



# Trade Liberalization under the Doha Development Agenda: Options and Consequences for Africa

## Abstract

This study provides a quantitative estimate of the potential economic consequences of multilateral trade reform for Africa. It uses a framework that incorporates issues of particular concern to Africa, such as preference erosion, loss of tariff revenue and the impact of OECD agricultural support programmes on African countries. The results show that countries in sub-Saharan Africa, and to a lesser extent, Southern Africa are vulnerable to partial trade reforms. Since other regions derive positive gains from partial reforms, the results underscore the need for development issues to be taken more seriously in the current round of multilateral trade negotiations.



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African Trade Policy Centre



Economic Commission for Africa

Trade Liberalization under the  
Doha Development Agenda:  
*Options and Consequences for Africa*

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## Executive Summary

The key development challenge facing the African region is how to reduce poverty through sustained economic growth. There is an emerging consensus that trade, if well managed, could play an important role in confronting this challenge. This fact has been recognized by African countries as evidenced in the fact that they are beginning to show more interest in multilateral trade negotiations. They are, however, concerned that they have not been able to derive substantial benefits from trade due in part to the protective agricultural policies and trading practices of Organization of Economic Cooperation and Development (OECD) countries.

This study 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. It also examines the impact of OECD agricultural support programmes on Africa and provides an idea of the relative importance for Africa of the three pillars in the Doha round negotiations on agriculture, with a view to assisting African trade officials in ranking their priorities in the negotiations.

The study is based on the Global Trade Policy Analysis (GTAP) model, which is a multi-sector and multi-region general equilibrium model widely used by trade analysts to examine the impact of trade policies. It 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.

Three trade reform scenarios, capturing different degrees of trade liberalization, are considered. These are “little,” “modest,” and “full” trade liberalization scenarios. In the static version of the model, the study finds that full liberalization of trade would increase global welfare (income) by 0.3 percent, but would add 0.7 percent annually to income in the African region. The gains to Africa may seem modest but is significant given the fact that the region’s share of the global welfare gain is five percent while its share of global output is about two percent. The study also suggests that the gains from liberalization grow with the depth of reforms. While North Africa benefits from all liberalization scenarios, sub-Saharan Africa and Southern Africa incur losses when partial liberalization is carried out. This is largely due to the combined impact of preference erosion and binding overhang. Several countries in the two African sub-regions are major beneficiaries of preferential trading arrangements and partial market access reforms increase the degree of competition they face in export markets. But because of binding overhangs, partial reforms do not yield any significant improvement in market access for exports of countries in the two African sub-regions.

Another interesting finding of the study is that reforms force African countries to specialize more in the production of agricultural commodities. In particular, they result in the contraction of industrial activities in the region and a shift of resources into the production of commodities such as grains, sugar, and cotton. Although this change in the pattern of specialization is dictated by comparative advantage, it is worrisome because excessive dependence on commodities increases the degree of vulnerability faced by the region.

Regarding the three pillars of the negotiations on agriculture—market access, domestic support, and export competition—the study finds that, in terms of welfare gains, market access and domestic support are important for countries in North and Southern Africa. More specifically, under the full liberalization scenario, North Africa derives welfare gains of US \$578 and \$595 million from more market access and reductions in domestic support respectively. For Southern Africa the gains are \$336 and \$449 million US. Turning to sub-Saharan Africa, market access yields the largest benefits to the sub-region. The gain from this source is three times larger than the gain from domestic support. Furthermore, North Africa incurs losses from reductions in export subsidies—because it is a net importer of subsidized commodities—while the other sub-regions do not reap any significant benefits. With respect to Non-Agricultural Market Access (NAMA), the study finds that the African region is vulnerable to partial reforms in this area due largely to the loss of tariff revenue.

On trade facilitation, the study suggests that all African regions stand to derive benefits from reforms in this area. This result should, however, be interpreted with caution because the study does not incorporate the implementation costs associated with trade facilitation. To the extent that these are large, the net benefits to Africa may not be positive. The results also suggest that unilateral trade facilitation by other developing countries and transition economies without any reciprocal actions by African countries will lead to welfare losses in the African region.

When the model is modified to allow for dynamic effects, the study finds that there is a substantial increase in the benefits of trade reforms to all regions of the world. For the sub-Saharan Africa region, the welfare gains from full liberalization increases from \$704 million in the static model to \$4.3 billion US in the dynamic model. That is, the gain to sub-Saharan Africa in the dynamic model is about six times as large as in the static model. The huge welfare gain from the dynamic model is associated with the impact of capital accumulation. The results therefore emphasize the importance of complementing trade liberalization with investment enhancing policies.

What are the implications of our results for the current round of multilateral trade negotiations? Clearly, the most important result that has serious implications for negotiations under the Doha round is the idea that countries in sub-Saharan Africa and, to a lesser extent, Southern Africa, are vulnerable to partial trade 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, it stresses the need to strengthen special and differential treatment provisions for African countries to allow them to cushion the likely negative impact that may result from partial reforms. Broad measures that could be taken to achieve this include:

- ❑ More flexibility in WTO agreements to enable African countries to deal effectively with poverty reduction and food security issues;
- ❑ More sensitivity to the implementation costs of WTO agreements for poor African countries; and
- ❑ More meaningful and effective capacity building and technical assistance programmes to enable African countries to deal with supply constraints.

# 1 Introduction

The protection of agricultural markets remains a topic that seems to divide developing countries and member countries of the Organization for Economic Cooperation and Development (OECD). Renegotiations of the Uruguay Round Agreement on Agriculture under the Doha Development Agenda (DDA) were to bring parties together, but little headway has been made so far. Between the two rounds of WTO-talks, OECD countries have been reluctant to phase out support to their farmers. For Africa, so much affected by distortions in agricultural markets, this is a major disappointment.

In response to the limited progress made in the current Doha round of multilateral trade negotiations, African countries have increased their calls for fair trade practices and are beginning to show more interest in multilateral trade negotiations. Trade negotiation is a bargaining game. This has several implications. First, there is the need to bring ranked priorities to the negotiation table, preferably based on calculated gains and losses from various outcomes to the economy. Understanding the impact of various methods of trade liberalization is important if an economy is to maximize its gains from the process. This is particularly critical in the negotiations on agriculture where the so-called “modalities” have a large influence on the likely outcome of the process. Second, there is the need for countries with similar interests to unite and seek common positions on some of the issues in order to gain negotiating power. Since the onset of the Doha round, several developing countries have been quite effective in joining umbrella groups to defend their key interests. For example, some African countries are members of the G20+ and the Cairns group of agricultural commodity exporters pushing for more rapid reform of agricultural trade. There has also been an increase in efforts by African countries to form common positions on key issues under the DDA so as to maximize their gains from the negotiation process.

One of the challenges facing African countries in the Doha round of negotiations is how to deal with the lack of capacity to conduct research on the impact of various proposals in the negotiations on their economies. This study is one in a series of recent efforts that have been made to identify the consequences of the DDA for African countries (see, for example, Iancovichina et al. 2001; and Kerkelä et al. 2000).<sup>1</sup> It has two main objectives. The first is to provide a quantitative estimate of the potential economic benefits that could accrue to Africa from multilateral trade reform using a framework that explicitly incorporates issues of concern to the region, such as preference erosion, loss of tariff revenue, and trade facilitation.<sup>2</sup> The second objective is to provide an idea of the relative importance for Africa of the three pillars in the agriculture negotiations so as to assist African trade officials in ranking their priorities in the negotiations.

<sup>1</sup> See also Francois et al. (2003a), International Monetary Fund (2002), IFPRI (2003, forthcoming), and Anderson et al. (2001) for recent applications of the GTAP model to the Doha round.

<sup>2</sup> See Amjadi et al. (1996) for a broad outline of trade policy issues for Africa.

The framework used in the analysis is the Global Trade Analysis Project (GTAP) model, which is a computable general equilibrium model used by trade analysts throughout the world. It is a model of the global economy, which allows the analyst to incorporate relations between all sectors of an economy in all countries of the world.

The study makes several contributions to the existing literature. First, the model used for the analysis incorporates unemployment of unskilled labour, which is a very important feature of African countries. Throughout the analysis it is assumed that unskilled labour may enter the wage economy when this factor of production is in demand, while demand for skilled labour responds to changes in the wage rate.

Second, the study 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 and the Agenda 2000 measures of the EU Common Agricultural Policy. It also assumes the full phase out of the Agreement on Textiles and Clothing (Multi Fibre Agreement) and the integration of China into the WTO. Trade reforms of varying degrees of comprehensiveness are simulated, and the welfare effects for Africa are measured as deviations from the baseline.

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 this effect is intertwined with binding overhang. Both features moderate the gains from trade reform, and make beneficiaries of preferences vulnerable to partial reforms.

Finally, the policy experiments conducted in the study 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 study is organized as follows. Chapter 2 discusses the role of trade in addressing the major development challenges facing the continent while chapter 3 presents an overview of Africa's position in global trade. Chapter 4 outlines the trade policy landscape for Africa, with emphasis on the "three pillars" in the agriculture negotiations, market access formula, and the incorporation of trade preferences. Chapter 5 presents the views of African countries on agricultural negotiations. The data, model, and policy scenarios used in the study are presented in chapter 6. Chapter 7 contains the results of the analysis. The concluding chapter analyzes the implications of the results for Africa and the Doha round of trade negotiations.

## 2 Trade and African Development

### The challenge of African development

When African nations gained political independence in the 1960s, they had so much promise. With abundant natural resources, fertile lands, low population density, and a growing and vibrant labour force, there was the conviction that if African leaders create a political, social and economic environment conducive to growth, and take appropriate measures to ensure that the benefits trickle down to the poor, there would be a marked improvement in living standards on the continent.

To date, however, Africa's promise has not yet been realized and this is reflected in the fact that the economic performance of the region is poor given its resource endowments and also relative to other developing countries. Table 2-1 shows that over the period 1981-90, real Gross Domestic Product (GDP) per capita fell by 1.2 percent in sub-Saharan Africa (SSA). In East Asia and Pacific countries it rose by 5.7 percent while in South Asia it rose by 3.5 percent. The only two regions that had negative growth rates as in SSA were the Middle East and North Africa, and Latin America and the Caribbean, although the decline in these regions was not as large as in SSA. The poor performance of SSA relative to other developing countries is even more pronounced when we look at the growth rates over the 1991-2000 period when real GDP per capita fell by 0.4 percent in SSA but rose in all other regions: in East Asia and Pacific countries the growth rate was 6.4 percent; in Latin America and the Caribbean it was 1.6 percent; in the Middle East and North Africa it was one percent; and in South Asia it was 3.2 percent (World Bank 2003).

**Table 2-1: Growth Rate of Real GDP per capita, 1981-2000 (annual average)**

	1981-1990	1991-2000
East Asia and Pacific	5.7	6.4
Latin America and Caribbean	-0.9	1.6
Middle East and North Africa	-0.6	1.0
South Asia	3.5	3.2
Sub-Saharan Africa	-1.2	-0.4

Source: World Bank 2003

Various explanations have been adduced for this dismal economic performance ranging from poor domestic policies and geography to colonial legacy and an inhospitable external environment.<sup>3</sup> However, an important fact that has emerged out of the debate on Africa's growth and development experience is that

<sup>3</sup> Despite the controversy created by attempts to provide explanations for the region's economic problems, it is clear that internal and external factors played a role. The unresolved issue is the relative importance of internal as opposed to external factors.

reducing poverty through sustainable growth is the primary development challenge facing the continent. African countries have recognized this challenge and are also taking measures to confront them. Since the 1990s there has been an improvement in economic policy design and implementation in the region. In addition, several countries have made significant progress toward strengthening macroeconomic stability and reinvigorating economic growth. Available data indicate that this has led to a modest improvement in economic performance. For example, in SSA average annual real GDP growth increased from two percent in the period 1984-93 to 3.7 percent over the period 1996-2001 and average annual inflation fell from 24.3 percent to 15.9 percent within the same period. Furthermore, overall fiscal deficits as a percentage of GDP dropped from a peak of nine percent in 1992 to two percent in 2001. While the recent gain in economic performance in the region is welcome, its sustainability is in doubt due largely to the adverse economic effects of the HIV/AIDS epidemic, the continued marginalization of Africa in the global economy, and the inability to find far-reaching solutions to the problems created by political instability, brain drain, and high external debt.

HIV/AIDS is the most serious development problem facing Africa today. The relatively modest development achievements of the region in the latter half of the 1990s are slowly being reversed because of the devastating economic effects of the epidemic. Studies suggest that two-thirds of people living with HIV are in Africa. Furthermore, in Cameroon, Kenya, Swaziland, Zambia, and the United Republic of Tanzania, it is estimated that there would be a decline in GDP of about 25 percent over 20 years as a result of the epidemic (International Labour Office 2000). The HIV/AIDS epidemic increases health and social security costs thereby having a negative effect on savings and growth. It also increases the cost of doing business, lowers productivity, and as a consequence reduces foreign direct investment. Given the negative impact of the disease on human capital formation, it is becoming clear that Africa's long-term growth prospects will be affected by the extent to which its leaders are able to lift the constraints imposed by the epidemic. Unless this issue is dealt with swiftly and effectively, accelerating growth in the region will remain a daunting task, and increasing the standard of living a mirage.

The marginalization of Africa in the global economy is another problem threatening the sustainability of growth as well as poverty reduction efforts in the region. Over the last three decades, there were sharp declines in the share of the region in global trade and foreign direct investment flows. The region's share of world exports fell from 4.6 percent in 1980 to 1.8 percent in 2000. Its share of world imports declined from 3.6 percent to 1.6 percent over the same period. Furthermore, Africa's share of global inward FDI flows fell from 1.8 percent in the period 1986-90 to 0.8 percent over the period 1999-2000. These figures are well below the developing countries average of 17.5 percent and 17.9 percent over the same period. The low integration of the region into the global economy and the fact that it has not derived any significant benefits from world trade and investment has led to concerns that the region may be left behind in the globalization process.

Political instability continues to weaken and jeopardize the prospects for sustainable economic growth in the region. In Africa political instability often takes the form of wars as well as ethnic and religious conflicts. Studies have shown that political instability has a statistically significant negative effect on growth. Political instability can affect growth through its adverse effect on savings, investment, human capital formation, and the development of infrastructure as well as institutions needed to support the development process.

Brain drain is another problem inhibiting sustainable development in the region. Human capital is vital for sustained growth. But Africa continues to lose an increasing number of its educated people to developed countries. Available data indicate that about one-third of the professionals born in Africa live abroad. Furthermore, according to the International Organization for Migration (1999), more than 35 percent of college graduates in 40 percent of countries in the region reside abroad. These migrants leave in search of better pay and or living conditions but their departure results in skill shortages, as well as reductions in output and tax revenue. They therefore rob the continent of a vital and scarce resource needed for sustainable development. Proponents of migration often point to the fact that these negative effects of emigration are dampened by the inflow of remittances from migrant workers. It is true that remittances have a positive impact in the region. For example, a recent publication of the World Bank (2003) shows sub-Saharan Africa received \$4 billion in remittances in 2002 and this represents about 1.3 percent of the region's GDP. However, it is not clear that these benefits offset the costs to the society arising from the fact that a significant proportion of migrants received highly subsidized technical education funded through the domestic tax system.

High external debt continues to dampen as well as constrain the prospects for economic recovery and sustained growth in the region. In 2001, total external debt of SSA was \$203 billion (World Bank 2003). Of this amount, \$32.1 billion represented short-term debt while medium and long-term debt accounted for \$170.9 billion. High external debt increases country risk and hence the cost of borrowing to domestic investors with adverse consequences for investment. Furthermore, the need to service debt diverts resources from important development projects thereby threatening the ability of African countries to achieve their poverty reduction goals.

It is increasingly being recognized that the problems facing the continent cannot be solved in isolation. Consequently, there is a need for the international community to be more involved and engaged in the dialogue on how to free the continent from the shackles of poverty.

### **Confronting Africa's Development Challenges Through Trade**

In the 1960s and 1970s, African countries were very skeptical about the virtues of free trade. Since the late 1980s, they have shown more interest in multilateral trade as well as negotiations. This reflects the combined effect of three factors: dissatisfaction with the slow pace of regional integration; the belief that trade, if well

managed, could play a critical role in confronting the development challenges facing the continent; and the widespread view that multilateral trade could promote as well as spur up regional integration efforts in the region. By increasing competition, multilateral trade liberalization could force African governments to intensify regional integration efforts so as to reduce transactions costs through the development of regional infrastructure. Currently, infrastructure in Africa is lagging behind other emerging regions (see Table 2-2).

**Table 2-2: Infrastructure Indicators by World Region**

Country Group/ Region	Electric Power Consumption Per capita (kilowatt)	Telephone Mainline Per 1 000 people	Paved Roads (Percentage of total roads)	Population with access to save water	Population with access to sanitation (Percent)
	1997	1998	1997	1995	1995
Lower middle income	1 737	115	50.7	75	...
East Asia and Pacific	771	70	17.4	77	...
Europe and Central Asia	2 692	200	86.5	...	...
Latin America and Caribbean	1 402	123	26.0	75	68
South Asia	324	19	57.0	81	20
Middle East and North Africa	1 158	81	50.2	...	...
Sub-Saharan Africa	446	14	15.0	47	47

*Source: Reproduced from OECD (2002)*

Beginning in the 1980s several governments in the region engaged in domestic trade reforms in an effort to increase their participation in international trade. The impetus for these reforms came from four sources. First, African countries that sought financial assistance from the IMF/World Bank undertook some domestic trade reforms as part of the requirements of the Structural Adjustment Programmes (SAPs). Second, there were also trade reforms undertaken by African countries as a result of bilateral trade and cooperation agreements. For example, in 1999 South Africa negotiated a free trade agreement with the European Union (EU) to increase access for its products to European markets and so had to adopt certain trade reforms. Third, African countries also engaged in some trade reforms arising from their membership of different regional economic groupings. The key regional economic groups in the region are: the Economic Community of West African States (ECOWAS), Common Market for Eastern and

Southern Africa (COMESA), Economic Community of Central African States (ECCAS), the Southern Africa Development Community (SADC), the Arab Maghreb Union (AMU), and the Intergovernmental Authority on Development (IGAD). Finally, African countries have also undertaken reforms as a result of their increasing participation in the multilateral trading system. Membership of the World Trade Organization (WTO) obliges African countries to obey WTO rules and also honour their commitments to the organization. African countries that are not members of the WTO have also had to adopt trade reforms as part of the requirements for accession to the organization.

How far did these reforms go? There is some consensus that the reforms undertaken by African countries in the 1980s and 1990s have made the region relatively more open to market forces and private sector activity. Exchange and price controls as well as marketing boards have been eliminated in several countries and there has been a significant reduction in tariffs (see Hinkle et al 2003). In several countries, average trade weighted tariffs have been reduced to 15 percent or less (World Bank 2000). Also, core non-tariff barriers in the twelve SSA countries included in a recent study fell from 26 percent in 1989-94 to 10.4 percent in 1995-98 (Martin 2003). Despite the progress that has been made, the benefit to African countries from these reforms remain limited.

One might wonder why African countries are hesitant to fully liberalize their economies despite the conventional wisdom that free trade is good for growth and development. We see at least five reasons for this phenomenon. First, the evidence linking trade liberalization to growth and development is not as clear as economists would like to believe. Two recent papers, Rodriguez and Rodrik (2001) and Rodrik (2001), have argued that there are fundamental and methodological problems with the series of studies suggesting that trade liberalization enhances growth and development. They also pointed out that there is no convincing evidence that trade liberalization is systematically associated with economic growth. The papers also suggest that the nature of domestic institutions plays a key role in determining whether or not liberalization will have a positive outcome in an economy. Furthermore, even in countries in which liberalization was associated with growth, there is strong evidence that it was selective as opposed to comprehensive liberalization that led to the observed outcome.

Second, several African countries rely on trade taxes for government revenue and so are concerned about the fiscal consequences of liberalization for their economies. Between 1999-2001, for instance, import duties represented about 34 percent of government revenue in the Least Developed Countries (LDCs) in Africa. In theory, trade liberalization is unlikely to lead to any significant loss in trade tax revenue if it involves either the removal of quotas or reduction of very high tariffs and if the pre-liberalization regime was characterized by import compression. When these conditions are absent, liberalization is likely to have adverse consequences for trade tax revenue. That said, countries could adopt measures to ensure that liberalization does not erode their revenue base. These include: attracting more aid flows; finding alternative sources of tax revenue; reforming domestic tax and customs administration; diversifying the economy; and reducing smuggling and corruption.

