Consequences of the Doha Round Trade Reforms for Africa

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Abstract

This paper provides a quantitative estimate of the potential economic consequences of multilateral trade reform for Africa using a framework that explicitly incorporates issues of concern to the region, such as preference erosion, loss of tariff revenue, and trade facilitation. The results suggest that while African countries would derive modest gains from full liberalization in a static model, the gains are likely to be substantial in a dynamic setting. Furthermore, they suggest that countries in sub-Saharan Africa are likely to incur losses under partial reforms. Since other regions of the world derive positive gains from partial reforms and it is unlikely that there will be complete liberalization in the current round of negotiations, the results underscore the need for development issues to be taken more seriously in the negotiations. More specifically, they stress the need to strengthen special and differential treatment provisions for African countries, and least developed countries in general, to allow them cushion the likely negative impact that may result from partial reforms.

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I. Introduction

In recent years, multilateral trade negotiations have occupied center stage in economic policy discussions in the African region. This reflects partly the emerging consensus that trade has an important role to play in the economic development of the region. It also reflects the understanding that African countries have to be more active in trade negotiations in order to protect their interests.

Although African countries are making efforts to increase their involvement in the multilateral trading system, they are concerned that they have not been able to obtain any significant benefits from the huge gains resulting from an increase in world trade and finance in the last decade. Two key factors have contributed to this phenomenon. The first is the lack of appropriate domestic policies to reduce transactions costs and lift supply constraints. The second is the protective agricultural policies and trading practices of member countries of the Organization for Economic Cooperation and Development (OECD), which limit the trading opportunities available to the region. In 2002, governments, consumers and taxpayers in OECD countries transferred over $234 billion to their agricultural producers (OECD 2003). Such agricultural support encourages over-production and export dumping by producers in OECD countries thereby depressing world prices and forcing African competitors to struggle for survival or exit the market.

This paper is one in a series of recent efforts that have been made to assess the implications of trade liberalization for Africa (Anderson et al. 2001; Ianchovichina et al. 2002). Its main objective is to provide a quantitative estimate of the potential economic consequences of multilateral trade reform for Africa using a framework that explicitly incorporates issues of concern to the region, such as preference erosion, loss of tariff revenue, and trade facilitation.[1]

The experiments conducted in this paper are based on the GTAP (Global Trade Analysis Project) model, which is a multi-sector and multi-region general equilibrium model widely used by trade analysts to examine the impact of trade policies. Three trade reform scenarios, capturing different degrees of trade liberalization, are considered. These are "little," "modest," and "full" trade liberalization scenarios. The paper focuses on the impact of reforms at the sub-regional level for North Africa, sub-Saharan Africa, and Southern Africa. The focus on sub-regional, as opposed to country, level impacts can be ascribed to the fact that most African countries are not in the GTAP database and so it is not possible to conduct country level analysis. That said, to the extent that groups of countries have similar structures and trading patterns, the results could be used to draw general inferences on how the reforms might affect individual countries.

The paper makes several contributions to the existing literature. First, the model used for the analysis incorporates unemployment of unskilled labor, which is a very important feature of African countries and has implications for the results. Second, the paper estimates trade and welfare in Africa under a mid-term baseline run that reflects the altered policy landscape in which Doha outcomes are to be implemented eventually. The baseline includes full implementation of Uruguay Round commitments; the Agenda 2000 measures of the EU Common Agricultural Policy; and the enlargement of the EU to include ten Eastern European countries. It also assumes

[1] See (ECA 2004) for more information on the model and results.

the full phase out of the Agreement on Textiles and Clothing (Multi Fiber Agreement) and the integration of China into the WTO.

Third, substantial effort was made to incorporate preferential trade conditions in the tariff data, as well as differences between bound levels and applied rates. Many African countries are major beneficiaries of trade preferences, and the erosion of preferences under a global liberalization of border measures is of concern to them. It is shown that the existence of trade preferences and significant differences between bound and applied tariffs moderate the gains from trade reform, and make beneficiaries of preferences vulnerable to partial reforms.

Finally, the policy experiments conducted in the paper are based on the key interests of Africa in the Doha round. Emphasis is on the relative importance of the three pillars of the agriculture negotiations (market access, export competition and domestic support), non-agricultural market access as it relates to manufactures, and trade facilitation.

The paper is organized as follows. Section 2 examines the structure and pattern of Africa's trade. Section 3 describes the basic structure of the GTAP model that is used in the analysis. Section 4 discusses the implications of trade preferences and differences between bound and applied rates for the analysis. Section 5 presents the simulation results and section 6 contains concluding remarks.

II. Structure and Pattern of Africa's External Trade

Africa's trade potential has remained unfulfilled in the last 5 decades. While global trade volumes nearly doubled each decade, the African share in world trade gradually declined from over 7 per cent after WWII to just over 2 per cent in 2002 (Figure 1) (WTO 2003). Growth of merchandise exports and imports is positive, albeit moderate (Figure 2).

Figure 1: African merchandise trade volume 1990-2002 (Billion US Dollars)

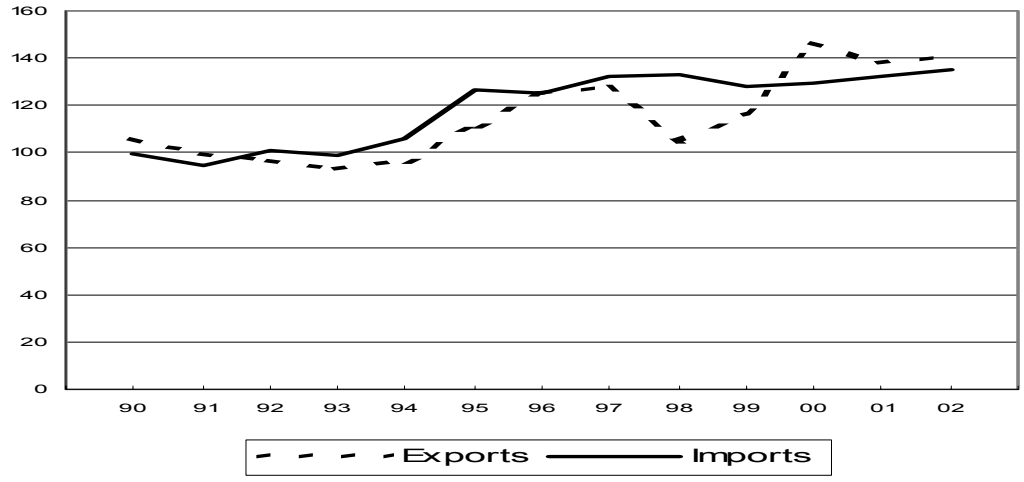
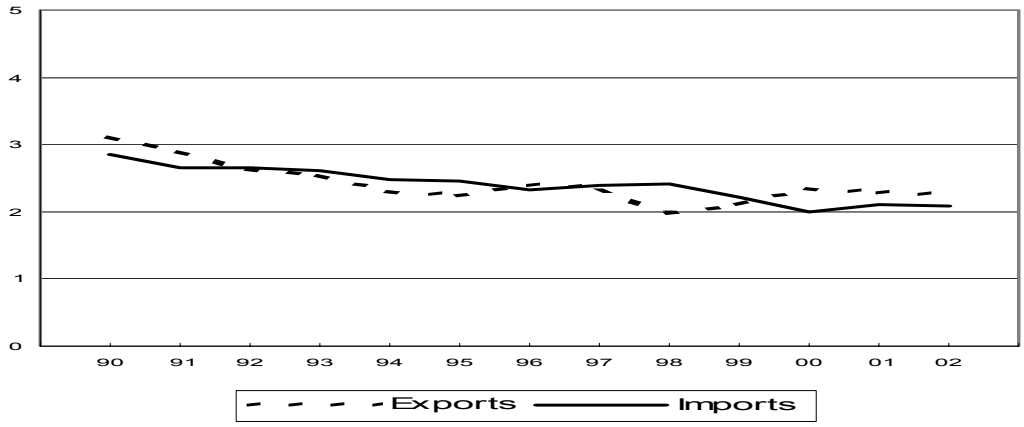


Figure 2: African share in world merchandise trade, 1990-2002 (%)



The declining share of Africa in global trade can be explained by the continent's prevailing specialization in mining products and primary agriculture. Trade in manufactures and in processed agricultural products has been the main drivers of worldwide trade growth, and African producers have been unable to benefit from this expansion. Prices of some of the main African export commodities are generally low, reducing trade volumes in value-terms. Prices for cotton, cocoa, coffee and groundnuts are currently at low levels.

