



Working Paper 6-2003

**Winners and Losers in
Prospect and Retrospect:
A Policy Agenda on Trade,
Employment and Poverty
in Southern Africa**

David Evans
IDS, University of Sussex

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ACRONYMS

CBI	Cross Border Initiative
CET	Constant Elasticity of Transformation
CGE	Computable General Equilibrium
CODEX	<i>Codex Alimentarius</i> Commission (dealing with food standards)
COMESA	Common Market for Eastern and Southern Africa
COMTRADE	UN Commodity Trade Statistics (UN Statistical Office)
CU	Customs Union
DFI	Direct Foreign Investment
DRC	Domestic Resource Cost
ERP	Effective Rate of Protection
EU	European Union
FT	Free Trade
FTA	Free Trade Area
GDP	Gross Domestic Product
GTAP	Global Trade Analysis Project (Purdue University)
IDC	Industrial Development Corporation (South Africa)
IFI	International Financial Institution
IMF	International Monetary Fund
LCMS/LSMS	Living Conditions/Standards Measurement Survey (World Bank)
LDC	Least Developed Country
LIFIC	Low Income Food Importing Country
MERCOSUR	Mercado Comun del Cono Sur (Southern Cone Common Market)
MFA	Multi-Fibre Agreement
MFN	Most Favoured Nation
NAFTA	North American Free Trade Agreement
NIC	Newly Industrialised Country
OR	Open Regionalism
PRSP	Poverty Reduction Strategy Paper
ROW	Rest of the World
RSA	Republic of South Africa
SA	South Africa
SACU	Southern Africa Customs Union
SADC	Southern African Development Community
SADCC	Southern African Development Co-operation Community
SAM	Social Accounting Matrix
SAP	Structural Adjustment Programme
SSA	Sub-Saharan Africa
UNCTAD	United Nations Conference on Trade and Development
US	United States
WTO	World Trade Organisation

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EXECUTIVE SUMMARY

The first section of this paper sketches the well-known argument that there is a potential clash between trade policy reform, employment creation and poverty alleviation in the context of economic integration in Southern Africa. The argument is developed in the wider context of the endowments and accumulation of key resources in sub-Saharan Africa (SSA) since 1960 and the consequences for the pattern of trade and growth. Unilateral and multilateral approaches to trade policy liberalisation are then discussed in the context of some macro-structural characteristics of Southern Africa. The known wide disparities in the level of development between countries sharpen the potentially uneven distribution of benefits of trade policy liberalisation, whether unilateral or multilateral.

Section 2 looks at some of the early research on the employment impact of economic integration in Southern Africa, the Southern African Development Community (SADC) Free Trade Area (FTA). The early datasets used to estimate the employment and (later) welfare response to different strategies towards economic integration highlighted many of the issues that have subsequently been researched, using better data and better economic policy models. Principally, the early results showed wide variability of the distribution of gains from a SADC FTA – both within and between countries. However, because of data gaps and unreliability and the use of simpler models, the particular findings were always subject to strong qualification.

In Section 3, the 1997 dataset from the Global Trade Analysis Project (GTAP) was used to develop the general arguments about resource endowments for SSA discussed in Section 1 in the context of a detailed analysis of the structural characteristics of seven SADC countries. The argument was further developed using the GTAP standard Computable General Equilibrium (CGE) model to explore the poverty and employment impact of unilateral, regional and global trade policy reform packages. Detailed calculations of poverty impacts were only possible for Zambia. It was found that the unilateral trade policy reforms in Southern Africa had powerful welfare and employment benefits, as did global reforms. Regional reforms such as the SADC FTA had useful but much smaller benefits. Typically, the country results were polarised, with the weaker countries benefiting least from the reform packages considered, and the poverty impact was ambiguous. The strong employment benefits estimated for unskilled labour were usually counter-balanced by strong benefits to the owners of mineral and land resources, which is mostly heavily concentrated in the countries with greatest gains.

Most estimates of the impact of trade policy reform consider only agriculture and manufacturing. In Section 4, some rough estimates of tariff equivalents for the service sectors are added. An example of regulatory protection in the food sector is also considered. The results are striking. With services included in multilateral trade policy reform, the estimated comparative static benefits roughly double. Alternative packages of reform of food standards and pricing structures in post and telecommunications have powerful welfare and trade restructuring effects at the sector level.

Three conclusions emerge. First, the empirical basis for understanding the impact of alternative packages of trade policy reform, unilateral, regional and multilateral, has been greatly deepened by the modelling possibilities of new GTAP dataset. It is now possible to link welfare, employment, income distribution and to some extent poverty impacts of regional economic policy change in a global context. An important part of this deepening of understanding came from the link with other studies based on the historical accumulation of key resources, human capital and natural resources. Secondly, there is obviously scope for improving the model estimates used in this study through a more appropriate selection of sectors, increasing the number of countries with direct estimation of poverty impacts, and improving model specification. Finally, the important research synergy from linking the CGE model and estimates to earlier studies focussing on factor endowments and the pattern of trade could be extended in many other ways, particularly to the use of poverty case study material.

1. INTRODUCTION TO TRADE, EMPLOYMENT AND POVERTY ISSUES¹

1.1 Trade Policy and Economic Integration in Southern Africa: A Background Sketch

Since the end of the colonial period, pan-African economic integration has been a region-wide political and economic goal. Yet the history of economic integration in Africa is peppered with a failure to generate the necessary political drive and economic institutions required for success. The Southern Africa Customs Union (SACU) set up in 1910 is a modest success story that runs against the historical examples of failure. Amongst developed countries, the European Union (EU) stands out as a success story for a Customs Union (CU). The plethora of FTAs developed over the last 20 years or so and spawned especially by the EU have been vehicles for partial trade liberalisation, often to facilitate inward foreign investment. These have substituted for global trade policy liberalisation through the World Trade Organisation (WTO), or country-level trade policy liberalisation. The aim has not been to develop deep integration of commodity, capital and labour markets facilitated by strong central institutions.

In Southern Africa, the Southern African Development Co-operation Community (SADCC), set up in 1980, and later SADC, had a strong anti-apartheid political drive. Initially, economic co-operation was based on a sectoral approach, but SADCC was economically and institutionally weak. The Windhoek Treaty of 1992 changed the basis of economic co-operation to allow for 'efficiency, economy and competitiveness' and laid the foundation for future steps in economic integration. SADC had the potential for becoming a potent force for regional integration in Southern Africa. Paradoxically, the end of apartheid and South Africa (SA) membership of SADC weakened the political drive for full economic integration envisaged in the Windhoek Treaty, a change that became evident over time as SA's interests diverged from the rest of SADC.

Throughout the 1990s, there have been contradictory tendencies towards economic integration in Southern Africa. A strong and often conditional support for country level liberalisation by the International Financial Institutions (IFIs), such as the World Bank and the International Monetary Fund, and by the WTO has been a powerful crosscurrent. There have been other regional associations cutting across SADC, such as the Common Market for Eastern and Southern Africa (COMESA) and the Cross Border Initiative (CBI). It was against this background that the 1996 SADC Protocol on Trade Co-operation for the creation of a Free Trade Area was agreed and finally implemented during the year 2000. About the time of the SADC Trade Protocol, SA began negotiations around the EU/SA FTA. This was agreed to in 1999, allowing SA to gain access to the EU on preferential post-Lomé terms and to facilitate EU Direct Foreign Investment (DFI) into SA for some items up until the year 2018. SA has subsequently followed this pattern with a string of FTAs with India, the Southern Cone Common Market (MERCOSUR) and the United States (US) amongst others in which the provisions for inward DFI have been as important or more important than the trade liberalisation. Inevitably the bilateral FTAs entered into by SA cut across the regional agenda of closer economic integration between the countries of Southern Africa. At the global level, now that the WTO has set an agenda for negotiation of further trade policy reform in agriculture, manufacturing and services, the collective energy for regional integration in Southern Africa may be further weakened.

1.2 Employment and Poverty Issues

For some time now the overriding international development policy issue has been poverty reduction. In Southern Africa and particularly SA, employment expansion is also a major closely related policy issue. At the same time, there is a strong commitment to further trade policy liberalisation, both regionally and globally. Thus there are two policy agendas – trade liberalisation and further opening of economies to globalisation on growth and efficiency grounds, and policies for employment expansion and the reduction of poverty. Yet it is striking that little is known about where and by how much global or regional trade liberalisation will

¹ This section is an edited and extended version of Evans (2000).

contribute to employment expansion and poverty alleviation, and where it may even hurt employment and those in poverty.

There are different modalities for the two policy agendas. The trade liberalisation agenda proceeds mainly through a multinational negotiating process in which individual nations perceive a 'cost' assigned to trade liberalisation itself. Alternatively, it is believed that these 'costs' can be transformed into mutual benefits and enhanced growth if the liberalisation is carried out in a multinational framework. There has been no direct linkage between overall welfare gains and compensation for any minority welfare losses.² On the other hand, poverty alleviation proceeds directly through the activities of the World Bank, and sister institutions and through bilateral aid from developed countries. A direct linkage between identified overall gains from further global trade liberalisation and potential losers may be called for when some of the losers are also those in poverty.

At the global and regional level, broadly conceived employment expansion and poverty alleviation are practically surrogates for the same thing because there are few developing countries where skilled labour faces unemployment (in contrast to countries in transition in Eastern Europe). Thus employment expansion actually means increased employment for unskilled labour that has the effect of poverty reduction.

Poverty is pervasive in many parts of the world, particularly in Africa and South Asia. A simple and commonly used economic measure of poverty is the headcount estimate, the percent of population that are living on less than \$1 per day measured at 1985 Purchasing Power Parity prices. Recent World Bank data shows overall poverty incidence of around 25% of the overall population in developing countries when measured by the US\$1 per day standard. Poverty reduction is rightly at the top of the international agenda at the beginning of the new millennium.

The typical World Bank Poverty Profiles show that poor households, in comparison with better off households, are larger, less well educated, have fewer assets, have poorer land and housing, and those in rural areas are often remote. A useful way of illustrating the linkages is in the form of a matrix linking the profile of poverty with examples of poverty alleviation policies, and the possible impact of trade policy changes e.g. through a new WTO Millennium Round. Table 1 sets out some examples of the positive and negative linkages between income poverty alleviation channels and trade policy change.

In the first column of Table 1, the attributes are typical of poor households compared with better off households and in the second column; some of the development consequences of poverty are shown. The third column shows some of the channels through which income poverty alleviation can work whilst the last column shows how trade policy can interact with income poverty. The last row describes how the gains and losses from trade policy changes are expressed as winners and losers in terms of income poverty in the medium run (over three to five years). Some of these policy channels, such as factor price change or employment change given the stock of fixed assets, operate only in the short to medium run, whilst in other cases, longer run asset accumulation or population growth is involved. Developing a matrix of the channels of income poverty alleviation and global or regional trade policy effects in a quantitative manner is at the heart of urgently needed new research.³

² Thus estimates of the benefits of the Uruguay Round and of regional integration in Southern Africa show positive global or regional benefits from trade liberalisation that are unevenly distributed between both countries and regions. The implicit assumption usually made in trade negotiations is that welfare gains from trade liberalisation are assessed regardless of whether or not the losers are compensated. The fact that the empirical literature suggested that Africa would lose from the Uruguay Round has not gone unnoticed. Such negative effects are in fact recognised in the Uruguay document itself, where special consideration was proposed for the Low-income Food Importing Countries, or LIFIC. See (Whalley, 1999, Table 2 and 3).

³ An exhaustive discussion of the channels through which trade policy impacts on poverty can be found in McCulloch et al (2002).

Table 1: Winners and Losers from Trade Policy Change: Impact on Income Poverty

Poverty Profile Comparison with Better-off Households	Consequences of Poverty:	Poverty Alleviation Channels:	Gain or Loss to Poorest through Trade Policy Change in the Medium run:
Larger households	Higher population growth	Medium run: Increased market opportunities especially for women	Impact effects mainly on returns to labour and employment in low skill tradable sectors, sometimes formal sectors, sometimes subsistence and informal sectors
Less well educated and less human capital	Less able to respond to new economic opportunities with higher skill; higher population growth	Improved access to training and education	Impact effects mainly through returns to skill intensive tradable sectors as poorest accumulate skills
Fewer financial and physical capital assets	Less able to respond to new economic opportunities with higher capital requirements	Improve access to credit and physical capital assets	Impact effects mainly through returns to capital intensive tradable sectors as poorest gain access to capital accumulation
Poorer land, housing and access to infrastructure	Low returns to fixed assets especially land, housing and infrastructure	Improve use of land, including redistribution of land; improve housing and infrastructure for market access	In rural areas, affects poorest mainly through returns to land in tradable subsistence sectors; in urban areas affects poorest mainly through returns to fixed assets in tradable informal sectors and access to formal low skill export sectors
Winners and Losers: Impact on Income Poverty	Income poverty effects mainly depend on factor price and employment changes induced by trade policy change, the initial resource endowments of the poorest in relation to over all resource endowments, and country comparative advantage		

The impact of trade policy changes on poverty alleviation

In a simplified manner, a good deal can be said on the ways in which trade policy changes have an impact on poverty alleviation. In so far as trade policy change stimulates overall growth, the poor will benefit from a generally improved economic environment. It has often been argued that trade policy liberalisation would increase economic growth, increasing the chance that there would be favourable effects on unskilled wages and therefore poverty alleviation from trade policy liberalisation. This linkage was originally made on the basis of country case study evidence, and when the starting position was extremely high levels of protection, there was much merit in the argument. However, the argument needs qualification when the institutional environment within which trade policy reform takes place plays a crucial role, as in the East Asian miracle countries such as Taiwan and Korea.⁴ Also, cross-section statistical evidence often finds trade policy liberalisation a weak determinant of growth compared with investment or initial endowments of skills.⁵ Thus, the view that trade policy liberalisation has an impact on income poverty alleviation through growth needs to be qualified. Whilst economic growth is the best long run remedy for poverty alleviation, poor households lack the very resources most needed to participate in economic growth. In this context, emphasis on the benefits of growth on average levels of poverty can lead to insufficient attention being paid to the deviation around the average response.⁶ The desired policy interventions for poverty alleviation are usually specific and multifaceted and include distributional as well as growth issues, especially the distributional issues that arise from trade policy reform that were highlighted in Table 1.

4 See for example Amsden (1989) and Wade (1990).

5 See for example (Evans, 1989, Ch 9); (Rodrik, 1999); (Rodriguez and Rodrik, 1999).

6 See for example Dollar and Kraay (2000) and White and Anderson (2000).

Trade liberalisation in the global economy can be expected to yield an overall economic welfare benefit – the gains from trade. However within countries there will be winners and losers. Consider a simplified example in which developing countries with abundant unskilled labour expand their unskilled labour-intensive exports with trade liberalisation, thus raising real unskilled wages. If the supply of skilled labour is scarce in developing countries, the real returns to skilled labour will fall. The opposite will tend to be the case in developed economies with an abundant supply of skilled labour and a scarce supply of unskilled labour. That is, unskilled wages will fall and skilled wages will tend to rise in developed countries. If all unskilled workers are also below the income poverty line in both developing and developed countries, then the liberalisation of trade will alleviate income poverty in developing economies, and worsen income poverty in developed economies.

The above argument can be used to illustrate the intersection between trade and poverty agendas in Table 1. Thus, in a country with abundant unskilled labour, trade policy liberalisation is likely to improve market opportunities in low skill intensive exportable products. In practice, women often dominate employment in such industries.⁷ Rising returns to unskilled labour that combine with a rapid growth of output can have obvious pro-poor benefits. However, trade policy liberalisation may not enhance the returns to other factors such as skill. With a low initial stock of skills and no factor price equalisation, it is likely that the returns to skill and skill acquisition will already be high. In the context, the rapid accumulation of skills can provide one of the foundations for a growth strategy based on export promotion with upgrading from lower to higher skill products. This can have favourable pro-poor effects through the effects on unskilled wages and labour intensive export. Also, the rapid accumulation of skills by unskilled workers can have pro-poor effects. When the accumulation of skills begins at a low base, the impact of the expansion of trade is dominated by the direct effect on poverty through unskilled wages and the expansion of low skilled exports. The story is mixed when a country is natural resource or land abundant. In this case, trade policy liberalisation is likely to increase the returns to resources and land, with an uncertain outcome for the returns to labour, either skilled or unskilled. Trade policy liberalisation will only be definitely pro-poor when some of the increased returns to land also benefit the poor, as when a subsistence sector produces an export product. This argument is slightly complicated when the returns to unskilled labour are determined either by a subsistence wage or by an institutional wage and the usual comparative advantage arguments do not hold for unskilled labour. In this case, the effect of trade policy liberalisation on the returns to land or natural resources and skills will be determined by the (land and resource)/skill ratio. When the country is land and resource abundant so that it has an above world average (land and resource)/skill ratio, trade policy liberalisation will increase the returns to land and resources and lower the returns on skilled labour. Whether or not such trade policy liberalisation is pro-poor depends on the extent to which the poor own land and resources involved in export production, and the export response to trade policy liberalisation. In a dynamic context where unskilled workers have access to skill accumulation, then when the land and resource/skill ratio is lower than the world average, trade policy will enhance the returns to skilled labour and will benefit the poor over time, as in the East Asian case. Unskilled workers may also benefit from skill acquisition when the country has a high (land and resource)/skill ratio and trade liberalisation lowers the returns to skills, provided the returns to skill are initially high enough.