Third, in any case of liberalization, there are bound to be winners and losers. If the losers have political clout they are likely to put pressure on domestic leaders to resist liberalization, especially if there is no domestic mechanism in place to compensate them for the potential loss. Fourth, there is a genuine concern among African countries that multilateral trade liberalization and the associated rules and obligations would lead to the loss of domestic policy instruments and space needed to address pressing development problems. This is particularly important given that countries in the region are highly vulnerable to external shocks due largely to their high dependence on commodity exports (see chapter 3).

Finally, there is the widespread view that although African countries have made some progress in liberalizing their economies, they have not derived any significant benefits from the process. It is therefore understandable that they are reluctant to increase the pace of reforms. The key question then is how can African countries derive more benefits from domestic trade reforms? Africa must learn, adapt, and incorporate the lessons of trade reforms in industrial, as well as other developing, countries into their trade reform programmes if they are to derive substantial benefits from the process. The key lessons from these experiences are that:

- ❑ Trade policy must be integrated into national development strategies in order to avoid policy incoherence and allow countries to derive more benefits from trade
- ❑ For domestic trade reforms to enhance development, they must be carried out in such a way that they can have positive effects on sectors that generate employment and income;
- ❑ The timing and pace of reforms must be chosen carefully to ensure the sustainability of policies and avoid the risk of policy reversals;
- ❑ Trade reforms do not work in isolation. They have to be accompanied by other economic measures, such as a good macroeconomic policy environment and appropriate laws, infrastructure and institutions;
- ❑ Diversification of an economy is necessary to minimize the impact of trade shocks on an economy and increase the benefits from trade reforms; and
- ❑ Trade reforms must not focus on imports alone. There is the need to promote exports if reform is to have any substantial positive impact on an economy.

## Africa and the Doha Development Agenda

African countries are interested in increasing their involvement in the multilateral trading system so as to reap the benefits of global economic integration. However, they are disappointed that the region has not benefited from the huge gains resulting from an increase in world trade and finance in the last decade. This has led to an examination of the reasons why international trade has not played its expected role in enhancing growth and reducing poverty in the region? Two key factors are responsible for this phenomenon:

(1) Lack of complementary domestic policies. For a country to take advantage of trade opportunities and reap the benefits of trade, it must put in place domestic policies that would create an incentive for the private sector to flourish. Unfortunately, up until the mid 1990s several African countries had domestic policies—for example, those affecting transport and transaction costs—that had negative effects on trade, investment, and growth in general. There was also the inability or unwillingness of African countries to put in place measures that would enable the region to lift supply constraints and to diversify so as to increase their ability to exploit the trading opportunities made available to the region. The fact that very few African countries have been able to take advantage of preferences received under the ACP-EU partnership agreements provides support for this idea.

(2) Protective domestic agricultural policies and trading practices of OECD countries have also contributed to the inability of African countries to exploit the potential gains from multilateral trade liberalization. In 2002 governments, consumers and taxpayers in OECD countries transferred over \$234 billion to their agricultural producers.<sup>4</sup> Support programmes encourage over-production and export dumping by producers in OECD countries. The support given to OECD producers allow them to sell their products on the world market at prices below production costs thereby depressing world prices and forcing competitors to struggle for survival or exit the market. Cotton presents a very interesting example of how OECD agricultural support programmes hurt African countries. Between 2001-2002, the US spent \$3.9 billion on agricultural support to its 25,000 cotton farmers, a figure that is twice the amount it spent in 1992. This agricultural support programme has had a negative impact on world cotton prices because the US is the largest exporter of the product. Since the mid 1990s, the price of cotton has fallen by about 54 percent with devastating effects for cotton exporting countries in Africa. Available evidence suggests that US subsidies on cotton led to a loss of about \$300 million in potential revenue in sub-Saharan Africa between 2001-2002. To put this figure into perspective, it is important to understand the extent of the damage caused to individual economies. For example, in Burkina Faso, it led to a loss of one percent of GDP and 12 percent of export revenue. In Mali, it led to a loss of 1.7 percent of GDP and eight percent of export earnings. In Benin, the loss was about 1.4 percent of GDP and nine percent of

<sup>4</sup> A preliminary measure for the Producer Support Estimate (PSE) in 2002 measured USD 234.8 million, against an average of USD 240.9 billion in the years 1986-1988 (OECD 2003)

export earnings (Oxfam 2002). The same story can be told of subsidies on other commodities exported by African countries but the experience of cotton provides a stark illustration of the adverse consequences of OECD agricultural support programmes in Africa.

In several rounds of multilateral trade negotiations, African countries expressed concerns about these external barriers inhibiting their ability to integrate into the global economy and take advantage of trading opportunities. An attempt to address this issue led to the declaration of the Doha Round of multilateral trade negotiations as a Development Round. At the fourth WTO ministerial conference in Doha in November 2001, several promises were made to African countries, and developing countries in general, in an effort to increase their ability to benefit from global trade. However, in the twenty-one months between the Ministerial conferences in Doha and Cancun, no significant progress was made in the negotiations and this has led to the widespread feeling that it is highly unlikely that the promises made to poor countries under the Doha Development Agenda (DDA) will be fulfilled before the December 2004 date set for the conclusion of the round. In the run-up to the Cancun meeting, the US tried to inject new life into the talks by issuing a joint proposal with the European Union. While African countries had reservations about the nature and scope of the proposals, they saw it as a positive development and hoped that it would increase the prospects for a successful meeting in Cancun. As we all know, the Cancun Ministerial Conference ended with no agreement by Ministers on any of the key issues on the agenda.

From an African perspective, the failure of the talks in Cancun was not surprising given the fact that there was no serious effort made by the developed countries to address the key issues of concern to African countries in the negotiations. At Cancun African countries made demands in several areas of the negotiations (agriculture, cotton, non-agricultural market access, and development issues) but the demands on cotton and agriculture attracted more attention at the meeting. On cotton, they made two requests: the first is the elimination of subsidies by developed countries within a reasonable and specified period; and the second was the payment of compensation to the affected-countries during the transition period. On agriculture, they wanted more serious commitments from the developed countries to reduce and or phase out domestic support, export subsidies, and other barriers to agricultural trade. Clearly, developed countries were reluctant to make any serious concessions on these issues in Cancun.

The failure of the Cancun meeting has added more credence to the doubts expressed by African countries about the ability of the Doha round to meet their development aspirations. Africa's concerns in the on-going round of trade talks are in three parts. The first is the relatively low bargaining power of African countries in the negotiations as reflected in their inability to influence the agenda and pace of the negotiations. The second aspect of Africa's concerns relates to the fact that the areas in which there have not been significant progress in negotiations are those of importance to African countries: namely agriculture, non-agricultural market access; and development issues and concerns. The final aspect of Africa's concerns relate to the lack of an effective mechanism to address problems of capacity constraints

in the region. Existing trade capacity building programmes tend to have a short-term focus and do not provide a coherent framework to address problems posed by supply-side constraints and the lack of competitiveness of African economies.

Since the collapse of the Cancun meeting there have been informal discussions between some of the developed countries and African countries on what needs to be done to make the Doha round contribute to African development. An important fact that is emerging from these discussions as well as from research on African economies, is that progress in the negotiations on agriculture is important for the Doha round to make any real contribution to the development efforts of the region. In several African countries, a large proportion of the population depends on the agricultural sector for their livelihood. The sector accounts for roughly two-thirds of the region's labour force and one-third of its GDP. Consequently, an increase in agricultural productivity through trade is needed to increase the prospects for poverty reduction in the region. Other measures that could enhance the contribution of the round to African development include:

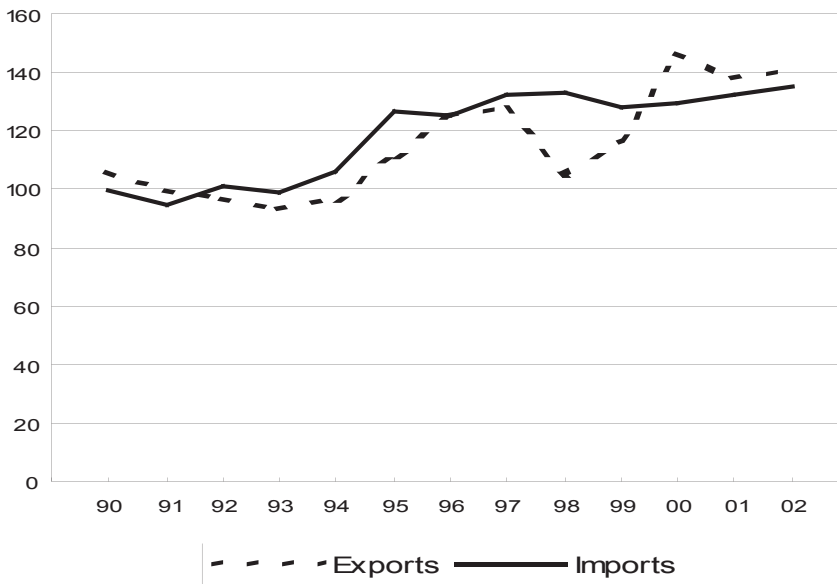
- ❑ Better integration of development issues into the work programme of the WTO as well as mechanisms to make them fully effective and operational;
- ❑ More flexibility in WTO agreements to enable African countries deal effectively with poverty reduction and food security issues;
- ❑ Change of attitude by developed countries as evidenced by their willingness to honour commitments made to developing countries in previous rounds of trade negotiations;
- ❑ More sensitivity to the implementation costs of WTO agreements for poor African countries; and
- ❑ More meaningful and effective capacity building and technical assistance programmes.

### 3 Africa in World Trade

#### Trade patterns

Africa's trade potential has remained unfulfilled in the last five decades. While global trade volumes nearly doubled each decade, Africa's share in world trade gradually declined from over seven percent after World War II to just over two percent in 2002 (see Figure 3-1 and Figure 3-2) (WTO 2003).

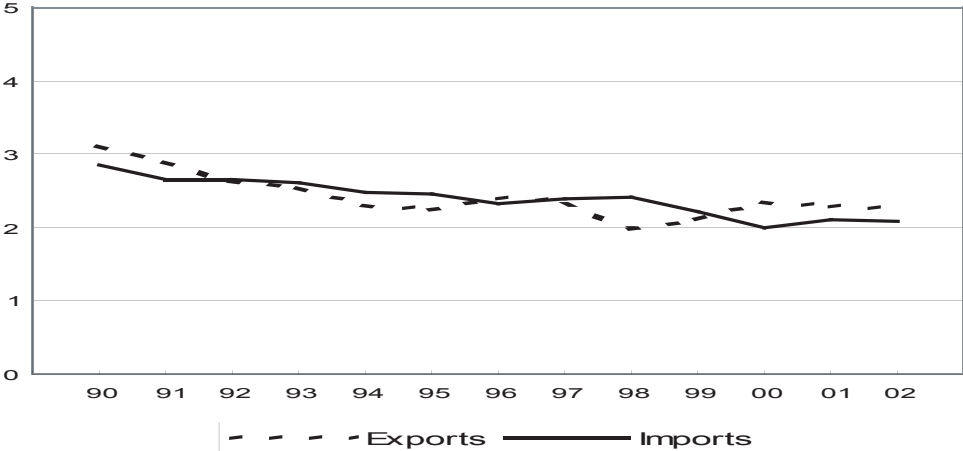
**Figure 3-1. African merchandise trade volume 1990-2002 (USD billion)**



Clearly, 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 eight percent 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, North American Free Trade Area (NAFTA) and Association of South East Asian Countries (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.

**Figure 3-2. African share in world merchandise trade, 1990-2002 (%)**



This study attempts to estimate the economic benefits for Africa resulting from multilateral trade liberalization. However, since the analysis is done at the sub-regional level, the results can only give a general indication of the impact of liberalization on individual countries. For individual countries, an important factor is the net trade position in certain products. The reason is that trade reform affects world market prices. More specifically, for many agricultural products trade liberalization results in an increase in prices on world markets, which results in gains to exporters to the world and losses to importers from world markets. African countries are, at least in the short term, likely to be affected most by reforms in the field of agriculture and trade policy. This makes it useful to classify African countries according to their trade position in primary agriculture and processed agriculture products (Table 3-1).

**Table 3-1. Country classification**

Trade position processed food	Trade position primary products	Trade position primary products
	Net primary exporter	Net primary importer
Net processed exporter	<p><i>Low Income countries:</i> Ethiopia Togo Mauritania Mali Chad Uganda Sudan Madagascar Kenya Ghana Cote d'Ivoire Cameroon Zimbabwe</p> <p><i>Middle Income Countries:</i> Morocco RSA Equatorial Guinea</p>	<p><i>Low Income countries:</i> Senegal Mozambique Burkina Faso Benin</p> <p><i>Middle Income countries:</i> Swaziland Mauritius</p>
Net processed importer	<p><i>Low Income countries:</i> Somalia Sao Tome and Principe Rwanda Niger Malawi Guinea Congo Dem Rep Central African Republic Burundi Guinea-Bissau Comoros Tanzania</p>	<p><i>Low income countries:</i> Zambia Sierra Leone Nigeria =low inc? Liberia Gambia Congo Rep Angola Eritrea Lesotho</p> <p><i>Middle income countries:</i> Egypt Botswana Tunisia Seychelles Libya Algeria</p>

Source: OECD (2001)

Exports of agricultural products accounted for \$22 billion in 2002, or 16 percent 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-Saharan Africa accounts for approximately 40 percent of total exports from Africa, and for over half of agricultural exports. Table 3-2 gives trade volumes and trade shares for the group of 45 countries in Sub-Saharan Africa. 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 records very small export levels.

**Table 3-2. Sub-Sahara Africa exports by country, 2001**

	Total Trade	Trade Share (%)	Total Agriculture	Trade Share (%)
Nigeria	19,224	34	444	4
Angola	6,317	11	45	0
Côte d'Ivoire	3,258	6	2,684	22
Gabon	3,009	5	479	4
Cameroon	2,009	4	983	8
Equatorial Guinea	1,787	3	119	1
Sudan	1,728	3	272	2
Zimbabwe	1,694	3	1,038	8
Botswana	1,692	3	64	1
Congo	1,672	3	112	1
Kenya	1,638	3	1,123	9
Mauritius	1,607	3	416	3
Ghana	1,327	2	778	6
Madagascar	1,112	2	552	4
Liberia	1,088	2	187	2
Guinea	870	2	58	0
Mozambique	711	1	155	1
Senegal	543	1	368	3
Zambia	536	1	81	1
Tanzania, UR	470	1	333	3
Mauritania	464	1	224	2
Congo, D.R.	434	1	32	0
Malawi	429	1	383	3
Ethiopia	312	1	227	2
Uganda	304	1	289	2
Seychelles	258	0	230	2
Niger	249	0	23	0
Togo	204	0	87	1
Mali	189	0	104	1
Burkina Faso	175	0	108	1
Benin	128	0	106	1
Other Sub-Sahara Africa a)	552	0	270	0
<b>Total</b>	<b>55,988</b>	<b>100</b>	<b>12,374</b>	<b>100</b>

Source: ITC/WTO data

a) Table 3-2 consists of countries with trade shares lower than one percent, both in total trade and agricultural trade. These countries are Sierra Leone, Rwanda, Central African Republic, Guinea, Chad, Comoros, Burundi, Somalia, Gambia, Eritrea, Djibouti, Sao Tome and Principe and Cape Verde.

## Revealed comparative advantage

There is a range of export products from sub-Saharan Africa that successfully participate in the world trading system. Identifying those products that perform well in international markets can give some indication as to which products and sectors might gain from a multilateral lowering of trade barriers. On the other hand, identifying products in which Africa does not have a comparative advantage will give an indication of sectors that may be adversely affected by increased competition due to a reduction in trade barriers. This is useful for the interpretation of the simulations, which are performed at a much higher level of aggregation. One measure that helps to identify the competitive strength of a country is the so-called “Revealed Comparative Advantage Index” (RCA) (Balassa, 1965). Based on the index, if an export product from an African country has a large world market share—adjusted for the total participation of African exports in world trade—then the index exceeds the level 100, and the country is said to have a revealed comparative advantage in that product.<sup>5</sup>

The RCA index can be criticized on various grounds. For example, it does not take product differentiation and intra-industry trade into account. Another disadvantage of this indicator is that it only takes exports into consideration and does not account for import penetration. In the context of African trade, with few imports re-exported, this flaw can be overcome. The data analyzed represent averages for the period 1993 to 2001 and use the full list of 261 products from the UNCTAD trade statistics. African exports are proxied by total imports of African products into the countries that report to UNCTAD, which gives about 90 percent accuracy on the export data.

One advantage of the RCA index is that it ensures that export volume alone does not determine which products perform well on international markets. For instance, at 350 million dollar, export volume of copper (SITC 682) is approximately equal to that of spices. Yet the index of copper stands at 135, while spices are at 1422. This shows that the region sub-Saharan Africa has a far greater share of world trade in spices than copper. The implication is that the export potential for spices is much larger than for copper.

Table 3-3 reports the 30 highest RCA indices calculated from all Sub-Sahara African exports at the SITC-3 level. The product list is, as expected, mostly made up of primary products, mining products and fuels. Traditional commodities cocoa, tea, and tobacco are at the top of the list. The eleventh rank for coffee on the 2001 RCA index confirms the depression in the coffee markets. Spice trade is clearly on the rise in the last decade. The indices for wood and cotton have declined somewhat from their peak in the later half of the 1990s.

<sup>5</sup>The revealed comparative advantage for good *i* from Africa is defined as:  
[(export good *i*, Africa)/(world exports good *i*)]/ [total exports Africa]/ (world exports)] \* 100

**Table 3-3. Revealed Comparative Advantage in Sub-Saharan Africa: Top 30 at SITC-3 level**

SITC code	Product group	RCA	Export volume (2001, \$mIn)
072	Cocoa	5247	2,430
074	Tea and mate	2007	481
121	Tobacco, unmanufactured	1597	987
075	Spices	1422	327
247	Wood rough,rough squared	1157	902
263	Cotton	1127	698
333	Petroleum oils, crude	995	29,865
287	Ore,concentr.base metals	934	542
285	Aluminium ore,conctr.etc	887	578
071	Coffee,coffee substitute	848	731
667	Pearls,precious stones	664	2,568
231	Natural rubber, etc.	591	226
793	Ship,boat,float.structrs	565	893
037	Fish etc.prepd,prsvd.nes	537	493
245	Fuel wood, wood charcoal	426	14
272	Fertilizers, crude	423	54
061	Sugars,molasses,honey	394	423
265	Vegetable textile fibres	365	18
036	Crustaceans,molluscs etc	364	625
689	Misc.non ferro base metals	359	129
223	Oilseed(oth.fix.veg.oil)	353	23
284	Nickel ores,conctr,matte	341	71
292	Crude veg.materials, nes	326	469
248	Wood, simply worked	318	769
342	Liquefied propane,butane	299	380
344	Petroleum gases, nes	287	98
057	Fruit,nuts excl.oil nuts	258	746

Source: OECD (2001)

The two columns on the right reveal that a big score on the RCA index need not imply a large trade volume, although it often does. With a total of 45 billion dollar, these Top-30 products account for over 80 percent of total exports in 2001. Crude petroleum oils is the product group with the largest volume by far in the list. Some products for which an African comparative advantage is often claimed do not appear in the list of table 2, groundnuts for example. Vegetables, the typical categories of “non-traditional” export growth, rank around the 100 average. Ranked equally modest are leather and apparel products. These sectors, then, will likely contract under tougher international competition after trade reform.

This method allows a powerful demonstration of the effect of tariff escalation, i.e. the phenomenon of tariffs levied on products rising with the degree of processing required. Compare an index of over 5000 for cocoa with a meagre 12 for chocolate, or a high of 394 for sugars and molasses with a mere 31 for sugar confectionaries. A similar pattern shows in fruit trade, with fruit and nuts at 258, preserved fruit at 81, and fruit juices at 24. Clearly, there remains a traditional pattern in food trade of importing raw agricultural product from Africa, adding value through processing elsewhere.