Exports of agricultural products accounted for $22 billion in 2002, or 16 per cent of total African merchandise exports. Fuel exports account for half of total exports, or a flow of $67 billion. The remainder is accounted for by manufactures. In 2002, Africa's exports of clothing ($7.4 billion), machinery and transport equipment ($7 billion) and iron and steel ($2.9 billion) expanded faster than world trade in these categories (WTO, 2003).

Sub-Sahara Africa accounts for approximately 40 percent of total exports from Africa, and for over half of agricultural exports. Nigeria and Angola are main exporters in the region, a reflection of large oil and diamond resources. Main agricultural exporters are Côte d'Ivoire, Kenya, Zimbabwe and Cameroon. A large set of countries has low export volumes.

An important way for African countries to increase their share of world trade is through an increase in intra-African trade. In 2002, intra-African trade represented only 8 per cent of total African trade. When we consider manufactures and agricultural exports alone, however, the share of intra-African trade is about 15 percent ($8.5 billion). History has shown that the largest share of world trade occurs within geographical regions that have reached a certain level of political and economic integration such as EU, NAFTA and ASEAN. There are several regional trading arrangements on the African continent (SADC, ECOWAS, ECCAS, AMU, and COMESA etc) but they have not been very successful in increasing trade among countries in the region. The reasons for this include: poor and inadequate infrastructure which limits the potential for cross-border movement of goods and persons; structural constraints associated with the fact that most countries in the region produce similar goods and so pay more attention to trade with countries outside the region; and the high incidence of conflicts in the region which breeds mistrust among members thereby creating an environment that is not supportive of integration.

III. Description of the Model

A proper assessment of the potential consequences of multilateral trade liberalization requires the use of a general equilibrium framework. The GTAP model adopted in this study is ideally suited to this kind of analysis. It is a multi-sector and multi-region computable general equilibrium model widely used for trade policy analysis. The basic structure is described in Hertel (1997). In the model, a representative regional household allocates regional income across three categories of final demand: private consumption, government expenditure, and savings. Private consumption is represented using a Constant Difference of Elasticities (CDE) functional form.

A representative producer for each sector of a country or region makes production decisions to maximize profits by choosing inputs of labor, capital, and intermediates to produce a single sector output. In the case of crop production, farmers also make decisions on land allocation. Producers can substitute primary factors for each other, and this substitution possibility is captured using a Constant Elasticity of Substitution (CES) functional form. In addition, it is assumed that intermediate goods are used in fixed proportions (Leontief). Intermediate inputs are produced domestically or imported, while primary factors cannot move across countries. Internationally traded commodities are assumed to be distinguished according to the region of origin. Using this Armington assumption implies that for example wheat imported from the United States (US) is different from wheat imported from the European Union (EU).

There are two global sectors in the GTAP model: transportation and banking sectors. The transportation sector accounts for international trade and transport activity. The banking sector allocates investment across regions to equate expected rates of return. This ensures that in equilibrium, global savings equal global investment. Taxes are included in the model at several levels. Production taxes are placed on intermediate inputs, primary inputs, or on output. Some trade taxes are modeled at the border. Additional internal taxes can be placed on domestic or imported intermediate inputs, and may be applied at differential rates that discriminate against imports. Trade policy instruments are represented as import or export taxes/subsidies. Welfare changes in the model are measured using the concept of equivalent variation.

The standard GTAP model assumes full employment of factors. This is inconsistent with the fact that there are huge reserves of unemployed or underemployed labor in developing countries. We therefore modify the model to allow for unemployment of unskilled labor in African economies. This is achieved by fixing the nominal wage rate, and letting the volume of employment of unskilled labor adjust (see McDonald and Walmsley (2003)).

The model is applied to version 5.3 of the GTAP database, which refers to the year 1997 (Dimaranan and McDougall, 2002). For the analysis, the world is divided into 12 regions and 13 sectors (see Tables 1 and 2). The aggregation of sectors has been designed to provide some degree of detail in the coverage of the agriculture and food sectors, which are of central interest to this study. All African countries are split into three regions: North Africa (nAfrica), Southern Africa (sAfrica), and Sub-Saharan Africa (SSA). The region North Africa includes all countries with access to the Mediterranean Sea. South Africa, Lesotho, Namibia and Swaziland constitute

the region Southern Africa while the region Sub-Saharan Africa comprises all remaining African countries.

Table 1: Regions

Name	Region
nAfrica	North Africa (Algeria, Egypt, Libya, Morocco and Tunisia)
SSA	Sub-Saharan Africa
sAfrica	Southern Africa (South Africa, Lesotho, Namibia and Swaziland)
EU15	European Union (15 Member countries)
NAM	North America (United States and Canada)
SAM	South America
AUSNZ	Australia and New Zealand
HiASIA	High-income Asia (Japan, Korea, Singapore, Taiwan)
China	China and Hong Kong
oASIA	Other Asian Countries
CEEC	Central and Eastern European Countries (EU Accession in 2004)*
ROW	Rest of the World

* Also referred to as Transition countries.

Table 2: Sectors

Name	Sector
Cereals	Wheat, Paddy Rice, other Cereals
Vegetable	Vegetables (also Potato) and Fruit
Oilseeds	Oil Seeds and oil processing
Sugar	Sugar Beet, Sugar Cane and Sugar Processing
Cotton	Fiber plants
Other Crops	Beverages and Spice Crops, Tobacco, Flowers
Animal	Cattle, Sheep, Pork, Poultry, Eggs, Raw Milk
proFood	Processed Food including Meat and Dairy
Extract	Extraction Industries
Light	Textile and Wearing apparel Industries
Industry	Other Industries*
Trade	Trade and Transport Services
Other Services	Energy Supply, Financial Services, Education

* Also referred to as heavy industries.

In 2005, when the outcomes of the Doha round are to be implemented if the original time path is followed, the trade policy environment will have changed considerably. To account for this, a baseline is constructed that includes important policy changes expected between 1997, the reference year of the database, and 2005. These changes include: implementation of all Uruguay Round commitments; the reform of the Common Agricultural Policy of the EU under Agenda

2000 (van Meijl and van Tongeren, 2002); China's WTO accession;[2] the implementation of the Agreement on Textile and Clothing (ATC) that phases out all quota restrictions in textile trade from 2005 onwards; and the enlargement of the EU to include countries in eastern Europe. Having simulated a range of policy measures between 1997 and 2005, we produce a baseline suitable for an analysis of the impact of the Doha Round.

Policy scenarios

In view of the proposals that have been made in the ongoing WTO Doha Round, we define and perform experiments for three scenarios of trade reform, namely, "little", "modest", and "full" liberalization. These scenarios are based on alternative liberalization approaches for trade in agriculture and manufactured goods. They are stylized rather than exact representations of the proposals that have been made in the current round of negotiations. In part, this is because we are working with an aggregate model (i.e. we do not model trade at the 6-digit HS level), and as such detailed treatment of all product-specific proposals is simply impossible. The first two scenarios are partial liberalization scenarios. The "little" liberalization scenario involves a linear 36% cut in agricultural tariffs; a 20% cut in industrial tariffs, export subsidies and domestic support for agriculture, and a partial reduction in trading costs, related to trade facilitation measures. The "modest" liberalization scenario involves a 50% reduction in all trade instruments. The third and most comprehensive scenario, involves full elimination of all border and support measures. All tariff cuts are applied to bound rates. Table 3 summarizes the policy experiments.

