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Modeling the EU's Everything But Arms Initiative for the Least Developed Countries

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Abstract

This study attempts to answer two key questions: what will be the likely impact of the EU's Everything But Arms (EBA) proposal, and, what would be the impact if the United States also were to implement a similar proposal? Using the GTAP model, the preliminary results in this paper show if only the EU's EBA proposal were implemented, then welfare in the least developed countries (LDCs) would increase by \$2.5 billion (0.53 percent of their GDP), exports would grow by 3 percent, and GDP would grow by 2.3 percent. If the United States and the EU both implemented similar programs, then LDC welfare would increase by \$3.1 billion (0.66 percent of GDP), exports would increase by 3.7 percent and total GDP growth by 2.9 percent. Another version of this scenario assumes that LDCs lack the supply capacity to exploit the new trade opportunities. In this case, LDC welfare increases by \$0.9 billion (0.2 percent of GDP), exports grow by 4.1 percent, and GDP grows at 2.3 percent. The impact of this last scenario still may be overstated, given that trade preferences are not fully accounted for in the GTAP tariff database. Overall, the results suggest that improving market access for the LDCs could help raise per capita incomes above trend projections, but the gains are modest.

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1. Introduction

Pressure has been building for the developed countries to extend greater trade benefits to the least developed countries (LDCs). The socioeconomic indicators in the LDCs are very low.¹ For example, in 1999 the average per capita average income was \$280, illiteracy was about 49 percent, life expectancy at birth averaged 51 years, and infant mortality rates were about 15 times higher than the developed countries (World Bank, 2001). Combined, the LDCs accounted for only 0.6 percent of world exports in 1999. Thus, many observers consider it both an economic and moral imperative for the developed countries to help raise incomes and the standards of living of the world's poorest countries. Trade openness is considered one vehicle to help achieve this goal.

In January 2001, the European Union (EU) announced the "Everything But Arms" (EBA) trade proposal, which was approved by the Commission in February 2001 (European Union, 2001). The initiative reduces all tariffs to zero on all products from the LDCs, except for armaments (hence the name). For 3 sensitive commodities (rice, sugar and bananas), the tariffs will be completely phased out over the 2002-09 period.²

¹ The United Nations determines which countries are considered least developed. Presently, there are 48 countries, including Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Dem. Rep. Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, The Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, São Tomé and Príncipe, Sierra Leone, Solomon Islands, Somalia, Sudan, Tanzania, Togo, Tuvalu, Uganda, Vanuatu, Yemen, and Zambia.

² For rice, the tariffs will be cut 20 percent by 2002, 50 percent by 2006, 80 percent by 2007, and 100 percent by 2009. For sugar, tariffs will be cut 20 percent by 2006, 50 percent by 2007, 80 percent by 2008, and 100 percent by 2009. For bananas, the tariffs will be cut 20 percent by 2002 and 100 percent by 2006 (European Union, 2001).

The objective of this paper is to model the impact of the EBA proposal will have on global trade. Specifically, this study attempts to answer two key questions. The first question is, what will be the likely impact of the EU's Everything But Arms proposal? The second question is, what would be the impact if the United States also were to implement a similar proposal?

This paper is organized as follows. Section 2 outlines the various modeling scenarios. Section 3 reviews the data used in the analysis. Section 4 presents and explains the modeling results. Section 5 discusses the results, including their credibility and comparisons with other studies. Section 6 concludes by summarizing the results.

2. Modeling Unilateral Trade Liberalization with the LDCs

This paper models the EBA and a hypothetical U.S. response under different scenarios using the Global Trade Analysis Program (GTAP) modeling framework. The features and details of the GTAP model have been explained in numerous other sources (e.g., Hertel, 1997). A few of the key features of the GTAP model are the following. The model assumes perfect competition and constant returns to scale technology. Consumer demands are represented by a constant difference of elasticities functional form. Resources are assumed to be fully employed in production. Products are allowed to be differentiated between production and imports, and between regions, to allow two-way trade, depending on the ease of substitution. At a global level, savings must equal investment, which is allocated across regions to equalize expected return rates.