## 4 Trade Policy Landscape

This chapter provides background information on selected issues in the current round of negotiations that are useful in understanding the results of the simulations. It provides an analysis of the three pillars in the negotiations on agriculture as well as the implications of differences between bound and applied tariffs. It also looks at the different approaches to trade liberalization, examines the issue of trading costs and preferences, and presents an assessment of the degree of protection of OECD trade policies.

### 4.1 Agriculture negotiations

The negotiations on agriculture are of great importance to African countries because of the critical role of the agricultural sector in the region. Agriculture is a major source of employment in the region and accounts for about 70 percent of total employment. It also plays a key role in economic growth, accounting for roughly 24 percent of the regions GDP and 40 percent of its foreign exchange earnings (Economic Commission for Africa, 2002). In addition, developments in the agricultural sector significantly affect the economic performance of the region with potential consequences for poverty reduction efforts.

The Uruguay Round Agreement on Agriculture (URAA) set the stage for the negotiations on agriculture under the DDA. It was also the first time that disciplines on agricultural trade and production were set in the multilateral trading system. Despite this achievement, the URAA had several shortcomings among which is the fact that it could not deal effectively with the issue of tariff peaks and escalation. Furthermore, it imposed implementation costs on poor countries and negotiating parties gave themselves considerable leeway in the selection of the appropriate reference period from which to measure reductions in agricultural support. Negotiations under the DDA are expected to address these limitations of the URAA.

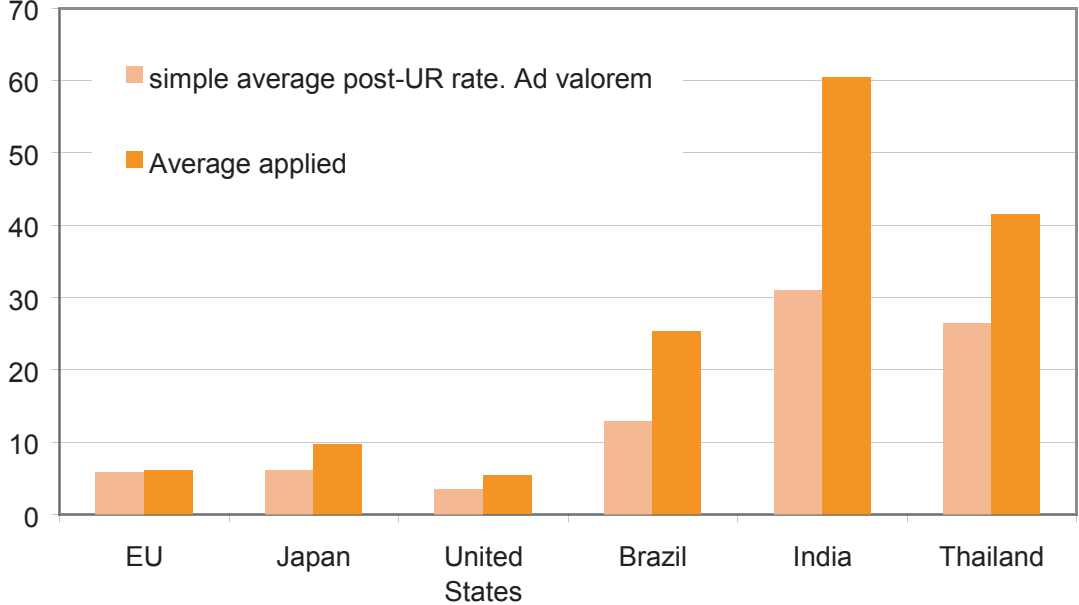
The DDA negotiations on agriculture are classified into three parts or “pillars”: market access; domestic support; and export competition. African countries have expressed their interests on each of these pillars in several forums. On the first pillar, they called for better market access for their agricultural products in developed countries as well as a reduction in tariff peaks, tariff escalation, and non-tariff barriers. They also called for the establishment of measures to mitigate the effects of preference erosion. On domestic support, they called for the reduction of all forms of domestic support measures provided by developed countries to their farmers. Finally, on export competition, they called for a reduction of export subsidies with a view to eliminating them within a specified period.

#### 4.1.1 Market Access in Agriculture

One key difference between agricultural and industrial products is that essentially all agricultural tariffs are bound. However, in both industrial and developing countries, there is a large degree of binding overhang (see Figure 4-1). Commitments not to erode current market access were meant to limit the scope for increased protection through “dirty tariffication” or the use of “ceiling bindings” (Hathaway and Ingco

1996). As the name implies, dirty tariffication involved violations of the spirit, if not the letter, of the URAA text. It involved setting tariff bindings at rates far above the current effective protection rates. The practice of setting high bindings complicated the problem of measuring the impact of further commitments to reduce bindings. Basically, in agriculture, we are in a world that allows scope for great policy discretion and uncertainty as a result of the loose nature of the commitments made. In addition, the setting of high bound rates made possible the conversion of non-tariff barriers (quotas and tariff rate quotas) into even more restrictive import tariffs. This in turn made quantity disciplines necessary to avoid backsliding.

**Figure 4-1: Binding overhang in agriculture tariffs, selected regions.**



**4.1.2 Export Subsidies & Domestic support**

Under the Uruguay round negotiations, domestic support programmes were classified into three categories. The first category is the “Amber Box,” which captures all domestic support measures that are considered to distort production or trade. Subsidies under this category are to be reduced or kept within defined limits. The second category, the Blue Box, covers payments aimed at limiting production. The final category, the Green Box, includes payments that do not distort trade or are considered to cause minimal distortion. Green box payments are allowed within limits. They include payments associated with environmental protection and those associated with regional development programmes.

The Aggregate Measure of Support (AMS) is widely used to measure the extent of protection, particularly domestic support, in the agricultural sector. Although it is a price-based measure, it includes only those forms of support that are agreed to be most trade distorting and so is not comprehensive.<sup>6</sup> A major issue in the discussions on domestic support is how to reduce the scope and incentive for members to reallocate expenditures from categories that are considered trade distorting to those that are not considered trade distorting.<sup>7</sup> This is of concern because although expenditures in the Amber Box are declining, there has been an increase in the use of Blue Box support.

As the AMS approach reflects available data, it is employed in this study as well. Table 4-1 provides data on the subsidies from farm-income policies and export competition for the EU, North America and high-income Asia. A negative number refers to a net tax on producers in that sector. Note that the accuracy with which these data reflect current subsidies in these regions varies. These are 1997 data from the GTAP database, which have been updated for cotton only. The GTAP database does not include domestic protection measurement for cotton. We include average domestic support levels in the European Union and the United States in the late 1990s.<sup>8</sup> Both export subsidies and domestic support vary largely from year to year due to variations in world prices, the size of harvests and other factors. So the numbers in the table provide an indication of support rather than a true reflection of the current state. They are used, nevertheless, as inputs in the simulation of policy changes in the model.

**Table 4-1. Agricultural subsidies in Quad countries (1997, \$ million)**

	Domestic support			Export subsidies		
	European Union	North America	High income Asia	European Union	North America	High income Asia
1 Cereals	22,374	21,767	1,576	517	-7	-1
2 Vegetable	-1,074	-100	-350	25	-2	-3
3 Oilseeds	6,029	2,606	-4	5	-5	-2
4 Sugar	72	169	-8	865	0	0
5 Cotton a)	1,276	1,392	0	0	0	0
6 other Crops	-801	-5	-281	9	-1	-5
7 Animal	14,650	4,240	1,200	0	-4	-2
8 proFOOD	-17,455	-194	-49,463	2,939	118	-86

Source: GTAP database version 5.3

a) Cotton support levels are updated with data from WTO notifications for European Union and United States only. See footnote 8.

<sup>6</sup> See OECD (2003) for methodology and measurements.

<sup>7</sup> Tangemann (1998) provides a discussion on these issues.

<sup>8</sup> Reported data are domestic support commitments notified to the WTO secretariat for the two regions with the largest levels of support: US and EU. The levels of subsidies for cotton farmers are extremely volatile between years; here we use averages of 1999-2000 for US, of 1997-1998 for EU.

## 4.2 Analysis of Market Access Modalities

There are various approaches to tariff reduction. Under the GATT negotiations on tariff reduction was initially based on a request-and-offer procedure. Under this approach members negotiate bilateral market access concessions, and subsequently extend them to other members. With a relatively small number of negotiating parties and the focus on a limited number of industrial products, members were able to substantially reduce average tariffs. However, the approach was abandoned in favour of a comprehensive formula approach in the Kennedy Round (1964-7). The next round, the Tokyo Round (1973-9) introduced the so-called Swiss formula. This approach was however abandoned during the Uruguay Round (1986-94) and a more flexible approach was adopted. This new approach required that, on average, tariffs were to be cut by a certain amount (e.g., 36% in agriculture). The distribution of the cut across sectors was left for negotiations between trading partners. While achieving substantial tariff reductions, the Uruguay round allowed members to protect strategic sectors, and failed to achieve significant reductions in tariff escalation.

### How to assess the effects?

To derive more benefits from trade negotiations, countries' have to assess the merits of the various proposals or modalities for market access, but it is not evident which criteria should be used for the assessment. For example, if an average cut in tariffs is the objective, it is not clear whether this should be a weighted or a simple average. If a weighted average is chosen and import weights are used, it may result in the underestimation of high prohibitive tariffs, because in such cases little trade occurs. There is also a complication introduced by the fact that bound rates for most countries are different from applied rates. This implies that reductions in bound rates do not always lead to reductions in applied rates and so it is important whether the reduction commitments are based on bound or applied rates. Other issues that arise in assessing the merits of different negotiating proposals include the effects of the proposals on:

- Tariff peaks: as the most severe impediments to trade occur if very high tariffs are in place, the effects on peaks deserves separate attention;
- Import prices: ultimately, this is what affects domestic markets. Consumers will enjoy lower prices, while domestic producers might fear competitive pressure from cheaper imports. For a small importing country the direct effect on domestic prices equals the change in the power of the tariff  $T=t/(1+t)$ , and can be readily calculated. For a large country, the effects on world markets need also to be taken into account;
- Tariff revenues: this concerns especially those countries which use tariff revenues as a prime source for generating government revenues, and which have little alternative means to levy domestic taxes. Evaluation of tax revenue effects is not straightforward, as it requires taking into account direct tariff revenue effects as well as indirect spending effects and supply response by domestic industries.
- Preferential market access: tariff reduction erodes preferential trade conditions to the loss of currently preferred suppliers, and to the benefit of competing producers.

## Introducing formulae for agricultural market access

The DDA negotiations on agriculture have introduced several approaches to tariff reform. The European Union prefers a Uruguay Round (UR) approach, which defines as the goal an *average cut* in tariffs. The Uruguay Round has in practice led to the outcome that larger cuts were applied to tariffs that were already relatively low, while applying only modest reductions to high tariffs. A minimum cut per tariff line, an additional requirement currently proposed, will prevent this, so the EU claims. In fact, this depends largely on the modalities for the minimum cut.

The USA and the CAIRNS group have proposed a formula approach. In contrast to the UR approach, a formula approach sets out rules to cut tariffs on each tariff-line. Specifically, these countries would like to apply a Swiss formula approach because it achieves higher proportional cuts in higher tariff rates and results in a maximum ceiling tariff per tariff line. The Swiss formula is the most appropriate modality for addressing the issue of tariff escalation. The so-called Derbez text that emerged during the Cancun ministerial conference proposed a 'blended' formula that combines a UR and a Swiss formula approaches. To give readers an idea of the implications of the formula approaches discussed in the current round of negotiations, we provide illustrations with a proportional cut, a Swiss formula, and a blended formula.

The proportional cut determines the new tariff  $t_1$  as a simple percentage of the original tariff  $t_0$ :

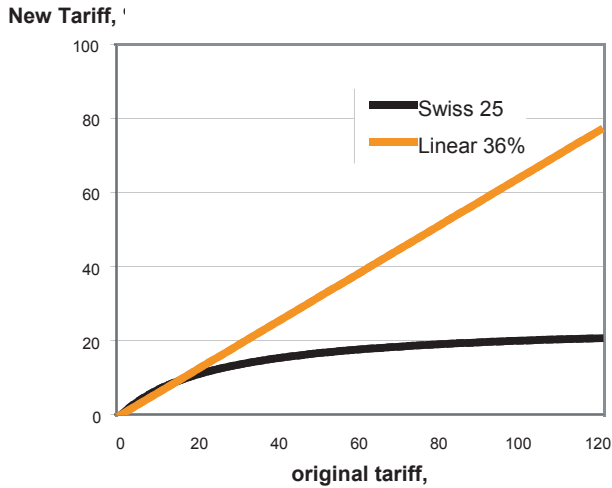
$$t_1 = c t_0$$

For example, if a 30 percent reduction were desired,  $c$  would be 0.7. The Swiss formula determines the new tariff as:

$$t_1 = a t_0 / (a + t_0)$$

The parameter  $a$  is to be determined as part of the negotiations. It determines the maximum tariff that remains after the implementation of commitments. For example, if  $a = 25$ , then the maximum tariff will be 25 percent. Besides defining effectively ceiling tariff, the Swiss formula has the feature of yielding sharper reductions in high tariffs, as can be seen from a comparison with the Linear 36 approach in Figure 4-2.

**Figure 4-2. Linear 36 versus Swiss formula**



By contrast, the UR approach sets the average reduction as a negotiation parameter, while it leaves open the exact way in which such an average is to be achieved. In fact, the UR approach allows the setting of an individual percent reduction  $c^i$  for each tariff line. This becomes evident from the following equation, where we introduce a superscript  $i$  to distinguish tariff lines, where  $t_0$  and  $t_1$  are tariff rates before and after reform, and  $\alpha$  denotes the simple average reduction:

$$\alpha = \frac{1}{n} \sum_i (t_0^i - t_1^i) / t_0^i = \frac{1}{n} \sum_i (t_0^i - c^i t_0^i) / t_0^i = \frac{1}{n} \sum_i (1 - c^i)$$

The following example is meant to illustrate the effects of different modalities. We show the effect of various modalities on a set of five initial tariffs that range from a high *ad valorem* tariff of 250 percent to a low one of just 10 percent. This reflects the variety of tariff lines for agricultural products in the world.

Figure 4-3 illustrates the effects of different modalities on the initial tariffs. Table 4-2 shows the percent cuts per tariff line. The linear proportional cut simply reduces each tariff by 36 percent, resulting in more favourable access conditions for the products subject to high tariffs, while the low tariff lines see relatively modest improvements. The UR approach shown in the figure assumes a minimum cut of 15 percent for each tariff line and an average reduction percentage of 36 percent. This is achieved in the example by reducing high tariffs by just 15 percent while reducing the Medium1 tariff by 25 percent, the Medium2 tariff by 36 percent and the Low tariff by as much as 90 percent. The incentive of this approach is clear:

very modest reductions in the high tariff range and large reduction in the low range. This contrasts sharply with the Swiss formula approach, where we assume the parameter  $a$  to equal 25, as proposed by the USA (“Swiss 25”). This brings down sharply the high tariffs, and results in an average reduction percentage of 61 percent. See Table 4-3 for summary statistics on tariff dispersion, and Table 4-4 for the direct effects of the tariff reforms on domestic prices.

**Table 4-2. Percent cuts per tariff line, %**

	Percent cuts			
	Linear 36%	UR 36%	Swiss 25	Blended
High1	-36	-15	-91	-18
High2	-36	-15	-76	-40
Medium1	-36	-25	-67	-50
Medium2	-36	-36	-44	-44
Low	-36	-90	-29	-100

**Table 4-3 Summary statistics, %**

	Linear 36%	UR 36%	Swiss 25	Blended	Total
Average	82	52	66	15	58
Max	250	160	213	23	205
Min	10	6	1	7	0
average cut	-36	-36	-61	-50	

**Table 4-4. Effects on domestic prices, % (\*)**

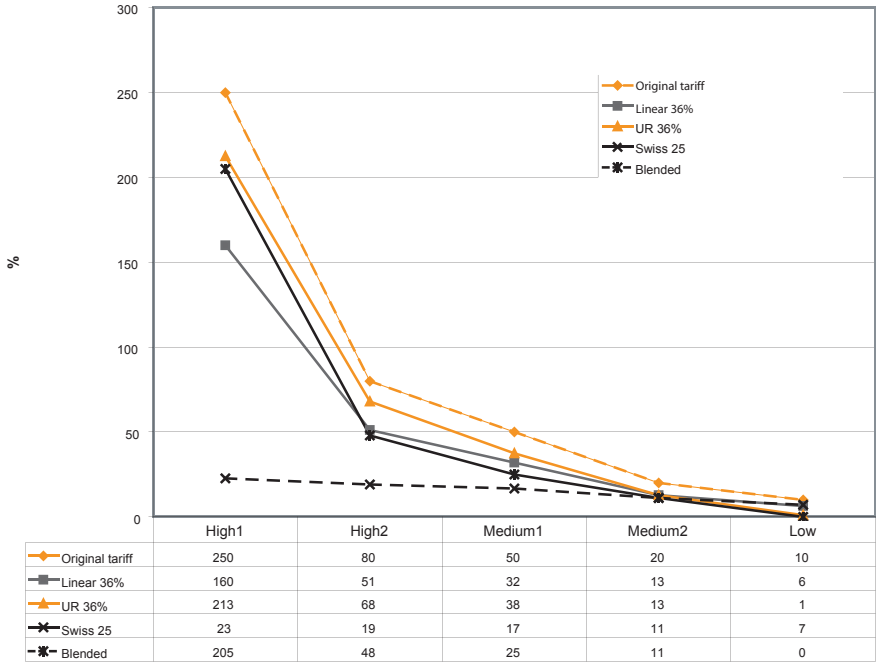
	Linear 36%	UR 36%	Swiss 25	Blended
High1	-25.7	-10.7	-64.9	-12.9
High2	-16.0	-6.7	-33.9	-17.8
Medium1	-12.0	-8.3	-22.2	-16.7
Medium2	-6.0	-6.0	-7.4	-7.4
Low	-3.3	-8.2	-2.6	-9.1

(\*) calculated as percent change in the power of the tariff

The blended formula approach proposed in the ‘Derbez text’ combines the UR approach with the Swiss formula and adds the requirement that at least one tariff line has to be reduced to zero. Given the features of the UR and the Swiss formula, we implement the blended formula by: applying the UR formula to the high and medium1 tariffs; reducing the low (nuisance) tariffs to zero; and applying the Swiss formula

to the medium range. The UR component of the cocktail is constructed such that the average reduction within this component equals 36 percent. Such a behaviour can be expected to occur if countries want to avoid granting improved market access in products that are considered to be of ‘strategic’ value. Hence, blending allows members still a considerable leeway in designing their tariff landscape.

**Figure 4-3. The impact of various modalities on tariffs**



It is important to find the interest of the negotiating parties in specific modalities. The examples given can be roughly interpreted as follows. The EU proposal of a UR approach points to a strong interest in keeping market access restricted for programme commodities as long as domestic support policies are in the process of reform. The EU, as well as Japan and Korea, have large tariff peaks in agriculture. It is in the interest of agricultural exporters to reduce these peaks. The use of a Swiss formula approach is in the interest of these countries because they have open markets in general (Australia and New Zealand) or have tariff peaks in non-agricultural sectors (US and Canada).

### 4.3 Non-agricultural market access

With the implementation of Uruguay Round commitments, average ad valorem tariffs in the industrial countries generally are around three percent, as is reflected in the upper panel of Table 4-5. However, there are important exceptions. One of these is textiles and clothing, where the average rate is roughly three times this average. This is reflected in the standard deviation and maximum tariff columns. With full implementation of current commitments, we estimate a simple average industrial tariff in the United States of 3.2 percent, a standard deviation of 4.3, and a maximum tariff of 37.5 percent. The European Union has a higher average, but less dispersion: the EU has an average of 3.7 percent, a standard deviation of 3.6 percent, and a maximum tariff of 17 percent.