Table 3: Liberalization scenarios

Scenario	Policy Changes
Little	Tariff Reduction: Agricultural Goods 36%, all other Goods 20% Reduction of Export Subsidies 20% Reduction Domestic Support 20% Trade Facilitation 1%
Modest	Tariff Reduction: All Goods 50% Reduction of Export Subsidies 50% Reduction Domestic Support 50% Trade Facilitation 1,5%
Full	Tariff Reduction: All Goods 100% Reduction of Export Subsidies 100% Reduction Domestic Support 100% Trade Facilitation 3%

[2] The integration of China into the WTO is incorporated by equalising all import tariffs according to the Most Favoured Nation clause. EU enlargement is simulated as a total trade liberalization between current EU members and the region CEEC. It is also assumed that CEEC adopts EU border tariffs as a result of membership of the EU.

IV. Trade Preferences and Binding Overhangs

Most African imports into OECD countries are traded under preferential conditions. The European Union, Japan, the United States and several developed countries reduce import duties and/or quantity restrictions on imports from Africa. Trade preferences follow a common format. First, all countries classified as developing countries are eligible for preferential trade under a Generalized System of Preferences. Second, a set of "deeper" and "wider" preferences for the least developed countries (LDCs) complements the GSP scheme. For example, the EU grants (with some major exceptions) all products from LDCs unrestricted market access at zero-duty under the "Everything But Arms" initiative. The US has a similar but less comprehensive scheme for African LDCs under the African Growth and Opportunity Act. Third, a myriad of bilateral deals or trade integration arrangements with favored trade partners adds (or reduces) the depth of preferences. In this category we find the EU scheme for African, Caribbean and Pacific (ACP) countries under the Cotonou Agreement, and various trade deals with North African countries. Most large importers have trade arrangements with important African economies such as Egypt and South Africa.

The value of a trade preference is the preference margin, i.e. the percent reduction on the Most Favored Nation (MFN) tariff applied on imports from the beneficiary country. Generally, the preference margins are substantial for LDCs but rather moderate under GSP schemes. GSP generally has little effect on large import duties: high tariffs occur mostly on sensitive agricultural products, for which preference margins are low or nonexistent. Table 4 reports on preferences margins as these have been calculated for this study. For exporters, the application of a preferential tariff rate generally implies a certain transaction cost, often in the form of an administrative procedure or the need to present certified information regarding the make of the product (UNCTAD, 2001). Exporters balance these costs against the preference margin, and may find that the benefits do not always outweigh the costs. If preferences are in fact not utilized, the data presented here exaggerate the potential benefits of preferential trade.

Table 4: Preference margins for Africa (% cut on MFN tariffs)*

	EU-25			US/Canada			High-income Asia		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Cereals	0	7	6	0	0	0	0	0	0
Vegetable	14	69	65	16	46	16	5	6	5
Oilseeds	0	16	16	30	30	30	0	0	0
Sugar	3	23	21	0	0	0	5	5	5
Cotton	0	0	0	1	1	1	0	0	0
Other Crops	14	63	63	2	6	2	18	34	18
Animal	0	33	30	2	3	2	0	0	0
proFood	19	59	57	13	32	13	7	12	7
Extract	0	0	0	0	0	0	0	0	0
Light	23	100	100	2	3	2	44	56	44
Industry	41	84	77	47	61	47	100	100	100
Trade	0	0	0	0	0	0	0	0	0
Other Services	0	0	0	0	0	0	0	0	0

* Under 0% preference margin, the full MFN tariff applies, under 100% margin the applied duty is nil. Data sources: applied tariffs from the GTAP database v5.3; average preference margins based on Hoekman et al. (2001) and Walkenhorst and Dihel (2003).

A major difference between agricultural and industrial products in the negotiations is that, unlike industrial products, all agricultural tariffs are bound. However, bound tariffs in most countries are generally higher than applied tariffs—a phenomenon known as "binding overhang". This has serious implications for multilateral trade liberalization. It implies that countries can raise applied tariffs so long as they are below the bound rate. Furthermore, it implies that reductions in bound rates do not necessarily lead to reductions in applied rates (see Francois et al. (2003)).

To beneficiaries, an important feature in trade negotiations is that preference margins erode in the process of a global reduction of MFN tariffs. However, a modest tariff cut on tariff lines with a large binding overhang (much "water in the tariff") has little effect on applied tariffs, and does not reduce pre-reform preference margins for African producers vis-à-vis their competitors in other (developing) regions. An important implication is that one should analyze preferences and binding overhang in close connection to one another.

How does this relate to market access for African exports? In figures 3-5, we present the level and the composition of bound tariffs that African exporters face in foreign markets. They are aggregated over all importing OECD countries, and non-OECD countries (including the African countries). Trade flows are used as aggregation weights, and therefore this presents a view on world market access from the perspective of African trade. Bound rates are taken from the GTAP database. Water and preference margins are computed as explained in the Appendix.

Regarding the *levels* of bound tariffs on exports of the African region, what is striking is that substantial tariff barriers remain from the Uruguay Round. As in most sectors tariffs above 10 percent ad valorem are common, market access reforms can be expected to have substantial impact on export prices in the global trading system. Bound rates in manufactures (light and heavy industry) are generally higher in non-OECD markets than in OECD regions. In various agricultural sectors, non-OECD markets show better access than OECD markets.

In terms of their *composition*, bound rates can be cut into three ad valorem pieces: the binding overhang or water gives the wedge between UR committed bound rate and the applied MFN rate; the preference margin reflects the reduction on MFN rates to the beneficiaries of trade preferences, providing them with a competitive edge. Preference margins generally range between 5 and 10 percent ad valorem. They apply mostly to African exports of vegetables, sugar, and processed food in agriculture, and to manufactures. Sub-Saharan Africa benefits in almost all sectors, due to zero-duty access of its LDCs. If there are no preferences granted, as in most non-OECD countries, the MFN rate is the applicable rate to exporters. North Africa faces large applied tariffs for its exports of cereals, sugar and processed food. For the other two regions sugar has the highest applied tariff.

The diagrams confirm that non-OECD tariffs contain much more water than OECD rates. Water of 20 to 40 percent ad valorem is common. Any partial tariff reform first squeezes this water out before applied rates are lowered, which is why partial reforms of border measures have but modest impact on market access in developing countries. However, any cut in tariff directly

erodes trade preferences to African exporters. In addition, reforms drive up prices for many imported agricultural products. As a result, African consumers of imported goods and producers of export goods are vulnerable to a partial liberalization under the Doha round.

Figure 3: Level and composition of the bound tariffs for exports of North Africa (% ad valorem)

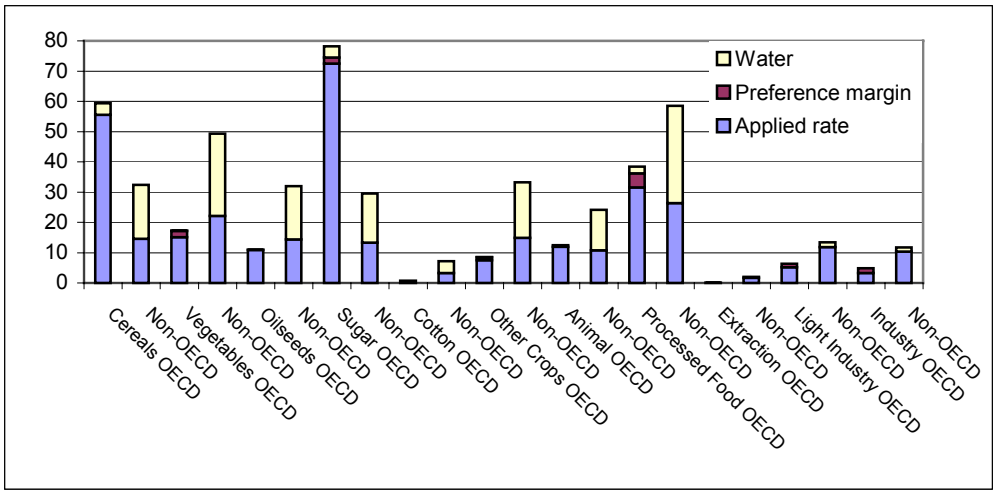


Figure 4: Level and composition of the bound tariffs for exports of sub-Saharan Africa (% ad valorem)

