



National Agricultural Marketing Council

Strategic positioning of South African Agriculture
in dynamic global markets

South African agriculture: a possible WTO outcome and FTA policy space — a modelling approach

by

Ron Sandrey and Hans Grinsted Jensen

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Summary and key points

Background

The stalling of the talks in the Doha Round at the World Trade Organisation (WTO) in Geneva are leading to questions about the value of such a Round for South Africa, and against this setting there is a feeling that the Republic may have gone too far in liberalising its agricultural sector and that perhaps an increase in border tariffs may be justified given the continued global distortions to agriculture.

This paper uses the Global Trade Analysis Project (GTAP) computer model to simulate (a) a likely outcome for agriculture from the Doha Round of the WTO and (b) the impacts for South Africa of raising its tariffs by 25 percentage points across all agricultural sectors. A feature of the analysis is that it uses as a 'base' or starting platform for the simulation to assess a possible Doha outcome against a trade picture that includes known global updates. This then enables us to isolate the effects of only the particular scenario in either (a) or (b) being investigated. Following the analysis of part (b) the paper then explores whether South Africa actually has the policy space within its multilateral World Trade Organisation (WTO) commitments and bilateral Free Trade Agreement (FTA) commitments to undertake such a unilateral action. The institutional issue of South Africa undertaking these actions within the mandate of the Southern African Customs Union (SACU) Agreement is ignored, although the implications from the model's output for the wider SACU is explored.

To set the scene a preamble to the WTO is provided. This includes the major issues from the agricultural negotiations in the WTO, an examination of the influence of the previous WTO Uruguay Round on agriculture in South Africa, and a review of some of the more recent analyses of a likely Doha Round outcome for African and South African agriculture. The striking feature of the latter is that the estimated benefits to agriculture globally are reducing as (1) the limitations of a likely outcome from Doha are being realised and (2) more realistic trade modelling is being done by researchers as the world has moved to a post-Uruguay Round tariff level, China has entered the WTO with reduced tariff levels and South Africa and the EU are assumed to have the TDCA fully operational.

Next, a profile of South African agricultural imports is given to set the scene. This includes an analysis of the changes in the trade over the last ten years, imports by destination, and the main import sources with their tariff rates and associated trade preferences.

The likely Doha outcome

At this stage the paper introduces and describes the trade model used for simulations. Firstly, the 'base' or platform that takes into account all known changes and simulates South African trade through to 2015 is developed. From there the assumptions pertaining to the most likely Doha outcome (assuming there is one) are placed into the model and then an outcome is simulated. An important part of these assumptions is that there will be a degree of flexibility that enables countries to preserve their tariff protection on a few selected lines, and this protection is allocated by the model to the most heavily protected tariff lines (**the so-called special and sensitive products**).

The **global welfare gains from Doha are estimated to be some \$48.2 billion, with a lesser \$3.3 billion of this from agricultural reform and the greater \$45 billion from the liberalisation of markets for non-agricultural goods. South Africa gains some \$223 million, with \$37 million of this from agricultural reform and the remainder from non-agricultural reforms.** The big gainers are China, Japan, EU and our 'rest of the world', while the US suffers a loss in welfare. Botswana has a loss in welfare of some \$12 million, while the 'rest of SACU' aggregation of Lesotho, Namibia and Swaziland gains by \$20 million. We show that these results are consistent with those presented in the literature review of recent analysis, and reinforce that the shielding of some sensitive and special products considerably reduces the global gains from agricultural liberalisation.

By product, the **gainers in South Africa are the beef and sheep meat and dairy products sectors** where output and consequently exports increase. Production and trade in the wheat and sugar sectors decline (where South Africa largely chose to utilise its protective flexibility in the sugar sector). Beef exports to the EU and 'rest of the world' are the big export gainers. There is a **very slight increase in agricultural imports**.

Increasing South African agricultural tariffs

This study was undertaken as a separate exercise **raising all tariffs by a uniform 25 percentage points** from the original base that did not consider a Doha Round outcome. Overall, the welfare results were positive for South Africa to the extent of an increase of \$51 million at 2015 despite a reduction in allocative efficiency in the South African economy. Botswana has a reduction in welfare (by \$17m), but the other SACU aggregation benefited by \$19 million. Most productive activities increased, while trade flows of both exports and imports declined as more domestic production was used locally. **On the face of it this move is marginally welfare enhancing for South Africa and South African agriculture.** This outcome is however very sensitive to the assumptions used about South Africa's ability to obtain a slightly higher price for its reduced exports on the global market, and if the Armington elasticity's governing this are increased then the welfare gain turns to a welfare loss of \$73 million.

The **problem comes when the 'policy space' available to make these changes is considered.** Here we find that the combination of breached WTO bound tariffs, the lower and similarly bound WTO in-quota tariff rates and bilateral tariff preferences negotiated with the EU and non-SACU Southern African Development Community (SADC) members means that there is little or no 'policy space' available to make these changes except in wheat, possibly other grains (maize) and vegetable oil seeds (an import that is used as feedstuff in the domestic chicken sector). **While this lack of space and the downstream effects of increasing input costs need to be further considered at a more detailed level, it appears that the limited policy space available will restrict South Africa's abilities to unilaterally raise border protection for the agricultural sector.**

1. Introduction and preamble

Roughly a decade after considerable liberalisation of its agricultural and agricultural trade policies South African agriculture is at somewhat of a crossroads. There is a body of opinion arguing that this liberalisation has not helped the sector and therefore a reversion to protectionism is required. The objective of this research is to clinically analyse the sector to assess as to how practical in terms of policy space and how desirable in terms of the overall benefits this option may be, given the current levels of commitments to multilateral trading partners through the WTO and regionally through commitments such as those to the European

Union (EU) through the Trade and Development Cooperation Agreement (TDCA) with the EU and preferences granted to SADC.

The primary tool for this examination will be the Global Trade Analysis Project (GTAP) computer model. We will run and report on two simulations from GTAP: the **first** will be to simulate an outcome for the current WTO Doha Development Agenda (DDA) with an emphasis on the agricultural results, both globally and for the region, while the **second** will be to simulate the impacts upon South Africa in general and the agricultural sector in particular from increasing all South Africa (SACU) applied agricultural tariffs by 25 percentage points in an arbitrary manner. Results from this second simulation will be scrutinised not only for a general picture of the overall impacts and the impacts by GTAP sector, but just as importantly to allow an initial assessment of how such an increase in agricultural tariffs may run into constraints and problems created by South Africa's commitments to the WTO such as bound tariffs and tariff rate quotas (TRQs) on one hand and Free Trade Agreement (FTA) partner preferences on the other hand. These GTAP results and subsequent analysis will also lead into a more detailed sector by sector and source by source examination to provide more in-depth information on the policy space available for agriculture in research (Sandrey et al., 2007).

Importantly, before undertaking the GTAP simulations we will provide some background to set the scene.

1.1 The WTO

The WTO deals with global rules of trade — it determines and oversees the multilateral trade rules among the 149 members. The main function is to ensure that international trade flows as smoothly, freely and predictably as possible and with no undesirable side-effects. It aims to raise standards of living and ensure full employment in member states by enabling the expansion of trade in goods and services in a sustainable manner, and the Agreement on Agriculture (AoA) was an essential component of this aim as it sought to negotiate a fairer and more market oriented trading system for agriculture. The current DDA aims to continue this momentum and further open global trade across a broad front.

But within this (and on the road to this) potentially fairer and more market oriented trading system there is no symmetry of negotiating power and opportunity between the parties, as over

three-quarters of WTO Members are developing or least developed countries with many of the latter situated in Africa. Developing countries are themselves not a homogeneous group, but agriculture plays an important role in most of their economies – whether through exporting, rural development and/or food security. Some are already food exporters, and others could develop export-oriented agricultural sectors, but first need better export opportunities. WTO Members have recognised that liberalisation in these developing countries' own markets needs to be more gradual than for developed countries — the principle of “special and differential treatment” (S&D), while least-developed countries are required to make very few adjustments. The latter comment is, however, tempered by the extent to which these least developed countries are an integral part of a common external tariff (CET) arrangement involving other developing or even least developed countries, as in these cases some will be unable to take full advantage of the S&D provisions. Such is the case within SACU, with Botswana, Namibia and Swaziland, along with South Africa itself, developing countries, while Lesotho is a least developed country. Finally, it is important to always keep in mind that the WTO negotiates of ‘bound’ tariffs, or tariff rates that members have pledged not to exceed, rather than ‘applied’ or what is actually levied at the border. In agriculture in particular, these bounds are often above and sometimes considerably above applied rates, thus a reduction in bounds may make little or even no difference in practice at the border.

1.2 The importance of agriculture

Agricultural protection in developed countries has led to three main effects. The first two effects are (a) lower global prices of some agricultural products as a result of these policies, which, in turn, (b) increased the competitiveness of developed countries' agricultural products on international markets, thus reducing the export levels of some African countries exporting the same products (cotton and sugar). However, importers of other agricultural products such as cereals benefited from an import prices that are often lower than the real costs. The third effect is (c) the high tariff (and non-tariff) protection is applied in most developed countries as part of their agricultural policies, and these restricted agricultural products that could be exported by African countries. For these reasons, the agriculture sector in the African countries is closely tied to agricultural policies in rich countries and any changes in these policies. In WTO-speak, (a) is domestic supports, (b) is export subsidies and (c) is market access, and suggests that gains to agriculture in Africa must start with reforms in the developed countries.

These issues are all linked and complex. It is easy to point to examples where African nations benefit from global agricultural protection. The opportunity to gain from preferential access into some markets and the abilities to gain from depressed commodity prices to the extent that countries are net food importers are two such examples. But these are second-best arguments, and one must not lose sight of the first-best 'big picture'. This 'big picture' is that provided care is taken to ensure that a carefully constructed negotiating strategy is followed within the framework of the Agreement on Agriculture (AoA) and that all the S&D provisions elaborated on later are taken advantage of by the developing countries, the net effects for Africa will be positive. All players must keep their eye firmly on the ball for that end position to become a reality.

