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AFTER THE URUGUAY ROUND: GLOBAL CHALLENGES AND AFRICA'S RESPONSES IN SELECTED AREAS

I. INTRODUCTION

1. Africa's role in world trade has long been the subject of fierce controversy. Much of the disagreement in African trade policy debates has arisen because participants have different perceptions of economic conditions, and hence different expectations of how a given policy change might work. Some have seen Africa's own history as proof that foreign trade is highly detrimental to the continent's development; while others have looked abroad and seen trade being closely linked to economic growth and poverty alleviation.

2. This paper is aimed at helping African policy makers to assess current trade policy options using the most accurate possible data, and an explicit, state-of-the-art analytical framework. We begin with an exhaustive accounting of Africa's role in world production, consumption and trading patterns for the most recent available year (1992). We then use the Global Trade Analysis Project (GTAP) modeling framework[1] to project forward the most likely changes in each region's population, capital stock, and productivity to a common target date (2005), based on macroeconomic forecasts from the World Bank. This applied general equilibrium (AGE) model permits us to capture how production, consumption, and trade are likely to adjust to these changes.

3. Using the projections for 2005 as a baseline, we simulate the consequences of alternative policies, starting with the implementation of the Uruguay Round agreement and then moving on to each possible African response. Careful accounting of how each policy is implemented, along with an explicit AGE model of how production, consumption, and trade can adjust, provides the most realistic possible "laboratory" in which the effects of possible choices can be simulated. Details of the method, assumptions and results are provided in the sections that follow - in this introduction we set out the major themes of the study, through an overview of past policies and assessing the factors propelling change (drivers of change).

A. Past policies and economic performance

4. During the 1960s and 1970s, many newly independent African Governments embarked on ambitious drives for economic self-sufficiency. Although there were some highly publicized efforts to increase exports, on balance African Governments have tended to restrict international trade and foreign ownership far more than did other major regions of the world.

5. Due in part to its own trade restrictions, Africa's share of world markets fell dramatically. At the outset of the independence period in 1961, Africa provided almost 9 per cent of the world's agricultural exports, and 3.7 per cent of all merchandise exports; by 1988, these shares had shrunk to 3.5 per cent and 1.2 per cent respectively. The market shares of other low-income regions also declined during this period, but not as much. For example, South Asia's market shares fell in half - but sub-Saharan Africa's shares fell to one third of their 1961 levels.

6. African Governments used a wide variety of instruments to limit trade and foster self-sufficiency, often building on the interventionist traditions of colonial administrations. Some of the key interventions were monopoly marketing boards and state trading companies, trade taxes and quotas, and foreign exchange restrictions. The result of these interventions was a strong disincentive to export and import, or adjust domestic production and consumption to changes in economic conditions.

7. In addition to direct interventions, substantial disincentives to trade have been imposed by high transport costs, both within Africa and for external trade. *Ad valorem* freight costs for the combined countries in sub-Saharan Africa are estimated at about 20 per cent above their competitors. Africa's trade

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[1] The Global Trade Analysis Project (GTAP), based at Purdue University, supports a global data base (McDougall, 1997) and modeling framework (Hertel, 1997) currently used by more than 150 researchers on five continents. It is supported by a consortium of 12 national and international agencies.

restrictions reduced not only the volume of trade, but also its diversity. In 1990 just four items - crude petroleum, precious stones, cocoa and coffee - accounted for 66 per cent of sub-Saharan Africa's exports to OECD countries.

8. Africa's concentration in terms of commodities is linked to concentration in terms of destinations. For developing countries as a whole, almost 40 per cent of all exports go to other developing countries, and 25 per cent go to the European Union. In contrast, for Africa less than 20 per cent to other developing countries, and over 50 per cent goes to the European Union (see table 1). This concentration is partly due to Africa's relative geographic isolation from Asia and Latin America, and its proximity to Europe. But it is also due to Europe's relatively greater demand for Africa's few export items, and also to European preferences through the Lomé Convention.

9. Africa's post-independence drive for self-sufficiency, by reducing the variety as well as volume of its trade, made the continent more vulnerable to events in specific foreign markets - and also increased the continent's dependence on local resources. With limited access to gains from trade, economic growth could be driven only by increases in the continent's own physical productivity. But the bulk of Africa's labour and capital is employed in agriculture, and for a variety of reasons, the worldwide "green revolution" by-passed the continent. Between 1960 and 1988 African grain yields remained roughly constant at around 700 kg/ha, while the total for other developing countries almost doubled from 820 to 1500 kg/ha (see figure 1).

10. With restricted gains from trade and limited increases in physical productivity, Africa's rapid population growth quickly eroded its levels of per capita income and wealth. During the 1970s, African economies were able to finance imports at low real interest rates, but after world interest rates rose in 1981 the continent's economic crisis became increasingly apparent. Capital inflows to finance trade and fiscal deficits were increasingly costly, forcing cutbacks in consumption and living standards.

11. The 1980s were a lost decade for most Africans. The costs of economic reform programmes were felt immediately, while their benefits came later - and then only if reforms were sustained over time and not offset by other changes. By the mid-1990s, sustained growth had been seen in a several countries such as Uganda, but many others were stuck in stop-go reforms and saw little recovery.

12. What lies ahead? What economic strategies are appropriate for Africa in the post-Uruguay Round environment? Before proceeding to the quantitative simulations it is appropriate to preview the major drivers of change, so as to set the stage for their interaction.

B. Drivers of change: the Uruguay Round in the context of other influences

13. This study assesses the effects of Uruguay Round implementation in the context of other changes which are occurring simultaneously in the world economy: although the Uruguay Round itself has important impacts on Africa, these are influenced in important ways by changes in relative resource endowments in Africa and in its trading partners.

1. Direct and indirect effects of the Uruguay Round

14. The direct effects of the Uruguay Round agreement in cutting restrictions on African trade are relatively small. For Africa's exports, the major foreign markets already imposed relatively few barriers, so there was little protection to be cut. On the import side, African Governments chose not to use the Uruguay Round to reduce restrictions very much, so the agreement has little direct impact there either. As a result, the direct benefits of participating in the Round are far more limited for Africa than they are for participants who used the negotiations to achieve deeper cuts in their own protection levels.

15. The indirect effects of the Round in cutting restrictions on other regions' trade are concentrated in the textile and garment sector, and in agriculture. In textiles and garments, phasing out of the Multifiber Arrangement (MFA) will remove constraints that currently limit competition from low-cost exporters elsewhere, particularly in Asia. As a result, prices of textiles and garments will fall, making this a relatively much less attractive sector than it was in the 1980s and 1990s when the MFA kept world prices high.

16. In agriculture, the opposite is likely to occur: the Uruguay Round Agreement on Agriculture requires industrialized countries to reduce farm subsidies, raising world prices and making this an increasingly attractive sector in the 1990s. The shift in world textile and apparel markets will harm Africa's growth prospects in that industry, while shifts in world agriculture will benefit Africa's prospects in that much larger sector. Which change has a greater impact on African welfare is an empirical question, that depends largely on Africa's own ability to expand its agricultural exports in response to new economic conditions.

17. As the Uruguay Round is implemented a number of other changes in world economic conditions are likely to occur. Their effects are likely to compound the effects of the Uruguay Round in increasing Africa's comparative advantage in agriculture.

2. Population growth and demographic change

18. One of the most important, most predictable and yet most widely overlooked drivers of change is the demographic transition, as mortality and fertility rates decline and then stabilize over time. This transition leads to an increase and then decrease in population growth rates, and a major shift in the composition of the population. The proportion of people who are children tends to rise and stay high (over 40 per cent) in the first phase of transition, then fall and stay low (below 25 per cent) after fertility declines.

19. The period of falling child-dependency ratios, when the average age of the population is rising, opens a window of opportunity for rapid economic growth, as there can be uniquely rapid increases in the country's labour force, human capital, and savings rates. African countries' fertility rates began to decline in the 1980s, opening the possibility of a similar burst of factor accumulation in the late 1990s and beyond. As in Asia and elsewhere, the potential supply of labour and capital must be mobilized appropriately, but for the first time in African history the possibility of rapid growth may be at hand.

3. Structural transformation and the agricultural sector

20. A major factor in resource mobilization is the economy's structural transformation from agriculture to industrial and service activities. This change is a fundamental feature of economic growth, driven by rising incomes and the accumulation of non-land capital. To earn those incomes and meet growing demand for non-agricultural products, workers and their savings flow out of agriculture, which produces a falling share of total income and employs a falling share of the workforce. But with rapid population growth the absolute number of farmers may still rise - and indeed must, by definition, continue to rise until the absolute number of non-farm jobs exceeds the number of new workers.

21. The African continent, which still has the world's fastest population growth rate and smallest non-farm sector, will continue to have most of its workforce in farming and experience rapid growth in the farm population - as its overall population growth rate falls. As a result, rapid growth in per capita incomes will be possible only if the rising number of farmers produce even more rapid increases in output per unit of land.

22. Africa's demographic and structural conditions make farm productivity the key to poverty alleviation and social equity as well as overall economic growth. Africa's poorest people are typically self-employed farmers, and are often women, children and younger men whose access to formal employment is limited by

social or geographic isolation.[2] Thus, the lowest-income households often rely on agricultural production for both subsistence and cash income. Many of the poorest households are located in the driest areas, and are net buyers of cereal grains which they purchase with income from selling livestock, legumes and other cash crops, as well as income from non-farm work. In this context, increased crop production is critical for the well-being of women partly by increasing their income as agricultural producers, partly by decreasing the real cost of providing food for their families, and partly by enhancing their employment opportunities through overall economic growth.

23. While Africa's demographic and structural conditions force it to rely on agriculture for economic growth, other drivers of change offer real grounds for optimism. First, as noted earlier Africa was bypassed by the first green revolution in agricultural technology. To the extent that the continent's agricultural research, extension and marketing systems rise to the challenge, there is potential for very rapid yield growth fueled by the combination of labour-intensive soil and water conservation practices, more responsive crop varieties, and more widely available input and product markets. Indeed, after stagnating since independence cereal yields began to rise in 1985, and have kept up with population growth since then even in the Sahel.

24. For yields to continue rising, increased use of labour and purchased inputs must be profitable - so a further condition for optimism is market demand. Here the most important driver of change is the world-wide dietary transition, as rising incomes leads to rising demand for feedgrains to supply dairy, poultry, and meat products. Combined with falling costs of overseas transport, rising incomes create rising global demand for African agricultural exports of all kinds. As other countries shift their resources out of agriculture, African countries will be increasingly able to compete for these markets - as Africa's farm population grows, it will be increasingly urgent to do so.