The Heckscher-Ohlin theory

The above argument on the relationship between factor price change and trade policy liberalisation is based on the Heckscher-Ohlin theory.⁸ Direct evidence of the link between factor price change and trade policy liberalisation is not available. Rather, the empirical work has gone in two basic directions. One route, pioneered by Adrian Wood, has used indices of factor endowments and the factor content of trade to make inferences about the relationship between income distribution and the expansion of trade.⁹ The other route has been to use the

7 See for example (Joekes, 1987); (Joekes and Weston, 1994), Wood (1994).

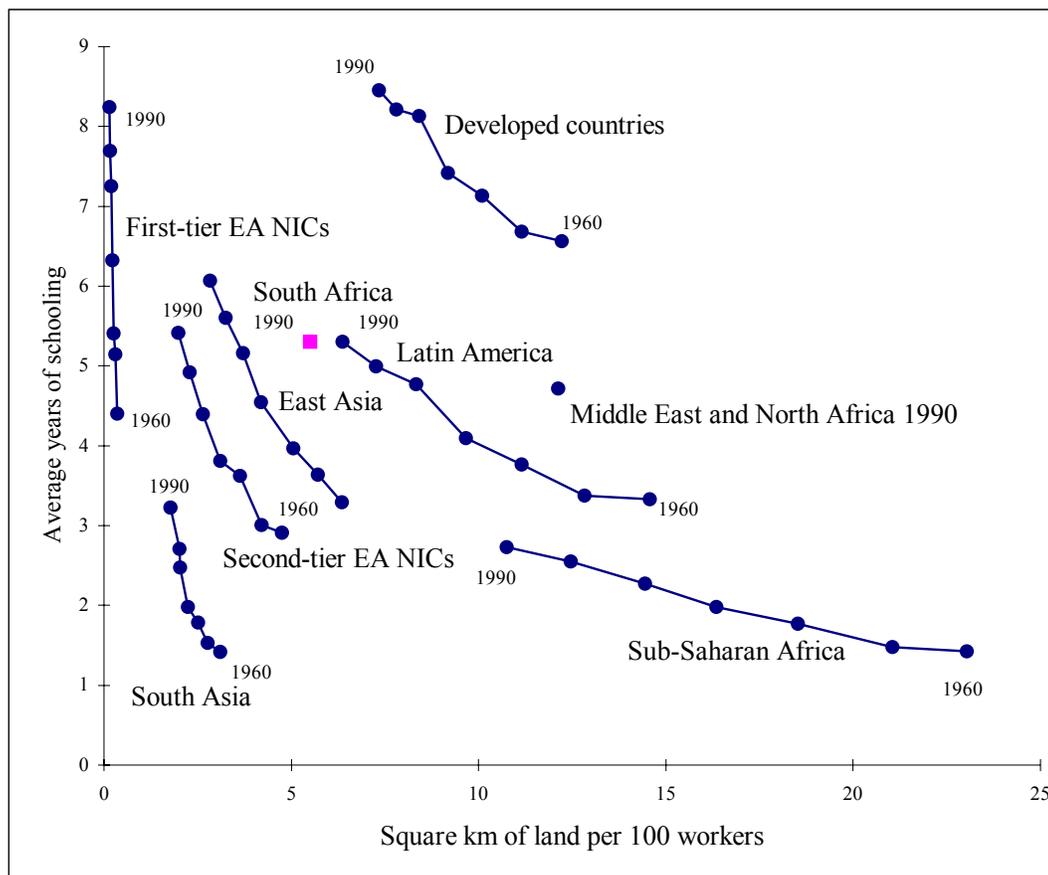
8 See for example Evans (1989) and Wood (1994).

9 See for example (Wood, 1994; 1997; 1998), (Rowthorn, 1995), (Wood and Berge, 1997), Wood and Mayer (1998).

measures of income distribution from the World Bank database¹⁰ in regression analyses of the relationship between income distribution, growth and trade policy liberalisation.

It turns out that Wood has found powerful evidence supporting a Heckscher-Ohlin view of the relationship between factor endowments and the factor content of exports in East Asia, Latin America, Africa and South Asia¹¹. The change in factor endowments of the major blocs of the world economy from 1960 to 1990 from Wood and Mayer (1998) is shown in Chart 1 below:

Chart 1: Global Skill and Resource Endowments 1960-1990



[Source: An updated version of the 'worm' diagram found in Wood and Mayer (1998) by courtesy of Adrian Wood.]

In Chart 1, land per worker on the X-axis and years of schooling on the Y-axis are proxies for endowments of human capital and natural resources. The endowments of capital excluded from the analysis. Extensive regression analysis by Wood and Mayer found that the relative endowments of human capital and natural resources as proxied in Chart 1 are a good predictor of the composition of trade measured by the ratio of primary exports to total exports. Further, it is suggested that the omitted capital endowment variable would be unlikely to add explanatory power to the determination of the pattern of trade. This could be brought about by long run international capital mobility so that capital is no longer an argument in the determination of comparative advantage.

To the standard static Heckscher-Ohlin arguments about the pattern of comparative advantage, Wood and Mayer add a growth story based largely on the relative success in the accumulation of human capital. Trade policy liberalisation is found to play little part in this growth story. The first-tier and later second-tier East Asian Newly Industrialised Countries (NICs) and the South Asian cases followed this path based on the export of low and then

¹⁰ See the Deininger-Squire Data Set, World Bank, 1996, recently republished in a revised and extended form by WIDER. See Cornia (1999).

¹¹ See (Wood, 1994, 1997, 1998), (Wood and Berge, 1997), (Wood and Mayer, 1999)

rising skill-based exports, reflected in the rising share of manufactured exports and the accumulation of human capital. In the case of Latin America and SSA, the story revolves around the high resource to human capital ratio. Where there has been skill accumulation such as in SA, increased skill content of exports is likely to be in primary products with a higher processed content.

The direct implication of Wood and Mayer's work for any opening up of the SSA region to world trade in the 1990s is likely to increase the share of primary products in total exports. If the Heckscher-Ohlin theory is correct, such opening of trade will improve returns to the region's abundant factor, natural resources, relative to the returns to skill. However, prediction of the impact on the distribution of income cannot be predicted without additional structural data and explicit account of the determinants of the distribution of income. A crude attempt to model the impact of alternative trade liberalisation strategies for 7 countries in Southern Africa is taken up in Section 3.

There is a widely held view that country income distributions are relatively stable and that global distribution of income and poverty should be best addressed through promoting growth rather than redistributive policies. However, there are serious data limitations in exploring this proposition empirically. One early study showed that protection in developing countries did harm unskilled wages, but there were relatively few data points.¹² More recently, the World Bank dataset on income distribution from the 1960s to the 1990s has been used in testing propositions about income distribution. Unfortunately, this dataset has a weak time series component compared with cross-section data points and therefore throws little light on distribution changes over time.¹³ Also, the measures used to capture the changes in the price of tradeables in cross section or over time differ from study to study and do not correlate with each other.¹⁴ A favourite measure is trade openness, defined as the sum of exports and imports divided by Gross Domestic Product (GDP), a variable influenced by many factors besides the height of trade protection. Thus, a recent econometric study of the effect of trade openness on poverty using the World Bank income distribution data and an outcome measure of trade openness finds that trade openness hurts the poorest regardless of the factor endowments or structural characteristics of the countries observed.¹⁵ This finding needs to be interpreted with caution. Further, complications such as monopoly power in the determination of import-competing prices, profit, or wages, may alter the above predictions.¹⁶

Thus, the empirical evidence on the effects of trade liberalisation on poverty is mixed and gives an incomplete picture. If the focus is on measured income distribution such as from World Bank dataset and trade openness, then the Heckscher-Ohlin propositions are usually contradicted and the appropriate conclusion is one of scepticism over the beneficial impact of trade liberalisation on income poverty alleviation. The links between the identified factor endowments, the pattern of trade and trade policy are in line with Heckscher-Ohlin theory but are rather weak whereas the accumulation of human capital and the pattern of trade are much stronger. Thus, policies designed to stimulate human capital rather than trade policy are associated with an improvement in income distribution and successful growth. If you believe that income distribution and trade expansion policies through trade policy reform are inadequately measured, then the conclusion is that there is powerful but partial evidence supporting a Heckscher-Ohlin view. Other empirical studies are suggestive of the endless ways in which particular circumstances that modify this basic view must be taken into account.

Another avenue to fill the knowledge gap on trade and poverty linkages is to use the well-known GTAP dataset and general equilibrium modelling capability.¹⁷ A general equilibrium trade model has both a strong theoretical and comprehensive database. In fact, the GTAP database includes unskilled and skilled labour, land, mineral resources and capital. It generates the counterfactual (what would happen with any given change in trade policies) automatically. Using GTAP to attempt to unravel the winners and losers from trade policy liberalisation is therefore likely to generate results with a strong Heckscher-Ohlin flavour, an

12 See Bourguignon and Morrisson (1990).

13 See White and Anderson (2000).

14 See for example Rodrik (1999).

15 See (Spilimbergo et al, 1999).

16 See for example (Harrison and Hanson, 1999); (Robbins, 1996); (Robbins and Gindling, 1999).

17 See (Hertel, 1997).

approach supported by Wood's findings in a dynamic but not static context. Where data is available, the GTAP database can be supplemented to capture specific country or regional effects that may modify the Heckscher-Ohlin nature of the results. In its comparative static form, a GTAP model is likely to capture relatively small impact effects on income poverty from trade policy change, but that is in the nature of comparative static modelling. With the advent of a dynamic GTAP model, future work will make it possible to capture trade policy liberalisation effects in a dynamic framework.

1.3 Some Structural Characteristics of Southern Africa

Looking back to Chart 1, it is straightforward to predict the impact of trade policy change on the distribution of income. For SSA with a very high resource to skill ratio and high initial trade protection, across-the-board trade policy liberalisation is likely to benefit the factor intensively used in exports and harm the factor used intensively in import competing production. Thus, land rents are likely to rise and skilled wages are likely to fall in Sub Saharan African countries. What happens to unskilled wages is dependent on several factors that can only be determined empirically. In SSA it is usually the case that there is unemployed unskilled labour. A simple way to model this is for unskilled wages to be determined exogenously, for example, by some sort of surplus labour mechanism. In this case, unskilled wages will not change, but the employment of unskilled labour will rise or fall according to the unskilled labour intensity of primary exports versus higher skill manufactured imports. Within Sub-Saharan Africa there are wide variations in factor endowments, as can be seen in Chart 1. For example, South Africa has 5.5 sq. km of land per 100 adults in 1990 and 5.3 average years of schooling placing her just to the left of the 1990 point for Latin America, well outside the factor endowment rations for the rest of Sub-Saharan Africa. For any particular country, the strength of the factor price changes and changes in unskilled employment for any given change in trade policy will depend on a more complex interaction of general equilibrium factors than can be captured in Chart 1.

To be convincing, the examination of the intersection of the trade policy liberalisation and poverty agendas will require an open-minded approach to the drawing together of several different research traditions. In particular, it would be important to be reasonably convinced that the findings for the general equilibrium trade model were consistent with the country knowledge of poverty specialists. Such an exercise would have high requirements of transparency and a close relationship with the policy process. Seldom has such a rich opportunity presented itself, given the dramatic improvements in the GTAP modelling framework to date, and the low marginal cost of further development for this new research.

The institutional context for monitoring the income distribution and poverty consequences of trade policy liberalisation is unclear. The WTO has no mandate to deal directly with any adverse poverty consequences of a Millennium Round except through its new developing country members. Traditionally, UNCTAD has had a role in dealing with trade and international inequality. In the new context, both UNCTAD and the new developing country members of the WTO could have a strong institutional role to play in working with developing countries (for example the Group 77 countries) in trying to build up an acceptable package of additional poverty alleviation measures in developing countries. In addition to the influence of differential resource endowments in trade policy changes and income distribution already discussed, the relative size of GDP has an important bearing on the capacity of countries to adjust to trade policy liberalisation. It can be assumed that relatively well-off countries will pay adjustment costs for themselves. Where countries are both small in terms of GDP and poor, bearing the cost of adjustment is more difficult. As can be seen from Table 2, there is a large variation in GDP between Southern Africa countries.

Table 2: Aggregate Economic Structure and Poverty in Southern African Economies

Country	Population	GNP \$	GNP \$	Year Survey	Gini Index	Poverty Measures: % Population under National or International Poverty Line			
						1998	Millions	Billions	Per Capita
Angola	12	4.1	178	N/a	N/a	N/a	N/a	na	N/a
Botswana	2	5.6	3600	N/a	N/a	N/a	33.3	61.3	1985-6
Lesotho	2	165	570	1986-7	56.0	49.2	43.1	65.7	1993
Malawi	11	144	200	N/a	N/a	54.0	N/a	N/a	1990-1
Mauritius	1	4.1	3566	N/a	N/a	10.6	N/a	N/a	1992
Mozambique	17	3.6	199	N/a	N/a	N/a	37.8	78.4	1996
Namibia	2	3.2	1940	N/a	N/a	N/a	34.9	55.8	1993
South Africa	41	119	2880	1993-4	59.3	N/a	11.5	35.8	1993
Swaziland	1	1.3	1443	N/a	N/a	N/a	N/a	N/a	N/a
Tanzania	32	6.7	210	1993	38.2	51.1	19.9	59.6	1993
Zambia	10	3.2	330	1996	49.8	68.0	72.6	91.7	1991,6
Zimbabwe	12	7.1	610	1990	56.8	25.5	35.9	64.2	1990-91
Total	143	466.9							

[Source: Population n GNP and Gini index from World Bank World Development Report 2000, Tables 1 and 5 and International Financial Statistics for Mauritius and Swaziland.
% Population under National and International poverty lines from World Bank Global Poverty Monitoring web site]

Taking the broad measure of extreme income poverty based on \$1US per day at 1993 prices, the percent of population under an International Poverty line varies from about 11 per cent in South Africa, to over 70 percent in Zambia. If the broadly-based income poverty estimates are at all accurate for the earlier part of the 1990s, the Zambia 'example' for the methodological exercise on the effects of trade policy reform on the poorest appears well chosen.

1.4 Unilateral vs. Multilateral Approaches to Trade Policy Liberalisation and Poverty

There are a number of types of regional integration to be considered when examining economic integration in Southern Africa. From the aspect of trade policy, the most important ones are:

A. Unilateral Trade Policy Liberalisation

Standard trade theory suggests that unilateral trade policy liberalisation will yield welfare gains from a single country viewpoint. This argument lies behind strong support for unilateral trade policy liberalisation under World Bank Structural Adjustment Programmes (SAPs) and under the auspices of the WTO.

B. Free Trade Area or FTA

This applies when existing tariff structures applicable to non-member countries or the rest of the world (ROW) are maintained as SADC moves towards Free Trade (FT) between member countries. Typically, rules of origin have to be applied to a FTA to prevent importation through the country with the lowest tariff for a particular commodity.

C. Customs Union or CU

The central difference between a CU and a FTA is that the CU has a common external tariff, thus dispensing with the need for rules of origin. Both a FTA and a CU have Free Trade with each other but a tariff is levied for trade with the Rest of the World, thus discriminating between members and non-members.

D. Open Regionalism or OR

Under OR, each country in the regional association cuts member and non-member trade barriers in a bargaining process concentrating initially on co-ordinated Most Favoured Nation or MFN-based trade policy reforms amongst the key member states. An extreme form of OR is Free Trade.

Macroeconomic stability is a pre requisite for economic integration in the sense that the real exchange rate of members must be allowed to adjust to correct trade imbalances.

A central theme of this paper is that a SADC FTA is a necessary first step towards deep regional integration. This is to be followed by investment measures/CU. Whilst the trade liberalisation process itself has contributed to regional integration through increased intra regional trade, unilateral trade reform has been used by the IFIs to weaken regional integration. Typically, unilateral trade reform has been a part of the package of policy conditionality under SAPS and has inevitably undermined regional institution building. The same point can be made with even more force regarding poverty alleviation strategies. Poverty research, policy formulation and the implementation of poverty alleviation strategies are based on country, regional and district case studies, drawn together into national Poverty Reduction Strategy Papers (PRSPs) prepared with the World Bank and the IMF. In so far as there is a regional dimension to the PRSPs, this is principally under the control and direction of the World Bank and the IMF, rather than regional institutions.

The Economic Efficiency of Regional Integration

The principle of comparative advantage is the core concept used in the assessment of the economic efficiency of unilateral trade policy reform and of regional economic integration. This is a static concept subject to a number of highly simplifying assumptions. It says that nations will export those commodities whose domestic price is low relative to the domestic price of importables. The determinants of comparative advantage range from differences in technology, the relative abundance of some factors compared with trading partners to economies of agglomeration. In Southern Africa, country comparative advantage is usually

built around the endowments of mineral and agricultural land and the availability of unskilled labour. SA is abundant in capital and skilled labour relative to her regional trading partners, but for trade with the rest of the world, she relies on her endowments of agricultural land and minerals.

At the heart of the analysis of regional integration is the concept of trade creation and trade diversion. In essence, trade creation occurs when an economic union leads to the growth of intra union trade that exploits comparative advantage i.e. when the union members experiencing expanded trade have relatively lower costs than do ROW suppliers. Trade diversion takes place when an economic union leads to an expansion in intra-union trade in which the relative costs are higher than those in competitor countries in the ROW. That is, where the expanded intra-regional trade is against comparative advantage. Where the size of the economic union is large relative to her trading partners, the terms of trade effects of the union have to be taken into account as well. As will be seen below, the extension of the static concepts and measures to include the dynamic effects is the most difficult aspect of the assessment of the efficiency of regional economic integration.

2. TRADE POLICY REFORM: EARLY NUMBERS AND ESTIMATES

2.1 Tariff Protection in Southern Africa

Disaggregated estimates of changes in applied tariffs in Southern Africa are summarised in terms of country averages in Table 3 below.

The most striking aspect of the estimated applied tariffs in Southern Africa is the average fall of around 100% from the early 1990s to the latter part of the 1990s. This change in tariffs was driven by unilateral tariff reforms under World Bank SAPs programmes or under WTO auspices. Clearly, it makes a great deal of difference if the estimates of the economic benefits of the SADC FTA are carried out with the earlier rather than the later tariffs which were in fact operative when the SADC FTA came into existence in 2000. Another important feature of the structure of protection is that SACU (and therefore SA) had relatively average tariffs at the beginning and the end of the period, especially compared to the high-tariff Zimbabwe.