The current state of play in the Doha Development Agenda (DDA) negotiations was succinctly summed up by the Chairman on the Committee on Agriculture in his report at the suspension of the DDA negotiations¹. While not a formal draft as agreed by members, it is a valuable document insofar as it reflects in a balanced and accurate way the state of the negotiations at that time, with the substantive views and positions of members outlined in square brackets. Many of these bracketed views are very divergent, but there are also areas where a consensus seems to be emerging. The reader is referred to this document for a comprehensive view of the different positions and the state of the negotiations.

1.3 Issues for the negotiations

It is becoming apparent that there are many trade-offs for developing and least developed countries in the increasingly complex web of global agricultural policies. For example, forcing the developed nations to open their markets creates export opportunities on the one hand, but on the other, for developing members, it may potentially reduce some rents from preferences and raise the price of domestic products for consumers, many of whom are urban poor. Similarly, while there is pretty much agreement on the abolition of export subsidies, this can have similar effects plus the added complication of potentially altering the dynamics of food aid, itself a complex set of inter-actions for developing countries. Perhaps nowhere are these dynamics as embodied as they are in the complexities of Special Products (SP) and Special safeguard Measures (SSM) for the developing and even least developed members on the one hand and the potential use of Sensitive Products by the developed countries on the other. For

¹ WTO TN/AG/W/3, 10 July 2006.

the latter, there is the danger that developed countries may declare all products of access interest to the developing world as sensitive, thus neutering the DDA for them, while on the other there is an urgent need for developing countries to seriously consider exactly what products they want to protect, justify these to at least their domestic constituencies, and examine how they are going to design and implement a regime to operate the SSM. All of these considerations become more complex for SACU that is bound by a common external tariff but includes both developing and least developed members.

1.4 The three main pillars

1.4.1 Market access

The Chairman's report of July 2006 referred to earlier contains details of the negotiating positions for the main members and coalitions of members. In general, the US has proposed a series of deeper cuts in tariffs based on four tiers for both developed and developing countries. There will be only one percent of tariff lines as "sensitive products", and there must be compensatory Tariff-Rate Quota (TRQ)² expansion for these products. The developing countries will operate under the same four tiers, but with tariff cuts to be negotiated. They will have longer periods and lesser cuts, and the SSM and SP to provide transitional protection from import surges, but they should make some meaningful commitments.

The EU has proposed a linear approach to tariff cuts that appear to be less steep than the US proposal. Importantly, the EU wants to preserve roughly eight percent of tariff lines as sensitive products that are protected by lower tariff cuts within an expanded TRQ access and with recourse to the special safeguard clauses. The G10³ has reaffirmed the principle of S&D and continued their support for sensitive product concession in market access. For tariff reductions, it suggests roughly positions as the US, and they suggest a choice between a simple linear cut within each box (with some refinements around the thresholds) or a more complex formula that enables a country to 'buy' protection for special product lines within a tier albeit at an overall cost.

² The TRQ is a two-levelled tariff where the tariff rate charged depends on the volume of imports. A lower (in-quota) tariff is charged on imports within the quota volume. A higher (over-quota) tariff is charged on imports in excess of the quota volume.

³ A WTO informal grouping comprising net food-importing, mainly developed countries that include **Japan**, Korea, Norway and Switzerland.

The G20⁴ proposal adopts a similar band structure to the US proposal, but proposes linear cuts within these bands for both developed and developing countries, with the developed cuts at least 54 percent on average nearly twice the maximum cut of 36 percent on average mandated for developing countries. Recall (a) that these reductions will eventually be made of bound and not applied rates, and (b) that least developed members are not obliged to make tariff reductions, although (c) the position of least developed countries within a customs union that may or may not have the same bound rates as a developing member(s) remains problematical at best.

1.4.2 Domestic supports

Offensively, there is a major debate evolving around reductions here, with much of the debate focusing on the EU's blue box and the need to ensure that 'box shifting' of supports does not take place. Reductions should increase global prices for many agricultural products, and although this is generally good for exporters, it may have implications for import prices and thereby consumers. This is not an domestic issue for South Africa, for, as the OECD report confirms, there are almost no supports to agriculture.

1.4.3 Export competition

While in general this concept is of limited concern to developing and least developed countries, there are some complex inter-plays involved. These include the need to ensure that delivery of genuine food aid is not hampered in an emergency, that such food aid does not destroy domestic commercial supplies, and that the monetisation of food aid shall be phased out. The balance is between ensuring that food aid is delivered when and where it is needed, and possible circumvention of export subsidies by the developed countries using surplus food as food aid in a way that is prejudicial to the objectives of curtailing export subsidies. There must remain a degree of flexibility and trust here. There is also a concern by some developing members (including South Africa and Kenya) that flexibility for state exporting of agricultural products should be given to developing countries in some circumstances.

⁴ Another recently formed informal grouping of Argentina, Bolivia, Brazil, Chile, China, Cuba, Egypt, Guatemala, India, Indonesia, Mexico, Nigeria, Pakistan, Paraguay, Philippines, South Africa, Tanzania, Thailand, Uruguay, Venezuela and Zimbabwe. These are generally but not necessarily food exporters that have provided an alternative view to the larger and richer OECD economies within the WTO.

1.5 Other issues and the implications

Special products, the SSM and even perhaps Sensitive Products need to be carefully considered. The latter are products that a member may declare and thus be obliged to make lesser market access commitments for that product. Special products extend this concept to developing members only for those products that are a staple or basic food of that country, and negotiations continue of how extensive this concession may be. Extending this still further is the SSM measure that will allow both developing and least developed members to raise tariffs in the event of an import surge that threatens domestic producers.

The SSM constitutes a unique instrument to assist with food security, livelihood security and rural development. It must be simple, effective and easy to implement. Members will need to consider what products they consider important to list in their schedules, and this extends to the SSM products. Similarly, developing countries and least developed countries are entitled to nominate Sensitive products, as these are not just for the developed countries. In practice, the use of Special products is likely to be more important for defensive interests. Members need to carefully watch the use of Sensitive Products by the developed members, as there is a balance between better market access and possibly preserving some preference rents as discussed earlier.

2. The Uruguay Round of the WTO and the Agreement on Agriculture (AoA)

Before looking in detail at the possible outcome of the WTO it is instructive to look back to the mid- to late 1990s and examine the impacts of the AoA, the precursor to the current DDA. There are several different channels through which the AoA may have impacted upon the agricultural sector in South Africa. These include domestic policy (with tariff policy as sub-set), and offshore market access conditions. However, South Africa's tariff reforms and overall agricultural domestic restructuring of the 1990s went far beyond anything mandated by the AoA and therefore the AoA was not an issue domestically. Thus, any gains would have come through enhanced off-shore market access and possible related gains globally.

South Africa's (or, more correctly, SACU's) actual applied most favoured nation (MFN) tariff rates are below or even significantly below the bound rates in many instances. Although an accurate one-for-one mapping is difficult, exceptions where the applied rates are similar to the

bound rates appear to be restricted to dairy and related products, eggs, honey, isolated vegetables lines, citrus fruits, liquorices and ginseng, cocoa and products, some bakery products, some hides and skins, and some minor natural fibres. In addition, while South Africa has tariff rate quotas (TRQs) for a large range of products that include at least some components of meat, dairy, eggs, vegetables, dried fruits, grapes, tea and coffee, grains, oil seeds, vegetable oils, sugar, food preparations, wine and spirits, soybean meal, tobacco and cotton, an analysis of imports in these TRQs suggests they are not binding. MFN tariffs on most of the significant lines appear to be at or below the blanket 20 percent AoA scheduled maximum rate for TRQs, and consequently many are filled several times over as the TRQ is ignored both administratively and in practice. These TRQ issues are examined in Sandrey et al. (2007), along with the implications of free trade agreements (FTAs) on policy space for the sector.

Hence, it is difficult to see where the AoA may have had any impact upon South African domestic agricultural policies. Did it have any influence upon exports? Sandrey and Vink (2006) examined this question and concluded that the AoA seemed to have had a limited impact upon the export profile. **Sugar** is a more complex situation, as, although the sector is protected domestically at price levels that are above world prices, South Africa is an important global exporter.⁵ The domestic policies of the EU, the US and Japan disrupt the global market by also heavily subsidising their sugar producers, but the AoA per se did little or nothing to assist the South African sugar sector as market access for sugar into developed markets was essentially unchanged.

2.1 Future global liberalisation: implications for South Africa

A notable feature of the December 2005 WTO Hong Kong Ministerial was the use and citation of models, and the more recent ones are showing a considerable reduction in global welfare gains from trade liberalisation, and in particular an almost-disappearance of the gains to developing countries. Why are the gains shrinking? Part of the answer is that some of the assumptions are being revisited (employment, for example), while the newer version of the GTAP model and its associated database enables analysts to use better trade and tariff data and incorporate both the EU expansion and China's WTO accession into their now-updated base work. These combinations are making a huge difference, and it is only by using Version 6 of the GTAP data

⁵ Ranking 7th during the 2000–02 period with a 2.9% share, behind Brazil at 29%, EU, Thailand, Australia, Cuba and India but ahead of Mauritius in 11th place with 1%. During 2004 South African sugar exports (HS 1701) were some R 1.4 billion, and during 2005 they increased to R 1.7 billion.

base that we now can get a better idea of these more accurate gains from liberalisation. Ackerman (2005) details how the gains are becoming both smaller and skewed towards the developed countries rather than poverty alleviation in the developing world.

Using the Version 6 database, the World Bank has revised the potential benefits downwards to a miserly \$3.13 per head in the developing world (in contrast to the \$79.04 per head in the developed world)⁶. This work acknowledges the difficulties associated with anticipating an outcome for the Doha Development Agenda (DDA) and recognises some of the issues such as sensitive products, the bound versus applied tariffs, problems of quota rates and preference erosion and that of defining and disciplining reductions in agricultural supports in OECD countries. High income countries are the winners, and in some instance where special products can be exempted the developing countries as a group actually lose out.