II. PROJECTIONS TO 2005

25. In this paper we use the publicly available Global Trade Analysis Project (GTAP) modeling framework (Hertel, 1997) to evaluate the African impact of the Uruguay Round and a selection of other policy scenarios (see annex for more details on this framework). In order to project what the world economy might look like in the year 2005, with and without the Uruguay Round, we simulate the GTAP model by shocking a relatively small number of fundamental determinants of output, in addition to trade policies. In particular, we utilize exogenous projections of each region's endowment of physical capital, human capital, population and labour force and total factor productivity (TFP) as shown in table 2. These were based on combinations of historical data and projections of the growth in population, in the labour force, in real GDP and in investment obtained from World Bank sources. Capital stock projections were generated by adding investment in each year and subtracting depreciation using the methodology of Nehru and Dhareshwar (1994). The human capital projections were based on the growth in the stock of tertiary education as projected by Ahuja and Filmer (1995). The stock of agricultural land was held constant throughout the analysis. Finally, the projected rates of sector and factor neutral total factor productivity (TFP) growth rates for each of the 15 regions are obtained by subtracting the growth in total factor inputs from the real GDP projections. Rates of growth in agricultural sector TFP were set to 0.7 per cent/year above the average rate for the economy as a whole (Gehlhar *et al.*, 1994) based on empirical evidence (Bernard and Jones, 1997).

26. The groupings of countries in table 2 are based on a 10-region aggregation of the 30 region, version 3 GTAP databases (McDougall). Unfortunately, current coverage of Africa is limited to two composite regions: sub-Saharan Africa (SSA) and the Middle East and North Africa (MEA). Other trading partners

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[2] In this respect Africa's income distribution is quite unlike that of Asia or Latin America, where the poorest are often landless farm workers or city dwellers. Africa does have an increasing number of landless people, but they remain a much smaller share of the total proportion than in Asia, largely because Africa has far more farmland per worker.

are grouped by geographic location and income level. From the cumulative growth projections in table 2, it is clear that there are substantial differences between Africa and some of the other developing countries in their rates of factor accumulation. Sub-Saharan Africa has the highest projected rate of population growth over this period and the lowest rate of capital accumulation. Indeed, sub-Saharan Africa and the Middle East and North Africa are the only two regions where *the capital/unskilled labour ratio is expected to fall* between 1992 and 2005. Thus, despite relatively high rates of growth in human capital, real GDP *per capita* is projected to stagnate in these two regions.

27. Our projections to 2005 also require us to specify policies over this period. Most of the policy instruments in the model are *ad valorem* in nature. The one exception is the system of bilateral quotas restricting exports of textiles and apparel from developing countries to North America and Europe. These quotas have been administered under the Multifiber Arrangement which specified annual growth rates varying by country and commodity. The Uruguay Round agreement had an impact on many of these trade policy instruments and one of the goals of this paper is to evaluate this impact. In order to do so, we need a "counterfactual" scenario, to simulate what the world would have looked like in 2005 in the absence of such an agreement. This is the first experiment, which we conduct. We refer to this as "2005noUR". It involves retaining constant *ad valorem* equivalent distortions for all trade policies, with the exception of textiles and apparel for which quotas grow at the rates specified under the MFA.

28. Having established this counterfactual benchmark, we are now in a position to assess the impact of the Uruguay Round. We do so by introducing the policy shocks associated with implementation of the Round, starting from the updated database representing conditions in 2005. Thus, *the results obtained may be directly interpreted as the impact of the Uruguay Round agreement on Africa in the year 2005*, after the Round is implemented. As discussed in the annex, this approach understates some of the gains from trade by omitting the effects that trade liberalization is likely to have on factor accumulation or TFP growth rates.

III. IMPLEMENTATION OF THE URUGUAY ROUND

A. Tariffs and tariff-equivalents

29. We begin by computing pre-Uruguay Round bilateral rates of protection for the particular aggregation used here. We then compute post-Uruguay Round protection levels based on individual country offers to the World Trade Organization (WTO). The import tariff and tariff-equivalent shocks are computed based on the difference between these two protection levels. This pre- and post-Uruguay Round information is based on work done at the World Bank and the WTO. Its incorporation into GTAP is summarized in Reincke (1997) for tariffs and Ingco (1997) for non-tariff barriers in agriculture. In those cases where Uruguay Round bindings are above pre-Uruguay Round applied rates, no shock is applied.

30. Table 3 reports the relative size of the Uruguay Round offers across regions. For sub-Saharan Africa, the average pre-Uruguay Round protection levels for food and manufactures are 15.6 and 9.5 per cent, respectively. Post-Uruguay Round rates are 12.4 and 9.4 per cent for these same two aggregates, indicating almost no liberalization with respect to manufactures and an average price cut of only 1.7 per cent in food products. This stands in contrast to Asia, where reductions in protection are much greater. For example, in the case of Thailand, the average price cut on agricultural imports is almost 11 per cent, and 6 per cent on manufactures. Nevertheless, it is important to consider the nature of African Uruguay Round cuts in additional detail.

31. Tables 4 and 5 summarize both the extent of African Uruguay Round offers and the size of the Uruguay Round offers affecting sub-Saharan Africa and the Middle East and North Africa. Each table groups these offers both by trading partner and by commodity affected. These figures are obtained by multiplying the absolute value of the import tariff rate reduction by the value of the 1992 trade flow affected. Since these reductions will themselves affect the volume of trade along a particular route, they are of limited

value for economic analysis. Their primary role here is to provide a useful summary of relative importance of the Uruguay Round commitments across trading partners and commodities. These offers should not be used in place of the model-based economic impact estimates which will be reported below.

32. Examination of table 4 shows that African import prices will be little affected by the Uruguay Round tariff cuts in this region itself. Price cuts due to these tariff reductions in sub-Saharan Africa range from a high of 0.8 per cent on textiles and apparel to 0.45 per cent on grains and 0.16 per cent on livestock products. These proportionate cuts are far smaller than those offered by the developing countries in Asia (table 3). As a consequence, the total, 1992 trade-weighted value of these cuts is little more than US$200 million, with half of this coming on grains. The effect of the latter cuts is likely to be overwhelmed by the effect of higher export prices from Africa's primary grain sources, the North America Free Trade Area (NAFTA) and the European Union, where export subsidies are due to be cut under the Uruguay Round agreement. In the case of the Middle East and North Africa, cuts in protection due to the Uruguay Round are non-existent outside of the "other foods" sector. The distribution of Africa's Uruguay Round cuts across import sources, broadly reflects the pattern of African imports (see table 6), with the largest value cuts coming on imports from the European Union, followed by NAFTA.

33. Table 5 looks at the implications of the Uruguay Round for average price changes for African exports in destination markets. Here, the changes are more significant. The deepest price cuts at destination are for livestock products (an average of more than 3 per cent), followed by other food products, forestry and fish and manufactures. The trade-weighted value of these cuts greatly exceeds their counterparts in table 4, indicating that there will be a greater direct stimulus to African exports as opposed to imports under the Uruguay Round.

34. When these protection cuts on African exports are grouped by trading partner and averaged over all commodities, we note that the largest price cuts are in Asia. Thus, despite the relatively modest importance of African exports to Asia at present (see table 1), this region shows up significantly in the total value of cuts. This is an indication that we expect Asia's relative importance as an African export destination to increase under the Uruguay Round. As we will see below, this tendency is further reinforced by the relatively more rapid growth of incomes and purchasing power in the Asia region.

B. Export interventions

35. In addition to the reductions in import barriers, the simulation includes elimination of import quotas on textiles and apparel trade under the Uruguay Round Agreement on Textiles and Clothing (ATC). This agreement consists of a set of complex formulae for quota acceleration, and gradual abolition, intended to bring textiles and apparel under WTO discipline. The ATC culminates in complete elimination of quotas at the end of 2005. However, the agreement has "back-loaded" the liberalization by placing abolition of the most sensitive quotas at the end of this period. There are also a number of safeguards in the agreement. Given the amount of structural adjustment anticipated, there is some uncertainty about whether the final outcome will be completely free trade. Hertel *et al.* explore this issue in some detail. Here, we will assume that abolition is successful. Alternative scenarios could also be explored.

36. The most important feature of the ATC for sub-Saharan Africa is that only a few countries are presently affected (Kenya, Egypt and Mauritius according to the latest information from the International Textiles and Clothing Council). Furthermore, (a) these quotas only apply to African exports to NAFTA, (b) they are less binding (see table 7) and (c) they are scheduled to grow at a more rapid pace prior to their abolition. As a consequence, African exports of textiles and apparel to both the NAFTA and European Union markets are largely shielded from the competitive Asian suppliers via the current quotas on those exporters. Abolition of these quotas will tend to lower prices of textiles and apparel from low-cost exporters such as China in the world's largest markets, thereby making it more difficult for African exporters to compete.

37. Table 7 reports the average quota premia on exports of textiles and apparel from each region into the European Union and North American markets, as taken from the 1992, version 3 GTAP database (McDougall, 1997). The populous countries of South and East Asia faced the most restrictive quotas in 1992. Quota growth rates over the 1992-2005 period are also slower than for the less constrained regions such as sub-Saharan Africa and the Middle East and North Africa. As a consequence, we project an increase in these quota differentials in the 2005noUR database, so that when these quotas are eliminated in our Uruguay Round simulation, we expect to see a dramatic change in the sourcing of textiles and apparel in Europe and North America.

38. The final part of the Uruguay Round implementation in this study involves a cut in the *ad valorem equivalent* export subsidies on agricultural exports as reported to the WTO during the pre-Uruguay Round period. In practice, the constraint on these subsidies entails both a quantitative target and an expenditure target, only one of which will be binding. For purposes of this study, we have simply opted to implement the 36 per cent cut in value of subsidies via a reduction in the exogenous rate of subsidization. As is the case with the MFA, more elaborate scenarios could be developed with respect to these subsidy constraints.

IV. RESULTS

A. Composition of trade

1. Base year trade patterns

39. We begin our discussion of results by examining the overall pattern of trade between Africa and the rest of the world. Table 1 reports the distribution of African exports across trading partners in three different scenarios. The first represents the actual pattern of trade in 1992. About half of sub-Saharan Africa's exports go to Europe, versus 27 per cent for the world as a whole. This is hardly surprising given Africa's geography, commodity composition of trade, historical ties and free access granted these exports under the Lomé Convention. About 80 per cent of sub-Saharan Africa's and the Middle East and North Africa's exports go to OECD countries (European Union, NAFTA and EAsiaH), leaving relatively little trade with other developing countries.

40. Table 6 reports the commodity composition of African exports. Here, we see clear evidence of the dominance of primary products. Energy accounted for 31 per cent of sub-Saharan Africa's exports and 64 per cent of the Middle East and North Africa's exports in 1992. Food, forestry products, fish and minerals accounted for about 30 per cent of sub-Saharan Africa's exports in this year. This leaves only about one-third for manufacturing and services exports from this region. These figures contrast sharply with global trade shares where manufacturing and services account for about 80 per cent of the world total in 1992.

41. Tables 1, 6, 8 and 9 report the pattern of imports into Africa. Europe plays an even more prominent role as a source of goods than it does as a purchaser of African exports, while imports from North America and high-income East Asia are somewhat under-represented, relative to the world average. The commodity composition of these imports in 1992 complements the pattern of exports from Africa. Eighty to 85 per cent of the imports are manufactures or services, and these are heavily concentrated in the heavy manufacturing category, as is global trade overall.

2. Trade patterns in 2005

42. Tables 6 to 9 also report trade shares in the year 2005. The second set of columns in each group report the "counterfactual" trade shares representing where we project the world might have ended up in the absence of the Uruguay Round. The third set of columns refer to the projections for 2005 in the presence of the Uruguay Round agreement. This is the outcome which we anticipate if the Uruguay Round agreement is fully implemented.