Four scenarios are considered for this paper. All of the scenarios are medium run, i.e., intermediate steps that capture the phasing out of tariffs for the 3 sensitive commodities were

ignored. The first scenario tries to model the EBA in isolation (projection of status quo trade situation at this time, i.e., there is no U.S. response). The second one is purely hypothetical and considers what would happen if the U.S. were to implement an initiative similar to the EBA without the EU. The third scenario considers the combined impact if both the U.S. and the EU were to implement an initiative like the EBA proposal. The fourth scenario is the same as the third, but considers lower output response for the LDCs to reflect the apparent low productivity and supply constraints in these countries. The scenarios capture static gains related to removing distortions in consumption and production decisions. The static gains reflect changes in income due to increased economic efficiency via reallocations of resources by removing the distortions.

3. Data

This study models 14 geographic regions and 22 commodity groups in an effort to capture the EBA initiative's features. The GTAP 5.0.1 database is used for the analysis (McDougall, 2002). In an effort to group the LDCs together, a proxy measure was used as data for only a few countries were available.³ The commodity groups were partly created on the basis of identifying the effects for the 3 sensitive commodities (bananas, sugar, and rice).

³ The proxy included Bangladesh, Malawi, Mozambique, Tanzania, Uganda, Zambia, Rest of Sub-Saharan Africa (non-developed), and Rest of World. While 32 of the 48 LDCs are in Sub-Saharan Africa, the "Sub-Saharan Africa" aggregation refers to developed countries in Sub-Saharan Africa, primarily countries in the Southern Africa Customs Union.

It is useful to consider the macroeconomic data and trade patterns the different model regions. Table 1 shows the base data 1997 GDP and its components for the 14 different regions. The LDCs only account for 1.6 percent of global GDP. An important fact to note is that the LDCs, which are mostly from Sub-Sahara Africa, export about 39 percent of their goods to the EU and 24 percent to North America (Table 2). This helps explain in part why there is a greater impact when the EU liberalizes than when the U.S. liberalizes.

There are important features to note when examining the sectoral composition of foreign trade between the LDCs and the EU, U.S. and the world (Table 3). Overall, agriculture accounts for 17 percent of total exports from the LDCs to the world. Energy is the largest component of exports from the LDCs, according to the regional aggregation used in this analysis. Energy exports account for 30 percent of the LDCs' total exports overall, 56 percent of their exports to the U.S., and 20 percent of their exports to the EU.⁴ The next largest component of exports were services (23 percent) and other miscellaneous foods (10 percent), which includes the leading primary commodity exports of coffee, cocoa and tea.).

⁴ This primarily reflects the exports of Nigeria and Gabon (not LDCs) and Angola (an LDC). This presented a difficult modeling problem with the current GTAP database. Nigeria, with a population of 90-110 million people (depending on the source), appears to dominates the "rest of Sub-Sahara Africa" component. The country's 1999 per capita GDP is only \$240, despite its oil wealth (World Bank, 2001). The decision was made to keep "rest of Sub-Sahara Africa" in the LDCs aggregation, but exempt liberalization of the energy sector in the U.S. modeling scenario since U.S. energy imports from Sub-Sahara Africa receive preferential treatment (GAO, 2001).

The trade shares are relatively small for the EU-sensitive commodities (rice, sugar, and bananas). Sugar exports account for only 4 percent of LDC agricultural exports and less than 1 percent of overall exports. However, 81 percent of the LDCs' sugar exports go to the European Union. Rice exports accounts for less than 0.1 percent of total exports (none of the Asian countries in the LDCs are significant rice exporters). Bananas could not be separated from fruits and vegetables; however, this larger component only accounted for 8 percent of agricultural exports and 1.3 percent of total exports.

It is important to observe also the levels of protection for imports in the GTAP database (Table 4). The protection levels are calculated on the basis of *ad valorem* tariff levels and tariff equivalents for agricultural quotas. The GTAP database shows that import taxes in the EU for goods from the LDCs averaged 5.7 percent compared with 1.6 percent on goods from the rest of the world. For the U.S., the import taxes on goods from both the LDCs and the world averaged 2.3 percent. The EU shows 7 categories with average tariffs greater than 20 percent: rice, wheat, other grains, dairy products, meats, sugar, and live animals. The U.S. shows 2 categories with average taxes greater than 20 percent: dairy and sugar.