For South Africa the gains are generally modest but always positive. Under a complete global liberalisation of trade assumption the global gains are \$287 billion, with \$1.3 billion of this going to South Africa (with all exports up by 14.3% and imports up by a greater 18.0%, and agricultural exports up by 2.4% and imports up by a lesser 1.1%, thus highlighting that most of the gains are from non-agricultural sectors). We caution that this model uses a dynamic recursive approach which will lead to greater gains than the standard model, and thus the results are not directly comparable to the gains that we will present later in this paper.⁷ Now, moving to a DDA outcome simulation, the World Bank gains for South Africa become very modest but always positive: from \$0.1 to \$0.3 **billion**. There is, however, a much greater variation in the global outcome for agricultural, where the gains are from \$75 billion with full agricultural liberalisation to a much lower \$13.4 billion when making generous allowances for special products (note again that this model uses dynamic gains and is thus not directly comparable with ours). As a percentage of real income these South African World Bank gains are similar to those for India but well below those for Thailand, Argentina and Brazil

Another source of information detailing the potential benefits to South Africa from liberalisation of Organisation for Economic and Cooperation Development (OECD) agricultural policies is the recent OECD review of South African agriculture (OECD, 2006). They also use the GTAP

⁶ Anderson and Martin (2005), and Hertel and Winters (2005). Note that these gains are not repeatable gains, but rather a once-only step upwards.

⁷ Indeed, these gains are about three times the standard GTAP global gains of \$84 billion as presented in the same World Bank book in Chapter 2.

model, but we must caution that it is based upon Version 5 (1997 base year) and not Version 6 using the 2001 base year data. In addition, the different assumptions make it difficult to compare results, but with partial global liberalisation in both agriculture and non-agriculture, the South African gain is some \$251 **million** with around one-third of the South African gains (\$88m) coming from agriculture. The most import contributions are from global reforms in wheat, fruit and vegetables, dairy products, processed sugar and other processed food sectors.

Polaski (2006), using a very detailed approach based upon the GTAP model's recent database, found that agricultural liberalisation benefits only a relatively small subset of developing countries and that global benefits were modest. Those benefiting from agricultural liberalisation include Brazil, Argentina, most of Latin America, South Africa, and Thailand. Accounting for this modest global result is the 'Special Products'. For South Africa, gains are some \$57 **million** from the DDA agricultural-only, with most of these gains resulting from better sugar marketing conditions.

Another recent paper that examines the plausible impacts of the DDA is that by Kirkpatrick et al. (2006), where they agree that the economic impact of the DDA is likely to be modest, and smaller than earlier predicted. In particular they are worried that the gains are not shared, and in the poorer countries, with Sub-Sahara Africa as the example, poverty may worsen as these countries lose from trade liberalisation on the one hand and on the other face severe supply constraints that bedevil Africa. This is especially so when the dynamic or second and subsequent effects of the DDA are examined, as the developing countries have the best infrastructure to exploit these advantages. If the DDA is to be a 'development round' then additional measures such as 'aid for trade' will need to be implemented.

The Swedish Board of Trade (2006) simulated three potential Doha outcomes using GTAP: one core scenario, and two scenarios involving more and less far-reaching liberalisation respectively (with 'less' appearing to be a more realistic scenario). Four elements were included in all scenarios: non-agricultural market access (NAMA), agricultural liberalisation, services liberalisation and trade facilitation. For these options, three versions of the GTAP model were used; 'main model', 'standard GTAP' and 'dynamic GTAP'. The Least Developed Countries (LDCs) did not make any commitments on manufactures, agriculture and services, but they were expected to make commitments in trade facilitation. The estimated potential gain in real global income from this simulated Doha round was from \$46–230 billion per year, with the lower

estimate from less liberalisation using the standard GTAP, and the higher from the more far-reaching outcome. All country/regional groups gained, and the developing countries, including LDCs, were the major winners (with trade facilitation contributing the most to developing countries' gains). Gains for South Africa from Doha reform in the less liberalisation scenario using the standard model were exactly \$1,000 million, with 59 percent of this from Doha NAMA liberalisation, 37 percent from 'trade facilitation' and only three percent from agricultural liberalisation (with the remaining two percent from services). Netting out the trade facilitation gains these results using the standard GTAP and a not-overly optimistic view of a possible Doha outcome are consistent with the research above.

In addition, there are two other themes pertinent to the analysis of both FTAs and the DDA for Africa. These are (a) the question of tariff revenue loss and (b) the issue of trade creation and trade diversion. For the first issue Sandrey et al. (2006) examined the impacts of known and possible trade agreements that involve SACU and calculated the potential loss of tariff revenues to SACU as preferences are granted to trading partners. They found that this loss would have major impacts upon Lesotho's economy in particular as these tariff revenues currently comprise half of total government revenues in the Kingdom. On the second issue Sandrey (2006) took this a step further and found that introducing the trade creation and diversion formulas into the analysis accentuated the revenue loss problem.

3. Current South African agricultural imports and associated tariffs

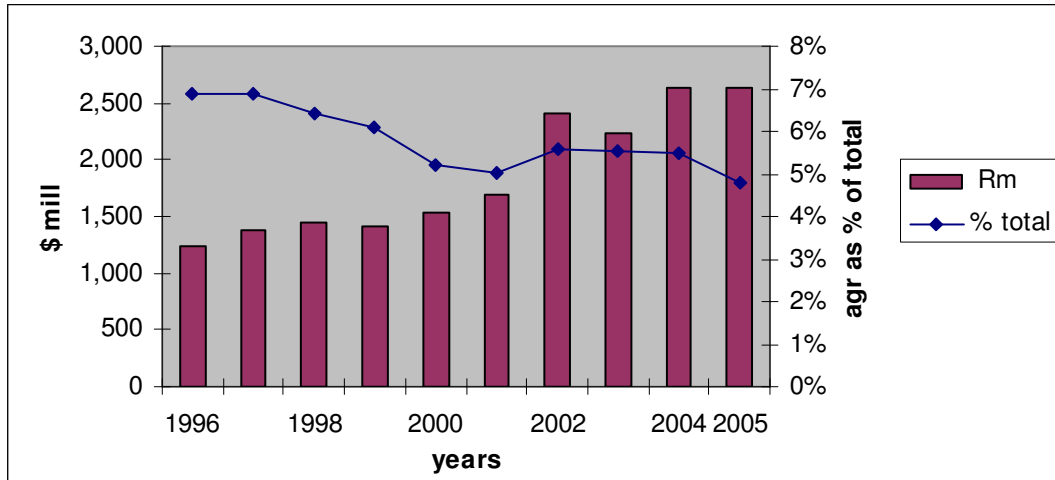
3.1 South African agricultural imports

During 2005 South Africa imported agricultural goods as defined by the WTO to the value of some \$2,63 million⁸, a figure very marginally down from the previous year and up from US\$ 1.2 billion during 1996. This data, along with the percentage share of agricultural imports in South Africa's total imports, is shown in Figure 1. Imports in \$ million are shown in columns on the left hand scale with the percentage share as a line related to the scale on the right hand side. In dollar value terms these imports were relatively stable from 1996 to 2001 before jumping to a newer and also stable level from 2002 to 2005. In terms of percentage of the total imports, a different pattern can be seen; the agricultural imports declined through to 2001 before increasing and then reverting to the 2001 level again during 2005. Importantly, there does not

⁸ In rand, this equated to some R17 billion.

seem to be an increase from the 1996 period once the deregulation effects could have become more pronounced.

Figure 1: Agricultural imports, US \$ million and % of total imports



Source: World trade Atlas

At the detailed HS 6 line level, the main imports during 2005 were rice, wheat, whiskies, soybean oilcake, chicken cuts and palm oils. These imports are shown in Table 1 (**note that values are in rand**), with an historical perspective from 1996 to 2005 presented to place the imports in context.

Table 1: Main agricultural imports at detailed level, Rand million

HS 6	Description	1996	1998	2000	2002	2004	2005
All agriculture		7,837	9,231	9,797	15,371	16,770	16,730
100630	Rice	596	808	900	1,213	1,303	1,408
100190	Wheat	643	421	563	869	1,249	1,122
220830	Whiskies	319	393	367	577	730	897
230400	Soybean oilcake	287	357	470	946	1,061	756
021714	Chicken cuts	101	207	209	257	496	726
151190	Palm oil	219	374	321	754	789	662
210690	Prepared food	138	232	326	452	452	576
150790	Soybean oil	3	0	0.7	55	437	506
520100	Cotton	270	423	220	625	743	424
240120	Tobacco	91	179	144	472	661	390
170490	Sugar confection	26	59	65	65	281	289

Source: World Trade Atlas

The top two imports of rice and wheat have been consistent in claiming their positions on the table over the period. The next line, whiskies, and both cotton and tobacco further down the list, while defined as agricultural products, are in somewhat of a different classification than the other

imports shown in that while they are both agricultural products they are not food items. Cotton in particular is an input into textile production. The dramatic growth has been in chicken cuts, soybean oil and to a lesser extent sugar confectionery. Note also that both soybean oilcakes and soybean oil are animal feeds and as such are inputs into a major component of South African agriculture. This general variety of imports deserves notice that increasing the protection for the sector may not necessarily provide neat, tidy and simple answers to the questions relating to overall impacts through the economy or even the agricultural sector itself.

The next question is to gain some indication of the sources of these imports and their respective protection rates both in general and specifically, given the preferential access granted to both the EU through the TDCA and non-SACU SADC members⁹. This information is given in Table 2, with the data presented for (a) the more aggregated HS 4 level and (b) for the 2005 imports. The duty, however, has been assessed on the early 2006 rates, as the SACU tariff schedule is a 'live' document and the TDCA year six preferences were used to be consistent with that source. A degree of product matching can be done between Tables 1 and 2, but Table 1 is at the detailed HS 6 level while Table 2 is at a more aggregated level.

Table 2: Agricultural imports by source, 2005 Rm, % share, duty % and main HS 4 product lines

Source	Imports Rm	% share	Average duty %	Main import	Second import	Third import
all	2,627	100	8.46%	wheat	rice	chicken
EU	651	24.34	8.42%	ethyl alcohol	food preps	drink flavour
Mercosur	649	24.25	12.65%	chicken	soy oilcake	soy oil
SADC	167	6.25	0.0%	cotton	tobacco	tea
USA	219	8.18	4.88%	wheat	ethyl alcohol	food preps
China	93	3.49	7.09%	animal guts	dried peas	fruit juice
India	110	4.11	2.93%	rice	veg extract	tobacco
Japan	1.6	0.06	4.70%	seed etc	drink flavour	food preps
Middle East	43	1.59	11.99%	bread etc	nuts etc	Preserve fruit
Rest world	742	27.73	8.58%	rice	palm oil	wheat

Source: World Trade Atlas and tralac calculations

⁹ Note that this data and subsequent analysis flowing from it does not include imports from the fellow SACU members Botswana, Lesotho, Namibia and Swaziland (BLNS), as (a) their data is not included in this source and (b) they have duty-free access as of right. Implications of the agricultural policy changes for the BLNS will be addressed separately.

