasticity E can be expressed as a function of the unemployment rate (u)

$$E = u/(1 - u)$$

which is directly observable in statistics from the International Labour Organisation (ILO) for many countries in the world. This is very convenient since the GTAP model/database is a global model and the labour supply curve has to be estimated for all regions/countries in the model. The ILO calculated elasticities for the 12 countries/regions specified in this paper, and these are shown in Table B1 below.

Table B1: Unemployment rate and estimated unskilled labour supply elasticities.

	U	Elasticity
South Africa	0.27	0.362
Botswana	0.24	0.312
RSACU	0.34	0.511
Nigeria	0.25	0.333
R. of Africa	0.25	0.333
EU27	0.09	0.100
USA	0.05	0.054
India	0.04	0.045
China	0.04	0.044
Brazil	0.09	0.098
Japan	0.04	0.046
R. of world	0.08	0.081

Source. ILO and own assumptions.