4. Results

Scenario 1. The first scenario considers the impact of EU liberalization toward the LDCs.⁵ If no further trade negotiations were to take place between the developed countries and the LDCs, then this scenario can be considered the isolated impact of implementing the EU's EBA proposal in a global framework.

⁵ The focus of the results is on regional trade impacts. However, Appendix Table 1 shows the corresponding impacts on commodity prices. Most of the price changes are small in either direction. The biggest prices change occurs for rice, which increases by as much as 0.25 percent in the fourth scenario.

With the scenario, the LDCs experience an increase in welfare as measured by the \$2.5 billion gain in equivalent variation (EV). The EU incurs a loss in total welfare of \$276 million in EV (less than 0.01 percent). This result was surprising as the terms of trade losses (\$1.1 billion) outweigh allocative efficiency gains (\$860 million). Exports from the LDCs increase by 3 percent as they divert trade from other regions. Overall, the effect of increased LDC exports is to worsen the terms of trade in most other regions, leading to small welfare losses. However, global welfare is increased slightly as the welfare gains in the LDCs outweigh the losses in other regions.

Scenario 2. The second scenario considers hypothetically what the impact would be if the U.S. were to implement a similar plan as the EBA without EU participation. The goal of the scenario is to compare the relative impacts of the U.S. liberalization scenario vis-à-vis the EU scenario. As noted earlier in the data section, about 56 percent of exports from the LDCs to the U.S. are for energy. Previous studies (e.g., GAO, 2001; Ianchovichina, 2001) have pointed out that a significant portion of imports from the LDCs under preferential programs are accounted for by energy (i.e., these imports enter the U.S. duty free already). To model this effect, liberalization of the energy sector was exempted since the GTAP data base on import taxes calculates taxes on the basis of most favored nation (MFN) rates, which does not reflect the reality of duty-free preference programs.

The results in scenario 2 are similar to scenario 1, but the impacts are relatively smaller (Table 6). The LDCs increase in welfare by \$616 million in terms of EV (0.13 percent of GDP) while the U.S. incurs a small loss of \$21 million (less than 0.01 percent of GDP). For the U.S., the terms of trade losses (\$173 million) outweigh the allocative efficiency gains (\$152 million) and

GDP effects. Again, other regions experience minor losses in welfare from the indirect effects of U.S. unilateral liberalization with the LDCs (i.e., terms of trade losses).

The LDCs experience a 0.54 percent increase in GDP in this scenario. Several regions show negligible losses in GDP growth. For example, GDP in Latin America and South Asia each would decline by 0.03 percent. The declines closely correspond to similar declines in export growth and terms of trade losses. The gains for the LDCs would appear to come at the expense of countries in these regions. Global welfare increases by \$188 million.

Scenario 3. In the third scenario, both the U.S. and EU liberalize trade with the LDCs. This would be the scenario if the U.S. were to negotiate a similar treaty as the EBA in the future.

The results show that welfare in the LDCs increases by \$3.1 billion (0.66 percent of GDP), mostly from a boost in their terms of trade (\$2.4 billion) (Table 7). The EU and U.S. would experience minor welfare losses (\$370 million and \$321million, respectively; each less than 0.01 percent of GDP). Again, the allocative efficiency gains from liberalizing trade are outweighed by the losses in terms of trade. For the EU, the allocative efficiency gains are \$833 million, but the terms of trade losses are \$1.2 billion. For the U.S., allocative efficiency gains are \$140 million and the terms of trade losses are \$461 million.

The LDCs show increases in GDP and export growth (2.9 percent and 3.7 percent, respectively) while other regions suffer minor losses because of trade diversion. South Asia and Latin America each show GDP declines of 0.10 percent each while Mexico's GDP is reduced by 0.06 percent. South Asia stands out as the big loser in terms of exports, which shrink by 0.13 percent. Latin American exports decline by 0.08 percent. EU exports grow by 0.03 percent, but GDP

declines by 0.07 percent, in part because of the higher terms of trade costs. Similarly, US exports increase by 0.03 percent, but GDP declines by 0.04 percent because of the worsening terms of trade.

Scenario 4. The final scenario is the same as scenario 3, except that LDCs economic growth increases responding to trade openness, but at a slower pace than in the third scenario. This is done to capture a salient feature of the LDCs that is widely believed by many economists to be true: that the LDCs have limited capacity to exploit any trade preferences and its spillover effects. Several reasons are offered for this belief, including such issues as political instability, low human capital levels, lack of infrastructure, limited technology, and so on.