Table 2 highlights that:

1. one-quarter of the agricultural imports are from the EU, and the implications of the TDCA will be explored in detail later. We would, however, point out that some 25 percent of the agricultural imports from the EU by value would have entered duty-free at the 2006 rates, and by the TDCA end point of around 2000–2012 this percentage increases dramatically to 81 percent;
2. another quarter are from Mercosur (Argentina, Brazil, Uruguay and Paraguay), and there is a (limited) trade agreement between SACU and Mercosur. This proposed FTA seems have very limited constraints on the policy space for South Africa, although it is our understanding that while negotiations have been more or less concluded there has not been an official signing and therefore implementation of the agreement¹⁰;
3. some 6.25 percent of the imports were from SADC, and these imports are granted duty-free status;
4. the US, China and Japan are all relatively important sources;
5. the rest of the world accounts for another significant 27.73 percent. Not shown is that this source is important for the three main imports of wheat (Australia), rice (Thailand) and palm oil (Malaysia and Indonesia); and
6. the average import duties range from a high of Mercosur at 12.65 percent to SADC's zero. Only the EU and SADC currently have preferences.

3.2 Intra-industry trade within agriculture

The traditional concept of trade is the standard comparative advantage one whereby nations trade products that each can specialise in, South African natural resources for Chinese manufactured goods for example. However, a particular feature of modern trade, and especially trade between developed countries, is that there is an increasing trade in similar products. Examples of this may be that countries producing similar motor vehicles may see one country making gear boxes and another clutches, or French wine for Spanish wine within the EU, still specialising, but in a very narrow range. This phenomenon sent trade practitioners off in search of a theory to fit the facts. Consequently, the term 'intra-industry trade' was coined in the 1970s. Here one divides the trade in a particular item into net or total trade by simply adding imports

¹⁰ Similarly, the agreement between SACU and European Free Trade Association (EFTA) has been concluded, but agricultural imports from EFTA into South Africa are minimal.

and exports in each line and intra-industry trade, with the latter a ratio of the difference between exports and imports in that line divided by the total net trade. Thus, if trade is mostly either exports or imports, the ratio will be low. But if there is a high level of both, the ratio or intra-industry trade index will be high. There are variations to the formula and some sophistication in the formula derivations, but we will stick to the basics here as we apply the formula to **exports and imports of South African agricultural products**.

A problem relates to the level of detail to use. We have used the HS 6 level data as the usual problem of different interpretations of the goods by different countries is avoided and we are not confusing apples and oranges. Another problem occurs when HS codes change, as periodically happens. We have addressed this (and the problem of no trade in either imports or exports in a particular line biasing the overall value) by excluding cells where there was no trade in that year. This HS code change will apply equally to both export and import lines where there is only one reporting country, as it is the same code. We should note that the concept is really only designed to sensibly apply to manufactured products, but the relationships of imports and exports between specific agricultural products will be instructive, especially as we have ten years of consistent data to work with. We also note that while the index figure is usually reported as being between zero and one — with zero no intra-industry trade at all and one being all intra-industry trade — we have taken the liberty of expressing the data as an index between one and 100 to make reading easier; the relativity stays the same of course.

Using the HS 6 lines we found 781 in total, but there was only trade reported between 670 and 712 lines in any one given year. Intuitively, we would expect the results to be relatively low (with 10 or less being low), exhibiting some variation between years and possibly increasing as the markets became more sophisticated. This was not the case in all three cases; the **average value was 26.63** with a low of 25.2 in 1998 and a high in 2003, although there was a discernable increase over the period with the average in the second five year period being 1.12 percentage points above the average for the first five years.

Examining **imports** we found that in five of the top 20 import lines there were five Intra-industry values above 50 (very high), with these five being food preparations (a general category of 'left overs' even at the HS 6 level), raw cotton, unprocessed tobacco, the sugar based soft drink flavourings, and mineral waters. The average value of the top-20 import line index was 25.6, or similar to the overall value. For **exports** we found a very different picture. Here the average

index was a much lower 4.4 value, with only one line of the 20 (cigarettes at 29.9) above 10.3. We would hypothesise that what may be happening on the import side is that there is a degree of on-shipment through to other non-SACU SADC members that is initially being reported as imports into South Africa. If this is the case, there will be repercussions that we are not picking up in the model.

3.3 Growth rates of imports

An examination of the HS 6 import lines where (a) the value of imports during 2005 was at least \$16 million and (b) the average annual growth rate expressed in log form since 1996 was at least 10 percent, revealed that there were 17 lines in this category. In aggregate, these lines accounted for 38 percent of the agricultural imports by value during 2005, a figure only modestly up from the value of 34 percent of the imports during 2001 but above the 20 percent in the base year of 1996. Note that the average increase in agricultural imports over the same period has been 15.5 percent, a figure three percentage points above the global average of South African imports of 12.5 percent. These most significant lines are shown below in Table 3.

Table 3: Fastest growing imports, \$m and annual % growth 2005 over 1996

HS code	description	Imports 1996 \$m	Imports 2005 \$m	Growth %
220830	Whiskies	74	141	11.5
230400	Soybean cake	67	119	10.8
020714	Chicken cuts	23	114	21.9
151190	Palm oil	51	104	12.3
210690	Food preparations	32	90	15.9
150790	Soybean oil	1	79	57.4
240120	Tobacco	21	61	16.2
170490	Sugar confectionery	6	45	26.7
020329	Pork	16	44	15.6
230990	Animal feeds	18	32	10.6
150710	Soybean oil	12	31	14.9
220210	Waters	5	25	22.0
090240	Black tea	13	23	10.6
220840	Rum	7	21	17.0
180690	Cocoa preparations	5	21	20.6
100300	Barley	0	19	124.5
020727	Turkey cuts	10	19	10.7

Source: World Trade Atlas, tralac calculations

Secondly, extending this analysis to the next step down, there were a further 14 lines with (a) growth rates above 10.0 percent annually and (b) imports during 2005 of between \$8 million and \$16 million. These lines are (they are **not** shown in Table 3): another line of chicken meat and offal; milk powders, whey and cheese; cashew nuts; cotton and other vegetable seeds; olive oils; raw cane sugar; bread; apple juice; coffee extracts; and fine animal hair.

Thirdly, for the import lines (and there are also 14 lines) that are above \$16 million but with lower growth rates, there were the two big imports of wheat and rice; frozen beef and lamb; kidney beans; coffee not roasted; malt (a decline of 2.0%); sunflower seeds (a decline of 10.2%); palm kernel; cocoa butter; sugar based soft drink flavours; peptones and other proteins; and cotton not carded.

4 The GTAP analysis

Introduction

4.1 Model, Database and Scenarios

The analysis undertaken in this paper is based upon a variant of the Global Trade Analysis Project (GTAP)¹¹ model developed by the authors 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 originating 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 labour is endogenously determined by the labour supply elasticity. We believe this is more relevant to a labour-surplus economy like South Africa's, although we undertake sensitivity analysis around this closure to highlight the policy implications of alternative labour 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

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

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 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 databases 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 SACU and its main trading partners. These 12 regions are South Africa, Botswana and Rest of SACU (also called XSC, with Lesotho, Namibia and Swaziland combined as they are in the GTAP database), India, Brazil, the EU, USA, China, Japan, Nigeria, Rest of Africa and the Rest of the World.

The applied ad valorem equivalents (AVEs) tariff data found in the standard GTAP Version 6 database originates 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

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.

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

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.

4.2 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 macroeconomy 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):

- a stylised implementation of the Agenda 2000 and the Mid-Term Review Reform (MTR) of the Common Agricultural Policy (CAP)
- the South Africa EU TDCA agreement
- the abolition of export quotas on textiles and apparel shipped to the EU and the implementation of the AGOA on access for textiles and apparel into the US
- 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 Everything But Arms (EBA) agreement between LDCs and the EU; and
- an update of India's applied MFN rates to the latest year available, 2005.¹⁴

¹⁴ In the process of updating the Indian MFN tariffs it was observed that South Africa exports of coal were 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 database MFN tariff on South African coal exports to India was adjusted to reflect South Africa's reporting of HS6 digit codes on coal exports.

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
The implementation of the AGOA for access to the US market
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 2 percent 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 and in the case of sugar the reduction of import tariffs

US agricultural subsidies

Agricultural expenditure fixed in nominal terms at its 2001 level

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 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 DDA and tariff-raising scenarios. A

simulation scenario measures the difference between our baseline model output at 2015 in the absence of for example the DDA against what it would be if the DDA outcome was introduced.

The **primary** scenario considered in this paper therefore entails the result from a possible Doha round, with the results as measured in the year 2015 in a world shaped by the **baseline** scenario. Differences between the so-called initial **baseline** scenario and this so-called **primary** Doha scenario are therefore the results of implementation of Doha. Note that we are not modelling reductions in either services or any non-tariff barriers.

Table 4: 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	7.2	0.6	0.9	0.8	3.9	7.2	1.3
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	1.7	3.6	3.7	0.4

Sources: World Bank forecasts, Walmsley (2006), and own assumptions. Most of these assumptions are common to GTAP users, thus ensuring a consistency in as much as possible between models.

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.

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 Doha 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 as to enable 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 DDA outcome. Before the simulation the tariff rates from

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.

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, an elastic time around 2010 to 2012 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.

The **primary** scenario considered in this paper models the result from a successful conclusion to the Doha Development Round of the WTO. We have modelled this using the G20 proposal for agriculture and the NAMA 11 group's suggestions to formulate our Non-Agricultural Market Access reform. 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 database are eliminated, while there is no change to domestic support in our Doha scenario¹⁶.