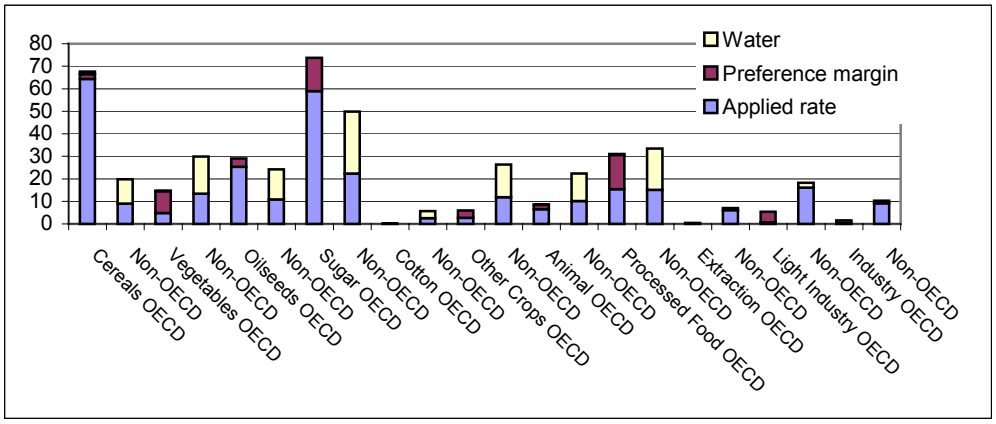
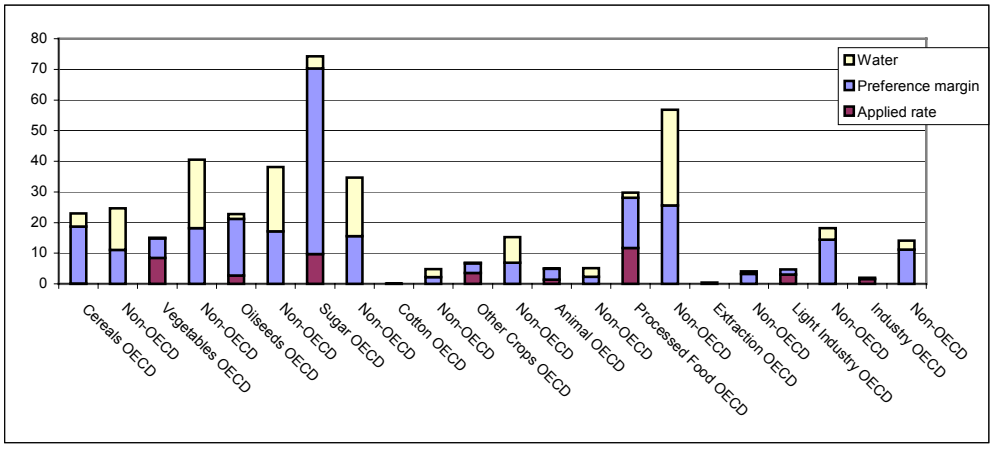


Figure 5: Level and composition of the bound tariffs for exports of Southern Africa (% ad valorem)



V. Simulation Results

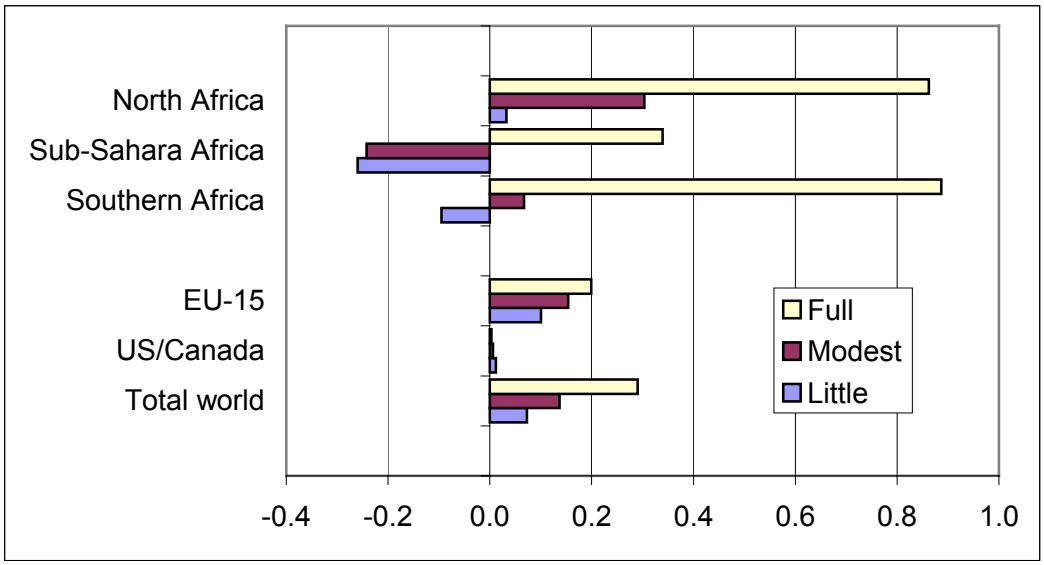
In this section, we present results of simulations of the model under different liberalization scenarios. Table 5 presents results of the static model. It shows that full trade liberalization could bring modest benefits to the African continent, as well as other regions of the world. Full reform would add 0.3 per cent to global income annually. Furthermore, the gain to the African region is about 0.7 per cent of GDP. Although the absolute gains to the African region seem small, they are quite significant for two reasons. The first is that Africa reaps above average welfare gains (Figure 6). Its share of the global welfare gain is 5 per cent while its share in global GDP and trade is about 2 per cent. The second is that these benefits are expected to reoccur each year and so the long-term benefits of liberalization to the region are likely to be substantial. The results also suggest that the gains to liberalization grow with the depth of reforms. All regions derive more gains under full liberalization. In Africa, reform results in yearly welfare gains of $3.7 billion under full liberalization, of $216 million under modest reform, and in a loss of $605 million under little reform. The gains are unevenly distributed across African sub-regions. National income gains in Southern Africa and North Africa amount to 0.9 percent of GDP under full reform, about 3 times as much as the gains to sub-Saharan Africa. In addition, sub-Saharan Africa incurs losses under little or modest reforms and so is vulnerable to all partial reforms.

Table 5: National income gains under trade reform*

	Million 1997 US Dollars			Percent of GDP		
	Little	Modest	Full	Little	Modest	Full
nAfrica	67	625	1775	0.0	0.3	0.9
SSA	-540	-502	704	-0.3	-0.2	0.3
sAfrica	-132	93	1233	-0.1	0.1	0.9
EU15	7996	12226	15860	0.1	0.2	0.2
NAM	1000	543	253	0.0	0.0	0.0
SAM	1855	3559	8181	0.1	0.2	0.4
AUSNZ	687	1279	4629	0.2	0.3	1.0
HiASIA	4470	11115	23965	0.1	0.2	0.5
China	1648	3285	6533	0.2	0.3	0.7
oASIA	1649	3311	5893	0.1	0.3	0.5
CEEC	113	139	-33	0.0	0.1	0.0
ROW	2274	3999	15173	0.1	0.2	0.8
Total	21087	39672	84164	0.1	0.1	0.3

* Based on the measure of equivalent variation

Figure 6: Additional national income after trade reform (percent change)



The result that sub-Saharan Africa is vulnerable to "little" and "modest" reforms can be attributed to the effect of preference erosion. The sub-region is a major beneficiary of preferences and partial market access reforms reduce tariffs on products exported to preference granting countries from countries that are not part of the preferential trading arrangements, thereby eroding any given preferential market access benefits received by sub-Saharan Africa. The effect of preference erosion is magnified by the existence of "binding overhangs." Under "little" and "modest reforms," which involve 20 to 50 percent tariff cuts, there is strong preference erosion in sub-Saharan Africa and the sub-region faces more competition with exporters from developing countries in other regions. But because of binding overhangs, partial reforms of the magnitude

considered do not result in a reduction in applied tariffs in several countries. Consequently, there are no improvements in market access for African products in other regions. In contrast, however, under a comprehensive reform, African producers suffer from preference erosion but they also have more access to markets in other regions and so experience positive welfare gains. This accounts for the difference in the results between partial and full reforms.