For these reasons, we allow productivity gains in the LDCs to generate from foreign investment, but argue that there are limits to how fast the investment can be absorbed. The LDCs' catch-up effects speed their advances, but at a slower pace than in the third scenario.

In this scenario, the most important result to note is that welfare in the LDCs increases by only \$936 million (0.20 percent of GDP) (Table 8). This in contrast to the \$3.1 billion welfare gain for LDCs in the third scenario (0.66 of GDP). The allocative efficiency gains (\$544 million) and terms of trade increases (\$2.3 billion) are offset to some extent by productivity losses (\$1.89 billion, not shown in table) due to the inability to absorb and utilize the foreign investment effectively. Exports from LDCs increase by 4.1 percent, but GDP only grows by 2.3 percent (lower than 2.9 percent in scenario). The results for the other regions are very similar to the third scenario.

5. Discussion

This section explores 3 important questions. The first question is, are the results credible? The second question is, how do the results compare with other studies? The third question is, what are the implications for per capita incomes in the LDCs?

5.1 Are the results credible?

The database limitations force a crude proxy of the LDCs, as explained earlier. This could potentially cast doubt on the results. However, we would argue that despite these limitations, the results are generally plausible. One reason is that since the EU is the largest trade partner with the LDCs (most of which are in Sub-Saharan Africa), it makes sense that the LDCs gain more when the EU liberalizes compared with the United States.

These scenarios can be considered an upper bound estimate of the economic impacts because of trade preferences. The GTAP database uses bound tariffs (except where applied tariffs are available), which are considerably above the applied rates in many instances. The trade liberalization effects may be overstated even further when one considers trade preference programs, such as the General System of Preferences (GSP, both US and EU), the Lome / Cotonou agreements (EU), and the African Growth and Opportunity Act (US). For many countries, a sizeable amount of trade is covered under preference arrangements (e.g., ABARE, 2001; Pollard, 2000; GAO, 2001; UNCTAD, 2001a). For example, Pollard (2000) shows that in recent years about 19 percent of total exports from 24 Caribbean countries were covered by preferences of the Caribbean Basin Economic Recovery Act (CBERA). UNCTAD (2001a)

showed for the LDCs, GSP preference exports to the “Quad” countries were 2 percent in Canada, 18 percent for Japan, 29 percent in the EU, and 35 percent in the United States.

5.2 How do the results compare with other studies?

There are at least two other study to our knowledge that examine similar modeling questions (Ianchovichina et al., 2001; UNCTAD, 2001b). Ianchovichina et al. (2001) focused on trade scenarios for 37 low-income countries in Sub-Saharan Africa (SSA-37). The scenarios examined separate liberalization scenarios for the EU’s EBA, the U.S. (recently passed African Growth and Opportunity Act), Japan, and the Quad (EU, US, Japan, and Canada). The study is different in the following ways: 1) it focuses on Sub-Saharan Africa rather than the LDCs; 2) it uses the GTAP 4.0 database; and 3) the country / commodity coverage is relatively more aggregated (7 regions, 16 commodities) than this study.

Overall, the Ianchovichina et al. study finds the trade impacts are somewhat proportional to what this study shows, but the magnitudes are much smaller (perhaps due to some extent by the higher level of aggregation). For example, in the scenario with the EU only, Ianchovichina et al. find that SSA-37 exports increase by 2.8 percent and welfare increases by \$316 million (compared with \$2.5 billion welfare gain in this study). In the U.S. scenario, SSA-37 exports increase by only 0.4 percent and welfare by \$49 million (\$617 million in this study). The Quad scenario elicits the largest impact: SSA-37 exports increase by 13.9 percent and welfare by \$1.7 billion.

It is more difficult to compare the results in this study with the UNCTAD (2001b) study. The UNCTAD study uses 22 sectors also, but tries to separate out the LDC countries available in the GTAP database to the extent possible (Bangladesh, Malawi, Tanzania, Uganda, Zambia, and

Rest of Sub-Sahara Africa). The study made an effort to adjust tariff levels in the database for preference margins. In a scenario with EU liberalization only, most of these countries show welfare gains while the EU shows small welfare loss (\$250 million, most from terms of trade losses). A second scenario considers a full liberalization with the LDCs by all Quad countries. The results show gains in most of the individual LDC countries. The U.S. and EU each show welfare losses less than 0.01 percent of their GDP (\$562 million and \$547 million). Overall, the results in this study appear to be consistent with the UNCTAD study.