The EU has already implemented its MTR reform of the CAP during the baseline by moving its support out of the blue box into the green box and reducing/abolishing administered prices in the amber box. This should enable the EU to maintain its present level of domestic support even after a possible outcome of the Doha round which would impose new restrictions on the value of domestic support in the amber and blue boxes. Furthermore, the assumption is made that the few remaining countries that need to make adjustments can do so by lower administered prices used in their Aggregate Measurement of Support (AMS) calculation notified to the WTO without it having any effect on domestic product.¹⁷

Two points here need to be commented upon. The first is: why have we omitted reductions in domestic supports from the model? The answer is that analysts are finding that this makes little difference to the results, and in practice it is very hard to model. Anderson et al. (2006) discuss this in detail, and start from the point that some 75 percent of the support to farmers and processors globally is from market access barriers in any case, and when the welfare cost of

¹⁶ The analysis does not take into account equivalent variation measures of export subsidies values of export credits, state trading enterprises and food aid. Also the expansion of in-quota TRQ quantities is not modelled with the implementation of sensitive products in agriculture.

¹⁷ Argentina, Canada, Iceland, Korea, Norway, Switzerland, Thailand and the United States are the members most likely to need to reduce notified domestic support. The United States may also need to be able to move non-product specific *de minimis* payments into the blue box in order to comply with a possible outcome of the Doha round.

these distortions is calculated in a 'back-of-the-envelope' manner, 86 percent of the welfare costs are from tariffs and an almost insignificant six percent is from domestic farm support. This latter figure may even be an over-estimate, but it is similar to the around five percent generated by the standard GTAP model. Similarly, the Swedish Board of Trade (2006) found almost insignificant gains from the reduction of domestic subsidies in their detailed analysis of a DDA outcome.

Secondly, the introduction of the two and three percent allowed for sensitive products makes a big difference, as discussed above in the introductory review section. In the GTAP database, South Africa has an average agricultural tariff rate of 7.87 percent, but isolating 19 HS 6 tariff lines takes out these lines that have an average of 63.5 percent. For the EU, based upon Germany's trade, isolating even two percent of the lines takes out 13 lines that have an average of 91.8 percent tariffs. Thus, the real targets are removed from the shooting gallery.

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 five percent of their tariff lines if it does not exceed five percent of their value of imports. South Africa is deemed to be protecting selected lines in wearing apparel and motor vehicles. 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 tariff so that the simple average of all NAMA tariff lines do not exceed respectively 28.5 and 22 percent on average. Less developed countries are not required to do anything but gain duty free access into developed countries markets. Detailed results of the NAMA simulation will be presented in other tralac research.

5 The results: Part One - a plausible Doha Round outcome

5.1 The big picture

Table 5 shows the changes in welfare¹⁸ from a possible Doha outcome, with the data expressed in US\$ million as one-off increases in annual welfare at the assessed end point of 2015. The

¹⁸The interpretation of results from a model is not straightforward. In the standard type of computer general equilibrium (CGE) such as GTAP model these results are expressed as welfare measures that

welfare results are given as a total value, and then this total is split between agriculture (which is itself split between agricultural export subsidy abolition and market access changes) and NAMA. The overall gains of \$48 billion are dominated by NAMA gains of \$45 billion, thus reinforcing the 'modern' GTAP results which show that use of the special and sensitive products neuters an agricultural outcome from the DDA. Note that (a) global welfare changes from the abolition of export subsidies are almost zero (a gain of \$7m), and (b) that we have not modelled any changes to domestic supports.

Table 5: Welfare (EV) results from Doha outcome, \$m

	Total	Agr Export	Agr market	NAMA
EV \$m		Subsidies	access	
ZAF	223	17	20	186
BWA	-12	-4	-3	-5
XSC	20	3	79	-62
NGA	198	-61	2	257
RAF	983	-295	341	937
EU	5,907	1,040	591	4,275
USA	-1,189	387	548	-2,124
IND	1,534	-3	68	1,469
CHN	8,968	-67	-9	9,044
BRA	2,611	89	617	1,905
JAP	5,404	-13	224	5,193
ROW	23,532	-1,086	787	23,831
Total	48,180	7	3,265	44,907

Source: GTAP results

South Africa's gains are \$223 million: \$17m of these from abolition of export subsidies, \$20 million from better market access for agricultural goods, but the bulk (\$186 million) from the NAMA outcome. Note that Botswana loses some \$12 million, while the Rest of SACU is a

show how much better off a country/region and the world are as a result of the particular change. There is no indication of the time-path of the welfare gains in a static model, so a welfare gain of \$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.

relatively big small gainer in welfare terms with big gains in agricultural market access off-set by the loss in NAMA.

The biggest loser in dollar terms is the USA, with all other countries/regions gaining. China and the rest of the world (ROW) are the biggest gainers, with all the gains coming from NAMA as China loses marginally in agricultural but gains in NAMA, while ROW's gains in agricultural market access are less than the loss from export subsidy abolition. The EU as almost the only user of export subsidies gains greatly from their abolition, while the US, EU and Brazil all gain from better market access for agricultural products.

Before moving on, it is instructive to go to the literature review section and compare our results for the overall welfare with the other research cited there. Recognising that models use different assumptions and even different modifications to the GTAP database, and recalling that our welfare gains are around \$223 million for South Africa and \$48 billion for the world (with a greater \$45 billion of this from NAMA and only \$3.2 billion from agriculture) we find that:

- our gains for South Africa compare with the World Bank dynamic model that gives gains of around \$100 to \$300 million from the DDA, with most from NAMA. Global gains from a global agricultural DDA outcome using the dynamic model are about three times ours, and that is consistent with what we would expect from a dynamic model;
- the OECD results for South Africa are very similar, with \$251 million against our \$223 million, and a similar split between agriculture and NAMA;
- Polaski's (2006) agricultural results for South Africa of \$57 million are more modest than ours but still 'ballpark' when both models look at sensitive products; while
- the overall Swedish results using the standard GTAP and less liberalisation are almost exactly the same as ours (\$46 billion versus our \$48 billion) but they include trade facilitation. The overall gains for South Africa (\$692 million) are, however, more than double our results, but their results for South African agriculture are similar (\$30 million against non-agriculture's \$590 million).

We take comfort from these 'ballpark' similarities and conclude that our results are reasonable.

Next, Table 6 shows the details of the changes in welfare for the complete simulation of both agriculture and NAMA. The gains to South Africa are spread across the contributing factors of

increased allocative efficiency (\$123m), capital stock (\$69m) and the terms of trade gains of \$55 million from better relative prices between exports and imports. This is, however, a loss of \$-25 million to unskilled labour. As expected from Table 5 above, the gains to both the EU and Japan are dominated by allocative efficiency as resources within these two economies are directed at production activities other than their heavily protected sectors.

Table 6: Change in welfare (EV of income) from Doha, \$ mill at 2015.

	Total	Allocative efficiency	Unskilled Labour	Capital¹⁹ stock	Terms of trade
EV					
ZAF	223	123	-25	69	55
BWA	-12	-2	-3	-4	-3
XSC	20	-8	-7	-7	42
NGA	198	18	2	36	143
RAF	983	704	-38	690	-374
EU	5,907	4,442	-226	3,721	-2,031
USA	-1,189	665	-434	2,245	-3,665
IND	1,534	624	25	1,153	-268
CHN	8,968	2,206	380	4,521	1,862
BRA	2,611	990	51	1,307	263
JAP	5,404	3,249	125	1,552	479
ROW	23,532	7,420	375	12,256	3,481
Total	48,180	20,430	225	27,539	-14

Source: GTAP results

Table 7 shows the relative changes in the South African GTAP agricultural sectors as a result of this Doha outcome. Note that paddy rice, sugar cane and beet and raw milk are largely non-traded sectors but rather mostly inputs into processed rice, sugar products and dairy products, and that some trade changes may be off low initial bases. There are big production increases in beef and mutton and the dairy sector, with declines in wheat in particular. Note that the gains to the dairy sector and to a lesser extent sugar result from the abolition of export subsidies, while NAMA is having an influence on plant based fibres (cotton) and wool through changes in the textile and wearing apparel sectors. In general, however, and consistent with the overall welfare changes, most of the output changes are driven by changes to market access.

¹⁹ Since the GTAP database and model do not have any international transfer of receipts between countries, the welfare gains of capital accumulation can be slightly over/understated in each region/country if part of the increased capital stock originates from foreign investments in a given country.

Table 7: Changes in South African production and trade (%) from base post-Doha

	Change Output	Contributions from			Change in Quantity	
		Ex Sub	Ag access	NAMA	exports	imports
paddy rice	1.81	-0.09	1.82	0.08	5.3	3.2
wheat	-4.56	0.06	-5.31	0.70	-12.3	-0.9
grains etc	1.50	0.58	0.82	0.10	3.5	-2.3
vege fruit	-0.36	-0.14	-0.51	0.30	-0.8	-0.5
oil seeds	2.15	-0.13	1.91	0.37	4.4	1.2
cane sugar	0.62	1.63	-1.36	0.34	-4.0	-9.9
plant fibres	-0.05	-0.03	0.35	-0.36	0.3	0.6
other crops	-0.07	-0.25	-0.02	0.21	-0.4	1.6
live cattle	2.45	0.08	2.55	-0.17	3.2	-1.5
other animal prod	0.14	0.01	0.05	0.07	-0.5	-0.2
raw milk	2.09	2.33	-0.45	0.20	-19.6	5.8
wool	1.72	-0.80	-1.10	3.61	2.3	2.9
beef mutton	3.17	0.06	3.36	-0.25	128.4	-3.7
other meat	-0.52	-0.19	-0.23	-0.09	-1.2	1.1
vege oils	0.69	0.05	0.43	0.20	3.8	0.5
dairy product	4.13	4.35	-0.50	0.28	14.5	-21.2
processed rice	0.91	1.06	-0.20	0.05	1.4	-0.1
sugar	0.65	1.89	-1.64	0.40	-1.6	-10.4
other food prod	0.80	0.30	0.48	0.03	3.3	-0.2
bev tobacco	0.51	0.03	0.33	0.15	1.9	-0.2

Source: GTAP results

Table 8 expands the GTAP analysis in Table 7 above to look at the changes in market prices. It shows that the price increases for most agricultural sectors (except a small reduction in wheat), and that most of the price changes are again driven by better market access conditions globally (except for dairy and sugar which gain from reductions in export subsidies). The abolition of export subsidies always makes a positive contribution to output price changes, while the contribution from changes in NAMA liberalisation is also mostly positive. The latter is likely to be

second round effects as resources within different countries move in response to higher rewards in manufacturing.