Table 6 decomposes welfare changes in the model into various components. It shows that better allocation of resources due to reform accounts for three-fourth of global welfare gains, or about $70 billion. For the African region, an improvement in the allocation of resources also accounts for a large share of the gains from reforms. An increase in the availability of resources in the economy is another source of welfare gain in the model. In the case of Africa, this comes from two sources: employment and trade facilitation. The expansion of the African economies allows previously unemployed or underemployed unskilled labor resources to be better utilized in the wage economy. Tapping this reserve pool of labor boosts welfare by about $2 billion annually. The second source of an increase in resource availability, trade facilitation, brings further gains, as goods can now be imported at lower cost in all regions.

Another component of welfare changes in the model is the terms of trade. By definition, terms of trade effects net out on the global level. It is, however, interesting to see the distribution of gains and losses over the twelve regions and sub-regions. In Africa, reforms result in a deterioration of the terms of trade and this has a negative effect on welfare. The composition of African exports (biased towards primary commodities) and its imports (biased towards manufactures) is instrumental in explaining the loss in the terms of trade. We shall return to the terms of trade below. Finally, we have to account for the change in the price of domestic savings relative to the price of foreign savings. This is similar to a terms-of-trade effect in our model, since each region 'exports' capital goods to the global bank and 'imports' savings from it.

Table 6: Decomposition of global welfare effects under full liberalisation (Million Dollars)*

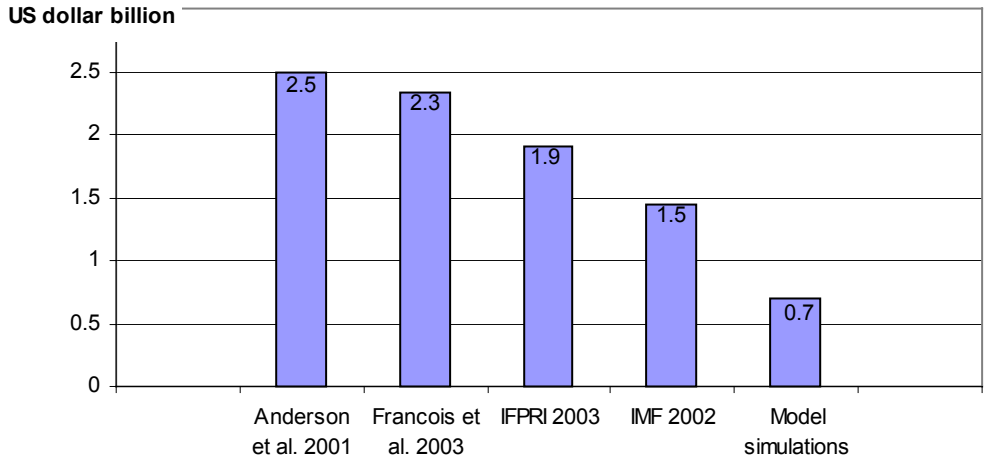
	Allocative effects	Employment effects	Trade facilitation	Terms of trade	Terms of trade' (capital account)	Total
North Africa	2713	431	424	-1390	-284	1894
Sub-Sahara Africa	1025	821	223	-623	-357	1089
Southern Africa	752	723	89	-21	50	1593
EU-15	16563	0	6443	-8047	1744	16702
US/Canada	4005	0	2003	-5111	-477	420
South America	6474	0	1097	1039	-216	8394
Australia/New Zealand	106	0	127	4578	71	4881
High-income Asia	13545	0	3091	8957	-738	24855
China	4614	0	885	1204	394	7097

Other Asia	5376	0	944	-476	-9	5835
Transition countries	510	0	553	-684	-447	-67
Rest of world	13571	0	2565	335	267	16737
Total	69254	1975	18442	-238	-2	89431
Share	77%	2%	21%	0%	0%	100%

* Welfare effects based on an equivalent variation measure

How do our results compare to those of existing studies? The estimated $84 billion global gains––0.3 percent of GDP—from this study are quite modest compared to outcomes of recent studies. For example, as shown in figure 7, the gains for the Sub-Sahara African region from this study are less than those reported in other studies. The welfare gains reported in earlier studies are around $2 billion, compared to $704 million in the present study. The difference can be attributed to the fact that the dimensions, model specification and the underlying country aggregations, differ across studies. The studies mentioned do not incorporate trade preferences and this plays and important role in the results. However, sub-Saharan African countries are involved in a number of preferential trading arrangements. By failing to take this into account, previous studies ignore the issue of preference erosion, thereby overestimating the welfare gains received by sub-Saharan Africa from trade liberalization.

Figure 7: Estimates of welfare gains in Sub-Sahara Africa (various studies)



Specialization

The reduction of trade distorting border measures and domestic policies in all countries leads to a shift in resource allocation within economies and between economies. As certain activities shrink with the removal of distortions, resources are freed that are subsequently employed elsewhere in the economy. As a consequence, countries tend to specialize more in those activities in which they have a comparative advantage. That is, they specialize in goods that use relatively

intensively the abundant production factors. Hence, we expect to observe shifts in the international specialization of activities in the results and this is indeed the case.

A measure of specialization is given by the specialization index, which reveals a country's net trade position by product.[3] The top panel of Table 7 shows the global specialization pattern prior to reform. The lower panel of the table shows the changes to the index (in percent point) under a full liberalization experiment. The numbers in both panels can be added to arrive at post-reform index levels.

Table 7: Specialization index, before reform and after full reform*

BASE (%)	Africa	Europe	North America	South America	Asia	AusNZ	Rest of World
Crops	7	-16	36	45	-30	71	-32
Livestock products	15	-3	21	3	-43	91	-16
Agro processing	-16	8	5	23	-33	66	-32
Light manufacturing	-2	-6	-26	2	29	-23	-19
Industry & extraction	1	2	-9	-12	4	-15	10
Services	-11	-1	13	-8	-4	6	-9
Total	-2	0	-5	-4	4	1	1

CHANGE (%-points)	Africa	Europe	North America	South America	Asia	AusNZ	Rest of World
Crops	5	-10	1	1	7	-3	4
Livestock products	19	-4	6	6	6	-4	4
Agro processing	5	-9	9	16	1	14	11
Light manufacturing	-4	-1	-8	-8	1	-18	2
Industry & extraction	-4	1	1	-2	-1	-9	-2
Services	0	2	2	-3	-4	-11	-2
Total	-2	0	1	0	-1	-1	-1

* A positive number indicates a net exporting position, a negative number indicates net imports. See footnote 3. Numbers in the top and lower panel can be added to derive the post-reform index
Source: trade data in the GTAP database v5.3, and model simulations

While the African continent, South America and Asia are able to specialize more in crops and livestock products, and reduce their need for imports of processed foods, the reverse can be observed in Europe. North America is currently a net exporter of agricultural products, and remains so after reform. In the (enlarged) Europe and North America we see an increased specialization in industry, while Asia is able to expand in labor-intensive light manufacturing.[4] In Australia & New Zealand there is an expansion of trade in processed foods.

[3] The specialisation index is the ratio of the trade balance over the trade volume: (X-M)/(X+M)*100. If this measure takes the value –100, all the country's trade in this product is imports, if it is +100 all the trade is exports.

[4] In this regard it is important to mention that our baseline already incorporates the phasing out of the export quota on textiles and garments under the Agreement on Textiles and Clothing (ATC). Any further changes in the textiles and

How do reforms affect the three African sub-regions? All sub-regions are net importers of cereals and oilseeds, and net exporters of vegetables. North Africa is a net exporter in light industries, and relies heavily on agricultural imports in almost all products. Cereal and oilseed imports partly serve the substantial animal products industry. Sub-Saharan Africa is almost fully specialized in crops and a major net importer of industrial products. Southern Africa is also a net importer in agriculture, except for cereals, oilseeds and cotton, and shows deep specialization in the sugar sector. Its trade balance in manufactures approaches zero.