5.3 What are the implications for per capita incomes?

To put the scenarios in this study in perspective, consider the following points. Per capita incomes have grown by 0.66 percent per year over the 1984-1999 period, for which aggregated LDC data are available (World Bank, 2001). If this growth rate were to continue for the next 20 years, average per capita incomes would rise from \$280 per person to \$320 per person (equivalent to Uganda today). However, if the additional 2.85 percent growth in total GDP from scenario 3 is factored in along with population growth (2.4 percent), per capita incomes would rise to \$340 per person, about the average level of Zambia in recent years.

6. Conclusions

This study has attempted to answer two key questions. The first question was what will be the likely impact of the EU's Everything But Arms proposal? The second question was what would be the impact if the United States also were to implement a similar proposal? The results of this study offer some insights into these questions.

Using the GTAP computable general equilibrium model, the preliminary results in this paper show if only the EU's EBA proposal were implemented, then the least developed countries would experience an increase in welfare of \$2.5 billion (0.53 percent of their GDP) while other regions would experience small welfare losses. The EU would experience a welfare loss of (\$276 million, less than 0.01 percent of its GDP) as allocative efficiency gains are offset by losses in the terms of trade (the terms of trade results throughout the paper require further investigation). Exports in the LDCs would grow by 3 percent as trade is diverted away from other regions. Total GDP in the LDCs would grow by 2.3 percent.

If the United States also were to implement a similar proposal, then the LDCs would experience even greater gains than just with the EU's proposal. In one version of this analysis, the LDCs would experience a \$3.1 billion increase in welfare (0.66 percent of GDP). Welfare in the EU and U.S. would decline by \$370 million and \$321 million respectively (less than 0.01 percent of GDP for each). Exports from the LDCs would increase by 3.7 percent and total GDP growth by 2.9 percent. A second version of the model assumes that LDCs lack the supply capacity to exploit the new trade opportunities. In this scenario, welfare in the LDCs improves by only \$936 million (0.20 percent of GDP) and GDP grows at 2.3 percent. This last scenario still may be overstated, given that trade preferences are not fully accounted for in the tariff database.

Overall, the modeling results suggest that improving market access for the LDCs could help raise per capita incomes above trend projections, but the gains are modest. If both the EU and US implement similar trade liberalization programs for the LDCs, an optimistic scenario implies that average per capita incomes over 20 years would rise from \$280 per capita to \$340 per capita, compared with \$320 per capita in a trend projection.

References

- Australian Bureau of Agricultural and Resource Economics (ABARE). *Trade Preferences: Are They Helpful in Advancing Economic Development in Poor Countries?* Canberra, Australia: ABARE, November 2001.
- European Union. "EU Approves 'Everything But Arms' Trade Access for Least Developed Countries." European Union news release, Feb. 27, 2001
<http://www.eurunion.org/news/press/2001/2001005.htm>.
- Hertel, Thomas (Ed.). *Global Trade Analysis: Modeling and Applications*. Cambridge: University of Cambridge, 1997.
- Ianchovichina, E. et al. "Unrestricted Market Access for Sub-Saharan Africa: How Much is it Worth and Who Pays?" World Bank Globalization Working Paper No. 2595 (http://econ.worldbank.org/files/1715_wps2595.pdf). Washington, DC: World Bank, 2001.
- McDougall, Robert (Ed.). *Global Trade, Assistance, and Protection: The GTAP 5 Database*. West Lafayette, IN: Purdue University Center for Global Trade Analysis, 2002.
- Pollard, Walker. "Impact of Caribbean Basin Economic Recovery Act Declines," *International Economic Review*, April/May 2000, 15-20.
- United Nations Conference on Trade and Development (UNCTAD). *Improving Market Access for Least Developed Countries*. UNCTAD/DITC/TNCD/4. New York: United Nations, 2001a.
- United Nations Conference on Trade and Development (UNCTAD). *Duty and Quota Free Access Market Access for the LDCs: An Analysis of Quad Initiatives*. UNCTAD/DITC/TNCD/4. London: United Nations, 2001b.
- United States Government Accounting Office. *International Trade: Comparison of U.S. and European Union Preference Programs*. Washington, DC: U.S. Government Accounting Office, GAO-01-647, 2001.
- World Bank, *World Development Indicators, 2001*. Washington, DC: World Bank, 2001.