Table 3: Aggregate SADC Applied Tariffs Used in Policy Models, 1990s
Trade weighted estimates of actual applied tariffs %

	Early 1990s (approx. as at Uruguay Round 1993-4)	Early to mid 1990s (approx. as at signing of SADC Trade Protocol 1996)	GTAP v.4 (approx. 1995)	GTAP v.5 (approx. 1997)
Angola	11.4	10.8	-	-
Botswana	-	2.2	-	5.5
Lesotho	-	0.0	-	-
Malawi	22.9	20.2	-	9.6
Mauritius	15.28	24.50	-	-
Mozambique	25.5	16.5	-	13.8
Namibia	-	0.0	-	-
SACU	9.4	-	-	-
SAF (ii)	-	-	10.0	-
South Africa	-	5.7	-	-
South Africa (i)	-	-	-	5.3
Swaziland	-	0.0	-	-
Tanzania	24.2	19.1	-	10.0
Zambia	29.7	12.5	-	8.1
Zimbabwe	40.3	16.7	-	13.6
Rest SAF (iii)	-	-	8.8	-
Average tariffs	13.9	7.0	9.6	6.6

[Source: Evans, 1997, 1998, 2000; GTAP datasets v.4 and v.5]

Notes:

- (i) SACU less Botswana
- (ii) SACU
- (iii) Angola, Malawi, Mauritius, Mozambique, Tanzania, Zambia

2.2 Disaggregated Partial Equilibrium Models of the SADC FTA

The simplest partial equilibrium approach to estimating the impact of trade policy change is to infer the impact of trade policy change on trade flows and resource allocation is to infer from the height of nominal protection. A ranking of sectors by the height protection was used to draw inferences on the relative efficiency of sectors, or comparative advantage. In the 1960s and 1970s, this approach was improved upon by taking into account intermediate input usage, so that estimates of the Effective Rate of Protection (ERP) or value-added protection could be estimated. The closely related concept of Domestic Resource Costs (DRCs) included shadow prices for key inputs, such as foreign exchange and wages, so that the relative efficiency of sectors could be estimated when market prices were not a good guide to efficiency, as is often the case in developing countries. It turns out that for relatively aggregated sectors, nominal and effective rates of protection show a moderately high rank correlation coefficient.¹⁸ However, nominal protection estimates give no guide to the efficiency aspects of a given structure of protection or the welfare benefits of changing trade protection.

Interest in the efficiency aspects of the proposed SADC FTA in Southern Africa drove the early efforts to model the impact effects in 1995 and 1996. At the time, there were no consistent estimates for each country of nominal protection, trade flows, ERPs or DRCs. Given the rapidly improving accessibility of estimates of applied tariff rates and trade flows in the SADC countries, obtaining a set of consistent nominal rates of protection was a realisable

¹⁸ See for example Evans (1972).

goal. However, it was not possible to obtain consistent input/output tables for each country to permit the calculation of either ERPs or DRCs.

A widely known approach to partial equilibrium modelling of tariff changes developed at the time of the Uruguay Round negotiations is the highly disaggregated SMART model (see *UNCTAD and World Bank, 1989*). However, the key disadvantage of the SMART model was a poor coverage of SADC countries. Thus there were two partial equilibrium studies of the impact of the SADC FTA that started from scratch, described in Evans (1997, 1998). They were based on a simple partial equilibrium model formulated to capture some of the key structural characteristics of SADC countries such as excess capacity in the manufacturing sector and non-competing imports in intermediate and capital goods sectors. For the remaining sectors, imperfect substitution between imports from SADC and rest of the world sources, and between all imports and domestic production, the Armington assumption, capture a flexible response to changing relative prices with the formation of a FTA. On the export side, exports to the ROW were assumed to be potentially responsive to income growth and improved market access. There were no supply side influences on exports to the ROW.

In the original partial equilibrium model used in the Commonwealth Secretariat study there was no sourcing of SADC imports. For example, imports of clothing into the Republic of South Africa (RSA) from SADC are not broken down into imports from Zambia, Zimbabwe and so on. Intra-SADC imports were allocated using accounting relationships and by retaining initial export shares for intra-SADC exports. This assumption was modified in the second study, with SADC trade data by country, origin and destination applied in an extended Armington framework.

Critical areas where the model assumptions at the micro level are restrictive are perfectly elastic supply of goods and constant returns to scale. At the economy-wide level, there is no balance of payments adjustment and no income and expenditure adjustment mechanism. Where there is excess capacity, both micro assumptions are likely to be good approximations. For agriculture, mining and manufacturing sectors operating close to full capacity, the supply response is likely to be exaggerated. The lack of balance of payments and macro-balance adjustment mechanisms means that the sectoral effects of the FTA will also be exaggerated. However, the model is better suited to give estimates of the orders of magnitude of the changes in the pattern of trade with the FTA and estimates of the increase in intra-SADC trade. On the other hand, estimates of the changes in output and employment are likely to be small, principally because of the comparative static nature of the exercise.

The initial study was for 27 sectors based on 1990-92 averages or 1991-93 in some cases. This database covers eight countries, including partial databases for SACU and SA. In the results reported, the SACU data was updated, and a data set for Mauritius was included using sources from that country. The second study was based on 12 SADC countries and 37 productive sectors for each country. The production and trade data were for 1991-93 averages, and the tariff data for the most recent year available at the time the model was built, roughly for early- to mid-1990, or for the tariffs that prevailed at the time of the SADC Trade Protocol in 1996.

2.3 A 12-Country General Equilibrium Model of SADC

A key limitation in the multi-country general equilibrium modelling in Southern Africa has been data. Prior to the construction of the GTAP v.5 database, one route was to extend the Industrial Development Corporation (IDC) of SA database used in the partial equilibrium model of the SADC FTA described in the previous section (Evans, 1998). The key missing data for a general equilibrium model is mainly on the demand side, and input/output tables for each country. The dataset was assembled using strong assumptions. For example, the SA input/output table was used for all countries, with adjustment for differing value-added shares in each sector. The final dataset preserved the main structural differences between SADC countries. Thus it was judged that the extended dataset was adequate for a first general equilibrium exploration of SADC integration.

The CGE model is based on the same 12 SADC countries. There were nine agricultural sectors, a mining sector, one non-traded service sector, and 26 manufacturing and mining sectors. This is the same as the second partial equilibrium model reported in the previous section with the addition of a service sector. The production and trade data were for 1991-93

averages, and the tariff data for the most recent year available at the time the model was built, roughly coinciding with the 1996 SADC Trade Protocol.

The CGE model can be recognised as close to standard assumptions with the exception of the mark-up price model. The main features of the model include:

- Armington functions were specified on the import side
- Perfectly elastic supply of goods in each sector
- Full employment of labour where labour is measured in wage goods
- A mark-up model of domestic cost formation
- Balance of payments equilibrium is maintained via variation of the real exchange rate
- Government expenditure and investment was held constant, whilst consumer demand and intermediate demand varied through price and income change
- A micro-based welfare function was constructed, based on an estimate of the consumer surplus change net of estimated intermediate demand less the loss of tariff revenue and the lump sum tax or subsidy required to maintain macro economic balance.

2.4 Partial and General Equilibrium Models Compared

It can be seen from Table 3 that the estimated applied tariff rates changed dramatically from the early- to mid-1990s. The earlier Commonwealth Secretariat study had to rely on crude adjustments to the early 1990s tariffs to arrive at a set of tariffs used to estimate the economic benefits of the SADC FTA. The later study was carried out for the IDC using more recent and therefore better estimates of the tariff rates for the mid 1990s. The IDC study also used bilateral trade flows and tariff rates. On these grounds alone, errors in data were likely to be important in the Commonwealth Secretariat study. A complete analysis of the accuracy of the earlier studies would have to account for errors in data estimation, changes in economic as well as the change from partial to general equilibrium. All that has been attempted here is a broad-brush approach focussing on the estimated national changes in employment induced by the SADC FTA in the partial equilibrium calculations, and the estimated changes in economic welfare from the CGE model. These are shown in Table 4 below.

Table 4: Comparisons of Welfare Indicators for Early Partial and General Equilibrium Models SADC FTA: Eight SADC Countries

Estimated 1996 tariffs	% L Partial COMSEC 1990-92	% L Partial IDC 1991-93	% Welfare CGE ESRC 1991-93
Angola	-0.03	-0.04	0.13
Malawi	0.10	0.22	2.83
Mauritius	0.12	0.13	0.32
Mozambique	-0.03	-1.16	0.83
South Africa	0.10	0.03	0.01
Tanzania	0.01	-0.02	0.07
Zambia	-0.004	-0.34	-1.67
Zimbabwe	0.33	1.89	1.91
SADC	0.09	0.15	0.11

[Source: Evans 1997, Table S.4a, 1998 Table 2.1, 2000 Table A.1]

Note: Averages based on 1990-92 and 1991-93 structural data.

Welfare % Absorption

The first striking observation is that the orders of magnitude of the estimated employment and welfare effects are very similar. Comparing columns one and two, the estimates with a sign change difference are for Tanzania, but the absolute size of the estimate is very small. Of greater concern is the large difference in the absolute size of the estimated employment change for Mozambique and SA (SACU), a result that almost certainly relates to lower estimates in the initial height of SA tariffs. Comparing columns two and three, there are two sign change differences in the country-level effects. Using better data, there is little difference in the estimates for SA, but a worryingly large absolute difference in the estimates arises for Mozambique.

The overall SADC results are similar, in spite of the fact that the partial equilibrium models assume unemployment and the CGE model assumes full employment, and estimated welfare effects in the partial equilibrium models treated employment changes as a welfare proxy. Even though the partial equilibrium studies use employment as the welfare indicator and the CGE model makes a direct welfare calculation, the results from the three studies are very close.

3. Winners and Losers from Trade Liberalisation Shocks in Southern Africa

3.1 The Main Data Sources

Most of the structural data used in empirical calculations reported in Sections 3 and 4 is from the GTAP v.5_rev2 dataset (see *Dimaranan and McDougall eds., 2002*). This dataset was initially built for the analysis of world trade, but has subsequently been extended for other kinds of economic environmental policy analysis. The complete GTAP database for 1997 has 65 regions/countries, 57 sectors and five primary factors. Seven SADC countries are identified in this dataset (the SADC7), namely Malawi, Mozambique, Botswana, Zambia, Zimbabwe, Tanzania and SA. Trade barriers are measured by trade-weighted tariffs. Tariff equivalents were used to estimate temperate agricultural protection and Multi-Fibre Agreement (MFA) export tax equivalents. The sets in the An aggregate version of the dataset was used in this study, consisting of the countries/regions, sectors and factors shown in Table 5 below.

Table 5: Structure of the GTAP Database

Regions	Sectors	Factors
1 North American Free Trade Agreement (NAFTA)	1 Crops	1 Land
2 EU	2 Livestock	2 UnSkLab
3 ROW	3 Food_Prod	3 SkLab
4 Malawi	4 Natres_Prod	4 Capital
5 Mozambique	5 Textiles	5 Nat_Res
6 Botswana	6 Apparel	
7 Zambia	7 Oth_Man	
8 Zimbabwe	8 Post_Tele	
9 Tanzania	9 Trade_Trans	
10 South Africa	10 Oth_Services	
11 S_SE_Asia		
12 E_Asia		

The dataset is relatively disaggregated for the seven Southern African countries and the five endowment factors. In terms of sectors and the rest of the world, the dataset is highly

aggregated. The more detailed economic structure for the SADC7 countries, their average tariffs on imports and the average tariffs paid in export markets are shown in section 3.1 of the main text.

The regional disaggregation turns out to be important for the Zambia 'example'. The missing gap in the GTAP database for mapping from factor income to disaggregated households was drawn from the 1995 Zambia Social Accounting Matrix (SAM) for four types of households for post-simulation calculations of the impact on the disaggregated net income paid to the disaggregated households.¹⁹ Finally, the 1996 Living Conditions Measurement Survey (LCMS) Household Survey for Zambia was used to link income changes to changes in headcount poverty, using a National Poverty Line for the Extremely Poor.

A new set of CGE estimates of the welfare effects of a set of regional and global tariff changes are shown using the new GTAP v.5 dataset. The model used is based on the standard GTAP closure with endogenous regional savings and world factor prices set as the *numéraire*. The variation is that surplus unskilled labour is allowed in the Southern African countries, but not elsewhere. Other desired modifications have yet to be incorporated, for example constant elasticity of transformation (CET) functions on the export side and regionally differentiated Armington elasticities. As will be seen, the results are rather Ricardian, with Mozambique being the marginal country with large changes in trade patterns and welfare. The inclusion of regional Armingtons and CET functions would constrain some of these Ricardian characteristics. To solve for a 'suppose' WTO Millennium Round in 2005, the following steps were made:

- The 1997 base was shocked for the EU/SA FTA that was implemented in 1999. No data was available for the exclusions to the FTA so that the EU/SA FTA was assumed to be, as strict definition, free trade between the members.
- The updated database after the EU/SA FTA was simulated was shocked for a SADC FTA. This has been agreed but not yet implemented. Note that only seven SADC countries are included in this modelling of the FTA. Some effects of the excluded countries could be modelled by adjustment of the import taxes in the seven countries on ROW countries that are SADC members, but this has not been done here.
- The updated database from a SADC FTA was shocked for the elimination of the MFA in NAFTA, EU and the ROW. For the reasons explained below, this is not a good way to model the elimination of the MFA, but it was all that was possible in the time available.
- The 'suppose' WTO Millennium Round was modelled by a cut global trade taxes by 40%. As explained below, this is not a good way to model either changes in developed country agricultural protection or service protection.
- Base GDP and trade structure were not updated to 2005 for the final WTO Round calculations. This means that the regional weights in the calculations are for 1997, not for the estimated policy changes in 2005. Refinement of the work will consider taking this modification on board.
- There is considerable scope for refinement of the modelling of the MFA, temperate agricultural protection and service sectors, and the forward projection of GDP changes is considerable, for example using the GTAP standard model facility to directly model tariff quotas. The emphasis in this first exploration of the model is the insights gained from the present formulation of the GTAP database for identifying winners and losers amongst the poorest persons within Southern Africa, as defined.

3.2 Factor Endowments, Economic Structure, Income Distribution and Poverty

Broadly speaking, estimation of the economic welfare, income distribution and poverty outcomes of economic policy change requires data on factor endowments and economic structure that can be connected through some kind of model. The model tells how commodity and factor prices change and interact to produce outputs and incomes for firms, households and governments. In this section, detailed empirical estimates of factor endowments are

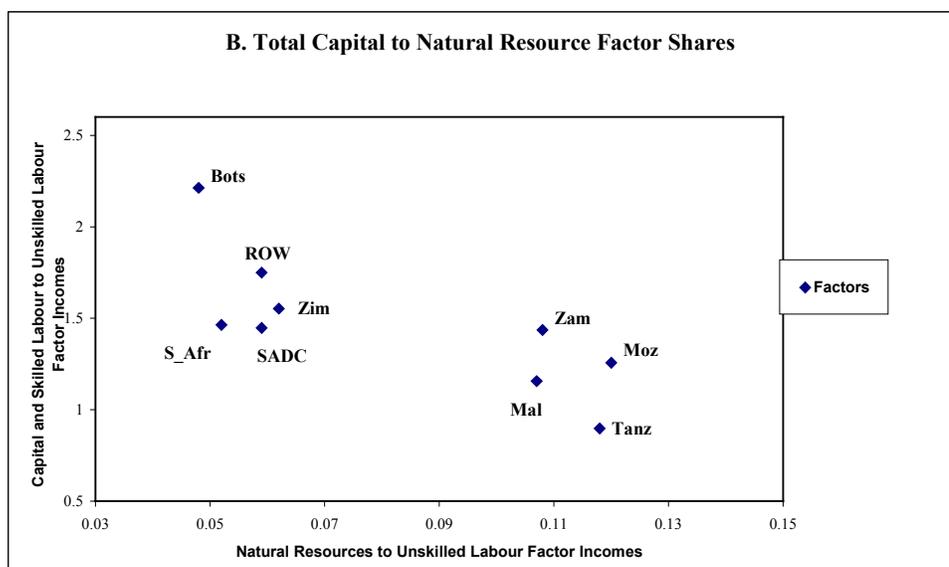
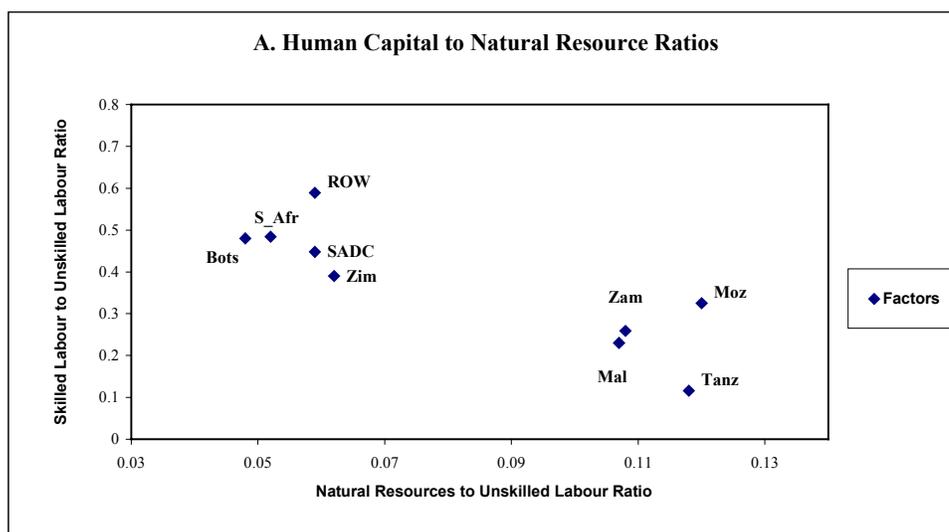
¹⁹ See Hausner (1999).

proxied by factor income shares. The economic structure for seven Southern Africa countries is then discussed, and an empirical model to link the two to determine economic welfare, income distribution and poverty impacts of trade policy liberalisation is described. Empirical impacts are discussed in Section 3.3.

The research reported in Section 1.2 links factor endowments and the pattern of trade. To the extent that there has been skill accumulation over time in SSA, it was suggested that the resulting increased skill content of exports would occur in more highly processed primary commodities, especially in countries such as SA. In this section, the factor shares in the GTAP v.5 dataset are used to provide proxies for human capital, capital and resource inputs. Building on the arguments behind the construction of Chart 1, the factor endowment ratios for the SADC7 are shown in Chart 2 below.

Chart 2: Factor Endowments in the SADC7 Countries

Factor Incomes Measured at 1997 Factor Prices in US\$ for Each Country



In Chart 2, factor endowments are proxied by factor incomes, the product of physical endowments and factor prices in each country. For the moment, it makes sense to first interpret Chart 2 as if factor prices were equal in the SADC7 countries, in which case

differences in endowments correctly reflect differences in physical resource endowments. The consequences of possible biases in factor prices between countries can then be examined.