Table 8: South African market price changes and contributing factors (%)

Sector	Market	Contributions from		
	price change	Export Subsidies	Agr market access	NAMA
paddy rice	1.15	0.24	0.82	0.09
wheat	-0.35	0.19	-0.70	0.15
other grains	0.74	0.30	0.41	0.03
veg fruit	0.45	0.19	0.18	0.08
oil seeds	1.04	0.20	0.72	0.12
sugar cane	0.64	0.54	0.01	0.08
plant fibres	0.54	0.22	0.37	-0.05
other crops	0.52	0.16	0.29	0.07
cattle etc	0.86	0.21	0.67	-0.03
animal prod	0.46	0.20	0.24	0.02
wool	0.79	0.58	0.19	0.03
beef mutton	0.61	0.17	0.52	-0.08
poultry etc	0.32	0.14	0.25	-0.07
vege oils	0.14	0.12	0.14	-0.12
dairy	0.19	0.27	0.09	-0.17
processed rice	0.40	0.15	0.13	0.12
sugar	0.27	0.21	0.12	-0.06
other food	0.27	0.15	0.11	0.02
bev tobacco	-0.17	0.07	0.06	-0.31

Source: GTAP results

Tables 9 and 10 take the next step and expand upon the changes to relative prices to show the specific details of the changes to firstly export destinations (in Table 9) and then import sources (in Table 10). An indication of the changes for both Botswana and XSC can be seen by regarding the ‘mirror’ of South African exports as their imports and *vice versa*, and here there are increased exports from South Africa to SACU in most sectors. The big overall export value increases from South Africa are in beef and sheep meats (the EU and ‘others’), and dairy. The

declines by export value are concentrated in wheat and sugar. By market, there is a move away from the EU towards 'others'. Overall, agricultural exports increase by \$175 million.

Table 9: Changes in South African agricultural exports, \$ million

Exports to:	BWA	XSC	RAF	EU	JAP	Others	Total
wheat	0.0	0.6	-0.8	0.0	-30.8	0.1	0.2
other grains	0.1	2.3	2.0	0.0	4.9	0.1	2.1
vege fruit	0.2	2.7	-0.1	-16.6	2.7	1.9	2.8
oil seeds	0.0	1.2	0.1	-0.3	3.2	-0.1	0.3
plant fibre	0.0	-0.3	0.0	0.0	0.0	0.0	0.7
other crops	0.0	4.5	-2.3	-4.8	0.9	2.2	0.0
live cattle	0.0	0.5	0.0	0.4	0.0	0.1	0.1
other agr	0.0	0.5	-0.2	-0.7	-0.1	0.7	-0.3
wool	0.0	0.1	-0.1	-1.7	0.0	5.0	0.2
beef etc	0.1	1.4	0.5	28.7	-0.3	0.0	77.4
poultry etc	-0.1	2.2	-2.0	-2.9	-0.6	1.2	0.8
vege oils	0.0	0.9	-0.1	-0.3	0.0	3.5	-0.1
dairy	1.2	1.4	11.7	13.0	0.3	0.3	2.3
rice	0.0	0.1	0.6	0.0	0.0	0.0	0.0
sugar	0.0	0.2	2.8	0.6	-17.7	0.6	6.5
other food	-0.5	1.3	-0.1	16.7	13.2	2.1	10.6
bev tobacco	-0.1	0.3	-0.6	7.3	1.1	0.1	3.5
Agriculture	1.1	19.8	11.5	39.3	-23.1	17.7	107.1
All sectors	-6.8	2.8	211.7	-235.0	0.6	156.6	317.7

Source: GTAP results

Table 10 duplicates Table 9 above, but this time to show changes to the agricultural imports into South Africa. The final outcome is that there is no overall change in agricultural imports into South Africa. There is a general but not absolute pattern observable from the export profile in that for the sectors where exports increase, there is a similar pattern of imports declining in tandem. By source, for the rest of SACU in XSC there are reductions across almost all sectors and beef in particular. Imports from RAF, the US and 'others' increase, as do most imports from 'other'. Imports from the EU decline in many sectors for little overall change. Note that overall for all sectors (i.e. NAMA included) imports from Botswana and the EU decline.

Table 10: Changes in South African agricultural imports, \$ million

	BWA	XSC	RAF	EU	USA	Others	Total
wheat	0.0	0.0	0.0	-0.1	-0.1	-1.1	-0.8
other grains	0.0	0.0	0.2	-1.4	0.4	2.2	0.4
vege fruit	0.0	-1.2	0.5	0.1	0.3	2.4	1.0
oil seeds	0.1	-0.2	0.4	0.0	0.0	0.4	0.6
plant fibre	0.0	-0.1	1.0	0.0	0.0	-0.6	0.6
other crops	0.0	-0.8	2.7	2.9	0.1	1.3	5.1
live cattle	0.0	0.9	0.0	0.1	0.2	0.3	1.4
other agr	0.1	-0.6	0.1	0.6	0.3	0.7	0.7
wool	0.0	0.0	0.1	0.4	0.0	-0.1	0.4
beef etc	0.2	-4.2	0.4	-1.1	0.2	4.7	-2.2
poultry etc	0.0	-0.4	0.1	2.1	0.1	0.3	1.4
vege oils	0.0	-0.1	0.0	0.3	0.0	2.5	1.1
dairy	0.1	0.5	0.1	-11.7	-0.2	5.0	-8.7
rice	0.3	0.0	0.0	-5.2	1.8	5.9	1.2
sugar	0.0	-2.8	0.7	-15.8	6.8	6.8	-6.9
other food	0.5	-0.8	0.4	-6.3	0.9	17.3	4.0
bev tobacco	0.0	-0.4	0.0	-0.3	0.1	1.3	0.4
Agriculture	1.3	-10.3	6.6	-35.4	10.8	49.1	-0.1
All sectors	-12.2	-39.3	62.6	-332.5	65.5	965.1	405.4

Source: GTAP results

5.2 Key trade changes in agricultural trade for the major global players

The objective for this section is to provide a short summary of the key agricultural trade changes for the major nations of the US, EU, Japan, China, India and Brazil.

There were several changes in the **EU's** external trading patterns²⁰, with agricultural imports increasing by \$1.7 billion and exports decreasing by \$0.25 billion. Exports of dairy products decreased by around \$1.6 billion as export subsidies were eliminated, while exports of other crops and poultry meat, etc., increased by around \$1.4 and \$1.8 billion respectively. There was, however, a large reduction in internal EU trade, with reductions of around \$5.0 billion that was

²⁰ Note that in GTAP this trade includes intra-EU trade.

concentrated in vegetables and fruit, beef, dairy and other food products. The results show a big increase in agricultural imports from Africa in general, with EU imports of beef up by \$300 million from RAF and \$30 million from South Africa, and increased imports of sugar of \$181 million from rest of SACU (Swaziland).. The big winners with increased imports were ROW (vegetables and fruit, dairy, sugar and other food), the US (other food), Brazil (beef) and RAF (vegetable oils).

Exports from the **US** increased by \$6.9 billion, with an extra \$2.7 billion going to Japan (\$1.4b in other meats), \$1.3 billion to the EU (other foods and other meats) and \$2.1 billion to ROW. Imports increased by a much lesser \$0.93 billion, with other crops (from Africa and Brazil) and other foods (from ROW) comprising much of the increase. Regionally for SACU there was little change. Exports to SACU as a whole are up by \$11.2 million (rice and sugar products to South Africa) and imports from SACU actually decreased marginally by almost \$1.0 million.

Brazil is widely expected to be a big winner from an agricultural DDA outcome, but the data hardly supports this. Exports are up by \$1.3 billion, with the increase concentrated in exports of beef and other foods (mostly to the EU) and oilseeds to ROW. Increased exports of other meats (chicken?) to the EU are merely diversions from ROW markets. Not surprisingly, there are few changes in imports (up by \$111m), with an increase in wheat from ROW dominating. There are few regional impacts for SACU, with exports of other meats (chicken) to South Africa declining by \$1.1 million as other markets open up and become more profitable for Brazil. Importantly for Brazil, there were limited changes in its global sugar exports (up \$54 million), indicating that the protected sugar markets are using their Special Products in sugar to avoid having to make access changes to their markets.

Those hoping for the DDA to force open the highly protected **Japanese** agricultural market will be given some comfort. Imports increase by \$4.8 billion, driven largely by huge increases of other meats (\$2.3b) and beef (\$0.9b) from the US; beef (\$358m), sugar (\$120m) from ROW; and other meats (\$1,111m) from the EU. Imports in the highly protected and contentious Japanese rice sector actually decline by \$10.9 million as Japan adroitly uses its flexibility here, but there are increases (mostly from ROW) of dairy products (\$248m) and of other foods (\$728m) mostly from the EU and US. Overall, there are however very small declines in some other Japanese agricultural import sectors (and from the US in particular). Imports from South Africa decline by \$23.7 million, with declines in wheat (\$32.1m) and sugar (\$19.3m) more than the increases

elsewhere (mostly \$14.8m in other foods). There were also increased agricultural exports of \$583 million, with (incredibly) almost half of these exports being paddy rice to the ROW.

Indian agricultural imports increase by \$484 million, with these increases concentrated in vegetables and fruit (\$197m) from the US (\$96m), ROW (\$75m) and the EU (\$62m); plant based fibres of \$77 million from RAF and the US; and vegetable oils of \$152 million from Brazil (\$136m) and the EU. Indian exports barely move (\$53m), with rice exports increasing by \$33.9 million the largest contributor to this (and \$2.4m of this increase destined for South Africa).

Chinese imports increase by \$2.4 billion, with increases in other meats of \$860 million (from EU, US and ROW but not Brazil) and other food products of \$431 million (from US, Japan and ROW) dominating this increase. There are, however, also sizable increases in wool, other animal products, vegetables and fruit, oil seeds and to lesser extent dairy products, with most of these increases coming from ROW. Exports increase by a minuscule \$14 million, although declines in other meats to Japan mask increases in other foods to Japan and ROW. Exports to SACU increase by \$0.8 million (mostly beverages and tobacco products to South Africa), while imports from SACU by around \$13 million overall with increases of \$5.4 million in wool from South Africa and smaller amounts in other general sectors from South Africa making up the balance.