Table 1 - Gross Domestic Product by Final Demand, 1997 Base Period Data (\$ Billion)

| Region | Consumption | Investment | Government | Exports | Imports | Total |
|---------------------|-------------|------------|------------|---------|---------|--------|
| Australia / NZ | 282 | 99 | 77 | 89 | (90) | 458 |
| China | 414 | 310 | 104 | 241 | (215) | 855 |
| East Asia | 3,421 | 1,718 | 581 | 1,270 | (1,197) | 5,793 |
| South Asia | 357 | 121 | 59 | 69 | (76) | 530 |
| United States | 5,495 | 1,398 | 1,202 | 873 | (1,023) | 7,945 |
| Canada | 370 | 118 | 124 | 235 | (217) | 631 |
| Mexico | 263 | 79 | 34 | 115 | (102) | 389 |
| Latin America | 1,102 | 321 | 211 | 211 | (259) | 1,586 |
| European Union | 4,888 | 1,488 | 1,489 | 2,455 | (2,362) | 7,958 |
| Other Europe | 227 | 85 | 70 | 167 | (136) | 413 |
| Former Soviet Union | 563 | 192 | 145 | 270 | (287) | 883 |
| N. Africa / M. East | 540 | 208 | 183 | 281 | (292) | 919 |
| Sub-Sahara Africa | 90 | 28 | 32 | 40 | (38) | 152 |
| Least 48 | 362 | 81 | 48 | 94 | (116) | 468 |
| World | 18,375 | 6,247 | 4,360 | 6,409 | (6,409) | 28,982 |

Source: McDougall (2002).

Table 2 - Trade partners for low income countries by model regions, 1997 base year (exports)

| Region | Australia / NZ | East Asia | North America | EU | Other Europe | Other | Total |
|----------------------------------|-------------------|--------------|------------------|---------|-----------------|--------|---------|
| ----- Exports (\$ Million) ----- | | | | | | | |
| China | 4,429 | 85,633 | 65,966 | 50,168 | 2,473 | 30,596 | 239,265 |
| South Asia | 961 | 11,010 | 16,385 | 21,242 | 980 | 16,082 | 66,659 |
| South America | 1,124 | 25,432 | 60,930 | 45,783 | 2,587 | 70,683 | 206,538 |
| Former Soviet Union | 900 | 20,063 | 18,842 | 111,579 | 4,313 | 99,028 | 254,726 |
| N. Africa / Mid East | 2,832 | 75,789 | 40,510 | 96,007 | 2,539 | 53,147 | 270,824 |
| Sub-Sahara Africa | 494 | 8,988 | 4,598 | 14,543 | 1,197 | 10,026 | 39,845 |
| LDCs | 1,581 | 13,359 | 21,940 | 35,163 | 1,450 | 16,718 | 90,209 |
| ----- Exports (Percent) ----- | | | | | | | |
| China | 1.85 | 35.79 | 27.57 | 20.97 | 1.03 | 12.79 | 100.00 |
| South Asia | 1.44 | 16.52 | 24.58 | 31.87 | 1.47 | 24.13 | 100.00 |
| South America | 0.54 | 12.31 | 29.50 | 22.17 | 1.25 | 34.22 | 100.00 |
| Former Soviet Union | 0.35 | 7.88 | 7.40 | 43.80 | 1.69 | 38.88 | 100.00 |
| N. Africa / Mid East | 1.05 | 27.98 | 14.96 | 35.45 | 0.94 | 19.62 | 100.00 |
| Sub-Sahara Africa | 1.24 | 22.56 | 11.54 | 36.50 | 3.01 | 25.16 | 100.00 |
| LDCs | 1.75 | 14.81 | 24.32 | 38.98 | 1.61 | 18.53 | 100.00 |

Source: McDougall (2002).