In Chart 2 A, the SADC7 countries are identified collectively and individually, and ROW refers to the remaining 58 countries and regions in the GTAP v.5 dataset. Natural resource endowments, measured by aggregating factor returns to land and to mineral resources, are measured on the X-axis per unit of unskilled labour, and skilled labour endowments are measured at the ratio of skilled to unskilled wage income, acting as a proxy for human capital endowments. This is consistent with a world in which capital is internationally mobile and therefore not a determinant of comparative advantage. There are two important stylised facts in the SADC7 countries – that there is unemployment of unskilled labour paid roughly by a fixed wage independent of the level of employment and that the skilled labour markets clear (see Section 3.3.2 below). In this case, only skilled labour (or human capital) and natural resource endowments determine comparative advantage, and unskilled labour is a natural choice of numéraire. In overall terms, Chart 2 A suggests that the SADC7 and the ROW groups have similar resource to unskilled labour ratios, but that the ROW has markedly higher skilled to unskilled labour ratios. Within the SADC7 countries, three countries form a cluster with higher skill to natural resource endowment ratios – SA, Zimbabwe and Botswana. A second cluster of countries – Zambia, Malawi, Mozambique and Tanzania – have much lower skill to resource ratios. For all the likely errors in these data, Chart 2A serves to put the endowment ratios of the SADC7 countries into a useful context. Countries with a higher per capita income fall into the group with the higher skill to natural resource and those with a lower per capita income into the second group.

In Chart 2 B, skilled labour and physical capital are aggregated (as is often done in trade analysis to reduce the number of dimensions) and referred to as 'capital'. It is also done here because in the modelling work reported in Section 3.3, both physical capital and human capital are assumed to be internationally immobile, which means both are determinants of comparative advantage. Of course, there other ways of reducing resource endowments from three to two dimensions, but as can be seen from Chart 2 B, a broadly similar clustering of the SADC7 countries emerges, and the picture of the SADC7 countries as a whole and the ROW is similar. The only difference that emerges is that Botswana has a much higher endowment ratio of total capital to unskilled labour ratio compared to SA and Zimbabwe, suggesting that the capital intensity of mining in Botswana is high relative to that of SA and Zimbabwe.

What are the possible biases in the measurement of the resource endowments? Considering skilled labour first in Chart 2 A, it should be noted that only the differences in the ratio of skilled to unskilled wages matters in the country comparisons, since the vertical axis records only the ratio of skilled to unskilled factor incomes. In this case only inter-country differences in the ratios of skilled to unskilled wages would bias the results. When capital is added to the returns to skilled labour in Chart 2 B, substantial error is likely to enter via between-country difference in the rate of return on capital. Overall returns to capital are likely to be higher in SA compared to other Southern African countries, though in sector-specific cases the reverse may be true. In the case of natural resources, the measure is relative to unskilled labour as before. Again, no inter-country biases from factor price differentials spring to mind, but differences in the ownership structure of land and mineral resources are likely to be important for inter-country comparisons.

Following the Wood and Mayer argument reported in Section 1.2, trade policy liberalisation in the SADC7 countries is likely to lead to a marked increase in the share of primary resource-intensive exports in total exports in all of the SADC7 countries, particularly Malawi, Tanzania, Mozambique and Zambia. This outcome is also likely for Botswana, SA and Zimbabwe, but in these cases the higher initial endowments of human capital or of all capital would most likely make the progression to higher value-added, resource-based products easier.

These observations can be made more specific by examining the detailed initial economic structure of the SADC7 countries in Tables 6, 7, 8 and 9. Table 6 shows factor shares for human capital, physical capital and resources for each of the SADC7 countries, for 12 commodity groups and for the aggregate SADC7 countries. Unskilled labour is excluded from the factor shares shown because unemployed unskilled labour occurs at a fixed wage for at least the SADC7 countries, which means it is not a determinant of comparative advantage. Table 7 shows the composition of domestic output, exports and imports for the SADC7 countries and is also broken down into 12 commodity groups. In Table 8, import tariffs and

tariff equivalents of protection on imports into NAFTA, EU, ROW+ and SADC7 are shown. (ROW+ includes the 58 regions and countries in the GTAP dataset not included in NAFTA, EU and SADC7.) Thus Table 8 covers the trade barriers facing SADC7 exporters in their principal export markets and SADC7 protection of their domestic markets. In Table 9 the direction of trade for Zambia is shown to support more detailed estimates of the poverty impact of trade policy change, discussed in Section 3.4.

Table 6: Factor Endowment Ratios in the SADC7 Countries

NAFTA	1 Crops	2 Livestock	3 Food_Prod	4 Natres_Prod	5 Textiles	6 Apparel	7 Oth_Man	8 Post_Tele	9 Trade_Trans	10 Oth_Services	Total
SkLab	3.7	3.6	14.1	6.8	22.2	26.4	38.4	35.0	32.4	46.6	39.6
Capital	52.9	53.3	85.9	55.5	77.8	73.6	61.6	65.0	67.6	53.4	58.9
Resources	43.4	43.1	0.0	37.7	0.0	0.0	0.0	0.0	0.0	0.0	1.5
EU											
SkLab	12.3	11.9	17.7	6.8	35.0	25.9	41.8	35.1	24.4	35.4	33.3
Capital	56.4	56.1	82.3	56.5	65.0	74.1	58.2	64.9	75.6	64.6	65.9
Resources	31.3	32.0	0.0	36.7	0.0	0.0	0.0	0.0	0.0	0.0	0.8
ROW											
SkLab	1.7	2.1	17.5	3.6	16.3	14.7	26.8	22.3	36.7	34.5	29.6
Capital	53.6	53.7	82.5	56.7	83.7	85.3	73.2	77.7	63.3	65.5	66.7
Resources	44.7	44.2	0.0	39.7	0.0	0.0	0.0	0.0	0.0	0.0	3.7
Mal											
SkLab	1.2	1.3	5.6	3.3	8.1	7.5	6.4	12.1	20.4	43.3	18.3
Capital	61.7	61.7	94.4	39.4	91.9	92.5	93.6	87.9	79.6	56.7	73.3
Resources	37.0	36.9	0.0	57.3	0.0	0.0	0.0	0.0	0.0	0.0	8.4
Moz											
SkLab	1.1	1.6	29.0	2.4	10.0	9.1	17.9	29.3	8.8	49.0	23.6
Capital	61.8	61.7	71.0	47.3	90.0	90.9	82.1	70.7	91.2	51.0	67.7
Resources	37.1	36.7	0.0	50.2	0.0	0.0	0.0	0.0	0.0	0.0	8.7
Bots											
SkLab	1.9	2.0	20.8	1.1	39.1	35.5	15.1	21.6	9.2	30.3	21.2
Capital	61.3	61.2	79.2	87.3	60.9	64.5	84.9	78.4	90.8	69.7	76.7
Resources	36.8	36.7	0.0	11.6	0.0	0.0	0.0	0.0	0.0	0.0	2.1

Table 6: Factor Endowment Ratios in the SADC7 Countries (Cont.)

Zam	1 crops	2 livestock	3 Food_Prod	4 Natres_Prod	5 Textiles	6 Apparel	7 Oth_Man	8 Post_Tele	9 Trade_Trans	10 Oth_Services	Total
SkLab	1.2	1.2	18.7	1.0	8.0	7.3	6.0	35.8	20.9	24.3	16.8
Capital	61.8	61.7	81.3	69.1	92.0	92.7	94.0	64.2	79.1	75.7	76.2
Resource	37.0	37.1	0.0	29.9	0.0	0.0	0.0	0.0	0.0	0.0	7.0
Zim											
SkLab	1.2	1.1	5.3	4.2	11.1	23.3	10.8	33.8	19.1	45.9	24.2
Capital	61.8	61.8	94.7	78.9	88.9	76.7	89.2	66.2	80.9	54.1	72.0
Resource	37.1	37.1	0.0	16.9	0.0	0.0	0.0	0.0	0.0	0.0	3.8
Tans											
SkLab	2.0	1.9	14.2	6.8	8.1	7.5	5.2	28.6	12.6	16.8	11.4
Capital	56.0	56.1	85.8	45.2	91.9	92.5	94.8	71.4	87.4	83.2	77.0
Resource	42.0	42.0	0.0	48.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6
S Afr											
SkLab	0.9	0.9	12.3	4.0	30.3	22.4	17.1	29.0	23.2	49.2	32.0
Capital	74.4	74.4	87.7	48.3	69.7	77.6	82.9	71.0	76.8	50.8	64.6
Resource	24.8	24.8	0.0	47.7	0.0	0.0	0.0	0.0	0.0	0.0	3.4
S_SE_Asi											
SkLab	0.3	0.3	6.6	3.1	15.0	7.9	10.6	13.1	15.7	27.1	14.5
Capital	24.6	25.8	93.4	68.3	85.0	92.1	89.4	86.9	84.3	72.9	71.6
Resource	75.1	73.9	0.0	28.6	0.0	0.0	0.0	0.0	0.0	0.0	13.9
E_Asia											
SkLab	1.0	1.2	13.2	3.0	14.9	20.5	15.7	16.3	17.3	38.4	22.3
Capital	10.6	10.4	86.8	52.3	85.1	79.5	84.3	83.7	82.7	61.6	68.5
Resource	88.5	88.4	0.0	44.7	0.0	0.0	0.0	0.0	0.0	0.0	9.3

[Source: GTAP v.5_rev2 dataset]

Table 7: Economic Structure of SADC7 Countries: Output, Exports and Import Shares by Sector 1997

	Malawi			Mozambique			Botswana			Zambia			Zimbabwe			Tanzania			SA		
	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M
1 Crops	17.7	68.2	1.0	14.3	17.4	4.9	1.5	7.0	2.2	11.3	4.6	1.3	11.3	39.2	3.1	24.2	42.0	1.9	1.4	3.4	1.2
2 Livestock	1.5	0.1	0.0	2.0	0.1	0.0	1.8	0.2	1.1	2.4	0.2	0.2	2.4	0.4	0.2	2.3	1.3	0.1	2.1	0.6	0.3
3 Food_Prod	11.9	3.4	1.6	7.5	29.8	6.0	7.3	20.4	12.6	13.2	2.6	1.1	13.2	6.6	2.7	16.7	10.8	10.5	7.5	3.8	4.4
4 Natres_Prod	2.9	2.2	1.7	3.5	5.5	0.6	0.7	19.5	2.0	6.5	1.9	7.4	6.5	3.9	0.5	5.6	2.7	3.8	3.5	11.9	5.3
5 Textiles	0.9	4.1	4.2	0.3	2.4	5.1	0.0	4.6	2.1	1.5	3.3	3.4	1.5	2.4	4.3	0.3	1.5	3.1	1.6	1.7	3.2
6 Apparel	1.1	4.0	0.6	0.3	0.9	3.6	0.2	0.9	1.5	1.5	0.2	0.7	1.5	1.4	0.2	1.8	2.5	1.3	0.1	0.8	1.0
7 Oth_Man	14.6	1.5	73.6	2.2	11.4	68.0	10.2	30.0	56.4	8.9	60.8	69.0	8.9	31.1	72.2	6.9	8.0	52.0	19.6	60.7	69.1
8 Post_Tele	1.0	0.4	0.5	2.0	0.6	0.2	1.5	0.4	0.6	2.0	0.4	0.5	2.0	0.4	0.3	1.7	2.1	0.8	1.4	0.1	0.1
9 Trade_Trans	27.9	8.5	6.7	27.4	13.6	3.3	15.8	8.1	9.0	21.7	9.5	7.4	21.7	7.8	4.3	19.5	22.2	12.7	20.0	10.5	8.3
10 Oth_Services	20.6	7.6	10.1	40.6	18.3	8.2	60.9	8.8	12.4	31.0	16.5	9.0	31.0	6.8	12.1	21.2	6.9	13.8	42.9	6.4	6.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Primary	22.1	70.5	2.8	19.7	23.0	5.5	4.0	26.7	5.3	20.2	6.6	8.8	20.2	43.4	3.8	32.1	46.0	5.8	6.9	16.0	6.8
Other	77.9	29.5	97.2	80.3	77.0	94.5	96.0	73.3	94.7	79.8	93.4	91.2	79.8	56.6	96.2	67.9	54.0	94.2	93.1	84.0	93.2

[Source: GTAP v5_rev2 dataset]

Key:

Primary: Crops, Livestock, Natres_Prod

Other: Rest

Y is domestic output (Value added) at domestic prices

E is exports at world prices

M is imports at world prices

Table 8: Structure of Import Protection in SADC7 Countries 1997
Average Tariffs and Tariff Equivalents on Imports into:

Into NAFTA	NAFTA	EU	ROW+	SADC7	Total	Into ROW+	NAFTA	EU	ROW+	SADC7	Total
1 Crops	10.8	11.3	14.0	12.7	12.4	1 Crops	44.0	33.9	34.2	16.5	37.6
2 Livestock	4.2	2.7	2.0	1.8	3.6	2 Livestock	30.2	31.4	14.6	16.2	22.7
3 Food_Prod	17.6	14.6	15.4	25.3	16.0	3 Food_Prod	38.6	42.1	29.1	36.9	34.0
4 Natres_Prod	0.0	0.3	0.4	0.4	0.3	4 Natres_Prod	1.9	3.4	3.3	4.2	3.0
5 Textiles	0.0	10.4	11.6	8.3	7.7	5 Textiles	14.2	14.2	18.2	9.5	17.0
6 Apparel	0.0	14.1	13.6	12.0	11.3	6 apparel	22.5	12.3	14.6	16.6	15.7
7 Oth_Man	0.0	3.1	2.9	2.0	1.7	7 Oth_Man	7.1	10.5	9.8	8.4	9.1
8 Post_Tele	0.0	0.0	0.0	0.0	0.0	8 Post_Tele	0.3	0.3	0.3	0.2	0.3
9 Trade_Trans	0.0	0.0	0.0	0.0	0.0	9 Trade_Trans	0.1	0.2	0.3	0.2	0.2
10 Oth_Services	0.0	0.0	0.0	0.0	0.0	10 Oth_Services	0.5	0.8	0.9	0.6	0.8
Total	0.8	2.7	3.6	3.4	2.4	Total	8.6	8.4	9.7	8.6	9.1
Into EU						Into SADC7					
1 Crops	11.8	0.0	8.0	7.5	9.3	1 Crops	18.9	20.2	8.0	12.7	13.7
2 Livestock	16.7	0.0	8.1	5.5	13.5	2 Livestock	0.0	1.4	0.1	0.5	0.2
3 Food_Prod	24.0	0.0	33.1	41.5	21.9	3 Food_Prod	18.2	12.3	15.2	38.4	15.8
4 Natres_Prod	0.3	0.0	0.1	0.3	0.2	4 Natres_Prod	0.1	0.3	0.0	0.8	0.1
5 Textiles	9.0	0.0	7.4	4.4	7.0	5 Textiles	14.3	14.2	14.3	15.4	14.3
6 Apparel	11.4	0.0	8.5	11.7	8.6	6 Apparel	16.5	31.4	27.9	27.0	26.2
7 Oth_Man	2.8	0.0	2.9	1.6	2.3	7 Oth_Man	12.5	8.6	9.5	8.4	10.6
8 Post_Tele	0.0	0.0	0.0	0.0	0.0	8 Post_Tele	0.0	0.0	0.0	0.0	0.0
9 Trade_Trans	0.0	0.0	0.0	0.0	0.0	9 Trade_Trans	0.0	0.0	0.0	0.0	0.0
10 Oth_Services	0.0	0.0	0.0	0.0	0.0	10 Oth_Services	0.1	0.0	0.0	0.0	0.0
Total	3.7	0.0	3.5	3.6	2.9	Total	11.6	6.2	8.6	9.2	9.1

[Source: GTAP v.5_rev2 dataset]

Key: ROW+: ROW as previously defined plus S_SE_Asia and E_Asia

Table 9: Direction of Zambia's Trade 1997

Exports	NAFTA	EU	ROW	Malawi	Mozambique	Botswana	Zambia	Zimbabwe	Tanzania	SA	S_SE_Asia	E_Asia	Total
1 Crops	2.0	59.2	9.9	0.0	0.0	0.0	0.0	17.3	0.0	0.0	7.8	3.8	100.0
2 Livestock	17.6	29.4	23.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.6	5.9	100.0
3 Food_Prod	3.8	85.2	5.5	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.7	1.4	100.0
4 Natres_Prod	78.0	7.8	6.8	0.0	0.0	0.0	0.0	0.5	0.0	0.5	5.4	1.0	100.0
5 Textiles	0.6	95.8	1.4	0.0	0.0	0.0	0.0	1.7	0.6	0.3	0.0	0.0	100.0
6 Apparel	31.6	31.6	26.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	5.3	100.0
7 Oth_Man	9.7	20.1	20.9	0.0	0.0	0.1	0.0	2.4	0.7	2.2	38.0	5.9	100.0
8 Post_Tele	31.3	27.1	31.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	6.3	100.0
9 Trade_Trans	29.4	28.5	31.9	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.9	5.7	100.0
10 Oth_Services	21.0	28.0	41.7	0.1	0.5	0.1	0.0	1.9	0.0	0.3	3.3	3.1	100.0
Total	13.6	28.0	23.4	0.0	0.1	0.1	0.0	2.8	0.5	1.5	25.1	4.9	100.0

Imports	NAFTA	EU	ROW	Malawi	Mozambique	Botswana	Zambia	Zimbabwe	Tanzania	SA	S_SE_Asia	E_Asia	Total
1 Crops	0.8	4.0	3.2	0.0	0.0	0.0	0.0	90.3	0.0	0.0	1.6	0.8	100.0
2 Livestock	0.0	93.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
3 Food_Prod	2.8	38.7	21.7	0.0	0.0	0.0	0.0	4.7	0.0	0.0	30.2	0.9	100.0
4 Natres_Prod	4.1	19.1	49.8	6.7	0.0	4.0	0.0	1.2	0.0	1.2	12.1	1.4	100.0
5 Textiles	2.1	4.8	2.4	0.0	0.0	2.7	0.0	0.9	0.3	20.3	56.7	9.9	100.0
6 Apparel	2.7	9.6	6.8	0.0	0.0	0.0	0.0	1.4	0.0	50.7	28.8	1.4	100.0
7 Oth_Man	4.7	22.2	9.7	0.0	0.0	1.6	0.0	4.6	0.0	50.6	4.2	2.4	100.0
8 Post_Tele	31.9	27.7	31.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	6.4	100.0
9 Trade_Trans	30.0	24.9	33.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5	4.7	6.2	100.0
10 Oth_Services	31.4	29.5	29.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.5	5.4	100.0
Total	8.9	22.2	16.2	0.5	0.0	1.5	0.0	4.5	0.0	36.2	7.0	3.1	100.0

[Source: GTAP v5-rev2 dataset]

At first sight, the grouping of the SADC7 countries based on the measured factor endowments shown in Charts 2 A and 2B with high and low human capital to resource ratios does not work well for the SADC7 factor endowments and commodity groups shown in Table 6. Defining primary (resource based) commodities as crops, livestock and natural resource based products, only Malawi and Tanzania stand out as having highly resource based exports. Of the other two countries identified as having low human capital to resource ratios, Mozambique has almost 30% of its exports in processed food and most of Zambia's exports of minerals pass through the 'other manufactures' sector with minor processing. Thus, directly or indirectly, the lowest income resource abundant economies export resource intensive commodities. In the case of Zimbabwe, the high share of exports of crops from her highly productive large farms masks the high capital content of that sector. In Botswana and South Africa, high export shares of processed mineral products through other manufactures masks the extent of processed mineral products. The present aggregation of the GTAP dataset does not permit an assessment of the degree of processing of mineral exports.