Table 4-5 presents detailed data for three developing countries: Brazil, India, and Thailand. These countries span the spectrum of bindings in developing countries. Brazil's tariffs are all bound, though the average rate for industrial products is 14.9 percentage points above the current applied rate. This gap is called a "binding overhang". India and Thailand's tariffs are partially covered by bindings, again with significant binding overhang. For many developing countries the situation of Brazil applies: substantial binding means that reductions on bound rates in the range of 50 percent are necessary to force reductions in average applied rates. For many countries, even this will have little or no effect, as tariffs are largely unbound. For example, note that one-third of India's manufacturing tariffs and 90 percent of Sri Lanka's tariffs are unbound. Of course, this limits severely the negotiating leverage of developing countries in the WTO. This is also why the debate of using bound, applied, or "historic" rates as a starting point is important.

For services, "market access" is a problematic concept. From the outset, service negotiations have been "qualitative." They have not targeted numeric measures, but rather commitments in the cross-border movement of consumers and providers and the establishment of foreign providers. In fact, the GATS actually confuses FDI with international trade. As a result, efforts to quantify market access in service sectors (a basic requirement if we want to then quantify liberalization) have been problematic at best. The standard approach (as exemplified by Hoekman 1995) has been to produce inventory measures.

Our modelling exercise will exclude a simulation of liberalized services trade. It is difficult to find reliable data on traded services, and more so for Africa. For an exploratory study on the impact of reforms in services trade, the reader is referred to Francois et al. (2003b).

**Table 4-5. Applied tariffs on imports in selected regions**

Non-agriculture				
	post-UR and ITA tariffs			binding overhang
	simple average	standard deviation	maximum tariff	
European Union	3.7	3.6	17.0	0.4
Japan	2.3	3.4	30.9	0.1
United States	3.2	4.3	37.5	0.2
Brazil	15.9	6.0	35.0	14.9
India	19.2	16.5	40.0	3.9
Thailand	10.5	10.8	80.0	7.8
Agriculture				
	post-UR and ITA tariffs			binding overhang
	simple average	standard deviation	maximum tariff	
European Union	5.9	7.5	74.9	0.3
Japan	6.2	8.1	43.3	1.2
United States	3.5	7.4	90.0	0.5
Brazil	12.9	5.1	27.0	22.6
India	31.0	20.8	150.0	90.7
Thailand	26.5	14.4	65.0	7.1

Source: Francois and Martin (2003)

#### 4.4 Trade Preferences

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 (GSP). 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 (AGOA). Third, a myriad of bilateral deals or trade integration arrangements with favoured 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 Favoured Nation tariff applied on imports from the beneficiary country. Generally, the preference margins are substantial for LDCs but rather moderate under GSP schemes. GSP generally is of little effect on large import duties: large tariffs occur mostly on sensitive agricultural products, for which preference margins are low or nonexistent. Table 4-6 reports on preferences margins as these have been calculated for this study. Annex A documents the data and methods applied. 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 outweigh the costs. When preferences are in fact not utilized, the data presented here exaggerate the potential benefits of preferential trade.

**Table 4-6: 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)

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.

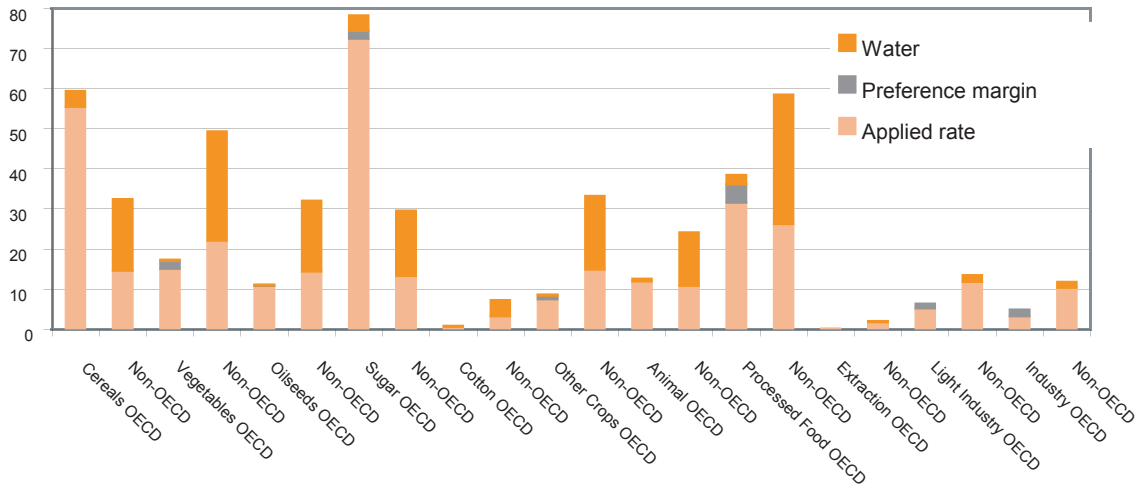
How does this relate to market access for African exports? In Figure 4-4 to Figure 4-6 we present the level and the composition of bound tariffs that the African exporters face in the importing countries. They are aggregated over all importing OECD countries, and non-OECD countries (including the African 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 Annex A.

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.

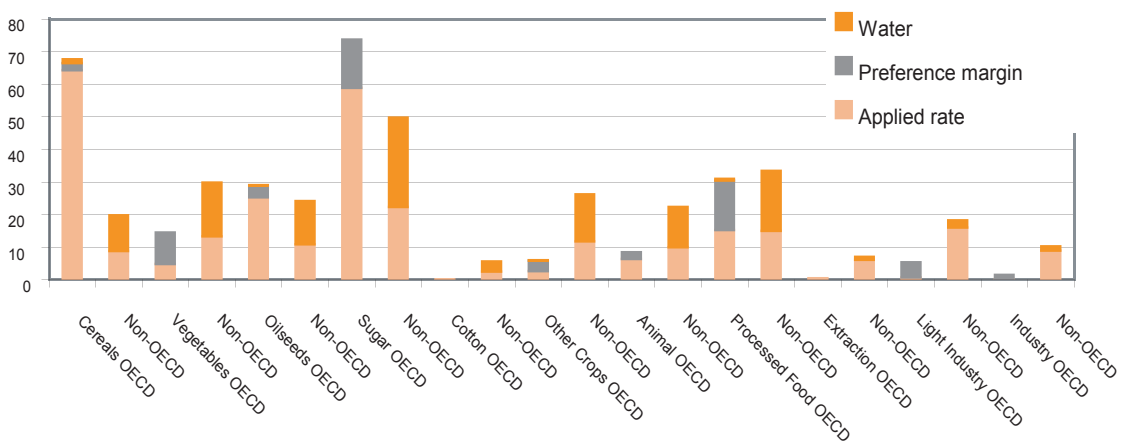
In terms of their *composition*, bound rates can be cut into three *ad valorem* pieces: the binding overhang or water gives the wedge between UR committed bound rate and the applied MFN rate; the preference margin reflects the reduction on MFN rates to the beneficiaries of trade preferences, providing them with a competitive edge. Preference margins generally range between five 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, as will be explained in a later chapter, 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 WTO.

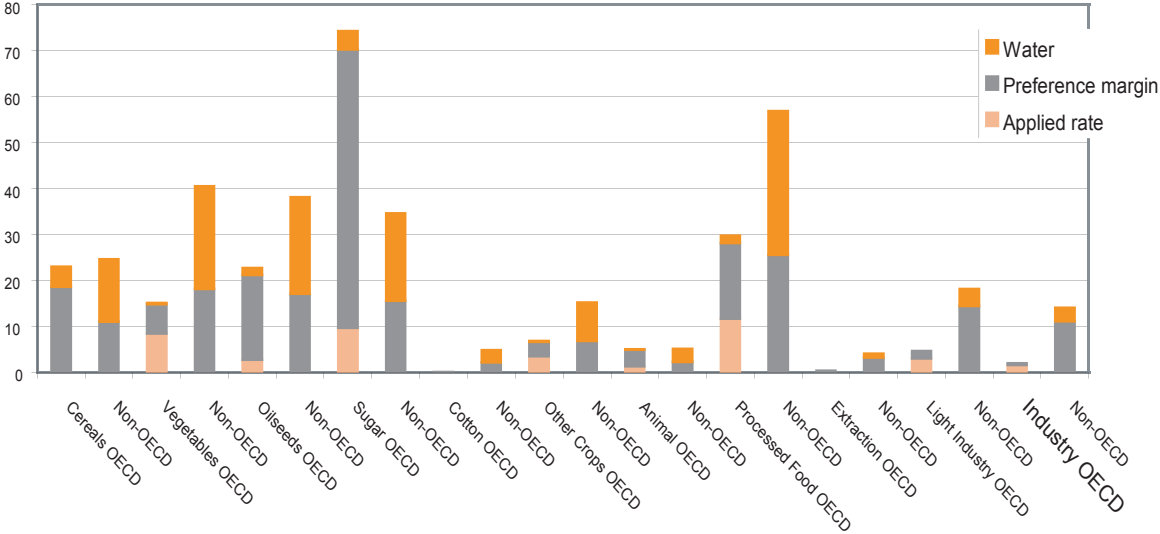
**Figure 4-4: Level and composition of the bound tariffs for exports of North Africa (% ad valorem)**



**Figure 4-5: Level and composition of the bound tariffs for exports of sub-Saharan Africa (% ad valorem)**



**Figure 4-6: Level and composition of the bound tariffs for exports of Southern Africa (% ad valorem)**



**4.5 Assessing the Degree of Protection of OECD Trade Policies**

Before examining the impact of OECD trade policies on African economies, it is useful to assess the degree of protection of OECD trade and agricultural policies. Relatively few studies have attempted to quantify the degree of protection associated with agricultural support policies in OECD countries using well-designed and rigorous econometric criteria. Two recent studies have tried to address this issue, although with contradictory results.

Bouet et al. (2001), examined the extent of trade barriers existing in developed countries using Market Access Maps (MAcMaps), which is a bilateral and disaggregated measure of market access that integrates various instruments of protection and takes account of the fact that developed countries’ apply different rates of protection on products imported from their trading partners through preferential trade arrangements. The instruments of protection considered in the study are: ad valorem duties, specific duties, tariff quotas, anti-dumping duties, and sanitary, environmental and technical norms. The study found that of the developed countries considered, the aggregate degree of trade protection in Switzerland was the highest with a MAcMaps tariff mean of 15.1 percent (see Table 4-7). The United States ranked second with a tariff mean of 11.8 percent, followed by the European Union (9.7%), Japan (9.0%), and Australia (8.8%). An interesting point to note in the results is that the United States appears to be more protective than the European Union even though the data show that tariff quotas, prohibitions, and ad valorem and specific duties are more protective in the later (see Table 4-8). The authors argue that this has to do with

the fact that the European Union has a greater incidence of discriminatory regimes and preferential trade agreements that give some developing countries more access to its markets.

**Table 4-7: Ranking of Countries by Degree of Protection**

Country	Tariff MacMaps (%)	Ranking of Countries
Australia	8.80	1
Japan	9.00	2
Morocco	19.40	8
EU	9.70	3
USA	11.80	4
Brazil	13.40	5
Switzerland	15.10	6
China	18.40	7

Source: Bouet et al.(2001)

**Table 4-8: Protection Measures by Type of Instruments**

	Canada	USA	Japan	European Union
Average Ad valorem taxes (%)	7.10	4.87	6.55	5.88
Specific Duties (%) (average ad-valorem equivalent)	7.97	12.75	7.37	50.04
No. of Prohibitions	0	0	0	881
Average In-Quota Tariff Rate (%)	3.50	8.70	17.28	15.17
Average Out-Quota Tariff Rate (%)	169.12	41.83	234.83	60.19

Source: Bouet et al.(2001)

Using a different methodology, Cline (2002) developed an index of industrial countries' trade policies toward developing countries. The index is a summary measure of developing country access to import markets of each of the major industrial countries. The index measures the overall protection level of each industrial country as a weighted average protection in three key areas: agriculture, textiles and apparels, and non-textile manufactures. The weights used are "adjusted import weights" to reduce the problem of endogeneity-bias associated with the fact that imports vary with tariff levels and so using simple import weights will bias the results downwards. The protection rates for each country in the three key sectors are

presented in Table 4-9. Four points are evident from these results.

- ❑ With the exception of Australia and New Zealand, protection is very high in agriculture compared to manufacturing and textile and apparel;
- ❑ Norway, Japan, Switzerland, and the European Union have higher degrees of protection in agriculture than the other industrial countries;
- ❑ Protection in the textile and apparel sector is lower in Japan and the European Union; and
- ❑ Australia and New Zealand have higher protection in manufacturing than the other countries.

The sectoral protection rates were used to compute an Aggregate Measure of Protection (AMP) for each country. The AMPs are presented in Table 4-10. Based on these results, trade protection is less in the United States than in the other industrial countries. Its AMP is 8.9 percent compared to 18.9 percent for the European Union. Norway appears to have the highest level of protection with an AMP of 112.1 percent.

Cline also considered another measure of market access known as revealed openness. This takes into account the fact that there are tacit barriers to trade that cannot be captured by measures such as the AMP. Three measures of revealed openness were used: the share of imports in GDP adjusted for country size; imports of manufactures from developing countries relative to GDP; and the ratio of imports from at risk developing countries. The ranking of countries based on this measure is presented in column three of Table 4-10. By this measure, Australia is the most open and Japan is the least open economy. Using the AMP and the revealed openness measures a composite ranking of trade regimes for the industrial countries was obtained. The table shows that, with the exception of Australia and Canada, the ranking from the AMP and the composite ranking measures are the same.

A puzzling observation is that the ranking of countries obtained from the two studies is different. In the Bouet et al. study, protection is highest in the United States and lowest in Japan while in the Cline study Japan and the European Union have higher protection levels than the United States. Cline attributes this to several factors among which is the fact that he used data for agricultural protection from the GTAP database, but the levels of agricultural protection in the European Union and Japan used in the Bouet et al study are very low compared to those in the GTAP database. Despite the apparent inconsistency in the ranking of industrial countries by degree of trade protectionism, it is clear from these studies that OECD policies severely limit market access for developing country exports.

**Table 4-9: Protection Measures for Key Sectors (%)**

	Manufactures	Textiles and Apparel	Agriculture
United States	4.6	25.4	34.4
New Zealand	12.3	30.3	5.0
Australia	13.4	35.4	5.2
Canada	5.4	32.3	65.5
European Union	5.0	17.2	100.2
Switzerland	1.9	24.2	187.1
Japan	3.6	11.6	231.9
Norway	3.6	26.7	304.6

Source: Cline (2002).

**Table 4-10: Aggregate Measures of Protection and Composite Ranking**

	Aggregate Measure of Protection: Level (%)	Revealed Openness Rank	Composite Rank
United States	8.9	4	1
New Zealand	12.8	2	2
Australia	14.1	1	3
Canada	13.7	5	4
European Union	18.9	3	5
Switzerland	32.5	6	6
Japan	45.0	8	7
Norway	112.1	7	8

Source: Cline (2002)

## 5 Africa's View on Agricultural Negotiations

Agriculture occupies a vital place in Africa for many reasons. Firstly, it represents the main source of employment with nearly 70 percent of the total in Least Developed Countries (LDCs), 30 percent in middle-income countries, but only three percent in developed countries (FAO 2000, OECD 2000). Secondly, agriculture continues to play a major role in economic growth in most African countries. It plays a great role in feeding the population and providing food security through food crops. At the same time, export crops make a great contribution to the income of many developing countries. Lastly, with respect to poverty reduction strategies, agriculture plays a crucial role for the simple reason that the majority of poor people live in rural areas.

All these reasons explain the importance accorded agricultural matters by African countries at international trade negotiations. Improvements in international markets for agricultural products, and a greater awareness of developing country concerns could bring about a more effective integration of their economies into the global economy and speed up economic growth. However, world markets have been strongly distorted by the various forms of agricultural support measures developed countries give to their farmers. At a time when African countries drastically reduced support to their poor farmers, the practice has continued to increase in the North, leading to negative impacts in developing countries for many decades. Consequently, in the Doha Round of World Trade Organization talks, African countries made the reduction of agricultural subsidies a key issue for negotiations.

### 5.1 Evolution of Agricultural Policies Over Several Decades

Developed countries experienced substantial industrial growth after the Second World War. This growth led to a huge rise in productivity and industrial-sector wages. Furthermore, the growth in consumption of industrial products led to an increase in industrialization and greater availability of jobs in this sector. This development had a negative impact on other sectors of the economy, more particularly, the agricultural sector, with production, the number of people employed in the sector and its contribution to domestic product falling in most developed countries. Alongside these economic effects, agricultural crisis had considerable social consequences with the increase in migration to cities and depopulation of the countryside. It is against this background, that most developed countries devised strategies to support their agricultural sectors particularly, through, protection of domestic production against foreign competition, support for local producers to enable them to balance the relevant wage structures, and export subsidies. These various forms of support had positive effects on most developed countries. For instance, European Union countries progressed from being net importers of agricultural products in the 50's to net exporters in the 70's. Furthermore, agricultural surplus rapidly increased resulting in price fall on the international markets.

The newly independent African countries also applied similar support mechanisms. In fact, most of these countries, from the end of the 60's and in the 70's, established new agricultural policies and set in

motion green revolutions. It should be recalled that prior to independence, agriculture had developed from colonial policies, which favoured export crops over food crops. The stated objective of modernizing agriculture in African countries was therefore to increase productivity and boost food crop output as a means of bringing about food security. Agricultural modernization strategies called for huge public investments, particularly in the institutional areas. Therefore a large number of enterprises specializing in rural development were established to construct rural infrastructure, support rural research, popularize new agricultural technologies, and provide funding and other resources like seeds and fertilizers to farmers at reduced costs. Agricultural modernization was considered necessary and indispensable for the take-off of African countries. An increase in agricultural productivity was expected to boost the income of local farmers and by so doing, widen the relatively small market of these countries. Furthermore, agricultural development was supposed to provide an outlet for chemical industries, intermediate goods industries and investment goods industries. Lastly, agricultural production growth was expected to provide the necessary inputs for food processing industries and all primary agricultural processing activities. For all these reasons, agricultural modernization was perceived as a necessity of the first order in development strategies owing to its impact on the rest of the economy. Public authorities assumed most of the funding costs necessary for this modernization. The buoyant price of raw materials exported by African countries in the 70's enabled them to successfully implement this policy.

However, in the early 80's, there was a change in scenario. Firstly, with regards to ideas, there was a change of paradigm challenging the Keynesian Consensus, which dominated economic thinking and discussion on development from the end of the Second World War. A new intellectual context emerged which made the market the main institution of regulating economies. This consensus cast doubt on state interventionism arguing that it created distortions which were the root cause of imbalances experienced by all economies, be it developed or developing. Furthermore, the early 80's was also characterized by the debt crisis faced by most developing countries. This crisis was the root cause of the adoption of structural adjustment programmes, which sought to redress internal and external deficit in developing countries. Re-establishing the imbalance called for State dis-engagement from economic activities and for markets to be given a greater role in regulating economic activities. In the agricultural sector, the new policies adopted in the 80's rejected state intervention and emphasized the capacity of private stakeholders to be at the forefront and ensure a revival of agricultural production.

However, years later, it was realized that these new options in agricultural development did not achieve the desired goals. On the contrary, a large number of developing countries experienced a real decline in food output. From the end of the '70s to 1997, global trade in agricultural products increased four-fold and attained a global value of nearly \$460 billion (FAO 1999). In this trade, the position of developing countries deteriorated. Their share of global imports rose from 28 percent in 1974 to 37 percent in 1997, with a smaller rise in exports, which went up from 30 percent to 34 percent during the same period. This development led to the rapid deterioration of the trade balance of developing countries with a deficit of

nearly \$13 billion in 1997. At the same time, food-aid for net food importing countries fell drastically. LDCs were badly affected and food insecurity continued unabated in these countries. Therefore, in the 80's and 90's, African countries began to experience a situation of great agricultural crisis and food emergency.