43. In the absence of the Uruguay Round, several trends are evident worldwide. Both sub-Saharan Africa and the Middle East and North Africa, as well as world, reduce their exports to the relatively slower growing North American and European markets. Africa as a destination for world exports also declines in relative importance, as sub-Saharan Africa falls from 2.2 to 2.0 per cent, and the Middle East and North Africa falls from 5.9 to 5.2 per cent of world exports. Simultaneously, there is an increase in the share of African and world exports going to Asian markets. This increase is most striking in the case of the low-income East Asian countries (China and Southeast Asia). Here, rapid economic growth results in their export global share nearly doubling. The sub-Saharan Africa region's export share to EAsiaL goes up by even more, rising from 2.4 to 5.8 per cent of the total, even without the Uruguay Round tariff cuts.

44. With the Uruguay Round cuts, the 2005 trade shares also change quite markedly in many cases. Perhaps most striking is the decline in African export shares to the EU15 market, as trade preferences are eroded under the Uruguay Round cuts. For example, sub-Saharan Africa's export share to EU15 falls from 47 to 44 per cent by the year 2005 as a consequence of the Uruguay Round agreement. In the case of the Middle East and North Africa, this decline in the relative importance of the European Union market is about two percentage points, from 36 to 34 per cent. These changes clearly reflect the erosion of African preferences in this market, as the world export share to the European Union barely declines as a result of the Uruguay Round. This decrease in European Union export share is absorbed by East Asia.

45. On a commodity basis, African export shares shift away from textiles and apparel and towards agriculture as a result of the Uruguay Round agreement (table 8). Over the 1992-2005 period, we project that sub-Saharan Africa's share of total exports from the textiles and apparel sector would have risen from 2.6 to 3.4 per cent if there had been no Uruguay Round, surpassing other small sectors such as forestry and fisheries - but that with the Uruguay Round agreement the textile and apparel sector declines in relative importance to 1.2 per cent, while the Uruguay Round raises the forestry and fish sector's share to 2.8 per cent. Other farm exports are also big gainers, and the five agriculture-based sectors rise from under 25 to around 26.5 per cent of total exports.

46. In general, African import shares, by source, are quite stable in the wake of the Uruguay Round (table 6). This reflects in part the absence of significant cuts in import protection in this region. Consider, for example, the world import share from EAsiaL following the Uruguay Round, which increases from 12.8 to 15.1 per cent. In contrast, African import shares scarcely change. In the case of the European Union, the Uruguay Round agreement causes this region's share of global imports to fall by almost a percentage point. However, the relative importance of the European Union in African imports actually rises. The commodity composition of African imports is similarly stable in the wake of Uruguay Round implementation (table 9).

C. Changes in output and trade

47. Table 10 reports the estimated percentage change in the volume of output and gross trade, by commodity for the aggregated sub-Saharan Africa and Middle East and North Africa regions, as a result of the Uruguay Round. It also reports the associated change in commodity trade balance. As can be seen by the totals in this table, the Uruguay Round agreement results in a slight reduction in trade for both sub-Saharan Africa and the Middle East and North Africa. Furthermore, their trade balances deteriorate slightly. The latter effect is due to the fact that real incomes and hence savings fall in these regions, while investment increases slightly due to our assumption that the composition of the global portfolio of regional investment remains fixed. An alternative (and common) assumption is to fix the trade balance exogenously. Given the small change in trade balance in table 10, this would not cause much difference in the results.

48. Both sub-Saharan Africa and Middle East and North Africa experience increases in agricultural output as a consequence of increased exports, and reduced imports, in the wake of the Uruguay Round. Consequently, the food trade balance for Africa improves. However, the pattern of sub-Saharan Africa food

exports changes as a result of the Uruguay Round (table 11). The volume of bilateral food exports to the European Union falls, excepting for livestock products (see European Union column in table 11), while export volume to many of the other developing countries increases, as protection is reduced and export subsidies from the European Union and NAFTA are cut. Middle East and North Africa exports of processed foods to EAsiaL rise by more than 100 per cent. Indeed, the farm and food output increases are particularly strong in the Middle East and North Africa (table 12).

49. Energy output and light manufactures production in the Middle East and North Africa fall, while heavy manufactures and services experience increases. Textiles and apparel production is particularly hard hit in both regions as a result of preference erosion in the European Union market. Exporters in sub-Saharan Africa and the Middle East and North Africa are currently placed at a significant advantage due to the presence of MFA quotas on imports from Asia (table 7). When these are eliminated, they are displaced in both the European Union and the North American markets. In particular, exports from sub-Saharan Africa to the European Union fall by 87 per cent, while exports to NAFTA fall by 81 per cent (table 11). Comparable figures for Middle East and North Africa exports of textiles and apparel are -85 and -69 per cent. While sales to the Asian markets rise (intermediate inputs for re-export as finished goods), this is not enough to offset these direct effects, and gross exports of textiles and apparel fall by 67 and 77 per cent in sub-Saharan Africa and the Middle East and North Africa, respectively. This results in a sizable negative change in the trade balance for this commodity in both regions.

D. Changes in welfare

50. Table 13 reports the welfare effects of the Uruguay Round on all regions in the model. Low-income East Asia is the biggest gainer, both in proportional terms (3.59 per cent of real income per year by 2005) and absolutely ($65,843 million/year). This is hardly surprising, since these countries cut their own import tariffs the most (table 5) and were also the most severely constrained by MFA quotas against their exports (table 7). Annual welfare gains for the world as a whole in the year 2005 are equal to US$192 billion at 1992 prices.[3]

51. Turning to the impact on Africa, we find that both sub-Saharan Africa and the Middle East and North Africa lose from implementation of the Uruguay Round agreement. *This occurs largely because sub-Saharan Africa and the Middle East and North Africa are very timid participants in the Uruguay Round. They did not take advantage of the negotiations to reduce their own distortionary protection.* Recall from table 2 that the Uruguay Round cuts in Africa's import tariffs are much smaller than the cuts by other regions. If Africa's import tariffs had declined more, lower import costs would have made exports more competitive as well. Given the absence of significant liberalization by Africa itself, the effects of the Uruguay Round on Africa are driven by the increase in trade between Asia and Europe which displaces African exports from the European Union market (tables 11 and 12). This displacement is partly due to the erosion of preferences from the Lomé Convention, partly due to the elimination of MFA quotas on imports of Asian textiles and apparel into the European Union, and partly due to the reduction in Asia's export costs due to their own tariff-reduction under the Uruguay Round.

52. The effects on African economic welfare of its displacement from European markets can be decomposed into two parts: a change in its external terms of trade, and a change in its internal allocative efficiency. The terms of trade effect is the smaller of the two, estimated to cost $205 million per year in 2005 for sub-Saharan Africa and $171 million in the Middle East and North Africa (despite a larger trade

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[3] This is somewhat smaller than the figure obtained by Hertel *et al.* (1995, 1997) using a similar approach. The differences are due to a variety of factors, including updated values for the MFA quotas and macroeconomic projections, incorporation of the Lomé Convention, and aggregation of the East Asian countries thereby blunting the welfare gains from their reforms.

volume). In contrast, trade displacement brings an allocative-efficiency cost of $377 million for sub-Saharan Africa and $570 for the Middle East and North Africa. This resource-allocation effect measures the loss in welfare owing to a worsening in the allocation of resources in Africa as a result of adjustments to the Uruguay Round. In effect, Uruguay Round implementation increases the costs to Africa of its own policy distortions. In both the sub-Saharan Africa and Middle East and North Africa regions trade is relatively heavily taxed, and the trade-reducing effects of Uruguay Round implementation worsen the welfare costs of these policies. Although domestic reforms can do relatively little about the terms of trade effect, they could sharply reduce the allocative efficiency costs to the extent that reforms reduce taxes on trade. We next turn to several possible policy responses to the projected Uruguay Round losses for Africa.

V. POLICY RESPONSES

53. In light of the adverse effects of the Uruguay Round on Africa, we focus in this last section of the paper on some of the possible policy responses which might help countries in the region overcome these negative effects and capitalize on the changing structure and increasing openness of world markets. We focus our attention in this section on sub-Saharan Africa in particular. Two reforms are examined in some detail: improvements in the efficiency with which goods are handled for international trade, and improvements in the efficiency of domestic food grains production.

A. Trade and transport reforms

54. Consider first the problem of high transport costs. As noted above, both internal and international transport costs pose a large barrier to trade within the region, and between sub-Saharan Africa and other trading partners. Amadji *et al.* (1996, table 13) report that average nominal freight rates on sub-Saharan Africa's exports (outside of oil) are about 20 per cent above those for other developing countries. Some of this cost difference may have arisen because of relatively small shipment volumes, in an industry with significant economies of scale. But much of Africa's cost disadvantage is due to delays in customs clearing, problems in coordination and logistics, and high mark-ups by monopoly transporters serving small markets. All of these barriers to trade could be reduced by institutional reforms. Such changes have relatively little financial cost, but are often postponed because they would harm politically favoured individuals and institutions.

55. What is needed to reduce transport costs includes custom reforms to make tariff obligations more transparent and speedy, management reforms or privatization of transit facilities such as ports and airports to make operations more accountable to users, and domestic-carrier reforms to eliminate national preferences and create an Africa-wide market for trade and transport services. In Zimbabwe, for example, reduction of preferences for the national cargo carrier AFFRETAIR has significantly reduced airfreight costs and delays for horticultural exports, although further progress towards lower-cost airport operations and open-skies competition among air carriers may be urgently needed.

56. A key factor in transport costs is economies of scale, both in the size of individual shipments and in the size of the network in which shipment occurs. Currently both are restricted by the need for shippers to have close links to national customs and transit systems. Without such country-of-origin restrictions, carriers would compete with one another over several countries. Although the size of each firm would rise, firms would have less power in each market since entry from elsewhere would be easier.

57. We explore the consequences of reforms in the trade and transport sector by introducing a 20 per cent reduction in bilateral trade and transport costs, applied to non-energy products originating in the sub-Saharan Africa region. This scenario assumes that, between the time reforms are implemented and the year 2005, the cost differences identified by Amadji *et al.* are eliminated entirely. We assume no change in the international transport costs for Africa's imports since these services are mainly arranged from the country

of origin, and no change in domestic transport costs since there is little evidence on the magnitude of cost reduction that reforms in this sector could bring.

58. At constant supply prices, our specification of transport reform would have the effect of reducing c.i.f. prices in the destination region by 20 per cent of the c.i.f.-f.o.b. margin. Thus, the larger the initial share of this margin in the cost of sub-Saharan Africa exports at a given destination market, the greater will be the impact of the reforms. The first column of table 14 reports the average trade and transport margin as a share of c.i.f. value for sub-Saharan Africa exports. The highest margins are for non-grain crops (12.4 per cent) and forestry and fish products (12.5 per cent). Thus it is hardly surprising that these commodities show two of the highest rates of increase in exports (8 and 9 per cent, respectively) when costs are reduced. Manufactured products also show significant increases in exports, since they too have substantial trade margins and, unlike primary products, they do not face supply constraints due to limited availability of land or natural resource stocks.