Resource endowments and factor intensity of production are not the only structural features of the SADC7 countries that will affect the resource allocation response to the opening up of trade. In Table 7, the structure of tariff and tariff equivalent protection for 1997 for the SADC7 countries and major trading partners is shown. For imports into the SADC7 countries, average import weighted tariffs and tariff equivalents (except for Services, where tariffs and tariff equivalents are assumed to be zero) are 9.1%. This is the same as average protection for the ROW+ countries. In the SADC7 countries, import protection is highest in processed food, textiles and especially apparel and modest elsewhere. It is striking that average tariffs on intra SADC7 trade in 1997 were highest in processed food and apparel. In the ROW+ regions, compared with the SADC7 countries, protection is higher in agricultural products and lower in apparel. In NAFTA and EU, overall tariffs and tariff equivalents are under 3% but remain high for crop, food product and apparel imports from the SADC7 countries.

The trade policy liberalisation packages discussed in the next section have a varied impact on trade, production and factor prices depending on the initial structure of each economy described above. Roughly speaking, the overall pattern of protection in the SADC7 countries follows a pattern of protection of sectors with a relatively high human capital to physical capital input ratio, namely food production, textiles and apparel. Other manufacturing, also with a relatively high human capital to physical capital input ratio, is dominated by non-competing imports and has a low initial tariff in 1997. Thus, any trade liberalisation package that is dominated by reforms on the import side in the SADC7 countries is therefore likely to raise resource rents. However, the impact of such reforms on the returns to human and physical capital cannot be predicted in advance. In so far as trade liberalisation packages improve SADC7 country access either to world markets or just the EU, the pattern of the effects are likely to be similar. Because the ownership of resources is highly skewed: mineral resources in Zambia, South Africa and Botswana, land resources in South Africa and Zimbabwe, the poverty impacts of factor price changes cannot be directly assessed. In so far as a large component of the returns to capital in agriculture are actually returns to non-wage family labour in the poorest countries, the structural data and model may miss an important component of any poverty reduction from trade policy reform. Finally, with unskilled labour and a fixed wage, the impact of trade policy liberalisation on the employment of unskilled labour cannot be predicted in advance. To the extent that the change in unskilled employment feeds directly into poor households, an important channel for the impact of trade liberalisation is can only be determined empirically.

3.3 General Equilibrium Model Structure and Assumptions

3.3.1 Some Assumptions in the GTAP Standard Model

In the calculations reported, the GTAP standard CGE model was used. Some of the key assumptions and structural characteristics built into the general equilibrium trade model used that have important implications for the results include:

- Imperfect substitution between domestic and imported sources of supply.
- No scale economies.
- Competitive markets.
- Fully employed factors of production with a surplus labour variant described below.
- For policy analysis, a micro-based welfare function based on equivalent variation is used.

- The GTAP data set has specified a wide range of tariff and tariff equivalent 'tax wedges' that affect trade flows. The tariff equivalents are mainly used for measuring temperate country agricultural protection and the export taxes implied by the MFA.
- The multi-country/region versions of the above that include multilateral trade flows are essentially a more complex version of a single country model;
- Unskilled labour is assumed to be unemployed at a fixed price is assumed to the SADC7 countries.
- Capital internationally immobile so that each country/region has its own rate of profit/interest.
- Imperfect competition in product markets is available as a choice in the standard GTAP model but is not used here.

The modelling choice of unemployed unskilled labour at a fixed wage requires further justification.

3.3.2 Unemployment

For this modelling exercise, the choice of labour market specification for unskilled labour is between a fully clearing labour market vs some kind of institutional or Lewis surplus labour mechanism. The welfare consequences of three different combination of labour market specification are:

A. In a fully employed market for both skilled and unskilled labour, the standard GTAP welfare calculation using equivalent variation is correct one to use, subject to the normal caveats.

B. For an institutional wage for unskilled labour and full employment for skilled labour, then the final welfare effects will be as given under A., plus the general equilibrium responses to the institutional wage and the net unskilled labour employment effects. The institutional wage for unskilled labour generates several unknown sources of error arise, principally:

(i) In principle, labour mobility in and out of the pool of unemployed labour will not affect the output except indirectly through any changes in the average product of labour. However, the model does not capture changes in the average product of labour.

(ii) Estimation of the Lewis subsistence wage, the average product in the subsistence sector, may not be well approximated by the estimated institutional wage for all unskilled labour

(iii) A trade policy shock may have second order effects on the average product in the subsistence sector and therefore the unskilled wage throughout the economy.

(iv) The best that the simple specification of unemployed unskilled labour is to assume that any implicit lump-sum transfers to the unemployed will be lowered if the employment of unskilled labour expands, so that increased employment of unskilled labour will have direct welfare benefits. Conversely, a decrease in the employment of unskilled labour will have a well fare cost through increased implicit lump sum transfers.

The above does not exhaust the possibilities of alternative specification of the labour market in Southern African countries or the possible sources of error. These points at least should be borne in mind in interpreting the orders of magnitude of the differences in welfare estimates from trade shocks when full. These caveats notwithstanding, changing employment of unskilled at a fixed wage does better justice to the reality of the SADC7 countries than the neo-classical assumption of full employment.

3.3.3 Household Disaggregation and Poverty Impact of Trade Policy Reform

A simple two-stage approach to putting income poverty in to GTAP is suggested. This is done for one country, Zambia, using the mapping of factor income to four types of households in Hausner (1999)²⁰ GTAP identifies five factors of production: agricultural land, unskilled labour, skilled labour, capital and natural resources, which are very close to the Hausner definition of factors. Income accruing to these factors can be mapped to households, translating the estimates of factor income change in the GTAP model into changes in

²⁰ A sample of other recent work on SAM's with disaggregated household sector for poverty analysis includes (Arndt, Robinson and Tarp, 1999); (Arndt and Tarp, 1999), (Robilliard and Robinson, 1999). A first update of the 1995 Zambia SAM by Hausner (1999) to 1998 by David Evans, James Thurlow and Sherman Robinson is at the write-up stage.

household income identified by broad socio-economic structures. Recently, Hertel et al (2002) have developed model with 7 target countries (including Zambia) with a mapping of estimated GTAP factor income change to household income for trade policy simulation for a major global trade policy liberation scenario. Hertel et al have a far more sophisticated treatment of the household sector than was possible in this study. The overlap with Zambia in the two studies provides a useful point of comparison. Ideally, household expenditure disaggregation would have been carried out within the standard GTAP model itself. The aggregate household used in the GTAP model simulations means that there is a mis-specification of the expenditure side of the model. The error in making estimates of factor price changes is not likely to be important in the trade policy experiments considered here.

In the results reported for Zambia are 'top-down' in the sense that only quantitative and qualitative data directly incorporated into the CGE model have been used. Poverty and sector case studies are also of considerable potential use to contextualise and extend the scope of the findings.²¹ A 'bottom-up' research strategy that combines the strengths of the 'top-down' findings would, in principle, yield better results on poverty impacts than is reported here.

Trade policy reform is but one aspect of globalisation that may produce winners and losers. In reviewing the policies for pro-poor growth in a globalised economy, Howard White makes a series of policy recommendations for national governments and the international community to help countries exploit the opportunities afforded by globalisation whilst protecting the well-being of losers mitigating the adverse side effects of globalisation²². The policies reviewed cover trade and investment policy, debt, safety nets, management and maintenance of infrastructure, compensation for countries which lose from the elimination of existing distortions in the global trading system, labour and environmental standards. Where the policies applied are through the international community or a regional group, the case for using a regional model such as GTAP is overwhelming. Yet national policies of a large country, or a dominating country in a region such as South Africa, can also have widespread repercussions. Thus, there are both national and international policy agendas that produce both winners and losers. When the protection or mitigation of losses of the poorest is on the international policy agenda, it is important to develop a research tool that can help identify the winners and losers. In the area of trade and poverty, already a good deal of progress has been made by McCulloch et al (2001) in identifying the micro case study evidence that helps to build up a picture of the winners and losers from trade policy reform. Developing GTAP so that such micro evidence can be linked in a macro framework would make an important contribution to identifying winners and losers from trade policy reform.

3.3.4 The Trade Policy Experiments

The form of the trade shock experiments performed follows from totally differentiating the national accounts identity:

$$dGDE = dC + dG + dI + dE - dM \quad (1)$$

and setting $dG = 0$, $dI = 0$ and $(dE - dM) = 0$. This is standard for trade policy experiments. However, in recent versions of run GTAP, it is not possible to set $(dE - dM)$ equal to zero.²³ When $(E-M)$ is relatively large as in several of the Southern African countries, an important source of error enters into the results reported. The trade policy experiments considered were all centred on the 1997 GTAP dataset. They were:

- *Unilateral trade policy reform lowers sector tariffs as estimated for trade policy reforms under World Bank SAPs and WTO auspices in Southern Africa.* These were heavily concentrated in the period immediately after the completion of the Uruguay Round, roughly up until 1997. The impact of these changes were estimated using a back-cast from 1997 back to the initial tariffs, shown in Table 3 column (1), disaggregated to the sector level.

²¹ See for example Carvalho and White (1997), Devarajan and Robinson (2002) and Evans (2001).

²² See White and Anderson (2000).

²³ This is because the standard GTAP and related models solve the model in changes rather than levels. If $(dE - dM)$ are held constant in current prices, the model is no longer homogeneous of degree zero in prices as it should be. See Evans and Hertel (2001).

- *EU_SA FTA lowers all Agricultural and Processed Food tariffs and tariff equivalents by 50% and all other tariffs by 100%.* Negotiations for the EU/SA FTA began were drawn out over a long period of time from the mid-1990s. Arguably, these negotiations held up the implementation of the SADC FTA. Modelling the EU/SA FTA is not straightforward, because not all of the intra trade barriers were set to zero. Translating the exclusions under the agreement into tariff equivalents has only been done in recent work.²⁴ The approach adopted here is to assume that agricultural and food trade barriers are cut by 50 per cent and the rest were cut by 100 per cent on a 1997 base. This is a 'guesstimate' used to deal with the very long time horizon to 2018 when the final 'clean' FTA is reached. Subsequent to the EU_SA FTA, original EU_SA FTA has been extended to include SACU, which effectively means Botswana in these calculations, and ultimately to be extended to all of SADC. In practice, the wider WTO1 experiment considered below mirrors an EU_SADC FTA. There have been a number of other bilateral FTAs negotiated by South Africa, sometimes referred to that the 'Butterfly Agreements' such as a SA_India FTA. The impact of the new 'butterfly' FTAs is quantitatively very small and has little impact on the orders of magnitude of the empirical estimates reported below.
- *SADC7 FTA: FTA with the SADC7 countries.* The SADC FTA, implemented in 2000, was modelled for seven countries only on the 1997 base by setting the intra SADC7 tariffs and exports taxes to zero.²⁵ The strong assumption is that the rules of origin can be enforced.
- *WTO1 lowers all tariffs, export taxes and agricultural production subsidies by 40%.* This is designed to roughly capture what may result from a post Doha WTO Millennium Round. A new base was estimated including the SADC7 FTA and the EU_SA FTA before the WTO1 calculation was made. It was constructed in the spirit of the sketched in Wang and Winters (2000) whereby temperate agricultural and global manufacturing trade barriers were cut by 40 per cent. Service sectors tariff equivalents were not incorporated into the dataset, so there were no service sector effects. In a rough and ready way, by holding developing country tariff cuts to 40%, it might be argued that this takes into account negotiating credits for the SADC7 countries from their unilateral liberalisation.²⁶
- *WTO2 adds incrementally the remaining SADC6 countries to the EU_SA FTA on the base calculated incorporating experiments up to the WTO1.* In effect, WTO2 encompasses the EU agreement to lower remaining export barriers for the Least Developed Country (LDC) members of the SADC7 countries (Zambia, Mozambique, Tanzania and Malawi) agreed in 2001.

It was notionally assumed that the WTO round begins in 2005, much earlier than is now likely to be the case. No adjustments for GDP growth from 1997 were included at this stage when estimating layers of trade policy reforms that began after 1997. Thus the summation of total benefits understates the benefits of later years because the effects of growth of the base from 1997 to 2005 are not taken into account. The results are shown in the next sub-section.

3.3 Impact of Trade Policy Reform

Several aspects of background information for assessing poverty levels and potential poverty impacts of tariff reform for 1997 are shown, including \$1 and \$2 per day poverty measures for the SADC7 countries and the factor share for unskilled labour. For each of the trade policy experiments described, the % impact effects are estimated and divided into macro and micro effects. The macro effects are changes in economic welfare; changes in economic rent (land,

²⁴ See Andriamananjara and Hillberry (2001). This greatly improves on earlier work on the EU/SU FTA by Davies (1998), Lewis et al (2001), and Evans (2001), which set the intra EU/ SA tariffs to zero.

²⁵ For an overview of the impact of the SADC FTA using an earlier highly disaggregated dataset, see Evans (2000).

²⁶ See Wang and Winters (2000) who argue the case for such credits rather well. See also Evans et al (1992) for empirical calculations of the potential size of negotiating credits for the elimination of export taxes on coffee and cocoa.

skilled labour, capital and natural resources); and changes in the employment of unskilled labour – for Zambia, directly calculated changes in headcount poverty of the poorest. The micro effects are changes in output, exports and imports by SADC7 country and sector. The results are shown in Tables 10 and 11.

Table 10: Trade Policy Interventions Affecting Southern Africa: Macro Response

1997 Base	NAFTA	EU	ROW	Mal	Moz	Bots	Zambia	Zimbabwe	Tanzania	SA	S_SE_Asia	E_Asia	Total	SADC	Rest
% \$1 a day poverty	N/a	N/a	N/a	54.0	37.8	33.3	72.6	35.9	19.9	11.5	N/a	N/a	N/a	N/a	N/a
% \$2 a day poverty	N/a	N/a	N/a	N/a	78.4	61.3	91.7	64.2	59.6	35.8	N/a	N/a	N/a	N/a	N/a
Gini index	N/a	N/a	N/a	N/a	N/a	N/a	49.8	56.8	38.2	59.3	N/a	N/a	N/a	N/a	N/a
Base Share UnSkLab%	37.9	33.3	35.5	44.2	42.1	30.7	39.3	38.2	49.6	39.7	35.2	35.3	35.6	39.9	35.6

% Change Unilateral Impact by: 2002

Welfare %	0.00	0.00	0.00	1.56	5.51	9.17	1.92	6.14	1.07	3.28	0.01	0.00	0.02	3.45	0.00
Economic rent %:				0.00											
Land	-0.07	-0.42	-0.12	13.41	22.20	35.11	4.30	74.41	5.61	-10.97	-0.05	-0.04	-0.11	5.90	-0.13
SkLab	0.00	0.01	0.01	2.20	10.59	14.50	4.17	8.31	1.18	4.54	0.02	0.03	0.03	4.90	0.01
Capital	0.00	0.01	0.01	1.58	11.74	14.51	4.08	7.97	1.21	4.15	0.02	0.03	0.04	4.67	0.01
Nat_Res	-0.07	-0.16	-0.15	12.38	47.96	31.59	0.10	18.85	5.99	23.83	-0.14	-0.14	0.12	22.56	-0.13
Unskilled Labour %	0.00	0.01	0.01	2.90	11.42	17.27	3.77	11.41	1.36	5.66	0.02	0.02	0.05	5.93	0.01
Headcount Poorest %	N/a	N/a	N/a	N/a	N/a	N/a	N/a	-3.06	N/a	N/a	N/a				

% Change EU_SA FTA Impact by: 2012

Welfare %	0.00	0.00	0.00	-0.08	-0.08	-0.13	0.00	-0.05	-0.01	0.61	0.00	0.00	0.00	0.50	0.00
Economic rent %:															
Land	-0.05	-0.38	-0.06	1.59	0.37	1.24	0.01	0.97	-0.04	13.94	-0.03	-0.02	-0.07	7.01	-0.10
SkLab	0.00	0.01	0.00	-0.20	-0.16	-0.23	0.02	-0.09	-0.01	0.96	0.00	0.00	0.01	0.84	0.00
Capital	0.00	0.01	0.00	-0.26	-0.21	-0.18	0.01	-0.15	-0.01	1.06	0.00	0.00	0.01	0.83	0.00
Nat_Res	0.03	0.00	0.04	0.91	0.30	2.76	0.06	0.50	0.00	0.38	0.04	0.03	0.04	0.41	0.03
Unskilled Labour %	0.00	0.01	0.00	-0.13	-0.12	-0.38	0.01	-0.10	-0.01	1.35	0.00	0.00	0.01	1.09	0.00
Headcount Poorest %	N/a	N/a	N/a	N/a	N/a	N/a	-0.03	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a

% Change SADC7 FTA Impact by: 2006

Welfare %	0.00	0.00	0.00	1.27	1.88	0.45	0.27	1.60	0.12	0.27	0.00	0.00	0.00	0.37	0.00
Economic rent %:															
Land	0.01	0.05	0.01	-9.39	7.91	-0.60	1.61	30.18	1.28	-2.57	-0.01	0.00	0.02	1.65	0.01
SkLab	0.00	0.00	0.00	2.83	4.78	1.23	0.71	3.27	0.26	0.53	0.00	0.00	0.00	0.71	0.00
Capital	0.00	0.00	0.00	3.26	6.52	1.26	0.78	4.97	0.27	0.51	0.00	0.00	0.00	0.89	0.00
Nat_Res	0.03	0.05	0.04	1.59	13.78	-3.53	1.32	-16.51	0.50	-0.01	0.05	0.03	0.03	-0.27	0.04
Unskilled Labour %	0.00	0.00	0.00	2.68	5.47	1.68	0.74	4.79	0.32	0.70	0.00	0.00	0.01	0.98	0.00
Headcount Poorest %	N/a	N/a	N/a	N/a	N/a	N/a	-0.70	N/a	N/a	N/a	N/a	N/a	N/a	N/a	Cont.