Figure 8: Altered specialization in Africa and EU-15 when moving from modest to full reform (change to the specialization index in %-points)

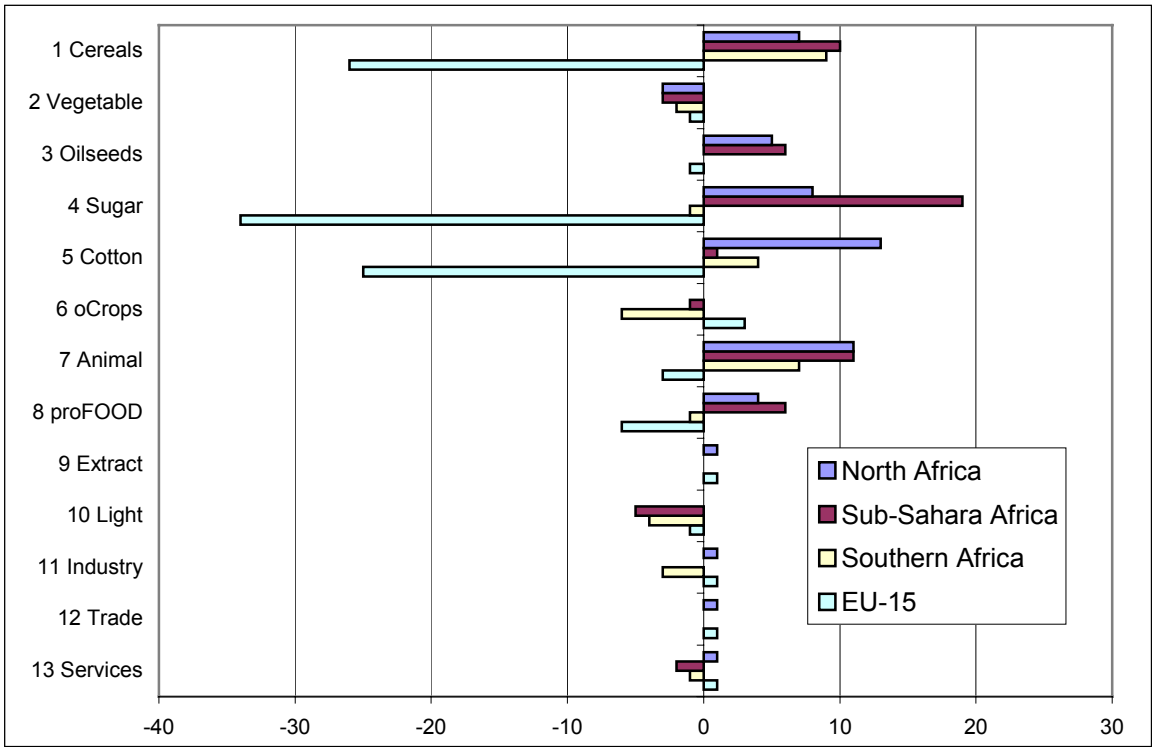


Figure 8 presents changes to the specialization index for Africa and its main trade partner (the EU-15) when moving from modest to full reform. For Africa, the pattern of specialization that results from reform is clear. Africa specializes more in cereals, sugar, and cotton and this is driven mostly by policy changes towards these programme commodities in OECD countries. There is less specialization in commodities such as vegetables, fruits, flowers, and commodity crops. Furthermore, there is a contraction of activity in light and heavy industry. Given that a move from a reform of Little to Modest depth renders small specialization effects, figure 8 helps to explain the jump in results between partial reform and a comprehensive liberalization.

The results also point to a de-industrialization tendency in all African sub-regions. Under little reform, industrial activity reduces by less than 1 percent, and under modest reform by 2 to 4

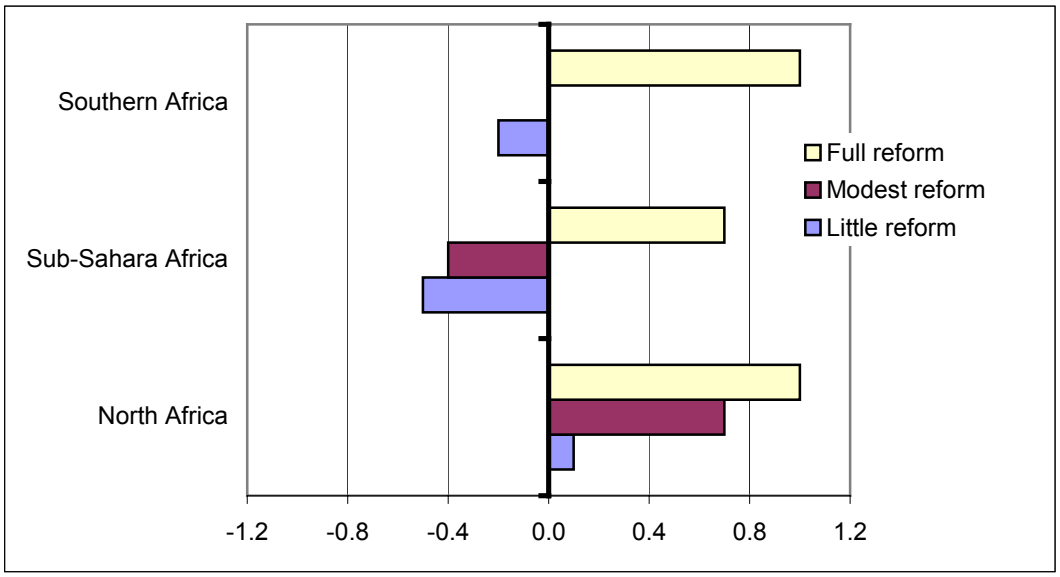
garments sectors stem from the reduction of import tariffs, and are rather small compared to the effect of the ATC. See Van Tongeren and Huang (2004) for an analysis of ATC phase out.

percent. Under full reform, the impact differs across regions. There are substantial reductions in the Sub-Saharan and Southern African regions amounting up to 9 percent activity loss.

Employment

As explained earlier, we specified the model such that the employment rate for unskilled workers adjusts endogenously. Figure 9 shows that in Sub-Saharan Africa and Southern Africa minor and moderate trade reforms result in decreased employment of unskilled workers. Under partial reforms, some sectors draw additional unskilled labor into the wage economy, as real wages drop. But the contraction of labor-intensive activities in such sectors as horticulture and textiles & clothing leads to a net reduction of unskilled labor employment in the partial reform scenarios. Accordingly, to substitute unskilled labor with other factors reduces production costs. North Africa shows a positive employment effect in all scenarios, as do all regions under the full liberalization scenario.

Figure 9: Employment effects, (% change to base number employed)



Trade facilitation

Trade facilitation is one of the four Singapore Issues that have generated so much controversy in the current round of trade talks. It was also one of the key issues that led to the collapse of the Fifth WTO ministerial conference in Cancun, Mexico. African countries have been opposed to the launching of negotiations in this area partly because they are not sure of the economic consequences for their economies and also because they fear that it may lead to huge implementation costs. Consequently, they are of the view that there is the need for more work to be done in this area before a decision is taken on whether or not negotiations should be launched in this area. In this section, we examine the impact of trade liberalization on the African region and also on other regions of the world. In the model trade facilitation reduces transactions costs associated with international trade (in an "iceberg" specification).

Three points can be made from the results. First, trade facilitation accounts for $736 million (or 16 percent) of the net African welfare gain under full reform. Also, all African regions derive gains from trade facilitation irrespective of whether the reform is partial or complete. Second, North Africa derives more gain from trade facilitation than Southern and Sub-Saharan African countries. For example, in the full liberalization scenario, North Africa gains $322 million while the gains for Southern Africa and Sub-Saharan Africa are $113 million and $84 million respectively. Third, unilateral trade facilitation in other developing and transition economies hurts countries in Sub-Saharan Africa. In the full liberalization scenario, unilateral trade facilitation in non-African developing and transition economies results in an income loss in Sub-Saharan Africa of $10 million. This may be due to the fact that countries in the sub-region compete with other developing countries and so when they unilaterally engage in trade facilitation their transactions costs fall thereby increasing their degree of competitiveness relative to the Sub-Saharan African region.