59. The impact of increased transport efficiency on exports feeds through to output changes in rough proportion to the overall importance of exports in output. This share is reported in the second column of table 14. For example, about one-third of non-grain crops are exported from sub-Saharan Africa, and the increase in output is roughly one-third of the increase in exports. A similar relationship holds for non-energy mining products (OthMin). In contrast, only 3 per cent of livestock and meat products are exported from this region, and so the increase in output is only about 3 per cent of the increase in exports.

60. The trade margins reduction examined here does not apply to services, which have no measurable margin, nor does it apply to energy products, which are exempted from this shock. Therefore, exports of these products fall, as the real exchange rate for sub-Saharan Africa appreciates with the increased demand for aggregate exports. This, in turn, results in a decline in output for these sectors.

61. The energy and service sectors are not the only sectors which experience reductions in output. The real appreciation in sub-Saharan Africa makes competing imports cheaper and sectors such as heavy machinery, for which imports make up a large share of the domestic market (38 per cent from the third column of table 14), experience an output decline. This is due to the fact that the reduction in sales to the domestic market outweighs the increase in exports. Overall, the fixity of total factor endowments in this simulation means that expansions in some sectors must be offset by contractions in others, and the availability of relatively low-cost imports from abroad helps determine which of the tradeable sectors will shrink.

62. The third column of table 15 reports the impact of the trade and transport reforms on trade balances by commodity. The numbers in parentheses show the change in trade balance from the 2005UR database, owing to the increase in transport efficiency, while the top numbers show the actual trade balance in the wake of this simulation. Not surprisingly, the major improvements in trade balance are in non-grain crops, forestry and fish and other mining, while the biggest declines are in the sectors which do not benefit from the improved efficiency: energy and services. (The associated changes in self-sufficiency are reported in annex table A1).

63. Table 17 reports the impact of increased transport efficiency on sub-Saharan Africa welfare, as well as worldwide welfare. Here we see that the gain to sub-Saharan Africa totals $1.2 billion, primarily due to improved terms of trade ($834 million). Again, this is hardly surprising, since the main impact of the shock is to increase the demand for sub-Saharan Africa exports, thereby raising regional export prices, relative to prices for imports. The remainder is due to improved efficiency, primarily stemming from the increase in sub-Saharan Africa imports following the real appreciation.

64. It is particularly interesting to compare this sub-Saharan Africa welfare change with the loss stemming from the Uruguay Round. As domestic reform in the trade and transport sector is implemented,

the sub-Saharan Africa region would *gain* a billion dollars, an amount more than twice the Uruguay Round losses.

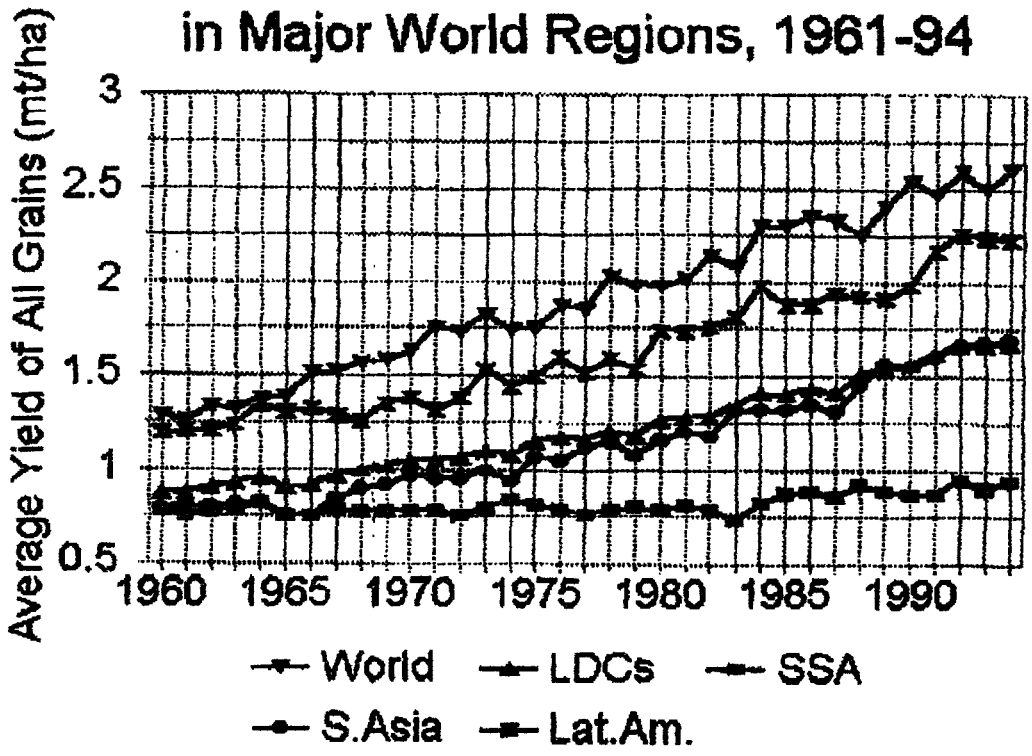
B. Grain productivity reforms

65. The second policy response we consider is the possibility of accelerating agricultural productivity growth to levels observed on other continents. Africa's lag is clearly illustrated by figure 1, which shows average grain yields for the world's major regions. At the beginning of the independence period, African yields were only slightly below those of South Asia and least developed countries (LDCs) as a whole. But all regions except Africa were able to raise their yield levels dramatically over the following 35 years, which released land and labour for other uses and provided a major engine of economic growth.

66. Annex table A2 summarizes each region's agricultural productivity performance in terms of average annual growth rates calculated from the data in figure 1. For the whole 35-year period (1960-1994), grain yields in South Asia grew at around 2.5 per cent per year, somewhat faster than Latin America or the LDCs total, and five times as fast as Africa. All regions' growth rates are slightly higher for the 30-year period that starts with the onset of the Green Revolution (1965-1994), when semi-dwarf, fertilizer-responsive rice and wheat varieties began to spread around the world. Growth rates are even higher during the first 20 years of this period (1965-1984), for all regions except Africa - where the growth rate actually fell to almost zero. The disastrous consequences of stagnation in African grain yields are visible throughout the continent, retarding progress in almost every area of economic development. During the decade after 1984 yield growth began to recover, but it remains well below other continents' averages.

Figure 1

Average Yield of All Grains in Major World Regions, 1961-94



67. Grain production is only one part of agriculture, and yields are only a partial measure of productivity, but grain yields are an extremely valuable indicator of African agricultural productivity for several reasons. Grains are important partly because they can be grown at very low input levels, and therefore dominate output among Africa's resource-poor smallholders. In addition, grains are usually Africa's least-cost source of basic nutrients, and therefore dominate consumption among the continent's low-income people. As a result, when grain yields are low, the resources of poor people are locked up in grain production, and it is not until grain yields rise that land, labour and other factors can be released for use on other crops, livestock and non-farm activities.

68. Yield per hectare is only a partial measure of productivity, in that many inputs other than land are needed to grow crops. Land itself can be seen as merely a place-holder for more specific crop needs: sunlight, temperature, moisture, nutrients, soil structure and so forth. Raising crop yields requires increased availability of these inputs. In Africa and other low-income regions, increased inputs are mainly supplied by on-farm labour, since there is a rising number of farm workers due to high rates of population growth relative to the number of new off-farm jobs. This increased labour use can generate significant yield growth on its own, through weed and pest control, livestock and crop-residue management, soil and water conservation, irrigation and other activities. Increased labour is particularly productive if combined with purchases of improved seed, fertilizer, equipment, or other inputs. Adding up all of this increased input use can account for much of the observed yield growth - but there is typically some unexplained residual due to changes in the way the inputs are used. We attribute this to changes in "total factor productivity" (TFP) in the sector.[4]

69. What rate of productivity growth can Africa realistically achieve, with appropriate reforms in research and seed systems or input and output markets? Block (1994) estimates total factor productivity (TFP) growth using a variety of methods, with the most plausible results being annual growth rates of +1.45 per cent for 1963-1968, -0.10 per cent for 1968-1973, -0.46 per cent for 1973-1978, -0.02 per cent for 1978-1983, and +1.63 per cent for 1983-1988. Block identifies numerous sources of bias and error in his data and so discourages direct use of these estimates - but they are broadly consistent with the picture presented by figure 1, and also with the work of Frisvold and Ingram (1993) who estimated TFP growth to be close to zero for the 1973-1975 to 1983-1985 period.

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[4] In crop production, the most important source of technical change is seed selection, through which the plant's genetic potential can be matched with farmers' needs. Africa had a late start on scientific breeding for grain crops, and it was not until the mid-1980s that national systems began to release improved food-grain varieties on a large scale. The continent's greatest food-crop success story is probably that of hybrid maize in Zimbabwe, where the colonial research system tried to develop early-maturing maize for European-owned farms starting in the late 1960s. The resulting hybrids were released in the late 1970s, and were so well adapted to smallholder areas that hybrids were almost universally adopted by after independence in 1980 (Masters 1994). Of course, crop breeding alone is not enough. Recent studies of African agricultural research have found numerous cases of highly promising crop varieties which failed to reach farmers because seed multiplication systems were inadequate (Masters, Oehmke and Bedingar 1996). Farmers also need appropriate agronomic methods to provide low-cost sources of nutrients and moisture, which for much of Africa requires labour-intensive management of crop residues and livestock, improved runoff control or water-harvesting techniques, plus manure and fertilizer (Sanders, Shapiro and Ramaswamy 1996). With appropriate government policies to ensure that farm prices reflect economy-wide scarcities, farmers can and will adopt the techniques that contribute most to aggregate productivity, resulting in rapid rates of productivity growth such as those observed in Asia and elsewhere over the past three decades.

70. For our policy-reform scenario we seek to identify that level of TFP growth in grains that could be sustained over the 1992-2005 period. We keep other TFP growth rates at the levels used in the base case projections, in order to focus on the particular technology deficit associated with late adoption of "green revolution" techniques for food grains. Given the need to project over a long future time period and the limited data available, it is useful to proceed analytically, decomposing total production growth into its components.

71. Some growth of total production may be accounted for by increased cropped area; and the balance is increased yields. For the projection, we take South Asia's sustained grain yield growth of 2.5 per cent as our benchmark of what can realistically be reached under the right conditions. From this we must subtract increased use of inputs in South Asia over this period. With rapid growth in the South Asian agricultural labour force, we project that about 1.5 per cent of that yield growth is accounted for by increased labour use. With regard to other inputs, we assume that growth rates for purchased seeds, fertilizer and equipment will be high but that the quantities used remain sufficiently small that their increase has little effect on measured TFP growth. Thus, the effect of adopting new seeds and agronomic methods, as well as more appropriate policies, is estimated to result in TFP growth of about 1 per cent per year over the 1992-2005 period, for a cumulative total gain of 13.8 per cent by the year 2005.

72. The impact of increased productivity in the sub-Saharan Africa grains sector is shown in table 16. The first point to note is that the 13.8 per cent increase in total factor productivity only translates into a 4.2 per cent increase in output. This is due to the sharp decline in grains prices, relative to the sub-Saharan Africa consumer price index. The latter is a consequence of the combination of very price inelastic domestic demand (an elasticity below 0.2 in absolute value), and the small share sold to the much more price responsive international market. As a result, the benefits of TFP growth in food grains is mostly passed on to domestic consumers (as opposed to factor owners or foreign buyers), and since food-grain consumption is most important in the budgets of the lowest-income households, this is very desirable for poverty alleviation and income distribution.