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	NAFTA	EU	ROW	Mal	Moz	Bots	Zambia	Zimbabwe	Tanzania	SA	S_SE_Asia	E_Asia	Total	SADC	Rest
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% Change WTO1 Impact by: 2012

Welfare %	0.03	0.09	0.25	0.69	3.59	2.39	0.91	1.55	0.93	0.94	0.62	0.42	0.17	1.03	0.16
Economic rent %:															
Land	10.61	-10.68	-1.58	4.95	12.95	19.69	4.93	25.23	7.79	2.58	2.45	2.28	0.49	6.96	0.46
SkLab	0.10	0.50	1.38	1.04	7.35	4.50	1.71	2.48	1.12	1.45	2.57	2.94	0.73	1.60	0.72
Capital	0.11	0.43	1.38	1.02	8.27	4.48	1.88	3.02	1.21	1.40	2.68	3.00	0.90	1.67	0.89
Nat_Res	1.03	1.60	2.43	6.96	20.34	-3.45	5.26	8.88	4.13	6.39	-2.90	-1.99	1.27	6.25	1.22
Unskilled Labour %	0.11	0.41	1.36	1.33	7.31	5.67	2.07	3.55	1.60	1.84	2.61	2.95	0.83	2.04	0.82
Headcount Poorest %	N/a	N/a	N/a	N/a	N/a	N/a	-1.66	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a

% Change WTO2 Impact by: 2012

Welfare %	0.00	0.00	0.00	0.37	2.70	2.13	0.40	1.13	0.45	-0.06	0.00	0.00	0.00	0.12	0.00
Economic rent %:															
Land	-0.01	-0.22	-0.02	2.90	7.19	34.16	8.78	14.67	5.23	0.59	-0.01	0.00	-0.03	4.75	-0.05
SkLab	0.00	0.01	0.00	0.59	6.14	3.49	0.33	1.59	0.59	-0.12	0.00	0.00	0.00	0.10	0.00
Capital	0.00	0.00	0.00	0.72	6.50	3.26	0.38	1.94	0.60	-0.12	0.00	0.00	0.00	0.25	0.00
Nat_Res	0.00	0.00	0.01	-1.60	11.47	-11.24	2.65	-4.59	0.02	0.54	0.00	0.00	0.01	0.32	0.00
Unskilled Labour %	-0.01	0.02	-0.01	4.81	7.68	5.73	1.48	8.19	1.05	1.65	-0.02	-0.02	0.01	2.13	0.00
Headcount Poorest %	N/a	N/a	N/a	N/a	N/a	N/a	-1.11	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a

Sum all changes

Welfare %	0.03	0.10	0.25	3.81	13.61	14.02	3.50	10.36	2.57	5.04	0.62	0.42	0.19	5.46	0.16
Economic rent %:															
Land	10.54	-11.26	-1.72	11.67	50.10	88.13	19.64	144.39	19.90	-9.40	2.39	2.24	0.38	20.11	0.30
SkLab	0.10	0.53	1.39	6.41	28.65	23.54	6.93	15.50	3.14	7.45	2.59	2.97	0.77	8.15	0.73
Capital	0.14	0.44	1.43	7.49	33.32	26.28	7.18	18.40	3.29	6.33	2.74	3.06	0.98	7.88	0.94
Nat_Res	0.99	1.50	2.33	19.19	93.43	13.00	9.34	6.53	10.62	32.09	-2.99	-2.10	1.44	29.95	1.13
Unskilled Labour %	0.10	0.45	1.35	11.58	31.77	29.98	8.07	27.83	4.32	11.20	2.61	2.95	0.90	12.17	0.82
Headcount Poorest %	N/a	N/a	N/a	N/a	N/a	N/a	-6.55	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a

Notes: Base poverty data from Table 2 and GTAP v5_rev2 dataset; welfare change % GDP.

Key: Unilateral lowers sector tariffs as shown in Table 3 above.

EU_SA FTA lowers all NAF tariffs 100% and AGRIFOOD tariffs by 50%

SADC7 FTA: FTA with the SADC7 countries

WTO1 lowers all tariffs, export taxes and agricultural production subsidies by 40%

WTO2 same as EU_SA FTA except extended to all SADC7 countries

Table 11: Trade Policy Interventions Affecting Southern Africa: Micro Response

% Change Unilateral

	Malawi			Mozambique			Botswana			Zambia			Zimbabwe			Tanzania			SA		
	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M
Crops	2.9	5.9	25.9	4.1	23.1	18.0	7.4	34.4	85.9	0.7	7.5	31.2	21.2	36.6	-3.7	1.2	12.5	11.5	-2.8	16.9	39.0
Livestock	0.8	2.8	-1.2	4.9	35.2	24.1	6.5	46.6	-13.8	0.7	9.4	51.2	3.4	29.9	9.9	0.7	16.1	23.8	-2.7	20.9	-13.2
Food_Prod	1.1	11.6	30.9	8.1	38.3	27.0	2.6	38.7	65.9	1.0	8.7	35.7	3.9	51.1	50.9	-1.9	16.3	23.8	-6.9	18.0	78.3
Natres_Prod	1.9	10.5	-2.5	8.1	25.6	-5.4	3.5	12.6	-10.2	-0.3	11.9	21.3	2.4	28.2	37.6	1.0	14.6	-2.6	2.8	3.8	0.6
Textiles	3.8	18.2	14.7	6.6	41.4	5.7	53.6	57.7	13.9	-6.2	12.6	37.7	0.2	35.7	28.7	-12.2	14.8	12.0	3.4	22.4	10.4
Apparel	12.9	45.6	82.8	-18.2	108.1	12.2	-63.1	20.5	165.0	-1.2	25.6	51.3	24.1	78.6	36.8	-10.9	27.4	120.5	4.4	29.0	16.5
Oth_Man	-7.2	24.5	12.5	24.5	65.2	4.6	-3.4	52.1	44.6	2.3	17.2	13.6	-5.1	49.8	27.0	-0.4	18.5	1.6	2.9	22.7	17.1
Post_Tele	2.7	6.2	-0.7	7.1	38.2	-14.6	7.8	24.0	-5.6	2.0	5.0	-0.4	5.5	24.0	-5.7	2.2	11.3	-4.7	2.9	11.3	-2.9
Trade_Trans	2.2	5.9	-1.8	5.1	17.7	-6.0	7.6	23.7	-7.6	2.0	4.8	-1.2	6.1	20.0	-7.6	1.4	10.6	-3.9	3.5	12.0	-3.8
Oth_Services	1.9	7.1	-2.6	3.6	29.1	-9.3	5.9	35.6	-12.0	2.1	6.1	-0.9	4.5	20.0	-4.1	0.2	11.5	-4.1	2.4	12.6	-4.1

% Change EU_SA_FTA

	Malawi			Mozambique			Botswana			Zambia			Zimbabwe			Tanzania			S Africa		
	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M
Crops	0.4	1.3	-0.8	0.1	0.5	-0.1	0.3	0.7	-0.3	0.0	-0.1	0.1	0.3	0.7	-0.8	0.0	0.0	-0.1	3.5	10.4	2.8
Livestock	0.0	1.8	-0.9	0.1	0.8	-0.3	0.2	1.1	-0.9	0.0	0.1	0.0	-0.2	0.9	-1.4	0.0	0.1	0.0	1.6	3.5	5.8
Food_Prod	0.0	2.0	-1.2	0.2	0.5	-0.3	0.0	0.2	-0.7	0.0	-0.2	0.0	-0.4	-3.9	-0.5	0.0	-0.5	0.0	2.2	44.6	15.5
Natres_Prod	0.1	1.4	-0.3	0.1	0.7	-0.4	0.5	0.6	-0.3	0.0	0.2	0.0	0.1	1.0	-0.5	0.0	0.2	0.0	0.0	-0.9	0.3
Textiles	-2.5	-4.8	-1.3	-0.2	0.2	-0.5	0.0	0.2	-5.4	0.0	0.2	0.1	-0.4	-1.8	-0.3	0.0	0.1	0.0	0.6	3.7	6.8
Apparel	-14.5	-36.2	-0.8	-13.4	-35.5	0.1	-23.8	-41.0	-0.5	-0.1	-0.2	1.7	-1.0	-2.2	0.4	0.0	0.0	0.0	25.4	54.8	19.3
Oth_Man	0.4	1.8	-0.6	-1.3	-2.6	-0.2	-0.7	-1.8	-0.5	0.0	0.0	0.1	-0.1	-0.9	-0.1	0.0	-0.1	0.0	0.0	3.6	4.7
Post_Tele	0.1	2.3	-0.9	-0.1	0.6	-0.4	0.0	1.5	-0.8	0.0	0.1	0.0	0.0	0.9	-0.4	0.0	0.1	-0.1	0.5	-0.9	1.0
Trade_Trans	-0.2	1.6	-1.1	-0.1	0.7	-0.5	-0.1	1.0	-0.7	0.0	0.1	0.0	0.0	0.7	-0.5	0.0	0.1	0.0	0.5	-0.5	0.8
Oth_Services	0.1	2.2	-1.0	0.0	0.8	-0.5	-0.1	1.4	-0.8	0.0	0.1	0.0	0.0	0.9	-0.5	0.0	0.1	0.0	0.4	-0.7	0.7

% Change SADC7 FTA

	Malawi			Mozambique			Botswana			Zambia			Zimbabwe			Tanzania			SA		
	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M
Crops	-2.4	-9.8	10.5	1.2	2.8	2.3	-0.3	0.4	9.1	0.3	5.0	-1.5	3.7	-0.6	22.0	0.3	1.2	1.3	-0.8	0.9	9.5
Livestock	0.2	-11.8	8.4	1.6	20.5	2.3	-0.1	0.8	0.4	0.1	1.3	-0.3	12.1	-11.8	18.0	0.0	0.7	2.1	-0.4	0.5	-0.6
Food_Prod	0.2	-12.4	21.3	2.2	7.0	7.0	-0.1	2.8	16.3	0.1	2.3	0.9	20.5	218.7	36.7	0.5	15.4	4.6	-0.8	3.1	15.7
Natres_Prod	0.1	0.3	3.5	1.9	3.3	1.2	-0.8	-0.5	6.9	0.1	1.3	1.8	-3.7	-4.5	5.0	0.1	1.1	-0.5	0.0	-0.8	0.8
Textiles	19.0	36.5	18.8	7.9	21.6	17.7	11.1	11.5	1.0	-0.8	3.8	7.4	-1.2	16.5	15.4	0.4	1.5	0.3	1.3	7.4	1.8
Apparel	151.2	396.9	176.6	246.9	838.2	16.3	-27.4	-33.4	20.8	-1.4	19.0	27.4	3.5	44.6	171.1	0.1	3.4	3.3	0.9	11.8	14.3
Oth_Man	-6.5	4.1	11.8	21.9	45.4	3.7	3.6	7.1	0.9	1.1	5.0	3.7	-7.3	-1.1	10.4	-0.7	2.1	0.9	0.8	2.3	0.8
Post_Tele	0.4	-17.2	8.9	2.4	6.0	-0.7	0.3	-1.9	1.4	0.2	0.6	0.1	1.5	-10.3	6.9	0.2	0.3	0.0	0.3	-1.2	0.9
Trade_Trans	3.2	-11.6	9.9	2.0	-0.7	2.2	0.7	-1.2	1.3	0.3	0.6	0.0	1.0	-7.4	7.2	0.1	0.2	0.0	0.2	-0.8	0.7
Oth_Services	-0.1	-16.1	8.8	0.5	2.9	0.3	0.2	-1.4	1.2	0.3	1.0	-0.1	0.6	-11.7	8.1	0.0	0.3	0.0	0.2	-1.0	0.8

% Change WTO1

	Malawi			Mozambique			Botswana			Zambia			Zimbabwe			Tanzania			S Africa		
	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M
Crops	0.9	1.3	7.6	1.7	-1.7	9.7	3.4	7.2	16.6	0.7	-3.7	6.6	4.8	6.0	3.2	1.7	9.4	3.1	1.0	9.7	12.0
Livestock	2.4	-7.3	9.2	5.5	-7.3	48.3	3.8	-11.6	14.4	2.2	8.2	12.5	4.2	22.7	1.5	1.1	15.4	10.4	-0.5	0.3	3.5
Food_Prod	4.2	78.0	13.8	8.0	29.2	27.4	5.8	29.8	42.0	3.2	84.4	12.0	5.7	57.0	14.1	-0.1	24.0	17.1	-1.0	34.5	40.0
Natres_Prod	1.0	7.3	1.1	2.7	-6.8	7.4	-1.3	-1.2	9.5	0.7	-4.7	8.3	1.1	11.8	2.9	0.6	2.5	-0.5	0.7	0.9	1.1
Textiles	-1.9	1.8	8.9	-7.8	-0.5	5.1	5.0	5.7	-3.6	-3.3	-0.5	13.7	-0.9	9.0	12.1	-5.1	-3.1	3.9	0.4	7.4	6.7
Apparel	0.7	8.9	59.5	-9.4	32.9	9.5	-35.4	-45.5	17.9	-1.2	-11.0	27.6	8.7	35.1	55.1	-5.7	-0.7	38.9	7.5	27.0	13.0
Oth_Man	-3.6	0.1	6.2	6.7	15.2	3.6	2.1	3.5	3.3	1.4	6.0	4.7	-2.6	4.1	6.2	-1.7	13.1	2.7	0.7	3.6	3.3
Post_Tele	0.9	-2.4	1.9	5.1	4.7	2.8	1.7	-2.1	3.1	0.9	-3.0	11.9	1.5	2.0	0.7	1.1	2.6	-0.3	0.9	1.9	-0.1
Trade_Trans	0.9	0.9	2.0	4.5	-2.3	7.2	2.1	1.2	3.0	0.8	-0.5	8.4	1.6	3.9	0.6	0.8	2.3	0.0	1.1	3.2	-0.2
Oth_Services	0.6	-1.9	1.6	2.3	-1.3	4.6	1.5	-0.7	2.7	0.3	-3.1	8.6	0.9	1.1	3.5	0.1	2.0	-0.2	0.7	2.0	-0.1

% Change WTO2

	Malawi			Mozambique			Botswana			Zambia			Zimbabwe			Tanzania			S Africa		
	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M	Y	E	M
Crops	0.4	0.3	1.3	0.2	-11.7	14.2	4.3	6.0	8.7	1.6	3.1	4.8	2.7	2.7	1.9	1.2	3.0	-1.6	0.2	0.5	-0.5
Livestock	3.7	8.0	7.6	8.4	-20.6	28.3	9.0	-13.8	22.7	3.1	-3.5	15.6	2.6	-0.5	4.9	0.3	2.8	6.7	0.1	0.9	-0.2
Food_Prod	6.0	125.0	3.1	13.0	28.9	10.5	12.7	40.3	20.1	5.4	164.8	2.3	4.0	15.1	2.8	2.3	34.1	2.0	0.1	0.5	-0.8
Natres_Prod	-0.3	-4.0	-0.6	1.5	-13.3	9.0	-2.6	-2.9	6.4	0.4	-4.3	3.7	-1.1	-0.6	-1.7	0.0	-1.2	-0.4	0.1	0.4	-0.3
Textiles	-2.4	-3.2	2.0	-9.3	-9.2	1.6	-0.2	0.0	0.7	4.3	16.7	4.0	4.6	12.4	8.4	-1.2	-1.2	1.5	0.0	-0.1	-0.3
Apparel	-5.6	-6.9	9.1	-15.2	-16.2	3.6	-5.1	4.0	9.3	0.0	5.0	6.9	34.6	64.0	4.7	-5.1	0.3	39.8	0.4	0.3	-0.6
Oth_Man	-2.7	-10.4	3.7	-2.0	-1.3	3.0	-2.2	-4.4	4.6	-2.8	-3.2	2.0	-3.0	2.5	4.3	-3.3	2.0	2.9	-0.2	-0.8	-0.4
Post_Tele	0.3	-3.2	1.7	4.3	-1.8	5.7	1.2	-5.5	4.5	0.1	-2.5	9.6	1.0	-1.5	1.7	0.4	-0.6	0.8	-0.1	0.8	-0.5
Trade_Trans	0.2	-2.0	1.8	3.9	-9.4	10.2	1.2	-3.4	3.8	0.1	-2.0	6.0	0.9	-0.8	1.7	0.2	-1.1	0.9	0.0	0.6	-0.4
Oth_Services	0.3	-2.8	1.6	2.0	-8.6	7.8	1.2	-4.3	4.0	-0.3	-2.3	6.4	0.6	-2.3	4.0	-0.2	-1.1	0.5	-0.1	0.7	-0.4

Key: Y value added valued at domestic prices; E exports valued at world prices; M imports valued at world prices

Unilateral lowers sector tariffs as shown in Table 3 above.

EU_SA FTA lowers all NAF tariffs 100% and AGRIFOOD tariffs by 50%

SADC7 FTA: FTA with the SADC7 countries

WTO1 lowers all tariffs, export taxes and agricultural production subsidies by 40%

WTO2 same as EU_SA FTA except extended to all SADC7 countries

For comparative purposes, the Poverty Measures and Gini indexes from Table 2 are shown in the first three rows of Table 10. The estimate of the factor shares for unskilled labour is from the GTAP v5 dataset.