For the rest of Africa the story is that agricultural exports increased by \$1.2 billion and imports by \$0.34 billion, indicating that the agricultural trade picture is positive. Exports were concentrated in vegetable oils (\$393m), with most of these destined for the EU, and exports of beef and sheep meats (\$317m), again to the EU (indeed, some \$808m of the total increase is to the EU). Plant fibres (cotton) increased by \$87 million, with most of this destined for ROW and India. Increases in imports were concentrated in wheat from ROW and other crops again from ROW. Imports from the EU declined by \$212 million, with most of this (\$221m) being dairy products that still declined overall despite increases of \$141 million from ROW and \$12.6 million from South Africa.

The big story for the rest of SACU is that sugar exports to the EU increase by \$169 million, and this dominates the overall increase in exports of \$145 million as many other sectors decline in response to the re-direction of resources to sugar. This in turn leads to lesser increases in imports of \$28.5 million, with almost half of this from South Africa with most sectors increasing marginally. For Botswana there is an increase in exports of \$5.8 million, with beef to ROW (\$5.3m) dominating this change. Imports decline by \$1.8 million, with \$2.8 million of this decline

from the EU (mostly dairy) but a balancing increase of \$1.2 million (again dairy) from South Africa.

6. GTAP Two - Increasing South African agricultural tariffs by 25 percentage points

This simulation was undertaken as part of an analysis of the implications for South Africa of reverting to more border protection for its agricultural sector, all other factors held constant. The main objective is to use the GTAP model to simulate such a broad-based approach to show the aggregate welfare results, and then examine both the underlying assumption and the model results to place such a move in a policy space perspective regarding South African (and SACU's) commitments through agreements such as the multilateral WTO and the bilateral TDCA and SADC preferences. Intra-SACU trade is of course held at free entry. This second part of the 25 percentage point increase, that of the 'policy space' to do so, is examined in more detail in Sandrey et al 2007, as the approach here is just to undertake an initial scoping exercise.

Increasing tariffs would be expected to increase the returns to agricultural producers, and resources would be drawn out of other more previously productive industries within the economy to go to the now more highly protected agricultural sector. This move of resources away from where they are best utilised will result in efficiency losses to the economy. There is however a possibility that the terms of trade increases may mitigate some of these losses depending upon the assumed market power of South Africa and the extent to which South Africa can raise its export price to reflect the 'scarcity factor' of its exports

6.1 The results: increasing South African agricultural tariffs

Table 11 shows the GTAP welfare results from this simulation. South African welfare increases by \$51 million, and welfare similarly increases in XSC, the US, India, China and the rest of the world. Welfare declines in Botswana, rest of Africa (RAF), the EU and Brazil. The losses to the EU and RAF probably result from arbitrarily denying these regions some of the preferential agricultural access into South Africa that they otherwise would have had: (a) the EU with partial preferences under TDCA and (b) presumably the dominant non-SACU SADC component of RAF with its effectively duty-free access into SACU. Note that Brazil loses as a result of facing increased tariffs into South Africa, and we would suggest that these imports (oil seed animal feeds) are largely inputs into further agricultural production in South Africa. Globally, the gains

from the slightly increased capital stock are negated by deteriorating allocative efficiency but with little change to labour and terms of trade overall, with all of this leading to a small overall global welfare gain of \$3 million.

In decomposing the contributions to South Africa's welfare gains we see that there is a big allocative efficiency loss as resources are transferred into the now-protected sectors and this relies on an equally large terms of trade gain to compensate, while employment's contribution increases as more labour is used. The striking feature is that the terms of trade almost completely mitigate the losses from allocative efficiency. This implies that South Africa does have market power in the global market. Analysis of the data shows that these gains are concentrated in the fruit and vegetables and other food sectors, both sectors where it is plausible that South Africa may have some limited market power. Alternatively, this result may in part be due to model assumptions, and in particular the values of the so-called Armington elasticities which are designed to measure just this feature of international trade that products are not all the same. This will be explored in more detail below. Most of the XSC gains are from terms of trade as South African (and consequently their) prices increase, while Botswana loses across the table.

Table 11: Welfare results from South Africa unilaterally raising agr tariffs

EV \$m	Total	Allocative efficiency	Unskilled labour	Capital Accum.	Terms of trade
South Africa	51	-118	19	33	116
Botswana	-17	-8	-1	-6	-1
XSC (Lesotho, Namib, Swaz)	19	-10	3	4	22
Nigeria	1	0	0	0	1
Rest of Africa	-56	-19	-4	-6	-27
EU-27	-68	-21	-1	16	-62
USA	32	11	0	37	-16
India	2	2	0	5	-4
China	16	2	0	11	3
Brazil	-5	0	0	0	-4
Japan	5	8	0	11	-15
Rest of world	22	3	-1	34	-13
Total	3	-149	14	138	0

Source: GTAP results

Table 12 shows that, domestically, the big gainers are owners of land in South Africa where prices increase by around 6.4 percent, and, more dramatically, in the rest of SACU where they increase by a large 10.5 percent. Both skilled and unskilled labour gain (through increased wages) in South Africa and rest of SACU, although not in Botswana.

Table 12: Real price changes in factors of production, % change

Factors	South Africa	Botswana	Lesotho Namibia Swaziland
Land	6.39	4.26	10.50
Unskilled labour	0.14	-0.16	0.21
Skilled labour	0.16	-0.22	0.26
Capital	0.09	0.00	0.13
Natural resources	0.14	-0.36	1.88

Source: GTAP results

Other changes worth reporting from the model results are:

Trade balance

- There is an overall positive increase of \$70.0 million in South Africa's trade balance
- Little changes to Botswana's (-\$0.14m) or rest SACU (\$-0.39)
- But a decline in RAF's of \$3.1 million and the EU's of \$13.7 million

CPI

- An increase of 0.72 points for South Africa, 0.55 for Botswana and a large 1.07 for rest of SACU.

There is also an increase of 0.24 percent in the real exchange rate (aggregate price of non-tradeables to tradeables) relative to the rest of the world in South Africa. This dampens South Africa's abilities to compete globally. Thus, there are some macroeconomic negatives such as an increased inflation rate for South Africa and many distributional considerations such as the impacts of higher food prices on the poor that need to be considered.

6.2 Changes to production and trade

Table 13 shows where the main changes in output by sector take place for South Africa, Botswana and XSC. Most agricultural sectors report increases. The exceptions for South Africa are the important export sector of vegetables, fruit and nuts; sugar cane and subsequently sugar; and wool. The large changes in Botswana need to be placed in perspective, as most are from very low bases, while for XSC most sectors increase output. The very low production increases in red meats and dairy are somewhat surprising, and note also that 'other meats' (mostly chicken) also increase production even in the face of increased feed prices from mostly Brazil. Domestic production of rice increases dramatically as barriers to imports are erected²¹. Not shown is that there are small reductions in almost all manufacturing sectors as resources are drawn into agriculture, but note in this context that skilled labour in particular is fixed and therefore the resource shifts away from manufacturing may be accentuated somewhat (although the shortage of skilled labour in South Africa is a reality).

Table 13: Increases in local production, percentage change from base

Sector	South Africa	Botswana	Lesotho Namibia Swaziland
paddy rice	14.3	7.3	5.9
wheat	5.3	36.9	23.1
other grains	1.1	0.1	0.3
vege, fruit nuts	-1.3	-0.4	3.6
oil seeds	3.0	12.2	2.8
sugar cane	-0.6	0.3	-2.6
plant fibres	4.0	8.4	0.5
other crops	3.9	5.3	2.5
live cattle etc	0.5	-0.2	0.4
other agr products	1.4	2.4	2.8

²¹ FAO production data suggests that South Africa grows around 1,400 hectares of rice annually with an average yield of 2.29 tonnes/hectare. This means domestic production of 3,200 tonnes. The World Trade Atlas data shows imports over the last four years to 2005 to be around 750,000 tonnes annually. Thus, an increase of 25 percent is still insignificant in contributing to around another 1,000 tonnes at best to domestic needs.

Sector	South Africa	Botswana	Lesotho Namibia Swaziland
raw milk	1.1	0.4	0.6
wool	-2.8	10.1	-1.7
beef mutton	0.1	-0.5	-0.1
other meats	3.8	0.0	6.0
vege oils	9.8	28.3	3.6
dairy products	2.0	0.2	3.0
processed rice	24.9	150.9	2.4
sugar	-0.9	49.2	-3.2
other food products	1.9	6.8	2.8
bev tobacco	0.5	-0.2	2.1

Source: GTAP results

Turning to changes in trade flows, Table 14 shows these in percentage terms along with the changes to both production and market prices. These market prices increase by 5.5 percent for wheat and around three percent for plant fibres (cotton), other meats (chicken) and vegetable oils. All sectors (except wool) are showing an increase of at least one percent. It is not surprising that wool, the sector with the lowest price increase, is one of two that actually reduces its production when other farming activities become relatively more profitable, but it is surprising that sugar production similarly declines even as market prices increase. Imports all decline as we would expect, but exports also decline in all sectors as the home market increases its demand for domestically produced goods. This in turn raises domestic market prices which increase the price of exported goods and therefore reducing the amount of exports from South Africa to the world. Not shown is that for NAMA products in the manufacturing sector, almost all production activity declines modestly even in the face of slight price increases, and similarly all exports and most imports from NAMA goods also decline.

Table 14: Changes in RSA production, trade and market prices, % change

Sector	Production	exports	imports	market prices
wheat	14.3	-7.2	-16.5	5.5
other grains	5.3	-14.2	-39.1	2.4
vege fruit nuts	1.1	-2.8	-17.8	1.7
oil seeds	-1.3	-3.3	-12.4	1.2
plant fibres	4.0	-10.5	-7.7	3.0
other crops	3.9	-10.8	-27.9	2.5
live cattle etc	0.5	-1.6	-2.0	1.5
other animal products	1.4	-3.4	-13.3	1.8
wool	-2.8	-10.1	-51.6	0.9
beef, other red meats	0.1	-9.6	-13.3	2.1
other meats	3.8	-14.7	-47.6	3.1
vegetable oils	9.8	-9.2	-35.5	3.0
dairy products	2.0	-3.4	-40.8	1.2
rice	24.9	-2.2	-14.9	2.1
sugar	-0.9	-7.7	-20.2	2.1
other food products	1.9	-3.5	-23.0	1.6
beverage tobacco	0.5	-1.6	-15.6	1.0

6.3 Sensitivity analysis

In order to test the sensitivity of the positive welfare result in this simulation we undertook a scenario whereby the Armington elasticities were doubled. As expected, Table 15 shows that the welfare results change from being positive (lower section of Table 15, from Table 11) to being negative to the amount of -\$73.2 million (top of Table 15).