However, while African countries were radically reducing support and all sorts of assistance to their farmers, support greatly increased in most developed countries. Therefore, in 1997, it was estimated that OECD countries gave nearly \$370 billion to their farmers, which is six times more than the amount given to development aid (UNDP 2002). These subsidies have continued increasing from that time even if official measures indicate a reduction over the years. All productions transferred by these countries into the green box benefited from this increase. It has been estimated that since 1997, agricultural support in OECD countries increased by up to 28 percent (UNDP 2003). European Union countries paid half these subsidies while Japan contributed nearly 39 percent. However, agricultural support was not limited to these countries. For example in year 2000, the United States provided nearly \$28 billion to their farmers. Furthermore, with the new US Farm Bill law of 2002, the American administration committed itself to granting \$180 billion in subsidies over a ten-year.

These various elements illustrate the tainted and an unequal nature of the global markets for agricultural products. In addition to productivity differentials in their favour, developed countries continue to support their big-scale farmers. This situation has a negative effect, not only on agricultural exports of African countries, but also on their production and as a result, on their food security. Therefore, agricultural negotiations are at the centre of the Doha development agenda.

## **5.2 Africa's Position in the International Negotiations on Agriculture**

Agricultural concern was of great importance in discussions within the WTO. In addition to concrete proposals, various agricultural visions were in conflict with one another. The European Union, Japan and other developed countries advanced the idea of agricultural multifunctionality, which justified the public support authorities accorded it over the years. Multifunctionality signifies that the social role of this sector is not limited to production but deals with other areas such as food security, protection of cultural heritage, economic viability of rural areas, protection of the landscape, the well being of rural people in their villages, the prevention of natural disasters, biological diversity and preservation of the environment. African countries challenged this perception and considered that the idea of multifunctionality was only to justify the rapid increase in subsidies since the 80's in developed countries. For their part, African countries have for years continued to clearly and rigorously defend multilateral rules, which if applied would lead to substantial reductions in support to farmers of developed countries. At the same time, they have demanded some flexibility in the application of these rules in order to enable them to continue to support their agricultural sectors and to ensure their food security. The Cairn's group consisting of about fifteen big-scale agricultural exporters are defending a totally different concept by underscoring the role of the market in regulating global trade. For these countries, all forms of subsidies that distort the role of the market and lead to ineffective allocations of global resources should be cancelled.

These various concepts were in conflict with one another in international negotiations, particularly from the Uruguay Round when countries demanded a break from the protection enjoyed by agriculture in the past and to impose greater multilateral discipline. Henceforth, the three main issues would be at the centre of international discussions, namely: market access, domestic agricultural support and export subsidies.

### **5.2.1 Market Access**

Although the price of industrial products have experienced huge reductions, the markets for agricultural products continue to benefit from substantial protection, particularly in developed countries. For example, the average rate of customs duties on industrial products declined from 40 percent to two percent between 1945 and 1995 while the average rate for agricultural products was still around 62 percent. These rates were still higher for products considered sensitive or strategic by OECD countries such as wheat (214%), barley (197%) and maize (154%). The Uruguay Round negotiations tried to reduce this protection first of all, by transforming all non-tariff barriers into tariff barriers and by reducing the latter. However, African countries considered that these reductions were still low and OECD contributions continued to place huge barriers to market access for developing countries' products. Furthermore, some tariffs on sensitive products have slightly increased over the years, in spite of commitments to reduce them.

African countries have also raised the issue of tariff peaks and tariff escalation applied by a majority of OECD countries. This phenomenon particularly affects these countries, whenever it is applied to a large portion of their exports. It is estimated that today more than half of tariff peaks are applied to agricultural products, agricultural processing and fish product (WTO and UNCTAD 1999). These tariff peaks sometimes exceed 100 percent. For example, bananas attract tariff peaks of 180 percent in European countries and groundnuts attract 550 percent in Japan and 132 percent in the United States. For other products like sugar, rice, meat, milk products, vegetables and fish, the applied peaks by OECD countries are still higher and vary between 600 percent and 900 percent.

In addition to the tariff peaks, African countries face tariff escalation. This phenomenon poses great difficulties for countries looking for a way out from international integration based on raw materials, and whose aim is to diversify their productive structures through the processing of their products. These tariff peaks were applied by OECD countries on products such as coffee, cocoa, oil producing plants, fruits and vegetables (Shirotori 2000). In spite of the commitments of OECD countries to limit tariff peaks, the protection rate for processed primary products was still high and revolved around 44 percent for wheat flour and 25 percent for orange juice in European countries, 30 percent for refined sugar in Japan and 42 percent for dairy products in the United States.

The continued high level of tariff protection in developed countries, in spite of their commitment to reduce them at Uruguay Round, was in contrast with the protection levels of African countries. The

latter carried out a series of reforms within the framework of structural adjustment programmes from the middle of the 80's in order to eliminate non-tariff protections and reduce custom's protection rates. It was in the light of this perspective that developing countries demanded, within the framework of international negotiations, for a substantial reduction of customs duties and greater market access for their agricultural products and primary processed products.

### **5.2.2 Domestic Support to Production**

Alongside the high tariff and non-tariff barriers, African countries demanded substantial reductions of domestic support measures applied by developed countries. In order to understand the importance of this support, it should be recalled that they represent nearly 20 percent of agricultural GDP for OECD countries, and for about half of them, more than 50 percent. Furthermore, since the middle of the 80's, African countries substantially reduced all forms of support given to their farmers within the framework of efforts to re-establish their macro-economic balances. Therefore, African economies are now in a competitive disadvantage not only because they were late in modernizing their agrarian structures but also due to the production support big-scale agro-industrial farmers of developed countries benefit from. These various forms of production support enabled the big-scale farmers of developed countries to maintain low prices on International markets. This situation was mostly the root cause of the substantial deterioration of exchange rates in African countries. Furthermore, and considering the liberalization of their international trade, small-scale farmers in African countries could not sustain the competition imposed on them by the big-scale agro-industrial firms and progressively left rural areas to go and increase the big metropolis of developing countries. Therefore, countries, which were self-sufficient in terms of food, lost this autonomy and became net importers of agricultural products.

From the Uruguay Round Cycle, African countries made the reduction of various forms of domestic support one of their major priorities in order to protect their small-scale farmers from the big agro-industrial enterprises who have become farmers in developed countries. This approach met with opposition from OECD countries who felt that any reduction could only be progressive. Therefore, the system of classifying three different types of support to agricultural production began (GATT 1994). Firstly, there is the amber box, which assembles all support that have a devastating and distorting effect on production and prices. For this category of products, reductions were fixed at an average of 20 percent for industrial countries and 13.3 percent percent for developing countries in relation to the Global Support Measure. Next was the blue box, which is an exemption given to European Union countries from the general agreement to reduce all subsidies, to enable them to sign the agreement. Some experts felt that these support measures, which are linked to the size of operation or the number of livestock, and linked to operations committed to the policy of reduction of output, has a relatively less important effect than that of the amber box. This did not prevent African countries from calling for the implementation of a policy renouncing these support measures. Next was the green box, which grouped all supports measures that have marginal devastating effects on the markets and prices. These support measures concerned subsidies

given under public funds and paid directly to local farmers but without any impact on prices. This enabled public authorities to take into account environmental issues and the need to maintain ecological and sociological balance of rural environments.

### **5.2.3 Export Subsidies**

Alongside the access to the markets and domestic support to production, the African countries equally underscored the subsidies granted by OECD countries on their agricultural exports. These subsidies enable them to maintain relatively low prices on the agricultural markets and to export their agricultural surplus. African countries have greatly suffered from this tendency of agricultural prices to fall, which have not only brought about a substantial reduction in export income but also the dislocation of agricultural production in countries that had opted for a strong liberalization of their agricultural trade. Recent studies have shown that close to 90 percent of global agricultural export subsidies are paid by European Union countries (UNDP 2003).

Agriculture constitutes a strategic sector for developing countries in terms of growth resumption and in reducing poverty. However, this sector, in addition to its domestic difficulties and weakness of its productivity, suffered from unfair competition in international markets. Indeed, in spite of the commitment of developed countries within the framework of Uruguay Round to reduce all forms of assistance and support to this sector, the support of the public authorities to big-scale farmers in developed countries did not stop and on the contrary, according to some accounts, increased substantially. Suddenly, negotiations in this sector have become an issue of strategic importance for the developing countries.

## **5.3 Towards Favourable Negotiations for Development**

The position of African countries within the framework of international negotiations on agricultural concerns evolves around two principles. On one side, it calls for greater access to developed-country markets for their agricultural products and the elimination of the most devastating forms of market support. At the same time, all these countries are calling for greater flexibility in the liberalization process by maintaining some form of protection for their farmers to ensure food security. These protections have become, all the more necessary given the increase in food insecurity and growing poverty in the countryside. The demand of African countries now revolve around four main concerns:

### **5.3.1 Market Access**

At this level, African countries are demanding for greater openness of markets for their product through the reduction of tariff-peaks. Most particularly, they are demanding for the reduction of tariff-peaks and the abandonment of the tariff escalation applied against their agricultural and processed products.

### **5.3.2 Domestic support to production**

At this level, the African countries are demanding the elimination of subsidies in the blue box. Regarding support in the amber box, these should be progressively phased-out and eliminated around year 2015. Finally, in relation to assistance in the green box, African countries, while taking into account developed country concerns for the protection of the environment and maintenance of the rural landscape, are demanding more rigorous criteria for defining support measures which should enter this category. This rigour is necessary in order to avoid the situation whereby contested blue and amber box support items become progressively integrated into this category.

### **5.3.3 Export Subsidies**

The African countries declared in favour of the elimination of these subsidies between now and year 2010.

### **5.3.4 Specific treatment for development**

African countries demanded a less stiff reduction of custom duties on agricultural products, longer period for the implementation as well as complete exemption for the LDCs.

Furthermore, some African countries underscored the strategic character of agricultural policies in development, which made food security a fundamental imperative within the fundamental rights of people. To this end, they suggested the establishment of a special support category for development in the agricultural sector. This chapter gave an idea on the views of African countries on international negotiations. Therefore, the objective of this study is to inform better their positions on their main areas of concern

## 6 Model, Data and Scenarios

### 6.1 Model structure

The framework adopted in this study is the GTAP model, which is a comparative static, multi-sector, and multi-region general equilibrium model. Each country or region is depicted within the same structural model. The regional household to which the income of factors, tariff revenues and taxes are assigned represents the consumer side. It is assumed that the regional household allocates its income to three expenditure categories: private household expenditures, government expenditures and savings. Consumption of private household is depicted using a non-homothetic Constant Difference of Elasticities (CDE) function.

A representative producer for each sector of a country or region makes production decisions to maximize profits by choosing inputs of labour, capital, and intermediates to produce a single sector output. 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). In the case of crop production, farmers also make decisions on land allocation. Intermediate inputs are produced domestically or imported, while primary factors cannot move across country. Internationally traded commodities are assumed to be distinguished according to the region of origin. Using this so-called Armington assumption implies that for example wheat imported from the US is different from wheat imported from the EU, and trade flows in both varieties have their own price tag. A great advantage of the Armington assumption is that it allows us to model bilateral trade flows and bilateral trade policies. We exploit this feature in the treatment of trade preferences vis a vis developing countries.

The GTAP model includes two global institutions. All transports between regions are carried out by the international transport sector. The trading costs reflect the transaction costs involved in international trade, as well as the physical activity of transportation itself. Using transport inputs from all regions the international transport sector minimizes its costs under the Cobb-Douglas technology. The second global institution is the global bank, which takes the savings from all regions and purchases investment goods in all regions depending on the expected rates of return. The global bank guarantees that global savings are equal to global investments.

The welfare changes are measured by the equivalent variation. Taxes are included in the theory of the model at several levels. Production taxes are placed on intermediate or primary inputs, or on output. Some trade taxes are modelled 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. A detailed discussion of the basic algebraic model structure of the GTAP model can be found in Hertel (1997).

A salient feature of many developing countries is unemployment (or under-employment) of human resources. This is at variance with the usual general equilibrium treatment of full employment of factors

of production. We therefore modify the model to allow for unemployment of unskilled labour in African economies. This is achieved by fixing the nominal wage rate, and letting the volume of employment of unskilled labour adjust (see McDonald and Walmsley (2003)). This specification of the labour market still allows the real wage to adjust.

## 6.2 Aggregation

The study uses a fairly global division for the sectors and a quantitative approach to agricultural policy in both the EU and third countries. Naturally, each sector in each country has its own specific characteristics, which cannot be examined individually in such a global analysis. The results presented in the study should therefore primarily be seen as an indication of the scale and direction of the anticipated effects.

**Table 6-1: 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 6-2: 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	Fibre 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.

### 6.3 Data Preparation and Simulation

In 2005 when the outcomes of the Doha round are expected to be implemented, the trade policy environment will have changed considerably. For this reason a baseline is constructed that includes several changes in the medium term. Then, trade reform of varying degrees of comprehensiveness are simulated, and welfare effects in African sub-regions are measured as deviations from the baseline.

In order to get the baseline run that serves as a starting point for our analysis, some important policy changes between 1997 – the reference year of the database – and 2005 are simulated: 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;<sup>9</sup> the implementation of the Agreement on Textile and Clothing (ATC) that phases out all quota restrictions in textile trade from 2005 onwards; and the EU Eastwards Enlargement, simulated as a total trade liberalization between the 15 EU member countries and the region CEEC and the adoption of EU border tariffs in CEEC countries.

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. If the negotiations can be concluded according to schedule, commitments made under the Doha Round are to be implemented from 2005 onwards.

<sup>9</sup> The integration of China in the WTO is incorporated by equalising all import tariffs according to the Most Favoured Nation clause.

## 6.4 Trading costs

With the reduction in traditional trade barriers, attention in the regional and multilateral trade arenas has not only shifted to quantity restrictions, but also to trade facilitation measures. These are meant to target less transparent trade barriers, such as customs procedures, product standards and conformance certifications, licensing requirements, and related administrative sources of trading costs. Studies of regional integration initiatives (Baldwin and Francois 1997, Smith and Venables 1988) have emphasized the potential for liberalization initiatives to substantially reduce such barriers. Conceptually, these costs are different from the price and quantity measures used for manufactures and agriculture. They are a pure global deadweight loss. The estimates of trading costs are very rough (at best). Nonetheless, they provide some sense of the magnitudes involved. An overview of estimates is provided in Table 6-3. In the context of the European Community (EC) single market programme, elimination of internal customs procedures and related administrative streamlining were projected to reduce trading costs by up to two percent of the value of trade (EC 1988). Globally, UNCTAD (1994) has noted that trading costs represent seven to 10 percent of the cost of delivered goods. Like the EC, UNCTAD also estimates that simple trade facilitation measures could reduce these costs by two percent of the value of trade. The Australian Industry Commission (1995) has estimated potentially higher savings in the context of Asia Pacific Economic Cooperation (APEC), ranging from five to 10 percent of the value of trade. Under more modest facilitation initiatives, the Japanese Economic Planning Agency (1997) has estimated savings at two percent in an APEC context, while Francois (2001) has employed a similar range of estimates.

**Table 6-3. Estimated cost savings from trade facilitation**

European Commission (1992)	In the context of the Single Market program, savings may amount to 1.6 percent to 1.7 percent of the value of trade due to savings on administrative costs
UNCTAD (1994)	Costs of transactions represent 7 to 10% of the value of trade. Trade facilitation could reduce this to 5% to 8%.
Australian Industry Commission (1995)	Trade facilitation may save 5% to 10% of the total value of trade, through reduced transaction costs, in the APEC context.
Japan EPA (1997)	A "modest" APEC initiative may lead to 2% savings (as a share of the value of trade) due to reduced transaction costs.

## 6.5 Policy scenarios

The core of our analysis is structured around a set of scenarios. These scenarios are based on alternative liberalization approaches for trade in agriculture and manufactured goods. They are meant to illustrate the implications of alternative approaches to market access liberalization. They are stylized rather than exact representations. 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.

In addition, the actual market access modalities remain to be worked out. In agriculture, domestic support may or may not be affected, developing countries may or may not have to liberalize, and certain politically sensitive sectors may yet again escape meaningful liberalization. Our scenarios themselves decomposed into different components, related to specific sets of countries and specific sectors and instruments. This offers the advantage of allowing us (or the reader) to construct rough representations of hybrid liberalization experiments later, since individual components can be taken from different scenarios and combined.<sup>10</sup>

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. The first two scenarios are partial liberalization scenarios. The “little” liberalization scenario involves a linear 36 percent cut in agricultural tariffs; a 20 percent 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 percent reduction in all trade instruments. The third and most comprehensive scenario, involves full elimination of all border and support measures. Table 6-4 summarizes the policy experiments.

**Table 6-4: 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%

<sup>10</sup> Technically, decomposition of general equilibrium-related effects of policy scenarios exhibit path dependence, meaning that the decomposition can be sensitive to the ordering of the elements of the experiment set. The impact of a particular instrument is also sensitive to the other members of the set. We employ a linear decomposition method here that does not exhibit path dependence (Harrison et al 2000). As such, individual experiment elements are roughly additive.

## 7 Results

This chapter presents results of the static model showing precisely how various degrees of trade liberalization could impact on African economies. We provide results at the sub-regional level for North Africa, Sub-Saharan Africa and Southern Africa. We focus on the sub-regional level because most African countries are not in the GTAP database and so it is not possible to conduct the analysis at the country level. However, to the extent that groups of countries have similar structures general inferences can be drawn on how the reforms might affect individual countries.

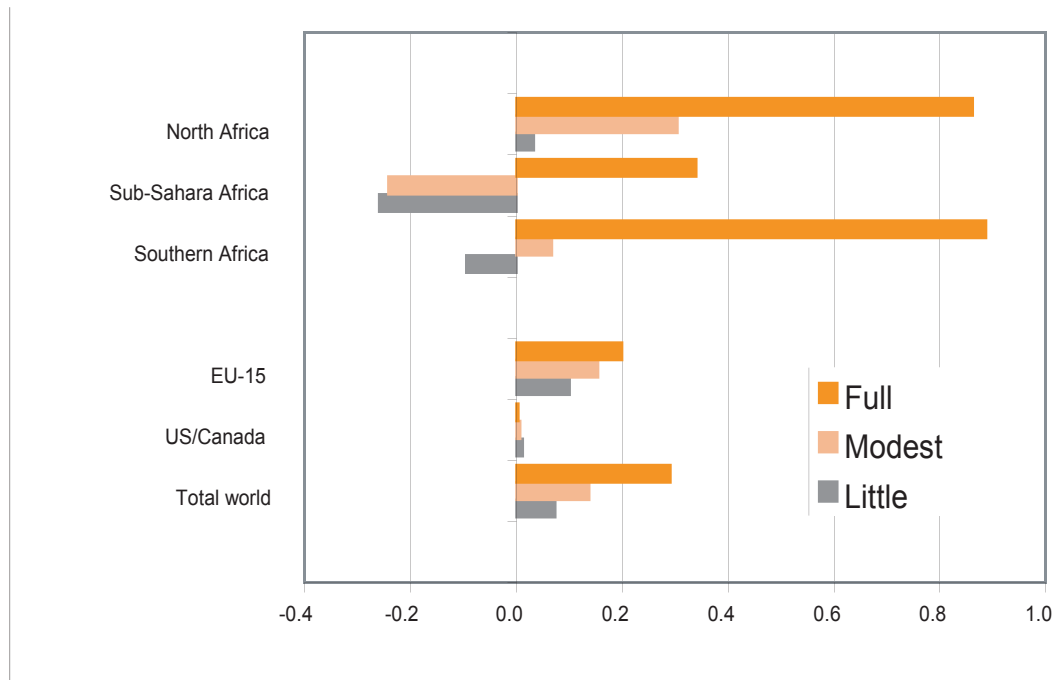
### 7.1 Aggregate results

Our simulations show that a very complete liberalization of distortions in both agricultural and non-agricultural trade could bring modest benefits to the African continent, as it does for all regions in the world (see Annex Table 1).<sup>11</sup> The results suggest that full reform would add 0.3 percent to global income annually. Furthermore, they suggest that the gain to the African region is about 0.7 percent 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 7-1). Its share of the global welfare gain is five percent while its share in global GDP and trade is about two percent. 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.

Annex Table 1 (page 73) gives more detail on the welfare effects under various scenarios of trade reform. It shows that in all regions of the world the gains from reform are largest under a comprehensive reform. In fact, benefits grow with the depth of reforms. 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 among the African sub-regions. National income gains in Southern Africa and North Africa amount to 0.9 percent of GDP under full reform, about three times as much as the gains for sub-Saharan Africa. In addition, sub-Saharan Africa is vulnerable to little or modest reform, as it incurs losses.