Consider each of the trade policy experiments in turn. In the case of the **Unilateral** tariff reductions in Southern Africa, the welfare impact effects in the SADC7 countries as a whole is nearly 3.5%, which is large by any standards for a comparative static result. Errors in the preliminary data are possibly largest in Botswana so the results for this country should be discounted, and the large benefit for Mozambique could be related to the large initial current account deficit (see footnote 28 above). The overall effects on factor income suggest that the strongest effects are on the % increased in economic rent for land, followed by the % increase in employment of unskilled labour. All other economic rents increase by smaller amounts than the two polar cases. Whilst there are no aggregate welfare losses for any particular country, there is a strong dispersion of the welfare benefits with the three poorest countries, Malawi, Zambia and Tanzania. Discounting the results for Mozambique, the largest benefits go to the three countries with the lowest poverty, Botswana, Zimbabwe and South Africa. On the face of it, the benefits of the unilateral trade policy reforms over the 1990s were both unevenly distributed and did not foster convergence between countries. Intra country inequality also increased substantially, for example in Zimbabwe where the % increase in economic rent on land is very much larger than for other factors or for the employment of unskilled labour. More ambiguous distribution results are suggested for South African, where the crops and processed food sectors have pressures for strong increases in imported supply with an associated fall in economic rent on land. This is in contrast with the strong increase in economic rent on mineral resources and the strong increase in employment of unskilled labour.

The estimated poverty impact of the unilateral trade policy reforms is strong for Zambia measured by the fall in headcount poverty and the increase in employment of unskilled labour. This result is confirmed by an across the board increase in factor rental, except for natural resources used by the minerals sector. Mineral rents barely rise, and from Table 11 it can be seen that Natres_Prod production in Zambia actually falls. This surprising result is probably due to the complex statistical specification of mineral production, processing and export that do not accurately reflect the economic structure of the minerals sector. Some of the imports of minerals are genuinely import competing (e.g., quarry stone and other building materials) and some imports for re-export (some copper ore). The majority of minerals exports are through the 'other manufacturing' sector where they are processed, though it is not clear how much the Natres_Prod sector has moved from being an integrated mining and processing for export sector to one where the mining and processing operations are separated out. In this statistical and structural tangle, the model appears to treat some of the re-exports of minerals as if they are imported into Natres_Prod and re-exported after processing in other manufacturing. Thus, in Table 11, under unilateral tariff changes, imports of minerals through Natres_Prod increase, production decreases, and there is a strong expansion of mineral exports through other manufacturing. For the other poorest countries Malawi and Tanzania (except Mozambique) the weak poverty response has already been noted. The poverty benefits in Zimbabwe and South Africa also appear to be strong, working through the rise in the employment of unskilled labour. This finding needs qualification on two counts. First, the wage paid to unskilled labour, particularly in South Africa, may be well above the poverty line, so that benefits to the poorest from an expansion of unskilled labour may exaggerate the poverty benefits. Second, the unilateral tariff reforms have induced a marked decline in the economic rent on land and an increase in mineral rent in South Africa. Given the strong concentration of ownership in the minerals sector, the poverty benefits from increased mineral rent are likely to be extremely small. In the primary agricultural sectors, there is also a strong concentration of so it is not possible to predict how the decline in economic rent on land would carry through to the impact on poverty.

The welfare impact of the EU/SA FTA for all of SADC is about .5%. As expected, most of these benefits are concentrated in South Africa. Improved access for SA's primary products, processed food and apparel into the EU accounts for most of this change in economic welfare, reflected in the increased exports in these sectors shown in Table 11. There is also a sharp rise in economic rent on land and a strong increase in employment of unskilled labour. As noted above, it is difficult to draw poverty reduction inferences from the rise in factor rents associated with the export expansion.

The overall welfare effect of the SADC7 FTA is nearly 0.4%, very much larger than the earlier estimates of around 0.1 per cent reported in Evans (2000). Almost all of this difference in welfare gains can be attributed to the inclusion of unemployed unskilled labour in this study. Again, although there are no estimated negative effects on welfare, the dispersion of welfare benefits is very large. Discounting the Mozambique result, the major beneficiaries are Malawi and Zimbabwe. From Table 11, it can be seen that there are large increases in trade under the SADC7 FTA particularly in Food_Prod, textiles and apparel. This reflects an increase in intra trade within the SADC7 FTA. Some of these effects are quite dramatic in % terms, particularly in textiles and apparel. However, it should be remembered that a large % change usually occurs when the initial magnitude is relatively small, as can be seen from Table 7 where the production, export and import shares for apparel are small. For Zambia, the poverty response is relatively strong, indicated by the % fall in headcount of -.7% being over two and a half times the overall welfare impact, whereas for the Unilateral tariff reforms, the fall in headcount of -3.6% is only one and a half times the overall welfare change. The message is clear for Zambia, and probably follows a similar but unmeasured poverty response in the other SADC7 countries. The Unilateral tariff reforms draw the countries in the direction of existing long run comparative advantage, benefiting resources used in primary and process primary exports and increasing factor and household income inequality. In contrast, by emphasising an increase in intra trade in manufactures and to some extent, processed food, the SADC7 FTA has a relatively stronger poverty impact. As argued in (Evans, 2000), whether a SADC FTA or low-tariff Customs Union is better for developing dynamic comparative advantage in the long run compared with continued moves towards freer trade is dependent on institutional development. It should not be a surprise that South Africa chose the more rapid development of the EU_SA FTA ahead of the SADC FTA, for as the results show clearly in Table 10, South Africa's welfare gains from the EU_SA FTA are much larger than for the SADC7 FTA.

The 'suppose' WTO1 round is a modest Doha WTO round with 40% global cuts in agricultural and manufacturing tariffs and tariff equivalents. It shows welfare benefits of slightly more than 1 per cent with much lower dispersion of the size of benefits between countries. The aggregate distributional impact for the SADC7 countries follows the same pattern as for the unilateral tariff reductions, where natural resource rents show the largest increase followed by the increased employment of unskilled labour. The % increase in all other economic rents is markedly lower. One of the differences compared with the unilateral tariff reductions is that mineral resource rents Nat_Res show a strong increase, reflecting the benefits of an all-round expansion in world trade under the WTO1. For Zambia, the poverty headcount response relative to the welfare response is similar to the SADC7 FTA and much stronger than for the unilateral tariff reforms. In other SADC7 countries, the strong % increase in the employment of unskilled labour is likely to have a powerful effect on reducing poverty. Where the ownership of land is dispersed, the strong increases in the economic rent on land will also have a pro-poor effect.

The in the WTO2 experiment, the EU_SADC7 FTA is extended to all of SADC7. Thus, WTO2 should be interpreted as an increment to the EU_SA FTA results already reported. It shows a small decrease in welfare for South Africa because the other SADC7 countries compete in the same EU markets that South Africa has greatest gains from, namely in primary sectors and apparel. The remaining SADC6 countries show quite substantial gains, except Malawi and Zambia. The over all changes in economic rents follow a familiar pattern with land leading over other factors and there is a strong unemployment effect through unskilled labour. In relative terms, the poverty effect in Zambia directly estimated is large, being well over double the size of the aggregate welfare effect.

Finally, the over-all impact of all of the trade policy changes considered is shown in the last set of results in Table 10. For SADC7 as a whole, the whole package of trade policy reforms yield an estimated welfare benefit of almost 5.5 %, a very large estimated gain for a comparative static model.²⁷ The unskilled labour employment effects combined with the economic rent changes for land and mineral resources dominate the effects on the economic rent on skilled labour and capital. This over all result follows closely that to be expected given the large changes in tariffs considered and the initial factor endowments. The impact on

²⁷ The total effects are approximated by the linear sum of the separate components, except that a new base was deployed for the WTO1 and WTO2 calculations.

Zambian headcount poverty is large relative to the overall welfare effects, reflecting the greater relative contribution to poverty reduction of the SADC FTA, WTO1 and WTO2 experiments than the Unilateral reforms. Universally in SADC, where mineral resources have a concentrated ownership structure, the rise in economic rents on mineral resources will have little direct effect on poverty. A similar observation can be made for economic rent on land in South Africa where concentrated ownership of agricultural land used in export production is likely to dampen any poverty reduction benefits. Overall, economic rent on skilled labour and capital benefits from the expanded opportunities for trade in the total package of reform considered and indirectly from the expansion of incomes from unskilled labour. Here, the final impact of increased employment of unskilled labour on poverty will depend on the relationship of the unskilled wage rate and the poverty lines, with unskilled wages in South Africa and probably Zimbabwe being well above the poverty lines.

Comparison of results with other studies is notoriously difficult. However, there are two comparisons worth making. First, with the exception of the results on the Unilateral tariff reforms and the direct links with comparative advantage factor price changes and poverty reduction estimates for Zambia, the over all thrust of the above findings follow the pattern in (Lewis et al, 2001). Second, the study by Hertel et al (2002) already discussed finds the impact of a 100% reduction in world agricultural and manufacturing tariffs yields a lowering of headcount poverty in Zambia of -.29%. This compares with an estimate of headcount poverty reduction of about -3.5% for a 40% reduction in agricultural and manufacturing tariffs and a SADC7 FTA with the EU (the WTO1 and WTO2 calculations plus the SADC7 FTA. The tariff and tariff equivalent shocks considered in this study are much lower than in Hertel et al. Since the datasets are basically the same (this study uses v5_rev2, not the final v5 version) differences must be elsewhere. The most likely candidates are the model closure, and in the method of estimation of the poverty headcount change from the Zambian household expenditure surveys. Although the method of estimation of headcount poverty change is far less sophisticated here than in Hertel et al, barring gross error in the simple headcount calculations reported, the difference is likely to arise from the labour market closures. Specifically, Hertel et al assume that all labour markets clear, whereas in this study, unskilled labour is employed at a fixed real wage. Thus, the large unskilled labour employment effects and large initial unskilled labour shares (see Table 10 above), the impact of this closure on the factor income changes used in the headcount calculations is the most likely reason for the difference between Table 10 results and the Hertel et al study.

It is very difficult to read off dynamic gains from trade policy reform and regional integration from the comparative static results and an assessment of possible sources of dynamic gains. Never the less, an assessment on the basis of available evidence, (discussed in Evans (2000)), suggests:

- *Scale Economies and Productivity Effects*

Within SADC, there are widespread opportunities for reaping scale economies outside traditional heavy industry, including the better use of infrastructure. When combined with productivity effects from trade creation and increased inducements for networking, this effect is likely to be large, especially if the trade expansion is in the context of an expansion of a rule-base trading environment. Typically, these effects are associated with increased intra trade which are likely to be associated with all of the economic reforms considered, except the SA_EU FTA taken by itself.

- *Reinvestment of Initial Gains*

SADC economies have traditionally had low rates of investment and low rates of utilisation of existing investment. If some of the excess capacity that exists in the region is taken up, and when a substantial part of the gains from freer trade are re-invested, faster growth can be expected. These gains are particularly likely to be realised when wider measures affecting the investment environment, such as greater certainty, are implemented, and when the trade reform involves an expansion of SADC7 trade as a whole with the EU, whether through the WTO1 or WTO2 routes.

Some of the above effects are once-and-for-all, such as increased capacity utilisation. Others are fully dynamic such as the reinvestment effects. Here, the dynamic benefits are treated as once-and-for-all effects. Measurement is further complicated since the options considered have different implications for the size and composition of intra SADC trade, including

different capital requirements of expansion of output. Estimation of the size of dynamic gains depends very much on successful rule based trading arrangements that would help facilitate productivity benefits through increased trade, and rule based investment arrangements that will facilitate DFI.

Another route towards including dynamic effects is to directly model total factor productivity change at in Diosa et al (2002) in a dynamic model of the FTA of the Americas and a Latin America EU FTA. Diosa et al obtained large estimates of the benefits of the FTA's considered because of the stylised endogenous specification of total factor productivity. That the dynamic effects are likely to be much greater than comparative static effects is no surprise. The catch is that empirically grounded estimates of dynamic effects are very hard to come by.

4. ADDING IN SERVICES²⁸

Since the Uruguay Round and the setting up of GATS, service sector issues have become important for all countries. Although a Doha WTO Round is unlikely to deal with services, there are already services sector issues that are important in the trade policy developments. These evolving service sector issues are of considerable importance in Southern Africa. In this section, some general service sector issues are discussed with an example showing the orders of magnitude of the empirical importance of including estimated tariff equivalents of service sectors in any global package of tariff reform. Then two examples are developed in very different contexts. The first estimates the welfare and trade pattern impact of reductions in prices of postal and telecommunications services that are happening outside trade policy agreements. The second explores the impact of changes food standards regulation in the EU on food imports from the SADC7 countries.

Generally speaking, the quantitative analysis of international regulation and market failure arises from the general principles of regulation and market failure. Applied to international regulation, there are broadly three categories of market failure to consider:

- Cross Border Externalities - imperfect information, information asymmetries, dealt with by standards
- Cross Border Scale Economies - imperfect competition, misuse of market power, dealt with by regulation
- Cross Border Public Goods

In this context, international regulation is appropriate in communities where it can be assumed that utility functions are homogeneous and a cost benefit test is passed, that is, where the benefits of regulation exceed the costs.

One of the difficulties in dealing with the quantification of the impact of standards and market regulation is that measurement is much easier to separate in principle than in practice. Hardest of all to measure are the cross border public goods. In essence, the appropriate standards and regulation of the above cross border market failures might be said to generate cross border public goods.

Measurement difficulties are compounded by the variety of methodologies used in the literature. The reason for this is apparent when one considers the types of measures applied:

- Standard tariff protection that may have some regulatory rationale
- Quantitative restriction with regulatory rationale

In practice, it is difficult to separate these out from traditional tariff and non-tariff barriers. Further, measurement of standards and regulatory intervention requires

- Import or export real border costs and real production costs associated with the application of standards and market regulation as in the aflatoxins example in food, developed below

²⁸ This section draws heavily on Evans et al (2001, ch 5). I am grateful to DG8 of the European Commission for permission to draw on the over-view of the quantitative results for this section.

- Price discrimination supported by both standards and regulation as in our post and telecoms example

These difficulties are reflected in the now large and rapidly growing empirical literature on standards and regulation. The early empirical literature stems from the estimates of standards and regulatory barriers to the EU Single Market in the 1988 Cechini Report, surveyed and summarised in Evans et al (2001, ch5 and Appendix 2). Some of the more recent empirical estimates of the cost impact of standards and regulation with direct relevance to Southern Africa were applied to an extension of the GTAP based CGE model already discussed in section 3 above and reported in detail in chapter 5 of Evans et al.

The overall importance of introducing services into calculations of the impact of trade policy reform and the specific examples with implications for Southern Africa is:

- **Quantitative importance of Services Protection in World Trade.** The levels of trade protection in the world economy around 1997, including some early estimates of the tariff equivalents of the consequences of regulatory protection and market failure in services, including Southern Africa. The quantitative importance of including the service sector liberalisation with further manufacturing and agricultural sector liberalisation is illustrated.
- **Post and Telecoms.** The impact of bilateral, MFN and multilateral routes to markets reform in the presence of cross border scale economies are illustrated with particular reference to Southern Africa.
- **Aflatoxins.** The impact of regulatory standards affecting aflatoxin levels in food imports into the EU: a case study of cross border externalities arising from imperfect information. The orders of magnitude of the costs of applying EU vs. CODEX standards on some Southern African exporters and the associated trade diversion are estimated.

Quantitative importance of Services Protection in World Trade

Hoekman (1995) examines specific Commitments under GATT and their quantification. He classifies each country's GATS commitments for each of 155 possible services sectors and each of the four modes of supply in terms of the extent to which they indicated restrictions on market access. The resulting estimate of tariff equivalents for the service sectors with the estimated tariffs and tariff equivalents for agriculture, mining and manufacturing previously shown for the 1997 GTAP v5_rev2 dataset are in Table 13 below:

Each coverage index is then multiplied by the tariff equivalent benchmark guesstimate to obtain the country/sector specific tariff equivalent. The highest tariff equivalent guesstimates are for transport and the lowest are for construction and wholesale and retail trade. Financial and personal services fall in between. The resultant estimates of the tariff equivalents are shown in Table 12 below.

Table 12: Global Protection in 1997 Including Services Tariffs and Tariff Equivalents

	NAFTA	EU	ROW	SADC7	S_SE_Asia	E_Asia
1 Crops	12.4	4.4	37.1	18.8	18.2	62.4
2 Livestock	3.6	3.7	30.4	3.1	17.7	7.2
3 Food_Prod	16.0	8.4	42.0	43.0	24.6	26.2
4 Natres_Prod	0.3	0.1	1.9	0.5	5.5	3.6
5 textiles	7.7	2.5	11.8	13.9	33.0	11.8
6 apparel	11.3	4.9	13.9	30.0	20.3	10.5
7 Oth_Man	1.7	0.9	7.5	5.9	15.8	7.8
8 Post_Tele	12.5	15.6	116.1	48.5	64.0	13.0
9 Trade_Trans	69.0	43.5	79.5	90.6	88.0	94.0
10 Oth_Services	14.8	10.4	27.5	23.2	19.0	26.7
Total	6.4	5.1	16.9	13.4	18.7	13.1

Source: GTAP v5r2 database and Hoekman (1995).

The average tariff and tariff equivalents for agriculture and manufacturing correspond to the estimates shown in Table 8. The averages differ because the introduced service protection requires a re-balancing of the GTAP dataset. In the process, the underlying trade flows used for regional aggregation change, throwing up the different average tariffs and tariff equivalents in the regional aggregations reported in the two tables.

Clearly, the order of magnitude of Hoekman's service sector estimates of tariff equivalents are very large compared with the manufacturing sector, where many GATT rounds have effectively eliminated tariffs in the OECD countries. Thus there is a concentration of higher levels of protection in agriculture, food products, textiles and clothing and the service sectors as shown in Table 12. Overall, it remains that the lowest average levels of import protection are NAFTA and the EU.