73. This grains TFP shock has a striking effect on gross trade flows for sub-Saharan Africa. Grain exports triple (albeit from a very low starting point), and imports shrink by more than 40 per cent. This in turn takes the sub-Saharan Africa region as a whole almost all the way towards balanced trade in grains (see last column of table 15), and hence "self-sufficiency" in grains (annex table A1). As a result of this strong expansion in net grains exports, most of the other sectors experience a decline in net exports. The two exceptions are livestock products and processed food products, both of which use substantial inputs of grains. Finally, note that improved grains productivity releases labour (and land) which is employed in the other farm sectors, all of which expand their output under this scenario.

74. The last set of columns in table 17 report welfare gains from the improvement in grains TFP. Sub-Saharan Africa's welfare gain totals $6.2 billion, which is a full order of magnitude larger than the absolute value of the Uruguay Round loss. Clearly domestic reforms in the grains sector are potentially much more important than the Uruguay Round itself. Furthermore, given the increased value of African grain production generated by Uruguay Round implementation, these reforms are more valuable with the Uruguay Round than they would have been without it.

75. Table 17 also offers a decomposition of the sources of this welfare gain to sub-Saharan Africa following the TFP improvement. The majority of the gain is due to the improved efficiency in grains itself, but $214 million in gains are due to improved allocation of resources, as this type of reform somewhat offsets the distortions caused by the structure of trade taxes. In addition, there is a small terms of trade improvement ($28 million) for the sub-Saharan Africa region as a whole.

VI. LIMITATIONS

76. As with any analysis, the approach presented here is only as good as the data and assumptions that go into it. It is our view that economic models are best used as part of a dialogue, aimed at drawing out the implications of observed data and analysts' expectations. We have made every effort to use state-of-the-art data and modeling tools to arrive at our conclusions, but further progress can certainly be made as more analysts and policy makers - particularly in Africa - contribute their ideas.

77. The single most important of these is the highly aggregate nature of our analysis with respect to the African economies. The current aggregation of all countries in sub-Saharan Africa and those in the Middle East and North Africa, is clearly unacceptable. Unfortunately, it is not just the GTAP database and model which suffers from limited coverage of the African continent. Most global assessments of the Uruguay Round suffered from very limited disaggregation in this region. Furthermore, most analyses of the impact of the Uruguay Round on Africa were performed by non-Africans. As a result, African policy makers were at a weak position during the Uruguay Round negotiations. Without the capacity to quantify the implications of alternative offers, it is hardly surprising that the final African offers tended to preserve the status quo.

78. We hope that in the future these database and institutional capacity limitations will be gradually removed. For example, the version 4 GTAP database (to be released later this year) will disaggregate Africa into four subregions. We anticipate that future releases of this database will have more country-level detail. This process of data improvement goes hand in hand with efforts to train more African economists in applied general equilibrium analysis.[5] In short, we are hopeful that this kind of qualification will be required when it comes to evaluating the next round of WTO negotiations on Africa.

VII. CONCLUSIONS

79. This study quantifies the impact on African economies of the Uruguay Round and possible policy responses. Several key aspects of the analysis go much farther than previous studies, most notably in capturing the impact on Africa of declining exports to Europe due to erosion of Lomé agreement privileges as well as elimination of the restraints on competitors imposed by MFA quotas on textiles and apparel imports to major markets. To our knowledge, this study is the first model-based assessment of the Uruguay Round that includes the Lomé effects, and is also the first to include updated information on the country allocation of MFA quotas.

80. Three other key distinguishing features of our study include:

(a) Incorporation of macroeconomic projections to 2005 to take account of change in the global economy during the period of Uruguay Round implementation;

(b) Improved treatments of consumer demand to account for changes in income elasticity at different levels of income; and

(c) Inclusion of changes in human capital to capture regional differences in education rates.

These features are particularly important in enabling the model to forecast the impact of the Uruguay Round over its full implementation.

81. The principal results of the study can be summarized as follows:

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[5] One such example is the January 1998 GTAP short course to be held in South Africa.

(a) The Uruguay Round agreement, once fully implemented in 2005, is projected to have a small but negative impact on economic welfare in Africa, by a total of $569 million per year in 1992 US dollars for sub-Saharan Africa, and $734 million for the Middle East and North Africa (table 13). These costs amount to losses of about one-tenth of one per cent of real income in both regions, compared with gains everywhere else, excepting for the transition economies of Eastern Europe which experience small net losses. Total worldwide gains are estimated at about $190 billion per year, or a gain of one-tenth of one per cent of real income. The greatest gains are in low-income south-east Asia and China, whose combined gains are estimated to be 3.6 per cent of real income, or $66 billion per year (table 13);

(b) The costs of the Uruguay Round in Africa are mainly due to the displacement of African exports to European markets by Asian competitors, whose tariffs on many exports into the European Union were reduced more than Africa's (the Lomé erosion effect) and whose textile and apparel exports will no longer be subject to more restrictive quotas (the MFA effect). Some of Asia's enhanced competitiveness after Uruguay Round implementation is also due to their use of the Round to institute sharp cuts in their own import tariffs, as a result of which their efficiency rises and export costs decline. In contrast, African Governments did not cut their import tariffs during the Round, which helps keep their exports off world markets;

(c) The costs of the Uruguay Round to Africa is heavily concentrated in the textile and apparel sector. Implementation of the Uruguay Round is projected to make output in this sector over 10 per cent smaller than it would otherwise be in 2005, costing over $2 billion in foreign exchange due to reduced exports and increased imports (table 8). Uruguay Round implementation causes small contractions in a few other sectors, and significant expansions in agriculture, most notably in non-grain crops whose production expands by 1.5 per cent and net foreign exchange earnings rise by almost $1.2 billion, as well as forestry and fish whose production rises by 1.7 per cent and net foreign exchange earnings by almost $0.6 billion (table 8). Much of these increases in farm exports are projected to be sold to Asia, as their import demand rises due to reduced import barriers, higher incomes and structural transformation;

(d) The effect of the Uruguay Round in providing increased incentives for African agriculture adds to an even larger cause of increased farm production, which is Africa's own rapid rate of growth in the farm labour force. The Uruguay Round helps improve prospects for this sub-population, raising the incomes of many of Africa's poorest people. Thus, changes in the international environment from the Uruguay Round and trends in domestic resource levels both point in the same direction, which is increased use of agriculture to provide labour-intensive employment and meet domestic food demand;

(e) The welfare losses from Uruguay Round implementation, which are concentrated in textile and apparel, could be more than offset by domestic reforms in either the trade and transport sector, or food-grain productivity. In both sectors Africa lags significantly behind other low-income countries, and institutional reforms could provide major gains at low cost;

(f) Trade and transport reforms would consist of more transparent and speedy customs systems, more reliable transit facilities, and less restrictive rules on competition among carriers. If such reforms could bring shipping margins on non-fuel exports down by 20 per cent, into line with costs in other developing countries, the resulting welfare gains would be approximately twice as large as the welfare losses from the Uruguay Round;

(g) Food-grain productivity gains would be driven by an increased research and development effort to identify and diffuse appropriate seed varieties, as well as reforms to make input and product markets more competitive. Based on a comparison with the South Asian experience in the last three decades, we conclude that such reforms might add as much as 1 per cent per year to total factor productivity growth in the African food-grain sector. In this case, the resulting welfare gains would be over ten times as large as the losses due to Uruguay Round implementation.

82. The implications of these results for economic strategy are clear. Implementation of Uruguay Round commitments around the world over the coming decade - along with simultaneous changes in underlying economic conditions - will induce significant changes in the composition of African economies. Exports will be increasingly diversified towards Asia rather than concentrated in Europe, and will increasingly consist of farm products rather than manufactures.

83. Following the "Asia/Agriculture" strategy that emerges from this analysis, African Governments which seize opportunities to open trade with Asian partners and which invest in agriculture will see those efforts rewarded under conditions of rising demand for their products. In contrast, those governments that try to resist these changes with protective policies and subsidies to existing industries will only compound their losses, as the Uruguay Round reduces their growth prospects.

84. Among the key elements of almost any country's Asia/Agriculture strategy would be institutional reforms in the key areas of international transport and food-grain production. In both areas Africa has fallen far behind other developing areas. The high cost of transport to overseas markets is particularly restrictive on high margin goods such as fisheries, forest products, and non-grain crops that might go to Asia. In addition, while low productivity growth in foodgrains has restricted production of other food and cash crops that might be exported.

85. The simulation results presented in this study suggest that economically low-cost institutional reforms in both areas could bring major bursts of economic growth, far larger in magnitude than the costs of the Uruguay Round. Taken together, such reforms could boost real incomes in sub-Saharan Africa by about 1.5 per cent per year or almost $7 billion annually by the year 2005. The net present value of such reforms (at a 5 per cent real rate of discount) is $140 billion. These gains are over ten times larger than the costs imposed on Africa by other countries' implementation of the Uruguay Round, and can be achieved with minimal outside assistance.

86. A general Asia/Agriculture strategy, along with specific reforms in the trade and transport sector and in food-grain production, constitute a new approach based on Africa's unique situation in the world economy. Analysis of the data shows that, because of Africa's high and rising comparative advantage in agriculture relative to Asia, attempts to grow by exporting manufactures are very unlikely to succeed, while exports of farm goods will yield large gains from trade. Relying on external or historical models such as an "Asian tiger" pursuit of labour-intensive manufacturing exports may be misleading, as Africa's resource endowments and market conditions are very different.

87. To produce policy analyses that are specific to contemporary Africa, it is necessary to conduct careful analyses of available data. With further research at the aggregate level, supplemented by much more detailed analyses at the country and sector level, African policy makers can be equipped with increasingly accurate assessments of the consequences of alternative policies. ECA, along with its many partners throughout Africa and the world, can play a major role in that process and thereby contribute to economic growth and poverty alleviation across the continent.

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Table 1. African export shares by destination (% of total)

	Sub-Saharan Africa			Middle East and North Africa			World		
	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR
Sub-Saharan Africa (SSA)	5.5	5.2	5.4	0.4	0.5	0.5	2.2	2.0	1.9
Middle East and North Africa (MEA)	2.0	2.0	2.1	4.7	4.8	4.8	5.9	5.2	4.9
European Community 15 countries (EU15)	50.7	47.4	44.0	39.0	35.8	33.6	27.0	23.9	23.3
Rest of Latin America (LTN)	2.2	2.3	2.3	2.8	3.1	3.0	4.4	4.4	4.3
North America (CAN, USA, MEX)(NAFTA)	21.1	18.9	18.9	12.8	11.9	11.7	24.3	22.7	22.3
Economies in transition (CEA, FSU) (EIT)	0.5	0.5	0.5	1.4	1.1	1.1	3.4	2.7	2.6
South Asia (SAsia)	1.8	2.5	2.7	3.6	4.8	4.3	1.3	1.6	1.9
East Asia with high income (EAsiaH)	11.3	12.8	13.7	28.4	29.0	31.2	17.7	19.1	19.1
East Asia with low income (EAsiaL)	2.4	5.8	7.3	2.8	5.2	5.7	6.7	11.6	13.3
Rest of the world (ROW)	2.5	2.6	3.1	4.1	3.8	4.1	7.1	6.8	6.4
Total (share)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: GTAP, version 3 database for 1992; authors' simulation results for 2005 no Uruguay Round and 2005 with Uruguay Round.