<sup>11</sup> We measure income gains as Equivalent Variation (EV). This is a single summary statistic to ascertain the net benefits from a policy change. The EV tells us how much money should be given or taken away from a consumer to compensate him for a change in the consumption pattern arising from a change in prices.

**Figure 7-1. Additional national income after trade reform, derived from equivalent variation (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 countries in sub-Saharan Africa. The effect of preference erosion is magnified by the existence of “binding overhangs,” that is the phenomenon of bound tariff rates being significantly higher than applied rates in several countries. 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.

What drives welfare changes after trade reform? Welfare is to be increased by making better use of available resources. Trade reform cuts barriers between economies, and thereby typically expands the range of choices for factors of production to be used, and increases consumer choice. The removal of subsidies and taxes has a similar impact. Better allocation results in more production and consumption, even with an unchanged amount of means. Expanded trade opportunities are instrumental in achieving such gains: typically, import goods can be obtained cheaper, and increased specialization in a competitive production scheme allows more exports to the world market that can finance the imports. Table 7-1, which decomposes the global total welfare impact from full liberalization into its main components, shows that the reshuffling of resources accounts for 3/4<sup>th</sup> of global welfare gains, or about \$70 billion. For the African region, a large share of the gains to the region can be attributed to an improvement in the allocation of resources.

The remainder of the global gains come from the increased availability of resources in the global economy. The first of two resource increases in the simulation refers to an employment effect in Africa. The expansion of the African economies allows previously unemployed or underemployed unskilled labour resources to be better utilized in the wage economy. Tapping this reserve leads to an additional boost to macro-economic welfare, adding almost \$2 billion annually. The second feature, trade facilitation, brings further gains, as goods can now be imported cheaper in all regions.<sup>12</sup> In this study, trade facilitation is implemented as a gain to be had at zero costs, which, as discussed in a section below, has serious implications for the feasibility of results.

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 the global bank.

<sup>12</sup> Technically, we model 'iceberg' trade cost. That is, a certain percentage of the commodity 'melts' away when shipped abroad. The amount of loss due to this melting is reduced with trade facilitation.

**Table 7-1. Decomposition of global welfare effects under full liberalization (mln USD)\***

	Allocative effects	Employment effects	Trade facilitation	Terms of trade	Terms of trade' (capital account)	Total
North Africa	2713	431	424	-1390	-284	1894
Sub-Saharan 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

It should be noted that a terms of trade deterioration has two opposing effects in the model. On the one hand it reduces the international purchasing power of income earned on African exports. On the other hand, it makes African exports cheaper or more competitive on world markets, thereby increasing exports and income. The net welfare effect of a terms of trade deterioration therefore depends on which effect dominates. Annex Table 2 shows the percentage change in the terms of trade for all regions in the model under the three different liberalization scenarios. A deterioration in terms of trade means that the

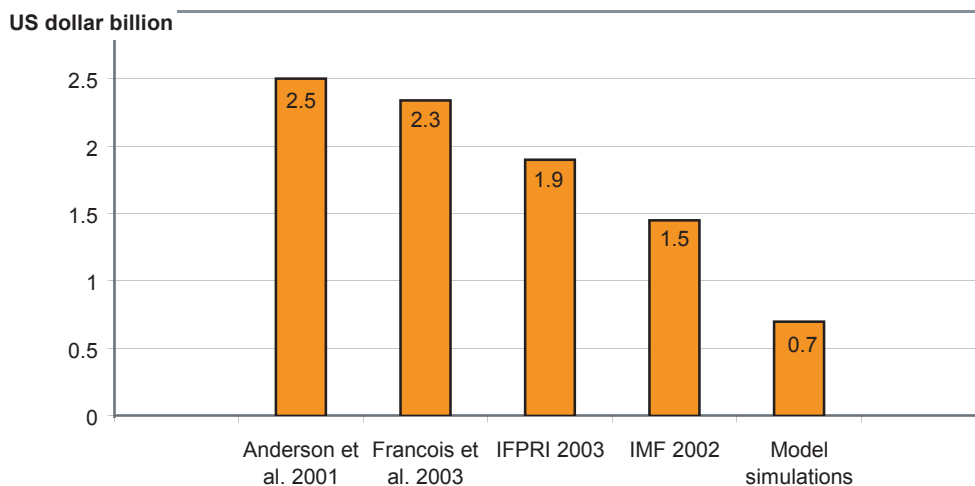
prices received for exports fall relative to the prices paid for imports. It can be seen from the table that all regions, except the EU-15, the transition countries and the African region, experience an improvement in their terms of trade after reform. The result for Africa is that the improvement in agricultural export performance acts as an important driver of African welfare gains under full reform. The lowering, and eventually phasing out, of trade restrictions opens avenues for African exports on OECD markets, especially in those agricultural products which will see a decline in production in OECD countries as a consequence of reduced support there.

What drives the change in relative import and export prices? Part of it is explained by the presence of unemployment in the model: by specification, nominal wages for unskilled labour are fixed in Africa such that unskilled labour cost do not rise much in real terms. Simultaneously - in accordance with standard trade theory - labour costs do rise in other regions where exports of labour-intensive products expand. As employment is fixed in all non-African regions, the increased use of labour resources drives up the wage there. In the process, African exports become cheaper to the rest of the world.

### **Comparing results across studies**

The estimated \$84 billion global gains (0.3% of GDP) from a full liberalization of border and support measures are quite modest compared to outcomes of recent studies. For example, as shown in Figure 7-2, the gains for the sub-Saharan 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 an 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 a full liberalization for trade.

**Figure 7-2: Estimates of welfare gains in Sub-Sahara Africa under full liberalization of border protection and domestic support measures**



Note that the current study may just as well have *overstated* the consequences of preference erosion. The scenarios presented here assume that the estimated preference margins effectively reduce the tariffs that African exporters are facing in the markets of OECD countries. Various observers (e.g., UNCTAD 2001) have pointed to the low rate of utilisation of preferences, citing lack of transparency, complex procedures and rules of origin as the main reasons for the ineffectiveness of the current preference schemes. If indeed African exporters are not exploiting fully the benefits of the preferential arrangements, then, obviously, there is not much actual erosion taking place if market access is improved for all members participating in the Doha round. Therefore, if preferences are unused, sub-Saharan Africa is more likely to benefit from “early harvest” or partial reforms.

## 7.2 Trade and specialization

- Reform affects the pattern of international specialization in the world economy
- Industrial expansion occurs mainly in OECD countries, not developing countries
- South-American countries expand production of commodities previously subsidized by OECD countries (the programme commodities), and agroindustries
- Africa shifts resources into programme commodities

### 7.2.1 The global picture

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.<sup>13</sup> The top panel of Table 7-2 shows the global specialization pattern prior to reform. Across the sectors identified, in Australia/New Zealand specialization is deepest, and approaches total specialization in livestock products. In North America, South America and Asia specialization goes to substantial depth, as the absolute value of indices reach 30 to 40. In Africa, and more so in Europe, the extent of specialization is modest. Africa is a net exporter in agriculture (crops and livestock), and a net importer in agro-processed products.

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. 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. The Australia & New Zealand region expands its trade in processed foods. The 'cost' to be paid for more specialization in agricultural products is a shift of resources away from industry and manufacturing. In the (enlarged) Europe and North America we see an increased specialization in industry, while Asia is able to expand in labour intensive light manufacturing.<sup>14</sup>

<sup>13</sup> The specialization 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.

<sup>14</sup> 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 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.

**Table 7-2: 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

*Source: trade data in the GTAP database v5.3, and model simulations*

\* A positive number indicates a net exporting position, a negative number indicates net imports. See footnote 13. Numbers in the top and lower panel can be added to derive the post-reform index

### 7.2.2 Specialization in Africa

Against the background of a change in global specialization, what is the impact on the three African regions and the thirteen sectors in the economy?

For each of the regions, current specialization patterns can be observed from the left columns of Table 7-3. Africa clearly finances agricultural imports with export revenues from the extraction industries, mining and oil. All 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 in 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. From Annex Table 3, which reports further detail on exports, imports and output, it is clear that agriculture accounts for but a small share of total trade. The African economies are not all that integrated into the world economy: the added sum of exports and imports flows amount to just 1/4<sup>th</sup> to 1/3<sup>rd</sup> of output. The specialization of sub-Saharan agriculture in exported commodities shows in the sector “other crops”, which includes cocoa, coffee, tea, tobacco, groundnuts and spices.<sup>15</sup> Note that the processed food sector (“proFood”) is the most important agricultural sector in terms of output and imports.<sup>16</sup> The manufacturing sectors are important both in terms of output and imports. The service economy (other services in the table) is large in all regions, reflecting large government and large sums of value-added generated by financial services and the like. There is a substantial African transport sector (“trade”).

**Table 7-3: Specialization index for Africa under base and after full liberalization, by region and sector (%)\***

	North Africa		Sub-Sahara Africa		Southern Africa	
	Base	Full	Base	Full	Base	Full
Cereals	-92	-80	-78	-58	-8	9
Vegetable	28	23	65	58	87	83
Oilseeds	-63	-53	-9	4	-64	-64
Sugar	-88	-75	-2	30	76	78
Cotton	-32	-11	93	95	-15	-5
oCrops	-74	-74	94	92	16	6
Animal	-16	11	38	57	36	50
proFOOD	-39	-27	-10	-4	11	11
Extract	84	85	89	89	44	44
Light	6	4	-22	-30	-3	-10
Industry	-51	-52	-58	-58	0	-4
Trade	37	38	-53	-52	8	8
Services	9	10	-26	-27	0	-1

Source: model simulations.

\* The index ranges between –100 (all trade are imports) and +100 (all trade are exports). See footnote 13 for detail on the index. Base refers to baseline data; full to results in the full reform scenario.

<sup>15</sup> The sector “Other crops” further covers a variety of commodities (roots and tubers) and high-value products (cut flowers, seeds).

<sup>16</sup> Processed food is a wide aggregate that consists of meat and dairy products, processed fisheries products, beverages and tobacco, and all other processed food products.

A view at the deepening specialization in agriculture under a full liberalization reveals, in fact, that it is composed of two counteracting effects. (See the right columns in Table 7-3 for the specialization index after reform. Changes in trade volume relative to base are revealed in Annex Table 4 and Annex Table 5.) First, the results show both import substitution and increased exports in the programme commodities (i.e. the agricultural goods that currently benefit from heavy protection in OECD countries), including sugar, cotton and oilseed crops, as well as beef and dairy products. Exports increases are notable for cereals, sugar and cotton but absolute volume changes are small. In general, the displacement of imports in programme commodities into Africa by home production is an important driver of the simulation results.

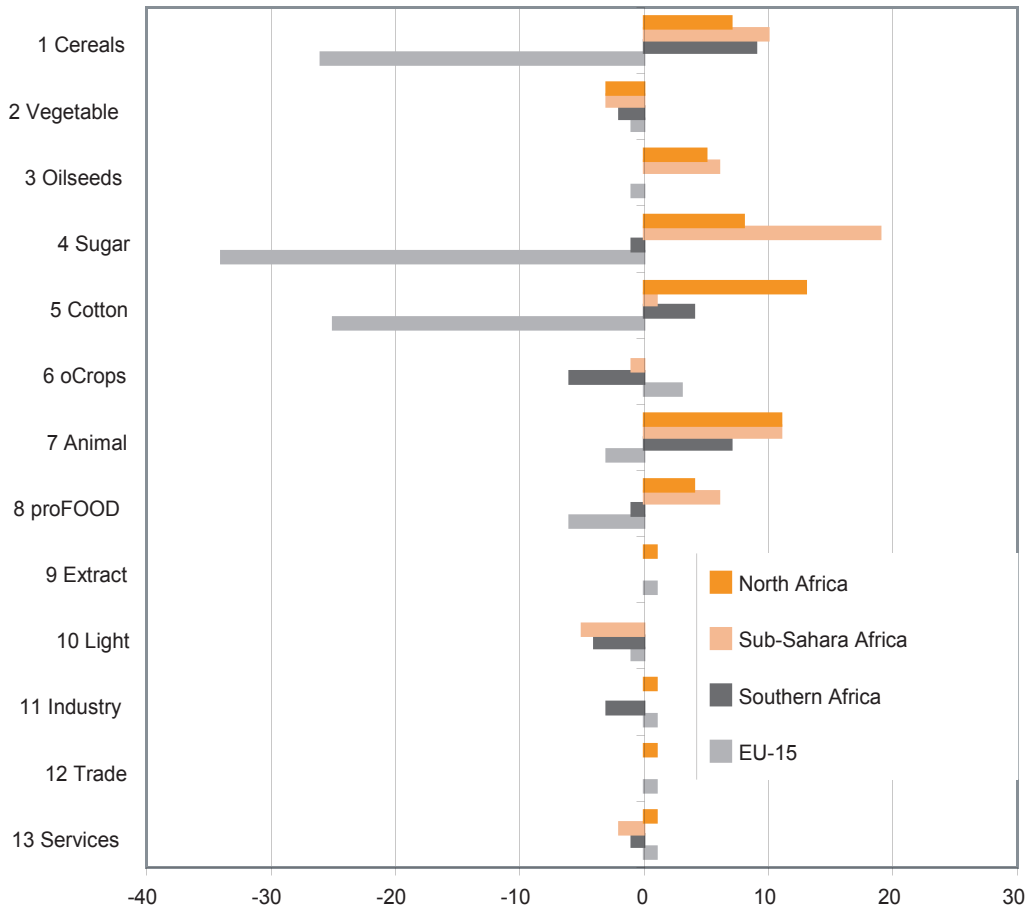
Second, there is a move away from commodities with both modest levels of protection in OECD countries and large value-added, such as vegetables and flowers (included in other crops). Exports decline in these sectors, especially to the loss of sub-Saharan Africa (SSA). Only in North Africa exports of these products grow. The processed food sector generates moderate results; under a total liberalization exports increase largely in all African regions, under less ambitious reform the processed food performance varies. Unfortunately, the aggregate level of results limits the detail on the important sector “other crops”, which includes most of African traditional export commodities.

While manufacture exports from both light and heavy industry increase for all African regions, imports grow even more. As discussed above, these effects relate to changes in the terms of trade. Exports of extraction products (extract), the most important export good, grow steadily with the comprehensiveness of reform.<sup>17</sup>

The pattern to the import and export changes that result from reform is clear: Africa displays an import substitution in grains, sugar and cotton that is driven by policy changes towards these programme crops in OECD countries. Agricultural production in the African regions moves partly away from other commodities and horticulture products, and the share of light and heavy industry in trade declines. Figure 7-3 presents a graphical demonstration. The graph reports changes to the specialization index when moving from modest to full reform, for Africa and the EU-15, Africa’s main trade partner. Given that a move from a reform of Little to Modest depth renders small specialization effects, the graph helps to explain the jump in results between partial reform and a comprehensive liberalization.

<sup>17</sup> The aggregate extraction sector consists of basic products from forestry, fishing, and the extraction of coal, oil, gas and minerals.

**Figure7-3. Altered specialization in Africa and EU-15 when moving from modest to full reform (change to the specialization index in %-points)**



### 7.3 Changing structure of production

- African economies move more into the supply of commodities that currently receive support in OECD countries
- Simultaneously they move away from non-subsidized commodities and agricultural goods with large value-added
- In some countries, factors of production now in manufacturing shift into agriculture
- Risk of de-industrialization in Africa

The resulting output changes follow the pattern of international specialization. While the African regions expand output in cereals, sugar and cotton, and moderately in animal products, output declines in commodities like vegetables, fruit and flowers and commodity crops. Not only are resources reallocated within agriculture, light and heavy industry contracts in all African regions. Under little reform, industrial activity reduces by less than one percent, under modest reform two to four percent. Under full reform, the impact differs across regions. There are substantial reductions in the sub-Saharan and Southern African regions amounting up to nine percent activity loss. After reform, African governments face quite a substantial loss of revenue from import duties on manufacturing imports. The output effects, presented in Annex Table 7 and summarized for sub-Saharan Africa in Table 7-4, point to a de-industrialization tendency in all African sub-regions – the flip side of deeper specialization in agriculture. In the comparative static general equilibrium model, it becomes more efficient to specialize in those activities that use intensively the relatively abundant production factors, i.e. (unskilled) labour.<sup>18</sup> Since industrial activities use the relatively scarce capital inputs, these activities tend to decline.

**Table 7-4. Share of agriculture and food in output in Sub-Sahara Africa**

	Before reform	After reform
Total economy including services:		
Agriculture	0.38	0.39
Non-agriculture	0.62	0.61
Merchandise economy:		
Agriculture	0.72	0.74
Non-agriculture	0.28	0.26

*Source: model simulations*

In as far as the industrial sector is the main engine for future growth, the de-industrialization tendency produced by our model is an alarming signal. Such effects have been discussed in the ‘new economic geography’ literature which shows that regions that are similar (or even identical) in their structure (endowments, technology) can endogenously differentiate into rich ‘core’ regions and poor ‘peripheral’ regions in the presence of increasing returns to scale. If industry can be characterized by increasing returns, and agriculture by constant returns, then a shift away from industry will lead to a low-level growth path compared to the growth in regions that are specializing more in industrial activities.<sup>19</sup>

<sup>18</sup> The fixing of nominal wages for unskilled labour in the African region further induces this process, as it makes skilled labour the scarce factor in Africa, driving skilled wages upwards relative to unskilled wages.

<sup>19</sup> A survey of the new economic geography is provided in Ottaviano and Puga (1998). See Francois et al. (2003) for an analysis of the regional impact of increasing returns in the setting of a global trade liberalization.

In the model simulations, the production factors move towards those activities that yield the relatively highest returns, and changes in relative prices are important drivers of adjustments between scenarios. **Factor prices** in Africa increase after full reform, as economic activity grows. All factor prices reflect the demand for factors of production except for the unskilled wage. The nominal wage rate for unskilled labour is fixed by specification, while the real wage rate adjusts to labour demand. Rising by four to eight percent across the continent, land prices rise most, a logical fact given the deeper specialization in land-intensive agriculture such as cereals, cotton, sugar and husbandry (see Annex Table 8). Factor prices decrease in the regions sub-Saharan Africa and Southern Africa under minor and moderate reform, reflecting the downscale in economic activity in these regions.

### **Box 1: Import substitution in program crops**

A closer look at developments in cereal trade is instructive for understanding the drive towards import substitution in program crops. Before reform, most African imports of wheat, rice and other grains are produced in the US and EU. Farm-income support to cereal farmers in these countries amounts to over 40 billion dollars, and keeps export prices low. Consequently, the US and EU supply half of North African, and 80 percent of sub-Saharan African cereals imports. South America and Southern Africa have far lower shares in this trade. Even minor reductions in support render cereal production far less attractive to European and American farmers, and output contracts strongly.<sup>20</sup> One would reason that African importers just seek replacing trade in other developing countries but the balance of trade constrains this: African producers loose much of their horticulture exports to US and EU farmers. Also, Africa cannot take over EU and US export markets for cereals under minor and modest trade reform, because preference margins for African products erode. As a result, Africa is forced to produce cereals that were previously imported, but at an inefficient scale. Only under full reform can Africa specialize far enough into agriculture to allow for positive allocation gains.