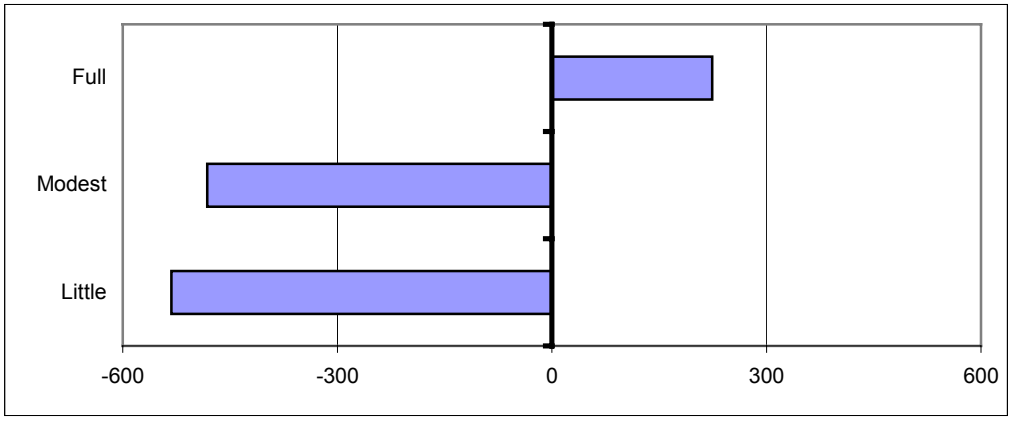
These positive results on trade facilitation should however be interpreted with caution because the study does not incorporate the implementation costs of trade facilitation for African countries. Lack of data on implementation costs made it impossible to incorporate this important feature in the model. To the extent that these costs are large, they may outweigh the gains derived in this study.

Non-agricultural market access

Non-agricultural market access (NAMA) raises a number of issues for Africa. First, is the potential loss of government tariff revenue that may result from liberalization and the likely impact on Africa. In several countries in the region, import duties represent a substantial part of government revenue. The second point is that Africa is currently a net importer of industrial goods (both light and heavy) and may, in fact, move even further away from industrial activity if there is trade reform.

The simulation results provide some indicative results on the net welfare effects. Despite some bleak expectations, Africa reaps a modest national income gain of $224 million from a full liberalization of border measures for manufactures (all else equal), as can be seen in the diagram below. Under partial reforms, however, the losses in tariff revenue outweigh gains from improved export performance and reduced import prices. There are losses to be incurred both under reform of little and modest scope. The results for the three sub-regions are broadly consistent with figure 10, except that sub-Saharan Africa also incurs a net loss under full reform.

Figure 10: Net welfare impact on Africa from NAMA reform (Million Dollars)



Dynamic effects

The analysis so far concentrates on the static (or direct) welfare gains from liberalization. These gains result from an improved allocation of resources. No fresh resources are injected into the global economy, except for unemployed or underutilized labor in African countries. The estimated effects on employment are, however, very limited, as labor intensive activities in African economies do not expand very much in the simulations. Alternatively, one could consider whether trade liberalization induces shifts in the regional pattern of savings and investment.

Relating to classical models of capital accumulation and growth, rather than to endogenous growth mechanisms, capital shifts have been explored extensively in the trade literature.[5] The scope of these "accumulation effects" depends on a number of factors, including the marginal product of capital, country risk and underlying savings behavior. In this section, we work with a classical savings-investment mechanism (discussed in Francois et al. 1997). This means we model long-run linkages between changes in income, savings, and investment. The results reported here therefore include changes in the capital stock, and the medium- to long-run implications of such changes.

For the dynamic analysis, the model specification is changed to allow for the endogenous adjustment of each region's capital stock (in the static closure the amount of capital is fixed in each region). This is achieved by a so-called 'Baldwin closure', which mimics classical savings behavior: the savings rate is fixed and the economy moves from one (pre-reform) steady state to a new (post-reform) steady state. The global bank disburses global savings in such a way as to maintain the regional composition of its investment portfolio, and hence regional differences in return to capital persist.[6]

[5] Research in this area includes Baldwin and Francois (1999), Smith (1976, 1977), and Srinivasan and Bhagwati (1980).

[6] See Francois et al. (1996) for an implementation in the GTAP framework.

Welfare results of the model with capital accumulation are presented in Table 8. The key differences between the results from the static model and those from the dynamic model are as follows. First, the introduction of capital accumulation increases the welfare gains to most regions in each of the liberalization scenarios. For example, the global welfare gain under full liberalization jumps from 0.3 percent to 0.7 percent of global GDP, or from $84 billion to $201 billion. Second, there is a tremendous increase in the welfare gains to Sub-Saharan Africa. In the full liberalization scenario, welfare increases from $704 million to $4.3 billion, that is six times as large as in the static model. In fact, Sub-Sahara Africa, shortly followed by the region other Asia, experiences the biggest growth in the capital stock. Under full reform, the capital stock grows by about 5 percent in these regions, against a world average growth of just over 1 percent. Moreover, unlike in the static model, Sub-Saharan Africa derives welfare gains in the moderate liberalization scenario. Finally, when expressed as a percentage of base GDP, the gains to Sub-Saharan Africa in the full liberalization scenario are far greater than those accruing to the world. For Sub-Saharan Africa it is 2.1 per cent of base GDP while for the world it is 0.7 per cent.

Table 8: National income gains in Static and Dynamic models (% of base GDP)

	Static Model			Dynamic Model		
	Little	Modest	Full	Little	Modest	Full
North Africa	0.0	0.3	0.9	0.1	0.4	0.9
Sub-Sahara Africa	-0.3	-0.2	0.3	-0.2	0.2	2.1
Southern Africa	-0.1	0.1	0.9	-0.1	0.0	1.3
EU-15	0.1	0.2	0.2	0.2	0.3	0.5
US/Canada	0.0	0.0	0.0	0.0	0.1	0.1
South America	0.1	0.2	0.4	0.3	0.7	1.5
Australia/New Zealand	0.2	0.3	1.0	0.3	0.7	2.2
High-income Asia	0.1	0.2	0.5	0.1	0.3	0.6
China	0.2	0.3	0.7	0.3	0.5	1.0
Other Asia	0.1	0.3	0.5	0.4	1.2	2.2
Transition countries	0.0	0.1	0.0	0.0	0.2	0.1
Rest of world	0.1	0.2	0.8	0.3	0.7	1.7
Total	0.1	0.1	0.3	0.1	0.3	0.7

* Based on Equivalent Variation

The simulations with capital accumulation clearly highlight the importance of complementing trade liberalization with investment enhancing policies. Without additional investments in the domestic economy the opportunities of trade liberalization remain largely untapped in Africa. A successful conclusion of the DDA can contribute to this by creating an environment that reduces risks to investors. Trade reform will remove current sources of uncertainty regarding market access in the global trading system such as trade preferences and binding overhang. Reduced uncertainty may stimulate inward capital flows to Africa. In turn, as the simulation results confirm, investments are instrumental in achieving output growth, enhanced labor productivity, and rising wages.

VI. Conclusion

This study provides a quantitative estimate of the potential economic consequences of multilateral trade reform for Africa using the GTAP model. It focuses on impacts at the sub-regional level because most African countries are not in the GTAP database. Consequently, there have been no attempts to transfer general conclusions to the country level because of the wide variety of economic conditions in African countries.

Three types of reform scenarios are considered: “little,” “modest,” and “full” liberalization scenarios. Our model results indicate that benefits increase with the depth of reforms. North Africa benefits from all liberalization efforts, be they comprehensive or partial. Sub-Saharan Africa and, to a lesser extent, Southern Africa incurs welfare losses when a partial liberalization is carried out, reflecting largely the combined impact of preference erosion and binding overhang.

Furthermore, whilst the African region would benefit from a comprehensive trade liberalization, any measure of reform will likely imply heavy risks on certain economies and specific sectors. Under full reform the reduction of agricultural support allows far reaching specialization in cereals, cotton and sugar. In order to accommodate the change African producers partly abandon commodity crops and horticulture. The African export position in these products on European markets worsens as preference erosion opens opportunities for competitors from South America and Asia. Labor resources are drawn into agriculture, which creates some new employment opportunities, and takes away some in the contracting manufacturing sectors. This adjustment drives the large "kink" that occurs between the results of minor/modest reform and of full reform of all trade-distorting border and support measures. Whether the allocation of more resources in agriculture, and the move away from manufactures is progress or regress in terms of development of the African region, is a matter of debate.