Table 2. Assumptions used in the projections: Cumulative percentage growth rates over the period 1992-2005

Regions (abbreviation)	Population (1)	Unskilled labour force (2)	Capital stock (3)	Skilled labour force (4)	Real GDP (5)
Sub-Saharan Africa (SSA)	44	49	15	148	53
Middle East and North Africa (MEA)	39	51	39	172	44
European Community 15 countries (EU15)	2	1	38	113	38
Rest of Latin America (LTN)	21	32	60	127	61
North America (CAN, USA, MEX)(NAFTA)	15	18	52	79	43
Economies in transition (CEA, FSU) (EIT)	5	-	10	23	23
South Asia (SAsia)	26	34	104	108	95
East Asia with high income (EAsiaH)	6	4	83	62	53
East Asia with low income (EAsiaL)	14	20	223	111	195
Rest of the world (ROW)	25	29	48	152	47

Source: Authors' modification of World Bank projections.

Table 3. Average pre- and post-Uruguay Round protection levels, by importing region

Importing region	Pre-Round[a] tariff (%)		Post-Round[b] tariff (%)		Average import[c] price cuts (%)	
	Food	Manufac-tures	Food	Manufac-tures	Food	Manufac-tures
US and Canada (USC)	11.7	4.3	11.0	2.8	-0.6	-1.4
European Union (EU)	26.5	6.5	26.0	3.9	-0.3	-2.4
Japan (JPN)	87,8	4.9	56.1	2.1	-8.1	-2.7
Korea (KOR)	99.5	16.1	41.1	8.2	-17.9	-6.8
Taiwan (TWN)	0.0[c]	0.0[c]	0.0[c]	0.0[c]	0.0[c]	0.0[c]
Hong Kong (HKG)	0.0[c]	0.0[c]	0.0[c]	0.0[c]	0.0[c]	0.0[c]
China (CHI)	0.0[c]	0.0[c]	0.0[c]	0.0[c]	0.0[c]	0.0[c]
Indonesia (IND)	21.9	14.2	15.5	13.5	-4.2	-0.6
Malaysia (MYS)	87.9	11.0	34.3	7.7	-14.9	-2.9
Philippines (PHL)	86.9	23.9	33.4	21.5	-15.3	-1.8
Thailand (THA)	59.8	36.2	34.5	27.6	-10.8	-5.9
Latin America (LTN)	2.3	17.1	1.5	14.9	-0.5	-1.6
Sub-Saharan Africa (SSA)	15.6	9.5	12.4	9.4	-1.7	-0.1
South Asia (SAS)	-3.5	51.9	-4.3	37.1	-0.7	-9.4
Rest of world (ROW)	15.7	10.6	14.1	9.1	-1.2	-1.3

[a] Source: Table 1, Hertel et al., as derived from the Integrated Data Base, GATT.

[b] Change in tariff rate divided by the power of the initial tariff rate. This is the average of the disaggregate price cuts, and therefore differs from the price cut computed from the average tariffs.

[c] Taiwan, Hong Kong and China are not covered by the integrated data base.

Table 4. Uruguay Round cuts on African imports

Regions (abbreviation)	Cuts by partner		Commodity	Cuts by commodity	
	SSA	MEA		SSA	MEA
Sub-Saharan Africa (SSA)	7.19 (0.21)	0.83 (0.05)	Grains	103.62 (0.45)	0 (0)
Middle East and North Africa (MEA)	0.83 (0.1)	0 (0)	Nongrains	0 (0)	0 (0)
European Community 15 countries (EU15)	129.32 (0.34	30.1 (0.03)	LstkMeat	82.95 (0.16)	0 (0)
Rest of Latin America (LTN)	4.93 (0.23)	0.18 (0)	OthFood	1.37 (0.03)	98.33 (0.86)
North America (CAN, USA, MEX)(NAFTA)	53.85 (0.56)	55.43 (0.17)	ForFish	0 (0)	0 (0)
Economies in transition (CEA, FSU) (EIT)	0.47 (0.12)	0.48 (0.02)	Energy	0 (0)	0 (0)
South Asia (SAsia)	0.57 (0.06)	2.39 (0.05)	OthMin	0 (0)	0 (0)
East Asia with high income (EAsiaH)	9.65 (0.08)	1.65 (0)	TexApp	30.31 (0.81)	0 (0)
East Asia with low income (EAsiaL)	10.11 (0.33)	1.19 (0.01)	LitMnfc	0 (0)	0 (0)
Rest of the world (ROW)	9.84 (0.31)	6.04 (0.05)	HvyMnfc	8.51 (0.02)	0 (0)
			UHCServ	0 (0)	0 (0)

Source: Authors' calculations from GTAP version 3 database (McDougall, 1997).

Note: Numbers in parantheses are per cent cut to total trade.

Table 5. Uruguay Round cuts on African exports

Regions (abbreviation)	Cuts by partner		Commodity	Cuts by commodity	
	SSA	MEA		SSA	MEA
Sub-Saharan Africa (SSA)	7.19 (0.21)	0.83 (0.11)	Grains	105.38 (0.69)	172.55 (0.51)
Middle East and North Africa (MEA)	0.83 (0.5)	0 (0)	Nongrains	42.44 (0.66)	21.24 (0.65)
European Community 15 countries (EU15)	200.18 (0.59)	373.66 (0.52)	LstkMeat	18.05 (3.17)	19.57 (3.06)
Rest of Latin America (LTN)	3.74 (0.24)	13.4 (0.26)	OthFood	103.25 (2.9)	47.18 (2.42)
North America (CAN, USA, MEX)(NAFTA)	22.43 (0.15)	91.1 (0.39)	ForFish	37.56 (1.65)	20.07 (2.77)
Economies in transition (CEA, FSU) (EIT)	1.56 (0.43)	2.4 (0.09)	Energy	1.09 (0)	27.94 (0.02)
South Asia (SAsia)	28.74 (2.19)	192.89 (2.89)	OthMin	3.85 (0.06)	17.27 (0.27)
East Asia with high income (EAsiaH)	172 (2.16)	107.52 (0.21)	TexApp	31.66 (1.83)	112.42 (1.58)
East Asia with low income (EAsiaL)	34.01 (1.96)	192.22 (3.71)	LitMnfc	36.23 (1.45)	36.3 (1.35)
Rest of the world (ROW)	42.69 (2.36)	56.05 (0.75)	HvyMnfc	133.87 (1.03)	555.53 (2.74)
			UHCServ	0 (0)	0 (0)

Source: Authors' calculations from GTAP version 3 database (McDougall, 1997).

Note: Numbers in parantheses are per cent cut to total trade.

Table 6. African import shares by source (% of total)

	Sub-Saharan Africa			Middle East and North Africa			World		
	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR
Sub-Saharan Africa (SSA)	4.7	4.8	5	0.7	0.8	0.8	2	2	1.8
Middle East and North Africa (MEA)	1.1	1.1	1.1	4	4.2	4.2	5.2	4.8	4.4
European Community 15 countries (EU15)	52.1	50.6	51.4	50.7	49	49.7	26.7	24.6	23.7
Rest of Latin America (LTN)	2.9	3.2	3.3	2.3	2.5	2.8	4.1	4.2	4
North America (CAN, USA, MEX)(NAFTA)	13	12.2	12.8	15.6	15.2	15.9	23	21.6	21.2
Economies in transition (CEA, FSU) (EIT)	0.5	0.5	0.5	1.3	1.2	1.2	3.2	2.8	2.6
South Asia (SAsia)	1.3	1.8	1.1	2.2	2.8	1.7	1.3	1.6	2
East Asia with high income (EAsiaH)	15.9	14.3	13.4	13.6	12	11.3	20.1	18.9	18.7
East Asia with low income (EAsiaL)	4.2	7.1	6.9	3.8	6.8	6.6	7.4	12.8	15.1
Rest of the world (ROW)	4.3	4.3	4.5	5.8	5.5	5.9	7.2	6.8	6.5
Total share	100	100	100	100	100	100	100	100	100

Source: GTAP, version 3 database for 1992; authors' simulation results for 2005 no Uruguay Round and 2005 with Uruguay Round.

Table 7. Textile and apparel MFA quota premia (% of f.o.b. value)

	MFA tax equivalent			
	European Community (EU15)		North America (NAFTA)	
	1992	2005 no UR	1992	2005 no UR
Sub-Saharan Africa (SSA)	0	0	4	4
Middle East and North Africa (MEA)	0	0	8	8
Rest of Latin America (LTN)	14	17	16	16
Economies in transition (CEA, FSU) (EIT)	0	0	10	10
South Asia (SAsia)	21	25	22	25
East Asia with high income (EAsiaH)	12	12	14	14
East Asia with low income (EAsiaL)	25	30	26	31
Rest of the world (ROW)	0	0	6	6

Source: GTAP, version 3 database for 1992; authors' simulation results for 2005.

Table 8. African export shares by commodity (% of total)

	Sub-Saharan Africa			Middle East and North Africa			World		
	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR
Grains	0.2	0.3	0.5	0.2	0.4	0.5	0.8	0.8	1.2
Nongrains	11.4	16.2	17.4	1.7	1.9	2	2	1.9	1.9
LstkMeat	0.8	1	1	0.4	0.4	0.5	1.2	1	1.8
OthFood	5.6	5.3	4.8	1.1	1	1	3.4	3.1	3
ForFish	3	2.1	2.8	0.4	0.2	0.2	1.1	1.3	1.4
Energy	31.3	27	27.2	64.4	59.4	60	8.4	8.7	8.1
OthMin	8.2	7.7	7.8	3.3	3.7	3.8	2.7	2.9	2.8
TexApp	2.6	3.4	1.2	3.8	4.5	1.1	5.7	5.6	7.3
LitMnfc	3.5	2.8	2.8	1.5	1.5	1.6	7.7	7.8	7.7
HvyMnfc	18.6	18	17.8	11.2	12.6	14.7	47.8	48.5	47.6
UHCServ	0.7	0.6	0.6	0.3	0.3	0.3	0.3	0.3	0.2
OthServ	14.1	15.6	16.1	11.7	14.1	14.3	18.9	18.1	17
Total	100	100	100	100	100	100	100	100	100

Source: GTAP, version 3 database for 1992; authors' simulation results for 2005 no Uruguay Round and 2005 with Uruguay Round.