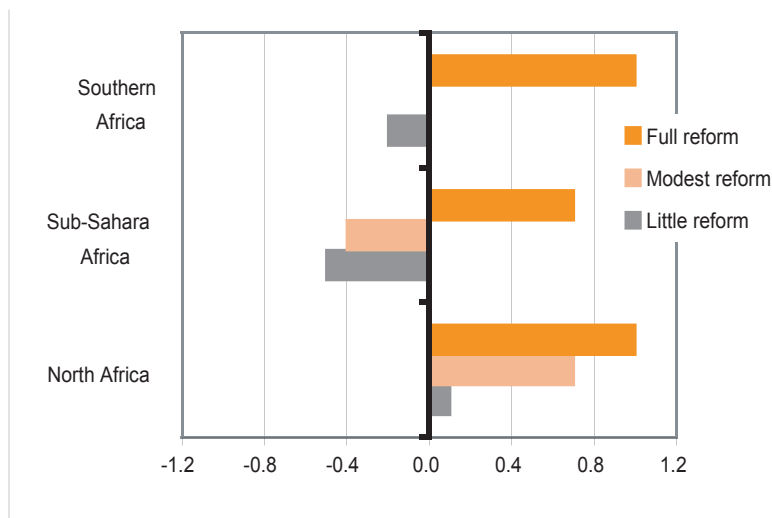
### **Trade liberalization and employment**

As explained above, we specified the model such that the employment rate for unskilled workers adjusts endogenously. Figure 7-4 shows that under the scenarios specified trade reform has limited impact on the employment of unskilled workers. In sub-Saharan Africa and Southern Africa minor and moderate trade reform results in decreased employment of unskilled workers. Some sectors draw additional unskilled labour into the wage economy, as real wages drop. But the contraction of labour intensive activities in such sectors as horticulture and textiles & clothing and the like leads to a net reduction of unskilled labour employment in the partial reform scenarios. Accordingly, to substitute unskilled labour with other factors reduces production costs. North Africa shows a positive employment effect in all scenarios, as do

<sup>20</sup> For example, after a simulated full reduction of support and border measures cereal and cotton output in the EU drop by 40 percent, and sugar production decreases by 25 percent.

all regions under the full liberalization scenario. Then, the additional purchasing power generated by the positive employment impact creates a beneficial multiplier effect in African economies, thereby resulting in large welfare gains.

**Figure 7-4: Employment effects, percentage change to base number employed**



The above describes the structural transformation in the African regions as they appear after a simulated round of trade liberalization. Each of the three scenarios is composed of five policy instruments. One wants, however, to bring to the negotiation table data on the impact of *single* policies such that priorities and trade-offs can be assessed. The following sections contribute to this debate by relating aggregate welfare effects for the African regions to policy changes in OECD countries, in Africa, and in other non-OECD countries.

#### 7.4 Domestic support and border measures

- From the three pillars, agricultural market access and domestic support are the most important for Africa
- NA and SA will benefit both from improved market access and reduced domestic support measures because they do not benefit from trade preferences and operate in the internationally competing markets
- SSA does not benefit from little and modest reform due to preference erosion, increased competition and reduced employment
- Under full reform, SSA will benefit largely from export increases under improved market access.

This section contributes to the debate on the relative importance of the three pillars in the agriculture negotiations—export competition, market access, and domestic support measures—on African economies. The results indicate that as we move from little and modest reforms to full reform, the gains to all sub-regions increase significantly. However, the different sub-regions within Africa are affected differently by the three different forms of agricultural support provided to farmers in OECD countries. Table 7-5 decomposes the welfare effects along the two policy instruments and along the region in which the policy change takes place. Detail on the other three policies considered in this study (export competition in agriculture, non-agricultural market access (NAMA) and trade facilitation) is provided in Annex Table 10 to Annex Table 12.

This study finds that market access and domestic support are the most important policy issues for North and Southern Africa in the agriculture negotiations. This has to do with the fact that most countries in these regions do not benefit from trade preferences given to ACP countries. While the sub-Saharan African region experiences losses under the little and modest reform scenarios, it gains under both market access and domestic support measures in the full scenario, although the gains are larger under the former. These results are due to the fact that sub-Saharan African countries experience preference erosion as well as increased competition in international markets under modest and little scenario. For full liberalization, improved market access and the resulting increase in allocative efficiency resulting from specialization outweighs the loss due to preference erosion as well as deteriorations in the terms of trade, and so the region experiences a net gain.

The region North Africa faces some losses in all scenarios from an export subsidy reduction in OECD countries. As an importer of subsidized exports North Africa has to deal with price increases. The situation is different for Southern Africa where exports are in fact facilitated when the OECD reduces its export subsidies. Accordingly, and to no surprise, Southern Africa shows positive welfare effects.

**Table 7-5: Welfare impact of global agricultural reform on African regions: market access & domestic support (mln USD)**

Affected region	Scenario	Agricultural market access	Domestic support
North Africa	little	197	125
	modest	391	280
	full	578	595
Sub-Sahara Africa	little	-242	-221
	modest	-175	-117
	full	933	328
Southern Africa	little	-125	89
	modest	-139	220
	full	336	449

*Source: model simulations*

The impact of tariff reductions by OECD countries is different. Minor tariff reductions on imports into the OECD result in welfare losses for the African regions between \$63 and \$371 million (Annex Table 10 to Annex Table 12). Since the African regions have preferential access to most of the OECD countries their position erodes vis-à-vis their competitors. Stronger tariff reductions under the modest and full scenarios have a positive impact on North Africa, as is clear from the tables in the Annex.

A reduction of domestic support in the OECD countries has two effects. First, due to a reduction of subsidies the production costs of agricultural goods rise and the outputs decrease. Second, land rents decline as a consequence of lower agricultural production. The effect is a decrease of production costs. As a result agricultural goods in OECD countries with modest protection like vegetable and other crops can improve their competitiveness. At the same time the output of strongly protected commodities (cereals, sugar and cotton) declines. Dependent on their export pattern the regions North Africa and Southern Africa take advantage of a domestic support reduction in OECD countries. For sub-Saharan Africa the resulting welfare effect depends on the degree of the liberalization. Sub-Saharan Africa suffers welfare losses in the little and modest scenarios, while the full reform scenario is beneficial.

## 7.5 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 (see section 7.1).

Trade facilitation accounts for \$736 million (or 16%) of the net African welfare gain under full reform. The impact of trade facilitation on African economies under different degrees of liberalization is shown in Annex Table 10 to Annex Table 12. Three points are evident from these results. First, all African regions derive gains from trade facilitation irrespective of whether the reform is partial or complete. The critical factor here is that the reform must be carried-out by all regions. 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. To the extent that these costs are large, they may outweigh the gains derived in this study.

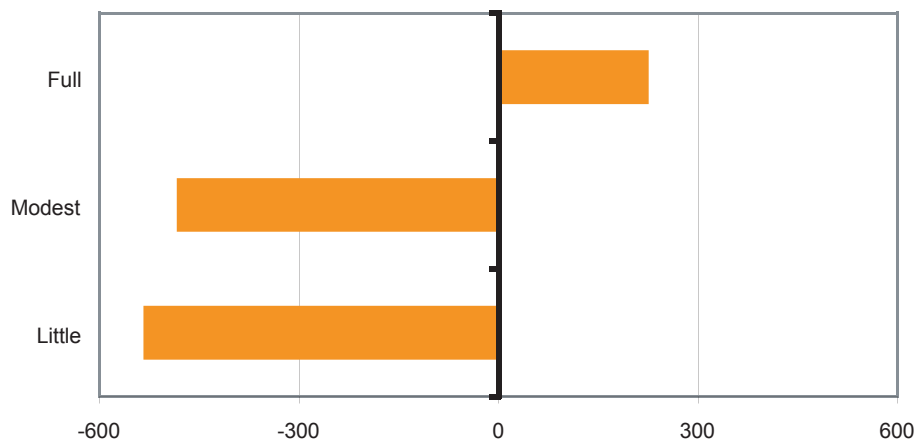
## 7.6 Non-Agricultural Market Access

The negotiations in the field of non-agricultural market access (NAMA) are presented as a conflict between OECD and non-OECD countries. This can partly be understood from the composition and level of tariffs on manufactures. There are at least two relevant observations from the analysis of market access for imports from Africa into other regions of the world in Chapter 4. First, in general, non-OECD countries apply more border protection to manufactures than OECD countries. Second, tariff schedules in non-OECD countries reveal more binding overhang.

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. Underlying the small difference in net effect are possible large deviations in – when moving from little to modest reform – tariff revenue loss and export gains. The results for the three sub-regions are broadly consistent with Figure 7-1, except that sub-Saharan Africa also incurs a net loss under full reform.

**Figure 7-5: Net welfare impact on Africa from NAMA reform (mln USD)**



### 7.7 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 un(der)utilized labour in African countries. The estimated effects on employment are, however, very limited, as labour 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.<sup>21</sup> The scope of these “accumulation effects” depends on a number of factors, including the marginal product of capital, country risk and underlying savings behaviour. 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 behaviour: 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.<sup>22</sup>

Welfare results of the model with capital accumulation are presented in Table 7.6 (the left panel of which reproduces the results from the static model). 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 (see Annex Table 13 for 1997 dollar terms). 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-Saharan 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 five percent in these regions, against a world average growth of just over one 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 percent of base GDP while for the world it is 0.7 percent.

<sup>21</sup> Research in this area includes Baldwin and Francois (1999), Smith (1976, 1977), and Srinivasan and Bhagwati (1980).

<sup>22</sup> See Francois et al. (1996) for an implementation in the GTAP framework.

**Table 7-6: National income gains as a percentage 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. As the simulation results confirm, investments are instrumental in achieving output growth, enhanced labour productivity, and rising wages.

## 8 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. Labour 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 in the face low rates of preference utilization. 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-Saharan 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 an African position in trade negotiations? This study 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. It is therefore important for African countries to ensure that any partial reform of trade incorporates adequate mechanisms to offset the losses to the continent and also gives them flexibility to deal with important development issues. In this regard, they must ensure that special and differential treatment provisions are firmly entrenched in any agreement under the Doha round of negotiations.

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**Annex Table 1: National income gains under trade reform\***

	Million 1997 USD			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

Source: model simulations

\* Based on the measure of equivalent variation

**Annex Table 2: The terms of trade, % change after reform**

	Reform scenario		
	Little	Modest	Full
North Africa	-0.3	-0.9	-2.2
Sub-Saharan Africa	-0.3	-0.7	-1
Southern Africa	-0.1	-0.2	-0.1
EU-15	-0.1	-0.2	-0.3
US/Canada	-0.1	-0.3	-0.4
South America	0.2	0.1	0.3
Australia/New Zealand	0.7	1.2	5
High-income Asia	0.1	0.5	0.9
China	0.2	0.3	0.4
Other Asia	0.2	0.1	-0.1
Transition countries	-0.1	-0.2	-0.5
Rest of world	0.2	0.2	0

Source: model simulations

**Annex Table 3: Output, Exports and Imports (mln USD 1997)**

	Output			Export			Import		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Cereals	14859	30056	1537	147	161	239	3432	1283	291
Vegetable	10003	10061	1703	663	840	736	397	200	56
Oilseeds	1935	4605	1083	347	435	81	1650	579	386
Sugar	6508	4766	993	54	613	308	853	644	42
Cotton	1767	2767	52	59	1515	31	164	46	38
Other Crops	527	14214	1040	87	5832	166	548	207	127
Animal	23870	10633	5234	166	160	218	207	69	93
proFood	21525	23959	17316	1074	2348	1105	2556	2939	885
Extract	36365	43998	15363	18168	26582	4057	1771	1636	1689
Light	46837	19143	16045	6885	2958	2703	7818	4918	2828
Industry	75132	36269	63089	9393	7933	19716	28927	31339	20855
Trade	57053	75607	51135	5425	4064	3052	2929	13715	2673
Other Services	140233	101630	100000	8025	4256	2192	6712	7379	2242
Total	436615	377708	274590	50492	57697	34604	57963	64956	32204

Source: GTAP database version 5.3 (Dimaranan and McDougall, 2002)

**Annex Table 4: African Export Volume, % change to the baseline**

	Little			Modest			Full		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Cereals	28.7	18.5	7.1	59.6	39.6	15.3	157.7	110.4	53.0
Vegetable	-1.7	-8.0	-8.8	-1.6	-11.7	-13.3	19.9	-2.7	-7.4
Oilseeds	11.8	6.7	-1.2	18.3	15.3	-2.5	48.9	52.9	16.5
Sugar	29.7	7.1	6.7	46.5	24.4	15.5	170.9	113.3	73.8
Cotton	5.8	6.4	5.7	17.3	18.2	13.7	55.5	44.8	32.1
Other Crops	-4.1	-4.9	-3.3	-6.8	-6.9	-5.4	2.1	-5.2	-8.1
Animal	13.6	6.5	4.2	33.2	21.9	17.8	114.6	76.3	44.4
proFood	5.9	-4.2	-1.9	17.0	-2.1	-1.0	80.8	32.8	45.7
Extract	0.6	0.7	0.8	1.9	1.7	1.7	4.2	3.1	2.9
Light	-0.2	1.5	1.4	7.5	6.0	5.9	27.6	13.3	14.5
Industry	0.5	1.6	0.7	5.3	7.2	3.0	21.5	18.1	7.5
Trade	0.6	1.4	0.8	1.0	3.5	1.5	3.2	6.6	2.1
Other Services	0.4	1.4	0.7	0.8	2.7	0.8	3.4	3.4	-0.4

**Annex Table 5: Imports into Africa, % change to the baseline**

	Little			Modest			Full		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Cereals	-5.7	-6.2	-4.3	-11.7	-12.3	-8.6	-16.3	-9.2	-3.3
Vegetable	3.3	2.5	0.0	5.4	4.0	0.4	37.2	25.8	25.4
Oilseeds	-0.1	0.4	-0.5	-0.3	0.2	-0.7	9.3	20.5	16.7
Sugar	-2.6	-3.8	0.5	-6.4	-9.5	1.3	8.1	-2.0	60.9
Cotton	-2.8	-0.4	-0.2	-8.7	-4.0	0.5	-14.9	-5.2	7.4
Other Crops	0.4	1.1	1.5	1.0	1.5	3.0	9.8	24.4	14.6
Animal	-1.0	-0.3	-0.2	-5.6	-4.1	-2.1	13.1	1.2	-2.0
proFood	-1.5	-1.4	-0.8	-5.5	-5.0	-2.9	27.3	11.6	41.3
Extract	-0.2	-0.1	-0.2	0.0	0.2	-0.2	1.2	2.3	0.3
Light	2.3	1.9	1.8	12.7	12.1	10.7	32.9	33.7	30.3
Industry	1.8	0.8	0.8	9.2	5.8	5.4	22.6	15.9	14.9
Trade	-0.2	-0.9	-0.4	0.0	-1.4	-0.4	-0.5	-1.4	0.5
Other Services	0.0	-0.4	-0.3	0.8	1.1	-0.1	1.1	5.0	1.4

**Annex Table 6: Prices of Imported Goods (CIF-Price, % change)**

	Little			Modest			Full		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Cereals	4.2	3.3	3.2	9.4	7.2	7.1	17.6	12.3	13.5
Vegetable	-1.0	-1.2	-0.2	-1.4	-1.8	-0.1	-2.3	-2.2	0.1
Oilseeds	0.2	-0.2	0.3	0.7	-0.1	0.6	0.9	-2.4	0.9
Sugar	2.0	2.1	0.0	4.9	5.3	0.0	8.9	9.7	0.0
Cotton	2.2	0.1	-0.1	6.5	0.5	0.0	13.9	1.3	0.3
Other Crops	-0.6	-0.8	-0.8	-0.9	-1.2	-1.2	-1.3	-1.6	-1.6
Animal	1.0	0.3	0.4	3.5	2.1	1.6	8.9	5.0	4.4
proFood	1.3	0.8	0.7	3.7	2.6	2.0	7.1	5.0	4.2
Extract	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.3
Light	-0.1	0.0	0.0	-0.4	-0.2	-0.2	-1.1	-0.8	-0.7
Industry	-0.1	-0.1	-0.1	-0.3	-0.3	-0.3	-0.9	-0.8	-0.8
Trade	0.0	0.3	0.1	0.0	0.6	0.0	-0.2	1.1	-0.1
Other Services	0.0	0.0	0.0	-0.2	-0.1	-0.1	-0.5	-0.4	-0.5

**Annex Table 7: Output (% change in value-terms)**

	Little			Modest			Full		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Cereals	1.7	0.3	2.0	4.0	0.8	4.8	4.3	1.4	9.3
Vegetable	-0.3	-0.9	-3.8	-0.3	-1.3	-5.7	-1.1	-0.8	-3.8
Oilseeds	1.2	0.4	-0.6	2.3	1.4	-0.7	-3.1	2.4	-9.3
Sugar	0.5	1.4	2.2	1.5	5.4	5.4	-1.1	17.6	21.7
Cotton	0.5	2.5	2.7	2.1	6.4	7.0	3.8	15.8	13.1
Other Crops	-2.2	-2.3	-0.8	-3.4	-3.2	-1.1	-12.9	-2.7	-2.1
Animal	0.1	-0.1	0.0	0.6	0.4	0.9	0.3	1.7	2.3
proFood	0.3	-0.6	-0.2	1.6	0.1	0.1	-3.8	0.9	0.3
Extract	0.0	0.2	0.1	0.0	0.5	0.3	0.2	0.8	0.6
Light	-0.8	-0.8	-0.3	-1.4	-4.0	-1.5	-0.7	-9.9	-3.6
Industry	-0.7	-0.8	-0.1	-2.8	-3.6	-0.5	-5.6	-8.3	-1.0
Trade	0.1	-0.1	0.0	0.4	0.1	0.2	0.7	0.7	0.8
Other Services	0.2	-0.2	-0.1	1.0	0.3	0.2	2.3	1.6	1.0

**Annex Table 8: Factor and Producer Prices (% change)**

	Little			Modest			Full		
	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica	nAfrica	SSA	sAfrica
Factor Prices									
Land	2.0	-2.4	-2.7	6.4	-1.6	-0.6	5.0	3.8	8.2
Unskilled Labor*	0	0	0	0	0	0	0	0	0
Skilled Labor*	0.1	-0.4	-0.2	0.8	-0.1	0.1	1.7	1.1	1.1
Capital	0.1	-0.4	-0.2	0.7	-0.3	0.0	1.1	0.6	0.8
Producer Prices									
Cereals	0.2	-0.3	-0.2	0.6	-0.5	-0.1	0.2	-0.6	0.5
Vegetable	0.1	-0.4	-0.6	0.3	-0.6	-0.7	-0.2	-0.3	-0.1
Oilseeds	0.2	-0.3	-0.2	0.4	-0.6	-0.3	-0.6	-1.0	-2.7
Sugar	0.2	-0.3	-0.2	0.6	-1.0	-0.1	-0.2	-1.7	-0.1
Cotton	0.1	-0.2	-0.2	0.5	-0.5	0.1	-0.3	-0.4	0.8
oCrops	-0.1	-0.5	-0.4	0.1	-1.0	-0.4	-1.0	-1.2	0.0
Animal	0.0	-0.3	-0.3	0.1	-0.5	-0.2	-1.2	-0.5	0.0
proFOOD	0.2	-0.3	-0.2	0.3	-0.5	-0.3	-0.8	-1.0	-1.0
Extract	0.0	0.0	0.0	-0.3	0.1	-0.1	-0.7	0.3	0.1
Light	-0.2	-0.4	-0.2	-0.9	-1.3	-0.8	-2.8	-2.7	-1.7
Industry	-0.2	-0.4	-0.2	-0.8	-1.4	-0.5	-2.1	-3.0	-0.9
Trade	0.0	-0.3	-0.1	0.0	-0.7	-0.2	-0.4	-1.3	-0.2
Services	-0.1	-0.3	-0.1	-0.3	-0.8	-0.3	-1.1	-1.1	-0.2

\* Refers to the real wage rate

**Annex Table 9: Unskilled Employment (% change in the number employed)**

	Little	Modest	Full
nAfrica	0.1	0.7	1.0
SSA	-0.5	-0.4	0.7
sAfrica	-0.2	0.0	1.0

**Annex Table 10: Welfare impact of policies under “Little reform” (USD mln)\***

		Export Subsidy	Agricultural Market Access	Non-Agricultural Market Access	Domestic Support	Trade Facilitation	Total
nAFRICA	Africa	0	0	-42	-1	89	47
	OECD	-36	197	-260	117	10	27
	Rest	-3	0	-16	8	4	-8
	Total	-39	197	-318	125	102	67
SSA	Africa	-7	0	35	-6	24	47
	OECD	-6	-242	-115	-225	1	-587
	Rest	7	0	-13	10	-3	0
	Total	-6	-242	-93	-221	23	-540
sAFRICA	Africa	-20	0	154	0	30	164
	OECD	6	-125	-246	79	5	-282
	Rest	3	0	-29	10	2	-14
	Total	-11	-125	-121	89	36	-132