The importance of liberalisation in service sectors to eliminate price discrimination supported by regulatory practices can be put into sharper focus by considering the welfare impact of a global round of trade liberalisation that concentrates first on agriculture and manufactures, and one that is extended to services as well. The detailed specification of the WTO1 experiment is the same as described in section 3.3.4 above. This experiment is also modified to WTOIS to include services. The results of these experiments are shown in Table 13 below.

Table 13: Welfare Impact of WTO Round With and Without Services

All Tariff and Tariff Equivalents Cut 40% for

WTO1: Agriculture and Industry

WTO1S: Agriculture, Industry and Services

% Net Factor Income	Efficiency and Employment Gains	Terms of Trade and Other	Total	Efficiency and Employment Gains	Terms of Trade and Other	Total
1 NAFTA	0.033	0.002	0.036	0.237	0.038	0.275
2 EU	0.105	0.06	0.165	0.534	0.015	0.549
3 ROW	0.326	-0.023	0.304	0.728	-0.035	0.693
4 Malawi	0.106	0.106	0.212	0.416	0.173	0.589
5 Mozambique	1.613	1.135	2.748	2.334	1.549	3.873
6 Botswana	0.718	0.151	0.871	1.108	0.178	1.284
7 Zambia	0.138	0.316	0.451	0.595	0.388	0.983
8 Zimbabwe	0.435	-0.251	0.185	1.135	-0.341	0.795
9 Tanzania	0.173	-0.238	-0.065	0.882	-0.27	0.614
10 SA	0.239	-0.057	0.182	0.629	-0.077	0.552
11 S_SE_Asia	0.813	-0.317	0.497	1.765	-0.237	1.528
12 E_Asia	0.526	0.029	0.555	0.972	0.068	1.04
Total	0.201	0	0.201	0.573	0	0.573
SADC	0.266	-0.046	0.220	0.687	-0.061	0.626
Rest	0.206	-0.001	0.205	0.579	-0.001	0.578

[Sources: Estimates of a 'suppose' WTO Round from Evans (2001) extended to Services.]

Note that welfare gains are shown as a % of net factor income rather than GDP as in Table 10. Since net factor income is smaller than GDP, the estimated welfare effects are slightly higher in Table 13.

The welfare effects shown in Table 13 are divided into two components. The first is the efficiency and employment effects, and the second is terms of trade and capital goods revaluation effects. The efficiency effects are the standard consumer and producer surplus changes, calculated as the equivalent variation. As before, the employment effects are only relevant for the SADC7, where the unskilled labour market is modelled by setting the unskilled wage at the base year rate as in section 3. In Table 13 the experiments WTO1 and WTOIS show strong positive efficiency and employment benefits in each region but positive and negative terms of trade effects. The latter sums to zero by definition for the global economy. Under are estimated to be 0.2% of global net factor income. This is slightly more than estimated for WTO1 in Table 10 because of the effects of rebalancing the base data to allow the service sector tariff equivalents to be included and because the Table 10 estimates are measured as a % of GDP. With services included in the 40% cut in tariffs and tariff equivalents under WTO1S the total welfare benefits increase to nearly 0.6 % of global net factor income and an increase in the estimated welfare effects nearly three times compared with the WTO1 excluding services.²⁹

Aflatoxin Standards and EU Imports for Food Products from Africa

The growing concern over health risks associated with food products has prompted revisions in Sanitary and Phytosanitary Standards (SPS) in industrialised countries. Such regulatory intervention with the intent to protect human health can lead to significant costs, especially for developing countries attempting to penetrate developed country markets. Food exports subject to SPS may involve rejection of imports following border inspection. The costs from import rejection will in turn involve *losses in the value* of the product, but also *transportation* and other *export costs*, all of which are incurred by the exporter. Compliance requirements on exporters will impose further costs – *upgrading production systems, processing and storage equipment, quality controls* - which are certainly non-trivial, especially for developing countries.

Estimation of the tariff equivalent of Food Standards such as Aflatoxins can be based on the gravity model estimates by Otsuki et al (2001) of the impact of changing regulations governing aflatoxins in food imports from Africa into the EU. The Otsuki study examines changes in trade flows into the EU where each member country had different Aflatoxin standards historically. The results suggest that the implementation of the new aflatoxins standard in the EU will have a negative impact on African exports of cereals, dried fruits and nuts to Europe. The EU standard would reduce the health risk by approximately 1.4 deaths per billion a year, a negligible change, whilst African exports would be cut by 64 per cent or US\$700 million in 1998 prices. This contrasts with regulation set at an international standard CODEX.

To provide an estimate of economic welfare cost, it is necessary to estimate the tariff equivalents of the Aflatoxin standards. The estimated import elasticities of standards are translated into tariff equivalents using an estimate of import demand elasticities. The tariff equivalents of the standards elasticities are then used in the GTAP modelling framework to estimate welfare and trade diversion effects.

This section explores the economic costs of regulation of the level aflatoxins in food imports into the EU where the regulation affects real border costs and real production costs. Such regulation is likely to incur welfare costs and results in trade diversion. This case study only deals with the economic costs of regulation of aflatoxins and does not take into account the benefit of lives saved by the regulation of aflatoxin levels. Ideally, the real border and production costs of the regulation of aflatoxins would be estimated by direct observation. In practice, this is very difficult and time consuming. However, the gravity model fitted for imports from Africa to 15 countries of the EU for cereals & preparations, nuts & dried fruit by Otsuki et

²⁹ The estimated welfare benefits of a WTO1S round with tariffs and tariff equivalents cut by 40 per cent across the board are about \$142 billion in absolute terms. This estimate looks rather smaller than the estimated benefits of over \$600 billion from a 30 per cent across the board WTO Round by Brown, Deardorff and Stern (2001). However, approximate accounting for growth effects from 1997 to 2005 to the base year 2005 from which the WTO Round reforms are assumed to apply increases the benefits by about one third. The introduction of scale economies and imperfect competition would further increase the benefits by two to three times. These adjustments would be likely to increase the welfare benefits to well over \$500 billion i.e. comparable to the Brown, Deardorff and Stern estimate. It should be stressed that these estimates are only illustrative of the overall importance of liberalisation of price discrimination supported by regulation in the service sectors.

al (2001) discussed above can be utilised to obtain estimates of the tariff equivalents of the existing aflatoxins standards applying. This was done by translating the gravity model estimates of the changes in imports into tariff equivalents using an estimate of the import elasticity of demand or the elasticity of standards.

The final step in the aflatoxins case study, the application of the EU tariff equivalents for EU and CODEX standards obtained into v5_rev2 categories, is shown in Table 14 below. The estimates of the welfare costs of the EU and CODEX Aflatoxin standards are shown in Table 15 below are intended only to illustrate the mechanisms at work in estimating the welfare and South African export effects.³⁰

Table 14: Estimates Tariff Equivalents of Aflatoxin Standards on African Imports into the EU

Units: current \$m 1998				
<i>EU Standards</i>				
	EU Imports Base 1998	EU Imports Predicted	Elasticity of standards	EU tariff equivalent
1. Cereals and preparations				
	297	120	4.4	31.3
2. Dried fruit and nuts				
	472	252	4.4	18.5
<i>Codex Standards</i>				
1. Cereals and preparations				
	297	501	4.4	-8.9
2. Dried fruit and nuts				
	472	539	4.4	-4.1

[Source: Own estimates, based on Otsuki et al (2001)]

³⁰ The Aflatoxin standards only affect components of the aggregate GTAP v5rev2 sector crops. The tariff equivalents for aflatoxins are treated as normal tariffs within the GTAP model used whereas in fact there should be a price wedge between domestic and world prices with no revenue effects. The volume of trade and production identified is so small a share of overall economic activity that the revenue effects of the tariff equivalents are spread over very large numbers.

Table 15: Impact of EU and CODEX Aflatoxin Standards on EU Imports from Africa
EU Standards: Welfare

% Net Factor Income 1997	Efficiency and Employment Gains	Terms of Trade and Other	Total
NAFTA	-0.006	0.023	0.018
EU	-0.052	0.165	0.112
ROW	-0.015	-0.025	-0.040
SADC5	-0.047	0.039	-0.005
Zimbabwe	-1.773	-8.685	-10.472
SA	-0.832	-2.840	-3.672
S_SE_Asia	0.001	0.008	0.010
E_Asia	-0.002	0.006	0.003
Total	-0.018	0.000	-0.018

EU Standards: % Change in South African Exports to:

	NAFTA	EU	ROW	SADC5	Zimbabwe	SA	S_SE_Asia	E_Asia
Crops	6.73	-52.33	6.83	13.83	-4.7	-1.54	0.1	0.08
Livestock	5.97	6.11	5.8	22.47	-2.62	-1.19	0.05	-0.03
Food_Prod	2.48	2.58	2.47	6.99	-4.83	-0.69	0	-0.01
Natres_Prod	0.11	0.08	0.1	-0.07	1.05	0.09	0	0
Textiles	0.81	0.84	0.81	1.66	-1.62	-0.02	0	0
Apparel	1.51	1.55	1.53	2.27	-5.79	-0.17	0	-0.01
Oth_Man	1.08	1.1	1.06	1.73	-2.57	-0.25	0	0
Post_Tele	0.83	0.84	0.83	2.91	-3.06	-0.38	0	0
Trade_Trans	0.87	0.87	0.86	3.09	-3.63	-0.42	0	0
Oth_Services	0.78	0.79	0.78	2.66	-4.21	-0.36	0	0

CODEX standards: Welfare

% Net Factor Income 1997	Efficiency and Employment Gains	Terms of Trade and Other	Total
NAFTA	0.001	-0.006	-0.004
EU	0.014	-0.041	-0.028
ROW	0.004	0.008	0.012
SADC5	0.008	-0.016	-0.013
Zimbabwe	0.388	1.939	2.327
SA	0.185	0.643	0.824
S_SE_Asia	0.000	-0.002	-0.002
E_Asia	0.000	-0.001	-0.001
Total	0.005	0.000	0.005

Codex Standards: % Change in South African Exports to:

	NAFTA	EU	ROW	SADC5	Zimbabwe	SA	S_SE_Asia	E_Asia
Crops	1.18	1.29	1.11	4.5	1.06	0.35	-0.02	-0.02
Livestock	0.9	1	0.84	3.45	0.58	0.27	-0.02	0.01
Food_Prod	0.28	0.33	0.26	0.9	1.07	0.16	0	0
Natres_Prod	-0.01	-0.01	-0.01	0.08	-0.23	-0.02	0	0
Textiles	0.04	0.06	0.03	0.13	0.36	0.01	0	0
Apparel	0.09	0.11	0.08	0.4	1.29	0.05	0	0
Oth_Man	0.07	0.08	0.07	0.19	0.57	0.06	0	0
Post_Tele	0.09	0.09	0.08	0.36	0.68	0.09	0	0
Trade_Trans	0.09	0.1	0.09	0.44	0.81	0.09	0	0
Oth_Services	0.08	0.08	0.08	0.35	0.94	0.08	0	0

For the EU, there are efficiency losses from the EU standards but terms of trade benefits from the decline in import demand that there is a net welfare gain.³¹ For the main identified African suppliers, South Africa and Zimbabwe, there are significant welfare losses. On the export side, South African exports of crops to the EU decline dramatically, switching to other export destinations such as NAFTA and the ROW.

The application of CODEX standards has rather different effects. For the EU, the fall in the domestic price for crops leads to a fall in domestic production and increased imports with adverse terms of trade effects. There are positive efficiency gains but negative terms of trade effects and the net effect is a decline in welfare. Both Zimbabwe and South Africa have efficiency gains and benefits from improved terms of trade. For South Africa, exports of crops increase to her main markets, especially to the EU.

³¹ Particular care must be taken in interpreting the terms of trade effects since these are likely to be exaggerated in the formulation of the GTAP model used.

Reform of Post and Telecom Market Structure

The above example showing the importance of introducing the service sectors into a global trade round does not flesh out the importance of different sectoral approaches to liberalisation. Here, an example based on Post Services and Telecommunications is developed to illustrate with a concrete example the well-known general welfare and trade diversionary effects of bilateral, MFN and multilateral reform. Table 16 shows the Hoekman (1995) estimates of tariff equivalents of price discrimination for postal services, basic telecoms and value added telecoms for six countries or regions for the base year 1995. The aggregated estimates for 1995 for Hoekman's regions were brought forward to 1997 by assuming that the value added telecoms tariff equivalent applied in 1997, except for Mexico, where little liberalisation was shown for 1995. The Hoekman tariff equivalents were applied to the GTAP v5_rev2 dataset described in section 3.³²

³² For the most part, this worked in an obvious way. The arbitrary components were the use of Mexico for the ROW, India for S_SE_Asia, Japan for E_Asia, and S_Africa for the rest of Southern Africa.

Table 16: Estimated Tariff Equivalents in Post and Telecom Markets

Tariff equivalents Hoekman (1995) sectors and regions

Regions	Sectors			Post_Tele		
	Post	Basic Telecoms	Value added Telecoms	1995 base	1997 est.	2000 target
US	200	13	13	23	13	0
EU	200	200	25	124	25	0
Japan	200	75	13	61	13	0
Mexico	100	40	200	116	116	0
US	200	13	13	23	13	0
India	200	200	64	141	64	0
SA	25	200	50	117	50	0

Tariff equivalents GTAP Post_Tele and Regions

GTAP regions				Post_Tele		
				1995 base	1997 est.	2000 target
NAFTA				23	13	0
EU				124	25	0
ROW				116	116	0
SA				117	50	0
S_SE_Asia				141	64	0
E_Asia				61	13	0

[Source: Hoekman (1995), Hertel et al (2000) and own estimates]

The next set of tables connect the different ways in which liberalisation of Post_Tele is carried out between 1997 and 2000. Three variants are considered: bilateral reform between the EU and NAFTA, MFN reforms in the EU and NAFTA and full multilateral reform. In Table 17, the estimated welfare impact of bilateral reforms between EU and NAFTA is shown.

Table 17: Welfare Impact of Bilateral Reform in EU and NAFTA of Post_Tele Market Structure: 1997-2000

% Net Factor Cost 1997	Efficiency and Employment Gains	Terms of Trade and Other	Total
NAFTA	0.097	0.078	0.174
EU	0.211	-0.014	0.197
ROW	0.005	-0.057	-0.053
SADC5	-0.068	-0.308	-0.342
Zimbabwe	0.000	-0.089	-0.089
SA	0.000	-0.017	-0.017
S_SE_Asia	0.083	-0.108	-0.025
E_Asia	0.033	-0.066	-0.033
Total	0.093	0.000	0.093

In the case of bilateral reform, the welfare gains are concentrated in the two reforming partners, the EU and NAFTA. The imports of post-and telecom services also increase. However, notice that the EU, already a large importer of post_tele, experiences a terms of trade loss whilst NAFTA, a major exporter of post_tele has a large terms of trade benefit. This concentration of the welfare benefits begins to change in the MFN example shown in Table 18, where other exporters of post_tele services also benefit from the opening up of the EU and NAFTA markets and the welfare benefits increase by over 50%.

Table 18: Impact of EU and NAFTA MFN Reform of Post_Tele Market Structure: 1997-2000

% Net Factor Cost 1997	Efficiency and Employment Gains	Terms of Trade and Other	Total
NAFTA	0.138	-0.007	0.131
EU	0.382	-0.206	0.176
ROW	0.008	0.138	0.146
SADC5	0.274	0.650	0.855
Zimbabwe	0.089	0.357	0.446
SA	-0.055	0.025	-0.030
S_SE_Asia	-0.033	0.248	0.215
E_Asia	-0.045	0.144	0.100
Total	0.148	0.000	0.148

The final example is the multilateral reform, shown in Table 19 below. In this case, the estimated welfare benefits dramatically increases and the imports of Post_Tele services increases across the board. Behind the increase in traded Post_Tele services is a terms of trade improvement which continues to benefit NAFTA and now benefits S_SE_Asia and E_Asia and harm the EU and the ROW.

Table 19: Impact of Multilateral Reform of Post and Telecom Market Structure: 1997-2000

% Net Factor Cost 1997	Efficiency and Employment Gains	Terms of Trade and Other	Total
NAFTA	0.173	0.099	0.272
EU	0.434	-0.065	0.369
ROW	1.937	-0.099	1.838
SADC5	2.325	-0.068	2.256
Zimbabwe	1.515	0.178	1.604
SA	0.338	0.004	0.342
S_SE_Asia	1.755	0.261	2.016
E_Asia	0.115	0.213	0.328
Total	0.837	0.000	0.837

5. CONCLUDING REMARKS

The known wide disparities in the level of development between countries sharpen the potentially uneven distribution of benefits of trade policy liberalisation, whether unilateral or multilateral. This basic structural feature of Southern Africa showed up in actual disparities in the gains from trade policy liberalisation discussed.. The early studies showed wide variability of the distribution of gains from a SADC FTA both within and between countries. However, because of data gaps and unreliability and the use of simpler models, the particular findings were always subject to strong qualification. The more recent empirical work found that the unilateral trade policy reforms in Southern Africa had powerful welfare and employment benefits, as did global reforms. Regional reforms such as the SADC FTA had useful but much smaller benefits. Typically, the country results were polarised with the weaker countries benefiting least from the reform packages considered, and the poverty impact was ambiguous. The strong employment benefits estimated for unskilled labour were usually counter balanced by strong benefits to the owners of mineral and land resources where ownership is mostly heavily concentrated in the countries with greatest gains.

With services included in multilateral trade policy reform, the estimated comparative static benefits of trade policy reforms roughly double. Alternative packages of reform of food standards and pricing structures in post and telecommunications have powerful welfare and trade restructuring effects at the sector level.

To summarise: first, the empirical basis for understanding the impact of alternative packages of trade policy reform, unilateral, regional and multilateral, has been greatly deepened by the modelling possibilities of new GTAP dataset. It is now possible to link welfare, employment, income distribution and to some extent poverty impacts of regional economic policy change in a global context. An important part of this deepening of understanding came from the link with other studies based on the historical accumulation of key resources, human capital and natural resources. Second, there is obviously scope for improving the model estimates used in this study through a more appropriate selection of sectors, increasing the number of countries with direct estimation of poverty impacts, and improving model specification. Finally, the important research synergy from linking the CGE model and estimates to earlier studies focussing on factor endowments and the pattern of trade could be extended in many other ways, particularly to the use of poverty case study material.

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