Table 9. African import shares by commodity (% of total)

	Sub-Saharan Africa			Middle East and North Africa			World		
	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR	1992	2005 no UR	2005 with UR
Grains	3.2	2.4	2.5	2.4	2.2.	2.2	0.9	0.8	1.2
Nongrains	1.2	0.9	0.9	1.9	1.7	1.6	2.2	2.1	2
LstkMeat	0.7	0.6	0.6	1.3	1.1	1	1.2	1	1.8
OthFood	5.8	5.5	5.2	5.5	5.6	5.5	3.5	3.1	3.1
ForFish	0.4	1	1.1	0.2	0.5	0.5	1.2	1.4	1.5
Energy	1.7	2.1	2.1	2	2.5	2.5	8.5	8.7	8.1
OthMin	2	2.2	2.2	3.5	3.9	3.9	2.8	3.1	2.9
TexApp	5.2	5.2	5.3	6.5	6.7	6.2	6	5.9	7.8
LitMnfc	5.2	5.5	5.6	6.2	6.3	6.4	8	8.2	8
HvyMnfc	50.4	51.2	51.2	46	46.1	46.6	47.7	48.4	47.4
UHCServ	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
OthServ	23.8	23.1	23	24.2	23.1	23.3	17.7	17	16
Total	100	100	100	100	100	100	100	100	100

Source: GTAP, version 3 database for 1992; authors' simulation results for 2005 no Uruguay Round and 2005 with Uruguay Round.

Table 10. Impact of Uruguay Round on African output and trade in the year 2005

	Sub-Saharan Africa				Middle East and North Africa			
			Gross change in trade				Gross change in trade	
	Output (%)	Gross exports (%)	Imports (%)	Balance (1992 $US millions)	Output (%)	Gross exports (%)	Imports (%)	Balance (1992 $US millions)
Grains	0.72	44.52	0.43	31.83	7.72	20.12	-10.02	486.87
Nongrains	1.52	6.61	-6.71	1157.02	1.8	4.26	-10.14	632.77
LstkMeat	0.01	5.88	2.73	-21.87	2.09	24.12	-14.96	603.18
OthFood	0.22	-11.39	-7.74	-254.78	1.04	5.94	-2.48	204.71
ForFish	1.68	27.92	8.13	567.32	0.63	24.54	2.91	78.36
Energy	0	0.14	-1.3	-8.92	-0.13	-0.19	0.79	-323.09
OthMin	-0.31	-0.45	-0.49	-43.11	-0.11	0.34	1.51	-105.84
TexApp	-10.58	-65.61	1.88	-2355.68	-24	-75.59	-7.47	-7117.36
LitMnfc	-0.75	-2.05	0.47	-74.92	-0.04	4.96	0.82	78.21
HvyMnfc	-0.64	-1.59	0.07	-214.04	3.18	15.12	1.16	3708.01
UHCServ	-0.14	0.62	0.01	3.09	0.06	-1.5	1.07	-18.01
OthServ	0.17	5.28	0.07	1116.09	0.15	4.04	1.22	1380.06
Total	n.a.	-0.19	-0.25	-97.98	n.a.	-0.4	-0.27	-392.13

Source: Authors' simulation results.

Table 11. Impact of Uruguay Round on bilateral exports for sub-Saharan Africa in the year 2005: 1992 $US millions
(% change in parentheses)

	SSA	MEA	EU15	LTN	NAFTA	EIT	SAsia	EAsiaH	EAsiaL	ROW	Total
Grains	8	0	-1	0	0	0	0	232	0	1	240
	(8.8)	(0)	(-4.33)	(0)	(0)	(0)	(0)	(85.21)	(0)	(53.73)	
Nongrains	24	86	-102	1	35	31	79	51	100	159	464
	(6.3)	(10.78)	(-3.96)	(4.24)	(4.70)	(19.60)	(95.88)	(9.72)	(29.69)	(31.71)	
LstkMeat	2	11	44	0	-2	2	3	-12	-1	214	261
	(87.05)	(28.07)	(1.03)	(0)	(-9.16)	(45.52)	(99.06)	(-83.32)	(-94.75)	(151.92)	
OthFood	75	30	-466	5	5	19	-3	-88	-60	21	-462
	(10.45)	(24.35)	(-18.69)	(13.49)	(1.75)	(29.69)	(39.50)	(-26.73)	(-22.87)	(12.82)	
ForFish	-2	-11	-143	0	-7	0	-7	-25	3943	40	3788
	(-9.31)	(-8.36)	(-17.68)	(0)	(-13.87)	(0)	(-5.13)	(-1.22)	(405.93)	(39.12)	
Energy	6	5	146	9	223	0	-261	80	6	3	217
	(1.23)	(2.22)	(1.04)	(1.07)	(2.04	(0)	(-37.38)	(8.78)	(14.69)	(2.49)	
OthMin	3	1	-43	0	-28	-1	-8	24	-23	-17	-92
	(0.23)	(1.96)	(-1.07)	(0)	(-3.12)	(-2.78)	(-9.55)	(5.98)	(1.84)	(-3.68)	
TexApp	-22	0	0	-1	0	-5	-1	-6	-22	95	38
	(7.74)	(0)	(-86.92)	(42.17)	(-81.11)	(-25.88)	(26.27)	(2.30)	(11.24)	(125.85)	
LitMnfc	-6	0	-179	2	38	1	0	8	166	2	32
	(-1.78)	(0)	(-13.46)	(10.21	(14.63)	(14.15)	(0)	(9.25)	(124.87)	(2.47	
HvyMnfc	-21	3	-525	-39	-60	3	-18	410	-218	47	-418
	(0.29)	(-0.17)	(-11.55)	(-9.91)	(-2.65)	(2.81)	(9.73)	(14.46)	(-7.12)	(6.84)	
UHCServ	0	0	2	0	0	0	0	2	0	0	4
	(0)	(0)	(0.21)	(0)	(0)	(0)	(0)	(3.98)	(0)	(0)	
OthServ	0	6	26	3	11	1	1	139	4	2	189
	(0)	(0.87)	(0.70)	(1.19)	(0.32)	(0.06)	(23.17)	(5.29)	(43.14)	(0.53)	

Source: Author's model results.

Note: Data represent changes from 2005 database generated by the no Uruguay Round experiment (E0). Top numbers represent changes in export volume flows in $US millions; numbers in parantheses represent percentage change in volume.

Table 12. Impact of Uruguay Round on bilateral exports for Middle East and North Africa in the year 2005: 1992 $US millions
(% change in parentheses)

	SSA	MEA	EU15	LTN	NAFTA	EIT	SAsia	EAsiaH	EAsiaL	ROW
Grains	1	0	-4	-6	0	0	-16	-3	842	-4
	(51.328)	(0)	(-10.25)	(-8.05)	(0)	(0)	(96.35)	(-87.66)	(7)	(37.09)
Nongrains	-2	-56	-383	6	-29	-2	-19	-26	-2	43
	(2.67)	(6.21)	(-5.69)	(0.56)	(1)	(15.38)	(88.97)	(9.15)	(43.40)	(26.97)
LstkMeat	6	66	-57	0	-1	1	-3	-7	0	441
	(120.72)	(19.68)	(-14.39)	(0)	(25.26)	(38.15)	(87.23)	(-20.16)	(-95.66)	(180.97)
OthFood	-5	-22	-14	-3	-2	-7	-1	-22	64	-10
	(2.79)	(4.52)	(7.62)	(-1.63)	(7.1)	(3.67)	(29.62)	(-29.18)	(129.28)	(-6.69)
ForFish	0	-1	1	-1	-2	0	0	139	1	-1
	(0)	(-1.11)	(3.10)	(-1.87)	(-8.19)	(0)	(0)	(50.52)	(13.46)	(-9.67)
Energy	-4	-65	-1294	-167	-123	46	-1957	1010	270	166
	(-1.86)	(-0.84)	(-1.77)	(-1.91)	(-1.0)	(-2.28)	(-39.04)	(5.89)	(11.32)	(-0.69)
OthMin	-9	-36	-169	-1	-273	-8	-178	120	537	-73
	(-3.35)	(-1.58)	(-3.67)	(-5.89)	(-6.83)	(6.16)	(-21.94)	(1.76)	(52.71)	(-8.27)
TexApp	-7	61	0	-2	0	-29	-3	-9	-3	-50
	(-15.22)	(-15.19)	(0)	(-2.38)	(0)	(-24.8)	(22.37)	(4.04)	(46.48)	(-48.47)
LitMnfc	-10	-86	-37	1	-74	-13	113	20	-9	-52
	(-2.94)	(-2.14)	(7.76)	(12.08)	(-1.71)	(-6.47)	(120.12)	(21.73)	(-3.61)	(-13.48)
HvyMnfc	-55	-391	1197	-111	374	-48	1464	546	-742	56
	(3.27)	(-2.55)	(18.96)	(-2.77)	(16.62)	(-6.26)	(69.44)	(27.44)	(-8.39)	(12.12)
UHCServ	0	-4	-47	0	0	0	0	-5	0	0
	(0)	(-0.81)	(-2.03)	(0)	(0)	(0)	(0)	(4.64)	(0)	(0)
OthServ	-17	-24	-1398	-123	-279	-12	-56	-779	-21	96
	(-3.18)	(-1.71)	(-1.87)	(-1.39)	(-2.24)	(-2.49)	(20.02)	(2.60)	(10.25)	(-3.07)

Source: Author's model results.
Note: Data represent changes from 2005 database generated by the no Uruguay Round experiment (E0)

Table 13. Impact of Uruguay Round on Africa's welfare in year 2005
(1992 $US millions)

	Welfare effects of Uruguay Round				
	Percentage change in income	Total welfare	Terms of trade	Allocative efficiency	Residual*
Sub-Saharan Africa (SSA)	-0.13	-569	-205	-377	13
Middle East and North Africa (MEA)	-0.1	-734	-171	-571	8
European Community 15 countries (EU15)	0.46	42300	11082	32142	-924
Rest of Latin America (LTN)	0.06	726	-2228	2981	-27
North America (NAFTA)	0.36	31495	16382	15498	-385
Economies in transition (EIT)	-0.04	-310	-545	229	8
South Asia (SAsia)	1.6	3923	1281	7885	-243
East Asia with high income (EAsiaH)	0.76	42738	4793	39028	-1083
East Asia with low income (EAsiaL)	3.59	65843	-28213	99059	-5003
Rest of the world (ROW)	0.13	1633	-2171	3835	-31
Total	0.6	192045	5	199709	-7669

Source: Author's simulation results.

* Residual is due to changes in the marginal utility of income.