\* Based on Equivalent Variation

**Annex Table 11: Welfare impact of policies under “Modest reform” (USD mln)\***

		Export Subsidy	Agricultural Tariff	Non-Agricultural Tariff	Domestic Support	Trade Facilitation	Total
nAFRICA	Africa	1	0	-354	-1	136	-220
	OECD	-91	391	309	260	14	883
	Rest	-8	0	-57	21	5	-39
	Total	-98	391	-102	280	155	625
SSA	Africa	-18	0	76	-14	38	82
	OECD	-9	-175	-266	-128	4	-573
	Rest	17	0	-49	25	-4	-11
	Total	-10	-175	-238	-117	38	-502
sAFRICA	Africa	-50	0	730	0	45	725
	OECD	16	-139	-602	193	7	-526
	Rest	7	0	-142	26	3	-105
	Total	-27	-139	-14	220	54	93

\* Based on Equivalent Variation

**Annex Table 12: Welfare impact of policies under “Full reform” (USD mln)\***

		Export Subsidy	Agricultural Tariff	Non-Agricultural Tariff	Domestic Support	Trade Facilitation	Total
nAFRICA	Africa	1	-776	-1370	-2	284	-1863
	OECD	-149	1208	1888	516	28	3491
	Rest	-20	146	-30	41	11	148
	Total	-168	578	488	555	322	1775
SSA	Africa	-38	-644	-213	-30	78	-847
	OECD	0	1419	-384	302	16	1352
	Rest	42	158	-48	57	-10	198
	Total	4	933	-645	328	84	704
sAFRICA	Africa	-114	17	1638	1	95	1636
	OECD	49	231	-915	394	14	-228
	Rest	19	89	-341	54	4	-175
	Total	-46	336	381	449	113	1233

\* Based on Equivalent Variation

**Annex Table 13: National income gains under alternative model specification\* (USD mln)**

	Static Model			Dynamic Model			
	Little	Modest	Full		Little	Modest	Full
nAfrica	67	625	1775		170	744	1767
SSA	-540	-502	704		-499	419	4331
sAfrica	-132	93	1233		-124	47	1771
EU15	7996	12226	15860		14554	26819	41647
NAM	1000	543	253		2183	4570	9988
SAM	1855	3559	8181		5249	13020	30552
AUSNZ	687	1279	4629		1471	2982	10107
HiASIA	4470	11115	23965		5878	16060	32582
China	1648	3285	6533		2640	5230	9927
oASIA	1649	3311	5893		4963	12801	24519
CEEC	113	139	-33		130	481	281
ROW	2274	3999	15173		5077	14118	33617
Total	21087	39672	84164		41692	97291	201089

\* Based on Equivalent Variation

**Annex Table 14: Capital stock effects**

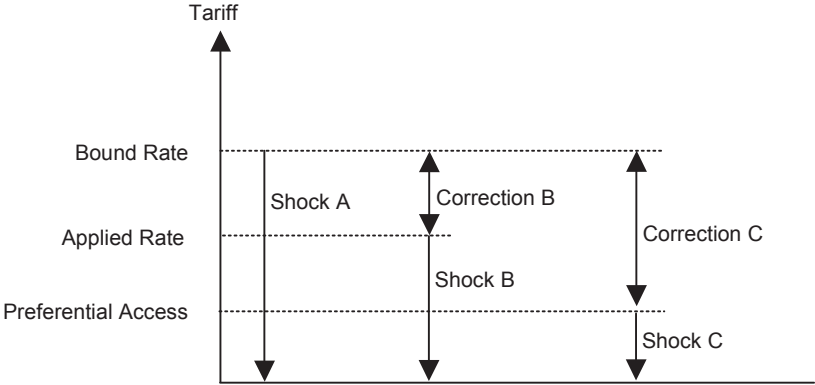
	Percent change in capital stock		
	Little	Modest	Full
nAFRICA	0.3	1.4	2.3
SSA	0.0	1.6	5.5
sAFRICA	0.0	0.6	2.7
EU15	0.2	0.4	0.7
NAM	0.0	0.1	0.2
SAM	0.5	1.3	3.1
AUSNZ	0.6	1.2	3.7
HiASIA	0.1	0.4	0.6
China	0.4	0.8	1.4
oASIA	0.8	2.3	4.6
CEEC	0.0	0.2	0.0
ROW	0.6	2.0	3.5
WORLD	0.2	0.6	1.2

## Annex A. 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<sup>23</sup> 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 A-0-1). If tariffs are completely eliminated and there is no difference between bound and applied rates we use shock A<sup>24</sup>. In the case of the applied rate in Figure A-0-1 shock B is suitable. Accordingly, we have to alter the shock A with the correction B<sup>25</sup>. Otherwise we would overestimate the tariff cut and simulation results would not be reliable.

**Figure A-0-1: Bound and Applied Tariff Rate as well as Preferential Access**



<sup>23</sup> 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.

<sup>24</sup> In general equilibrium modeling “shock” means exogenous change.

<sup>25</sup> 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.

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 countries. We aggregate them for the sectors presented in chapter 5.1. A detailed outline of the single country preferences is in appendix 3. For some sectors the import tariffs of the QUAD regions are completely abolished (Reduction of 100 percent, Table 23 in the appendix 3).

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<sup>26</sup>.

**Table A0-1: 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

Table 5 includes 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.

<sup>26</sup> A detailed discussion of preferences is provided in Achterbosch et al. (2003).

**Table A0-2: 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
	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	

Aggregation	Country	GSP	ACP	LDC
SSA	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	

## Annex B. Aggregation of GTAP Database

**Table B0-1: Aggregation of 12 Regions**

Abrev.	GTAP-Region		Abrev.	GTAP-Region		
nAfrica	Morocco	MAR	AUSNZ	Australia	AUS	
	Rest of North Africa	XNF		New Zealand	NZL	
SSA	Botswana	BWA	HiASIA	Japan	JPN	
	Malawi	MWI		Korea	KOR	
	Mozambique	MOZ		Taiwan	TWN	
	Tanzania	TZA	China	Singapore	SGP	
	Zambia	ZMB		China	CHN	
	Zimbabwe	ZWE		Hong Kong	HKG	
	Other Southern Africa	XSF		Indonesia	IDN	
	Uganda	UGA		Malaysia	MYS	
	Rest of Sub-Saharan Africa	XSS		Philippines	PHL	
sAfrica	Rest of South Afr. Custom Union	XSC	oASIA	Thailand	THA	
	Austria	AUT		Vietnam	VNM	
EU15	Belgium	BEL		Bangladesh	BGD	
	Denmark	DNK		India	IND	
	Finland	FIN		Sri Lanka	LKA	
	France	FRA		Rest of South Asia	XSA	
	Germany	DEU		Rest of South Asia	XSA	
	United Kingdom	GBR		CEEC	Czech Republic	CZE
	Greece	GRC			Hungary	HUN
	Ireland	IRL	Malta		MLT	
	Italy	ITA	Poland		POL	
	Luxembourg	LUX	Slovakia		SVK	
	Netherlands	NLD	Slovenia		SVN	
	Portugal	PRT	Estonia		EST	
	Spain	ESP	Latvia		LVA	
	Sweden	SWE	Lithuania		LTU	
NAM	Canada	CAN	Cyprus		CYP	
	United States	USA	Switzerland	CHE		
SAM	Mexico	MEX	ROW	Rest of EFTA	XEF	
	Central America, Caribbean	XCM		Albania	ALB	
	Colombia	COL		Bulgaria	BGR	
	Peru	PER		Croatia	HRV	
	Venezuela	VEN		Romania	ROM	
	Rest of Andean Pact	XAP		Russian Federation	RUS	
	Argentina	ARG		Rest of Former Soviet Union	XSU	
	Brazil	BRA		Turkey	TUR	
	Chile	CHL		Rest of Middle East	XME	
	Uruguay	URY		Rest of World	XRW	
	Rest of South America	XSM				

**Table B0-2: Aggregation of 13 Sectors**

Abrev.	GTAP-Sector	
Cereals	Paddy rice	PDR
	Processed rice	PCR
	Wheat	WHT
	Cereal grains nec	GRO
Vegetable	Vegetables, fruit, nuts	V F
Oilseeds	Oil Seeds	OSD
	Vegetable oils and fats	VOL
Sugar	Sugar cane, sugar beet	C B
	Sugar processing	SGR
Cotton	Plant-based fibers	PFB
oCrops	Crops nec	OCR
Animal	Cattle,sheep,goats,horses	CTL
	Animal products nec	OAP
	Wool, silk-worm cocoons	WOL
	Raw milk	RMK
proFOOD	Meat of cattle,and sheep	CMT
	Meat products nec	OMT
	Dairy products	MIL
	Food products nec	OFD
	Beverages and tobacco	B T
Extract	Forestry	FOR
	Fishing	FSH
	Coal	COL
	Oil	OIL
	Gas	GAS
	Minerals nec	OMN
Light	Textiles	TEX
	Wearing apparel	WAP
	Leather products	LEA
	Wood products	LUM
	Paper products, publishing	PPP
Industry	Petroleum, coal products	P C
	Chemical,rubber,plastic prods	CRP
	Mineral products nec	NMM
	Ferrous metals	I S
	Metals nec	NFM
	Metal products	FMP
	Motor vehicles and parts	MVH
	Transport equipment nec	OTN
	Electronic equipment	ELE
	Machinery and equipment	OME
Manufactures nec	OMF	

Abrev.	GTAP-Sector	
Trade	Trade	TRD
	Transport nec	OTP
	Sea transport	WTP
	Air transport	ATP
Services	Electricity	ELY
	Gas manufacture, distribution	GDT
	Water	WTR
	Construction	CNS
	Communication	CMN
	Financial services nec	OFI
	Insurance	ISR
	Business services nec	OBS
	Recreation and other services	ROS
	PubAdmin/Defence/Health/Educat	OSG
	Dwellings	DWE

## ANNEX C: An Overview of the Computational Model

### 1. Introduction

This annex provides an overview of the basic structure of the global CGE model employed for our assessment of Doha Round-based multilateral trade liberalization. The model is implemented in GEMPACK -- a software package designed for solving large applied general equilibrium models. The model is solved as an explicit non-linear system of equations, through techniques described by Harrison and Pearson (1994). More information can be obtained at the following URL – <http://www.monash.edu.au/policy/gempack.htm>. The reader is referred to Hertel (1996: <http://www.agecon.purdue.edu/gtap/model/Chap2.pdf>) for a detailed discussion of the basic algebraic model structure represented by the GEMPACK code. While this appendix provides a broad overview of the model, detailed discussion of mathematical structure is limited to added features, beyond the standard GTAP structure.

The model is a standard multi-region computable general equilibrium (CGE) model. See Van Tongeren et al.(2001) for a review and assesment of the features of applied agricultural trade models. Social accounting data are based on Version 5 of the GTAP dataset (McDougall 2001), with an update to reflect post-Uruguay Round protection, Agenda 2000, China's accession to the WTO, and EU enlargement, as discussed in the body of the report.

### 2. General structure

The general conceptual structure of a regional economy in the model is represented in Annex Figure 1. Within each region, firms produce output, employing land, labour, capital, and natural resources and combining these with intermediate inputs. Firm output is purchased by consumers, government, the investment sector, and by other firms. Firm output can also be sold for export. Land is only employed in the agricultural sectors, while capital and labour (both skilled and unskilled) are mobile between all production sectors. Capital is fully mobile within regions.

All demand sources combine imports with domestic goods to produce a composite good, as indicated in the figure. In constant returns sectors, these are Armington composites. In increasing returns sectors, these are composites of firm-differentiated goods. Relevant substitution and trade elasticities are presented in Appendix Table 1.

### 3. Taxes and policy variables

Taxes are included in the theory of the model at several levels. Production taxes are placed on intermediate or 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. Where relevant, taxes are also placed on exports, and on primary factor income. Finally, where relevant (as indicated by social accounting data) taxes are placed on final consumption, and can be applied differentially to consumption of domestic and imported goods.

Trade policy instruments are represented as import or export taxes/subsidies. This includes applied most-favored nation (mfn) tariffs, antidumping duties, countervailing duties, price undertakings, export quotas, and other trade restrictions. One exception are service-sector trading costs, which are not covered by the database. Tariff rates for China's accession to the WTO are taken from Francois and Spinanger (2001) and Van Tongeren and Huang (2004).

#### 4. Trade and transportation costs

International trade is modeled as a process that explicitly involves trading costs, which include both trade and transportation services. These trading costs reflect the transaction costs involved in international trade, as well as the physical activity of transportation itself. Those trading costs related to international movement of goods and related logistic services are met by composite services purchased from a global trade services sector, where the composite "international trade services" activity is produced as a Cobb-Douglas composite of regional exports of trade and transport service exports. Trade-cost margins are based on reconciled f.o.b. and c.i.f. trade data, as reported in version 5.3 of the GTAP dataset.

#### 5. The composite household and final demand structure

Final demand is determined by an upper-tier Cobb-Douglas preference function, which allocates income in fixed shares to current consumption, investment, and government services. This yields a fixed savings rate. Government services are produced by a Leontief technology, with household/government transfers being endogenous. The lower-tier nest for current consumption is also specified as a Cobb-Douglas. The regional capital markets adjust so that changes in savings match changes in regional investment expenditures. (Note that the Cobb-Douglas demand function is a special case of the CDE demand function employed in the standard GTAP model code. It is implemented through GEMPACK parameter files.)

#### 5 Trade

The basic structure of demand in constant returns sectors is Armington preferences. In Armington sectors, goods are differentiated by country of origin, and the similarity of goods from different regions is measured by the elasticity of substitution. Formally, within a particular region, we assume that demand goods from different regions are aggregated into a composite import according to the following CES function:

$$(1) \quad q_{j,r}^M = \left[ \sum_{i=1}^R \alpha_{j,i,r} M_{j,i,r}^{\rho_j} \right]^{1/\rho_j}$$

In equation (5),  $M_{j,i,r}$  is the quantity of  $M_j$  from region  $i$  consumed in region  $r$ . The elasticity of substitution between varieties from different regions is then equal to  $\sigma_j^M$ , where  $\sigma_j^M = 1/(1-\rho_j)$ . Composite imports are

combined with the domestic good  $q^D$  in a second CES nest, yielding the Armington composite  $q$ .

$$(2) \quad q_{j,r} = \left[ \Omega_{j,M,r} (q_{j,r}^M)^{\beta_j} + \Omega_{j,D,r} (q_{j,r}^D)^{\beta_j} \right]^{1/\beta_j}$$

The elasticity of substitution between the domestic good and composite imports is then equal to  $\sigma_j^D$ , where  $\sigma_j^D = 1/(1-\beta_j)$ . At the same time, from the first order conditions, the demand for import  $M_{j,i,r}$  can then be shown to equal

$$(3) \quad M_{j,i,r} = \left[ \frac{\alpha_{j,i,r}}{P_{j,i,r}} \right]^{\sigma_j^M} \left[ \sum_{i=1}^R \alpha_{j,i,r}^{\sigma_j^M} P_{j,i,r}^{1-\sigma_j^M} \right]^{-1} E_{j,r}^M \\ = \left[ \frac{\alpha_{j,i,r}}{P_{j,i,r}} \right]^{\sigma_j^M} (P_{j,r}^M)^{\sigma_j^M - 1} E_{j,r}^M$$

where  $E_{j,r}^M$  represents expenditures on imports in region  $r$  on the sector  $j$  Armington composite.

## 7. Capital accumulation

Dynamic effects through capital accumulation are modeled as 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. 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 behaviour: 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. The capital accumulation mechanisms are described in Francois et al (1996b: <http://www.agecon.purdue.edu/gtap/techpaper/tp-7.htm>).

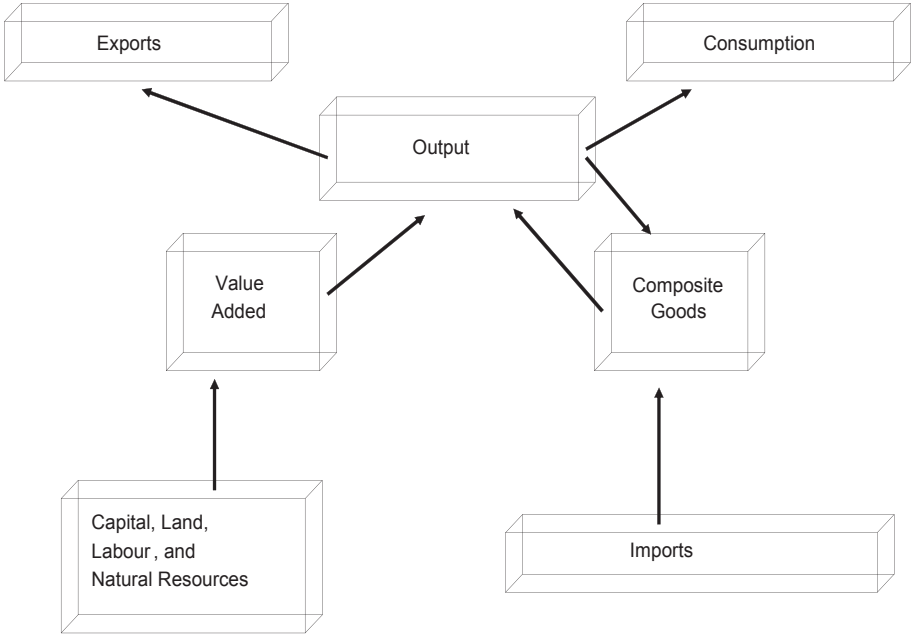
Technically, we fix each region's trade balance (pre-reform steady state), in order to fix the regional savings-investment balance. Each region's investment demand is matched by savings from domestic sources and foreign sources. Investment demand is translated into capital expansion, which shifts the regional production possibility frontier outward.

## Annex D: References

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# Annex Figure 1

## The Flow of Production



## Annex table 1: Substitution elasticities in the model

	Armington elasticity, domestic/imported	Armington elasticity, allocation of imports	CES elasticity of substitution primary factors
Cereals	2.2	4.4	0.3
Vegetable	2.2	4.4	0.2
Oilseeds	2.2	4.4	0.6
Sugar	2.2	4.4	0.6
Cotton	2.2	4.4	0.2
oCrops	2.2	4.4	0.2
Animal	2.6	5.5	0.2
proFOOD	2.4	4.8	1.1
Extract	2.8	5.6	0.2
Light	2.7	6	1.3
Industry	2.9	6	1.3
Trade	1.9	3.8	1.7
Services	1.9	3.9	1.3

## Annex table 2: Income elasticity private household demand

	nAFRICA	SSA	sAFRICA	EU15	NAM	SAM	AUSNZ	HiASIA	China	oASIA	CEEC	ROW
Cereals	0.2	0.5	0.4	0.2	0.2	0.2	0.1	0.1	0.4	0.3	0.1	0.2
Vegetable	0.7	0.6	0.6	0.3	0.3	0.5	0.2	0.4	0.9	0.7	0.5	0.6
Oilseeds	0.7	0.6	0.6	0.3	0.2	0.5	0.2	0.4	0.8	0.7	0.5	0.6
Sugar	0.7	0.6	0.6	0.3	0.3	0.5	0.3	0.3	0.8	0.7	0.5	0.6
Cotton	0.7	0.6	0.6	0.3	0.3	0.5	0.3	0.3	0.8	0.7	0.5	0.6
oCrops	0.7	0.6	0.6	0.3	0.3	0.6	0.1	0.3	0.5	0.7	0.5	0.5
Animal	0.7	0.6	0.6	0.3	0.3	0.4	0.2	0.5	1.1	0.6	0.4	0.4
proFOOD	0.7	0.6	0.6	0.4	0.4	0.6	0.5	0.5	0.9	0.7	0.6	0.6
Extract	0.9	1	1	0.6	1.1	0.9	0.3	0.6	0.9	1	1	0.9
Light	1.1	0.9	1	1	1	1	1	0.9	0.9	0.9	1	1
Industry	1.4	1.3	1.1	1.1	1	1.2	1.1	1.1	1.1	1.3	1.1	1.1
Trade	1.4	1.4	1.1	1.1	1	1.2	1.1	1.1	1.2	1.4	1.2	1.2
Services	1.3	1.4	1.1	1.1	1	1.2	1.1	1.1	1.1	1.3	1.2	1.2

Calculated from the CDE expenditure system