Table 15: welfare results of doubling the Armington elasticities, \$m

		Allocative	unskilled	Capital	Terms
EV	Total	efficiency	labour	accumulation	of
	with double Armington elasticities				trade
South Africa	-73.2	-211	11	25	101
Botswana	-21.6	-12	-1	-8	0
Rest SACU	9.4	-16	0	3	22
Total	-223.0	-297.7	5.8	69.2	-0.3
	with standard Armington elasticities (Table 11)				
South Africa	51	-118	19	33	116
Botswana	-17	-8	-1	-6	-1
Rest SACU	19	-10	3	4	22
Total	51	-118	19	33	116

Source: GTAP results

Doubling the Armington elasticities also reduces the quantity of agricultural imports and exports compared to the “normal” elasticities. Production of agricultural products increase and the decline in non agricultural (manufacturing) goods is larger. Therefore agriculture are pulling more resources out of other sectors which results in a larger negative allocative efficiency of - \$211 million which dominates the positive terms of trade effect (\$101m) in the new EV decomposition. We still do not have 100% homogenous good in the model assumptions although doubling the Armington elasticities does assume the goods are relatively more homogenous compared to our base assumptions. Note that while there is a reduction in the terms of trade gains for South Africa, this change from \$117 million to \$101 million is not large. The agricultural sectors contributing the most to these terms of trade gains in the standard Armington simulation were fruit and vegetables (\$19m), other foods (\$17m) and other crops (\$10m). These gains reduced to \$17 million, \$15 million and \$10 million respectively when the Armingtons were doubled.

6.4 Policy space

While it is a useful exercise to simulate the increase of South African agricultural tariffs to ascertain some indication of overall welfare results, there are institutions and agreements in place that mean it would be difficult for South Africa to actually do this. One such multilateral institution is the WTO, where South Africa has pledged (a) bound tariff rates that it will not

exceed and (b) tariff rate quota (TRQ) access for preferential import duties. On the first issue of bound tariffs, these are to some extent an artefact of the arcane world of trade negotiators, as in most cases they are above the actual at-the-border applied rates (a phenomenon known to trade economists as ‘water in the tariff’, as a WTO agreed cut in bound rates may not make any practical difference at the border). There is a linkage between these bound rates and the TRQs, as South Africa has bound (i.e. promised not to increase) its TRQ rates of 20 percent of the bound rates.

Should South Africa wish to increase these TRQ rates, for example, GATT Article XXVIII, modification of schedules, comes into play. Importantly, Paragraph 2 talks about the provision of compensation, and this would have to be negotiated with interested parties, some of whom may prove to be very litigious²². With the number of tariff quotas that South Africa has, there would be a lot of WTO interest in this move, and we shall explore the potential restrictions for policy space a move to increase rates may actually have. Table 15 shows in Column Two the values of agricultural imports (\$m) during 2005 for the GTAP agricultural sectors that contain TRQs, with the percentage of the imports by source to set the scene for the next step of the analysis, that of FTA commitments. The right hand column shows the percentage of the GTAP sector that contains HS 6 lines that are governed by TRQs: for example, dairy imports were \$65.8 million and 95 percent of these are governed by TRQs, while 62 percent of imports of beef and sheep meats are governed by TRQs.

Table 15: GTAP agricultural sectors, RSA imports \$m and % shares

GTAP sector	All	EU	USA	SADC	MERC	Rest	% TRQ
Veges, fruit, nuts	27.1	8.8%	1.4%	2.6%	2.0%	85.2%	35%
Plant-based fibres	66.6	0.1%	0.0%	99.6%	0.0%	0.3%	100%
Crops nec	100.2	10.9%	1.1%	42.8%	25.2%	20.0%	61%
Beef, mutton goat	51.8	0.2%	0.0%	0.0%	58.8%	41.0%	62%
Meat products nec	129.9	3.0%	0.4%	0.0%	85.7%	10.9%	63%
Dairy products	65.8	53.9%	1.0%	0.0%	12.8%	32.3%	95%
Food products nec	132.6	51.3%	15.8%	0.3%	6.5%	26.1%	21%

Table 15 also points to the second constraint that will limit South Africa's 'policy space' to increase tariffs. This is the regional agreements, with the TDCA for EU access and effective duty-free access from SADC²³ currently in place and others being mooted. For imports of plant-based fibres (read 'cotton') of \$66 million, almost all is from SADC; while for crops not elsewhere specified some 42 percent (read 'mostly tobacco') is also from SDAC. Similarly, a large percentage of many of the imports shown are from the EU where binding commitments have been made that would require serious negotiation to change. We have shown the imports from both the US and Mercosur (Brazil, Argentina, Uruguay and Paraguay) as there is a possibility of South Africa/SACU discussing trade agreement with these major sources of agricultural imports as well.

We can extend this line of analysis to examine the current duty profile and place this in perspective with the current bound rates to gain an appreciation of where there may or may not be policy space in (a) the WTO sense and (b) the FTA perspective. This is shown in Tables 16 and 17 below. The WTO policy space for duties is shown in Table 16, and this follows from Table 15 above that looks at those GTAP sectors that contain TRQ products. It should be read in conjunction with Table 15. Table 17 later shows the FTA policy space.

Table 16: the WTO policy space by GTAP sector

	Import \$m	% duty assessed 2005				Policy Space %
		MFN	Pref	EU end	Bound	
Wheat	181	1.95	1.95	2.0	70.68	Yes
Other grains	36	0.06	0.05	0.0	28.2	Yes
Vege fruit nuts	78	6.54	5.19	0.0	16.38	No
Oil seeds	20	9.01	3.23	0.0	47.21	Yes XX
Plant fibres	67	24.88	0.08	0.0	60.0	Yes XX
Other crops	193	12.95	4.67	0.0	43.76	Yes XX
Live cattle etc	11	0.0	0.0	0.0	0.0	No
Other animal prod	63	0.47	0.41	0.0	0.75	No
Wool	11	0.0	0.0	0.0	0.03	No
Beef mutton	83	25.96	25.92	2.1	81.0	Yes XX
Poultry etc	211	14.50	14.05	6.6	59.49	Yes XX

²³ SADC means the non-SACU members of SADC, who have duty-free access for all agricultural imports in South Africa (and, by default, SACU). SADC trade is the major component of the 'rest of Africa' configuration in the GTAP model.

	Import \$m	% duty assessed 2005				Policy Space %
		MFN	Pref	EU end	Bound	
Vege oils	449	8.47	7.69	0.1	59.04	Yes
Dairy	85	66.75	43.75	26.6	78.05	No
Rice	224	0.0	0.0	0.0	0.0	No
Sugar	13	0.0	0.0	0.0	0.0	No
Other foods	512	13.60	8.16	1.2	34.33	No
Bev tobacco	279	7.01	1.95	0.4	74.76	Yes

Source: tralac analysis

Table 16 shows:

- The GTAP sector and 2005 imports in US dollars;
- The MFN rates for these imports with (i) no preferences offered and (ii) the preferences in place at the end of the TDCA period to put the current applied duties in perspective;
- The duty rate for EU imports that will apply at end of TDCA period by GTAP sector;
- The WTO bound rates by GTAP sector; and
- Examining the MFN rate in Column Three against the WTO bound rates with the 25 percentage points added as in this GTAP simulation scenario enables us to assess if we have breached the WTO bound rates and therefore 'policy space' from the WTO bound commitments. Note this does not take into account the TRQs from Table 15 where TRQ rates are set at 20 percent of the bound rates. Where an 'XX' appears along with the 'Yes' in this policy space it means that at least 60 percent of the imports are subject to TRQ rates which are not taken into account otherwise.

Table 17 takes another step and looks at the source of these imports from the EU with TDCA preferences, SADC which are duty-free, and the Mercosur sources where there are active FTA interests. The policy space on the right hand side now narrows down considerably as to where there may be space for increasing the duty rates by 25 percentage points as we have done. This space is limited to:

- wheat²⁴

²⁴ We would note that PROVIDE (2005) examined the implications of higher wheat tariffs in more detail than we are able to do with GTAP, and conclusively found that raising the tariffs by 25 points delivered highly concentrated benefits to the wheat industry that were lower than the income loss caused in other sectors.

- maybe other grains (mostly maize)
- vegetable oils (animal feed).

Table 17: the WTO policy space by GTAP sector

	Import	MFN duties and sources by % share				Policy
	\$m	MFN%	EU	SADC%	Merc %	Space %
Wheat	181	1.95	14.2	0.0	36.5	Yes
Other grains	36	0.05	12.0	1.1	18.4	Maybe
Vege fruit nuts	78	5.19	10.9	9.0	7.3	No
Oil seeds	20	3.23	0.9	60.4	15.6	No
Plant fibres	67	0.08	0.1	99	0.0	No
Other crops	193	4.67	14.9	26.4	14.3	No
Live cattle etc	11	0.0	40.0	0.5	6.2	No
Other animal prod	63	0.41	19.4	3.5	3.2	No
Wool	11	0.0	2.1	0.0	0.0	No
Beef mutton	83	25.92	1.4	0.0	42.6	No
Poultry etc	211	14.05	12.8	2.1	73.1	No
Vege oils	449	7.69	7.1	1.2	56.6	Yes
Dairy	85	43.75	54.4	0.1	10.7	No
Rice	224	0.0	0.6	0.1	0.2	No
Sugar	13	0.0	3.1	43.9	50.2	No
Other foods	512	8.16	40.0	1.2	12.8	No
Bev tobacco	279	1.95	67.6	1.9	1.0	No

Source: tralac analysis

Thus, while the GTAP simulation shows a modest gain to South Africa and XSC, closer analysis reveals that such a blanket policy is not an option when set against (a) WTO commitments and (b) known and likely FTA commitment. These aspects of the policy space need a more careful analysis, and in addition need to be considered against the balance between imports and exports by GTAP sector. It makes little economic sense to increase tariffs on what are dominantly export sectors for agriculture.

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