Table 14. Effects of trade margins (post-Uruguay Round; year 2005)
(in percentage)

	Average trade and transport margin	2005 UR export share	2005 UR import share	Relative prices	Output	Employment	Gross exports	Gross imports
Grains	5.1	1	5.9	0.82	-0.22	-0.22	0.74	3.44
Nongrains	12.4	30.7	2.9	0.8	2.6	2.79	8.35	2.56
LstkMeat	8	2.8	3.2	0.82	0.14	0.13	4.57	4.11
OthFood	5.7	8.1	11.1	0.81	-0.6	-0.47	2.46	3
ForFish	12.5	10.7	5.3	0.77	0.65	1.07	9.11	7.62
Energy	5.8	32.5	4.5	0.85	-1.01	-2.38	-2.44	0.76
OthMin	8.2	32.5	15.1	0.83	1.18	1.58	5.2	3.92
TexApp	7.7	3.6	18.5	0.82	-0.43	-0.76	9.5	3.5
LitMnfc	7.6	11	25.2	0.82	-0.02	-0.39	7.64	3.22
HvyMnfc	6.4	14.3	38	0.83	-0.25	-0.67	5.89	2.22
UHCServ	0	0.6	0.4	0.83	-0.01	-0.42	-5.41	2.31
OthServ	0	5.8	9.7	0.83	-0.44	-0.94	-4.18	2.49
Total				0	0.07	0	1.97	2.56

Table 15. Commodity trade balance in 2005 for sub-Saharan Africa under alternative scenarios ($US millions)

	Before Uruguay Round	After Uruguay Round	Post-Uruguay Round	
			With trade margins reforms	With technical progress in grains
Grains	-2351	-2319	-2409	-814
		(32)	(-90)	(2005)
Nongrains	15716	16873	18556	16821
		(1157)	(1683)	(-52)
LstkMeat	355	333	361	497
		(-22)	(28)	(164)
OthFood	-689	-944	-964	80
		(-255)	(-20)	(974)
ForFish	1111	1679	1893	1422
		(568)	(214)	(-257)
Energy	25628	25619	24995	24933
		(-9)	(-624)	(-686)
OthMin	5518	5475	5870	5227
		(-43)	(395)	(-248)
TexApp	-2313	-4668	-4753	-4834
		(-2355)	(-85)	(-166)
LitMnfc	-3305	-3380	-3353	-3634
		(-75)	(27)	(-254)
HvyMnfc	-38600	-38814	-38892	-39111
		(-214)	(-78)	(-297)
UHCServ	246	249	211	227
		(3)	(-38)	(-22)
OthServ	-4913	-3797	-5201	-4904
		(1116)	(-1404)	(1107)

Source: Author's simulation results.

Table 16. Effects of technical change in grains on sub-Saharan Africa's output, price and trade (2005: post-Uruguay Round)
(in percentage)

	Relative prices	Output	Employment	Gross exports	Gross imports
Grains	-16.22	4.18	-8.97	209.01	-42.44
Nongrains	-0.85	1.13	1.13	-0.16	2.24
LstkMeat	-2.47	1.59	1.68	13.78	-5.33
OthFood	-2.67	3.71	4.32	16.38	-4.51
ForFish	-0.03	0.41	1.02	-7.19	6.14
Energy	-0.54	-0.59	-0.53	-2.62	1.56
OthMin	-0.54	-0.58	-0.47	-2.84	1.81
TexApp	-0.61	0.86	1.34	-2.19	2.43
LitMnfc	-0.48	0.01	0.53	-3.82	2.5
HvyMnfc	-0.92	0.94	1.54	0.97	0.81
UHCServ	-0.46	0.59	1.18	-2.91	1.69
OthServ	-0.47	0.58	1.29	-2.21	2.74
	0	1.34	0	0.18	0.14

Source: Authors' simulation results.

Table 17. Welfare and income effects from Uruguay Round and policy reforms for sub-Saharan Africa
(in $US millions)

	Uruguay Round		Trade and transport reforms		Technical changes in grains	
	SSA	World	SSA	World	SSA	World
Percentage change in real income	-0.13	0.6	0.27	n.a.	1.43	n.a.
Total welfare	-568.73	192047.6	1176.71	1672.91	6207.12	7179.39
Allocative efficiency	-377.53	199707.2	365.75	745.9	214.63	1243.9
Terms of trade effects	-205.09	0	834.28	0	27.99	0
Technical change	0	0	0	975.5	6170.6	6170.6
Residual	13.89	-7659.59	-23.32	-48.49	-206.1	-235.11

Source: Author's simulation results.

Annex

METHODOLOGY AND SUPPLEMENTARY TABLES

1. The preferred modeling approach for quantifying the effects of regional and multilateral trade agreements or other large-scale economic changes is that of applied general equilibrium (AGE) analysis, as detailed in the recent volumes edited by Francois and Shiells for NAFTA or Martin and Winters for the Uruguay Round. AGE models offer the combined benefits of economy-wide coverage and sectoral disaggregation: economy-wide coverage is necessary in order to evaluate the impact of trade agreements on aggregate output, trade and welfare, while disaggregation is required in order to capture the gains from trade and specialization which often result from such agreements.

2. In this paper we use the publicly available, Global Trade Analysis Project (GTAP) modeling framework to evaluate the African impact of the Uruguay Round and a selection of other policy scenarios (Hertel, 1997). The GTAP model is a relatively standard, multi-region, applied general equilibrium model, which assumes perfectly competitive markets and constant returns to scale technology based on nested Constant Elasticity of Substitution production functions. Unlike most such models, GTAP utilizes a sophisticated representation of consumer demands which allows for differences in the income responsiveness of demand in different regions depending upon both the level of development of the region and the particular consumption patterns observed in that region.[1] We follow Gehlhar (1994) in augmenting the usual production technology with human capital. (The detailed mapping from commodities used in this study to the 37 commodities in the GTAP database is provided in annex table A3).

3. Comparative static AGE analyses of policy reform typically look at policy shocks in isolation. For example, most studies of the Uruguay Round Agreement (Harrison *et al.*, 1997; Francois *et al.*, 1997) have asked the question: "What would be the effect on the world economy in the base year (e.g. 1992) had the Uruguay Round been introduced and had its full effect in that year?" These studies necessarily abstract from interactions with other changes which might be occurring simultaneously. This is not a big problem when the contemporaneous changes are unimportant. However, this is not the case with policy reforms such as those agreed to under the Uruguay Round. These are due to be phased in over a 10-year period. Here, the appropriate question is as follows: "What will be the effect of the Uruguay Round Agreement on the world economy in the year 2005, after it has been fully implemented?" Bach *et al.* (1997) have shown that the answer to this question differs in some significant ways due to changes in the relative composition and openness of the world economy between 1992 and 2005, as well as changes in the restrictiveness of non-tariff barriers.

4. In order to project what the world economy might look like in the year 2005, with and without the Uruguay Round, we simulate the GTAP model by shocking a relatively small number of fundamental determinants of output. In particular, we utilize exogenous projections of each region's endowment of physical capital, human capital, population and labour force and total factor productivity (TFP). Most trade distortions are taken to be constant *ad valorem* tariffs. However, since the Multifibre Arrangement (MFA) operates through export quotas, which are exogenously specified, rather than their *ad valorem* equivalents, projections for these quotas are also required, and the associated implicit export taxes are permitted to adjust endogenously.

5. It is important to bear in mind that in this analysis endowments are shocked exogenously and not subject to influence by relative price changes induced by the Uruguay Round reforms. This is also the case with the shocks to total factor productivity (TFP) which are implied by the GDP projections. We find this

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[1] For a detailed documentation of the model and a number of illustrative applications which demonstrate its properties, see Hertel (1997).

approach attractive due to its relative simplicity and ease of interpretation. However, it is likely to lead to an underestimate of the gains from policy reform, if reductions in protection stimulate additional investment and spur technological progress.

6. Given projections of the exogenous variables, the model can be solved for the level and structure of output at the end of the Uruguay Round implementation period (2005). In the course of this simulation to the year 2005, the model maintains all of the restrictions imposed by general-equilibrium accounting: the changes in consumer demands are constrained to add up to changes in total spending; each group's income is determined by spending on its output; each region's total exports equals total imports of these goods less shipping costs.

7. The key factors driving structural change in the model are differences in the income elasticities of demand for different goods (Engel effects), and supply-side effects stemming from differential rates of factor accumulation interacting with differences in sectoral factor intensities. The latter are Rybczynski effects which can be important determinants of structural change (Krueger 1977; Leamer 1987; Martin and Warr, 1993).

8. The ability of any model to generate satisfactory projections depends upon its ability to capture the key linkages between variables of interest. The ability of the GTAP model to perform projections of this type has been validated through a backcasting exercise designed to see whether the model could explain the differences in East Asian trade patterns between the model's base year (1992) and those observed a decade earlier (Gehlhar, 1994; 1997).

9. Using only information on the differences in factor endowments between the 1992 and 1982, Gehlhar was able to provide reasonably accurate projections of trade shares in 1982. However, Gehlhar found that introducing a human capital factor was crucial to explain changes in trade shares, implying a need to add this factor to the standard model before using it for projections. This is in line with a number of growth regressions, where human capital is found to be a critical determinant of economic growth (e.g., Barro and Lee, 1993; Barro and Sala-i-Martin, 1995; Levine and Renelt, 1992).

10. For the analysis on long-term changes in trade patterns, such as these projections, Gehlhar also found that the results were improved with increases in the Armington elasticities of substitution to capture the high degree of substitution that is possible over time periods of a decade or more. Because of the results of this model validation exercise, elasticities of substitution twice as high as the standard GTAP elasticities were therefore used in the projection experiment reported in this paper.

11. This annex also includes several supplementary tables which are referenced in the text. The first of these, table A2, reports average growth rates in grain yields for sub-Saharan Africa, Latin America and South Asia over the 1960-1994 period. Table A1 reports changes in self-sufficiency ratios under the alternative scenarios considered in the paper.

Table A1. Effects of Uruguay Round and policy reforms on commodity self-sufficiency ratios* for sub-Saharan Africa (year 2005)

	1992	Before Uruguay Round	After Uruguay Round	Post-Uruguay Round	
				With trade margins reforms	With technical progress in grains
Grains	0.941	0.956	0.956	0.955	0.993
Nongrains	1.251	1.418	1.452	1.491	1.443
LstkMeat	1	1.01	1.009	1.01	1.014
OthFood	0.982	0.988	0.983	0.983	1.001
ForFish	1.131	1.047	1.07	1.078	1.058
Energy	1.584	1.47	1.471	1.46	1.455
OthMin	1.324	1.302	1.301	1.321	1.285
TexApp	0.983	0.94	0.875	0.873	0.872
LitMnfc	0.915	0.882	0.879	0.881	0.872
HvyMnfc	0.763	0.763	0.761	0.761	0.761
UHCServ	1.003	1.003	1.003	1.002	1.002
OthServ	0.965	0.982	0.986	0.981	0.982

Source: Author's simulation results.

* Computed as 1 + [trade balance/domestic use]

Table A2. Average annual growth of crop yields for all grains

	All LDCS	Sub-Saharan Africa	South Asia	Latin America
1960-1994	2.02	0.53	2.46	1.95
1965-1994	2.13	0.67	2.68	2.08
1965-1984	2.21	0.17	2.64	2.12
1984-1994	2.13	0.85	3.05	1.93

Source: Author's calculations from FAO-Agrostat data.

Notes: All growth rates are measured by OLS regression inclusive of start and end years.
South Asia is Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

Table A3. Commodity and regions aggregation

Abbreviation	Description
Grains	Paddy rice, processed rice, wheat, grains
NonGrains	Non-grain crops
LstkMeat	Meat products, wool, other livestock
OthFood	Milk products, beverages and tobacco, other food products
ForFish	Forestry and fishery
Energy	Petroleum and coal, oil, gas
OthMin	Non-metallic minerals, other minerals
TextApp	Textiles and wearing apparel
LitMnfc	Leather, lumber, fabricated metal products, other manufacturing
HvyMnfc	Pulp paper, chemicals, rubber and plastics, primary ferrous metals, non-ferrous metals, transport industries, heavy industries, machinery and equipment
UHCServ	Electricity, water and gas, construction, ownership of dwellings
OthServ	Trade and transport, other services (private and government)