The model simulations presented here assume that the estimated preference margins effectively reduce the tariffs that African exporters are facing. Consequently the value of these preferences is eroded if market access is improved multilaterally and globally. This may not be realistic if the rate of utilization of preferences is low. If African exporters are currently not making use of preference margins, then the actual erosion and concurring losses will be limited. Stated otherwise, the lower the actual use of preference, the more Africa will gain from early harvest trade reforms.

Regarding NAMA, the results indicate that the African region is also vulnerable to partial reforms due largely to the potential loss of tariff revenue. Several countries in the region rely on trade taxes and so partial liberalization that does not yield significant market access to the region’s exports is likely to result in welfare losses for the region. On trade facilitation, the results suggest that Africa would derive positive benefits from this area of negotiations. This, however, should be interpreted with caution because the study does not incorporate the costs of implementation of trade facilitation in the African region. An interesting result on trade facilitation is that countries in the African region would incur losses if they do not reciprocate any actions made by other developing countries to facilitate trade.

The introduction of dynamic effects in the model, through capital accumulation, increases the welfare benefits from trade reform in all regions of the world. For example, the gains to Sub-Sahara Africa in the dynamic model are six times larger than in the static model. Sub-Saharan Africa attracts large amounts of funds from global capital markets, which results in a jump in welfare gains to the sub-region. This points to the need for domestic policies in Africa aimed at stability and investor confidence that complement trade reform.

What are the implications of our findings for the Doha round of trade negotiations? First, the study stresses the need for reforms to be as comprehensive as possible. Second, it underscores the vulnerability of African countries to partial trade reforms. Clearly, nobody expects a full liberalization of trade under the Doha round and so it is not a feasible option. That leaves us with some consensus scenario of partial reform. All but the African partners to the negotiations have an incentive to support partial reforms since they will derive positive benefits. Consequently, to ensure that partial reforms do not have serious adverse effects on the African region, WTO members need to find appropriate mechanisms to make special and differential treatment a more effective instrument for development in Africa and other least developed countries.

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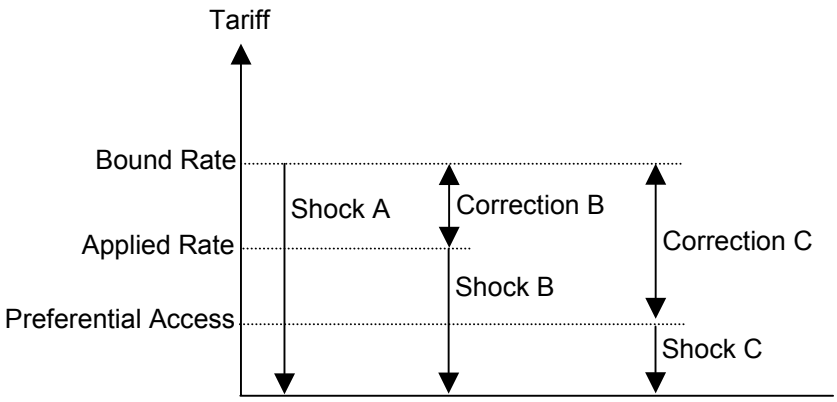
Appendix

Adjusting Tariffs for Preferences and Binding Overhang

The GTAP database comprises bound tariff rates. However, in most countries bound rates are different from applied rates and this has implications for trade reforms. There are two reasons. First, some countries apply lower tariffs in order to provide cheaper imports to domestic consumers. Nevertheless, the negotiation of the WTO refers to the bound rates. While the EU and NAM apply their bound rates, developing countries show impressive difference between bound and applied rates. A tariff reduction on bound rates means that the EU and NAM reduce their applied tariffs more than other regions.

Second, the QUAD countries[7] allow developing countries a preferential access, meaning they apply tariffs even lower than the applied rate. In order to introduce the real tariff cuts we have to take account of the differences between bound and applied rates on the one hand and bound rate and preferential access on the other (Figure A1). If tariffs are completely eliminated and there is no difference between bound and applied rates we use shock A[8]. In the case of the applied rate in Figure A1, shock B is suitable. Accordingly, we have to alter the shock A with the correction B[9]. Otherwise we would overestimate the tariff cut and simulation results would not be reliable.

Figure A1: Bound and Applied Tariff Rate as well as Preferential Access



The difference between applied and bound tariff rates is also known as "water in the tariff". We use information from Francois and Martin (2002) as well as Walkenhorst and Dihel (2003) to calculate the correction B. For the correction C we require information about the treatment of African exports in the QUAD countries, which are in our aggregation included in the regions EU15, CEEC, NAM and HiASIA. Hoekman et al. (2001) provide preferential rates of the QUAD

[7] The QUAD countries comprise the EU, Canada the USA as well as Japan. Furthermore, we assume that CEEC is applying the same preferences as the EU15. In the data preparation step C (Figure 1) we adjust the border protection of the CEEC towards the level of the EU15.

[8] In general equilibrium modeling "shock" means exogenous change.

[9] Assuming a small reduction of the bound rate, say –10%, and an applied rate of 80% the new bound rate would still be higher than the actual applied rate. In this case no shock is used because nothing is changing.

countries. We aggregate them for the sectors used in the analysis. For some sectors the import tariffs of the QUAD regions are completely abolished (Reduction of 100 percent).

There are three different levels of preferences. All African countries are allowed to export under the Generalized System of Preferences (GSP). The African, Caribbean and Pacific Countries (ACP) get a more favorable access to the European Union than the GSP. Compared with the APC the Least Developed Countries (LDC) can export under even more facilitated conditions[10].

Table A1: Preferences of African Exporters into QUAD Countries

	EU15	NAM	HiASIA
nAfrica	GSP	GSP	GSP
SSA	ACP-LDC	GSP-LDC	GSP-LDC
sAfrica	ACP	GSP	GSP

Tables 1 and 2 include the preferences for the regions of our aggregation. All exports of North Africa (nAfrica) to the QUAD countries are treated according to the GSP. The region Sub-Saharan Africa (SSA) includes least developed countries as well as countries with a less beneficial export conditions. We assume an average between the LDC and ACP or rather GSP preferences. The region South Africa (sAfrica) has an ACP accession to the EU while the other QUAD countries are applying the GSP for its exports.

Table A2: Preferences of African Countries

Aggregation	Country	GSP	ACP	LDC
North Africa	Algeria	X		
	Egypt	X		
	Libyan Arab Jamahiriya	X		
	Morocco	X		
	Tunisia	X		
SSA	Angola	X	X	X
	Benin	X	X	X
	Botswana	X	X	
	Burkina Faso	X	X	X
	Burundi	X	X	X
	Cameroon	X	X	
	Cape Verde	X	X	X
	Central African Republic	X	X	X
	Chad	X	X	X
	Comoros	X	X	X
	Congo/ Zaire	X	X	
	Democratic Republic of Congo	X	X	X
	Côte d'Ivoire	X	X	
	Djibouti	X	X	X
	Equatorial Guinea	X	X	X
	Eritrea	X	X	X
	Ethiopia	X	X	X
	Gabon	X	X	
	Gambia	X	X	X
	Ghana	X	X	
	Guinea	X	X	X
	Guinea-Bissau	X	X	X

[10] A detailed discussion of preferences is provided in Achterbosch et al. (2003).

	Kenya	X	X	
	Liberia	X	X	X
	Madagascar	X	X	X
	Malawi	X	X	X
	Mali	X	X	X
	Mauritania	X	X	X
	Mauritius	X	X	
	Mayotte	X	X	
	Mozambique	X	X	X
	Niger	X	X	X
	Nigeria	X	X	
	Rwanda	X	X	X
	São Tomé and Príncipe	X	X	X
	Senegal	X	X	X
	Seychelles	X	X	
	Sierra Leone	X	X	X
	Somalia	X	X	X
	Sudan	X	X	X
	Tanzania	X	X	X
	Togo	X	X	X
	Uganda	X	X	X
	Zambia	X	X	X
	Zimbabwe	X	X	
South Africa	Lesotho	X	X	X
	Namibia	X	X	
	South Africa	X	X	
	Swaziland	X	X	