Table 3 - Least 48 Trade Partners, 1997 Base Period (\$Million)

| Goods | Least 48 Exports to: | | | | Least 48 imports from: | | | |
|-----------------------|----------------------|--------|--------|--------|------------------------|--------|--------|---------|
| | EU | US | Other | World | EU | US | Other | World |
| Rice | 17 | 9 | 28 | 54 | 42 | 64 | 333 | 438 |
| Wheat | 5 | 1 | 12 | 18 | 303 | 270 | 276 | 849 |
| Other grains | 18 | 5 | 70 | 93 | 75 | 76 | 477 | 629 |
| Fruit / veg. | 626 | 32 | 560 | 1,217 | 299 | 80 | 316 | 695 |
| Dairy products | 23 | 7 | 62 | 92 | 777 | 17 | 314 | 1,108 |
| Meats | 48 | 15 | 100 | 162 | 541 | 85 | 523 | 1,150 |
| Oilseed and prod. | 492 | 14 | 296 | 802 | 373 | 125 | 794 | 1,292 |
| Sugar | 551 | 64 | 63 | 678 | 346 | 1 | 527 | 874 |
| Wool and fiber | 426 | 3 | 985 | 1,413 | 10 | 1 | 74 | 85 |
| Other misc. foods | 5,482 | 712 | 2,842 | 9,036 | 2,244 | 260 | 1,636 | 4,140 |
| Beverages / tobacco | 93 | 24 | 217 | 335 | 1,333 | 270 | 632 | 2,236 |
| Live animals | 15 | 3 | 16 | 33 | 39 | 1 | 72 | 112 |
| Animal products | 926 | 67 | 276 | 1,268 | 807 | 26 | 786 | 1,619 |
| Total agriculture | 8,721 | 954 | 5,525 | 15,199 | 7,192 | 1,275 | 6,760 | 15,227 |
| Forestry and fishery | 822 | 53 | 1,834 | 2,709 | 30 | 3 | 66 | 100 |
| Energy and products | 6,877 | 11,388 | 9,223 | 27,487 | 7,248 | 709 | 9,946 | 17,903 |
| Minerals and metals | 2,399 | 348 | 3,004 | 5,751 | 4,698 | 292 | 5,441 | 10,431 |
| Textile and apparel | 3,440 | 1,539 | 1,307 | 6,286 | 2,520 | 135 | 5,155 | 7,809 |
| Wood and paper | 1,174 | 84 | 1,071 | 2,329 | 2,194 | 184 | 1,955 | 4,332 |
| Transportation /mach. | 1,439 | 150 | 2,300 | 3,889 | 14,915 | 2,492 | 12,986 | 30,393 |
| Construction | 173 | 132 | 253 | 557 | 207 | 132 | 254 | 592 |
| Electronics | 3,386 | 606 | 1,243 | 5,236 | 4,250 | 701 | 2,821 | 7,772 |
| Services | 6,733 | 4,888 | 9,144 | 20,765 | 7,682 | 5,708 | 18,953 | 32,343 |
| Total non-agriculture | 26,442 | 19,189 | 29,379 | 75,010 | 43,744 | 10,355 | 57,577 | 111,676 |
| Grand total | 35,163 | 20,143 | 34,904 | 90,209 | 50,936 | 11,630 | 64,337 | 126,903 |

Source: McDougall (2002).

**Table 4 - Protection levels in US and EU, 1997 base period, percent
(import taxes/ total imports)**

| Goods | EU imports | | US imports | |
|-----------------------|------------|-------|------------|-------|
| | Least 48 | World | Least 48 | World |
| Rice | 45.3 | 27.5 | 5.2 | 5.2 |
| Wheat | 38.6 | 9.6 | 0.0 | 0.0 |
| Other grains | 28.0 | 7.6 | 0.0 | 0.0 |
| Fruit / veg. | 12.7 | 5.2 | 4.3 | 4.3 |
| Dairy products | 42.1 | 6.0 | 21.8 | 21.8 |
| Meats | 33.1 | 10.2 | 3.9 | 3.9 |
| Oilseed and prod. | 8.4 | 3.1 | 11.1 | 11.1 |
| Sugar | 43.6 | 26.7 | 34.5 | 34.5 |
| Wool and fiber | 0.0 | 0.0 | 3.6 | 3.6 |
| Other misc. foods | 11.4 | 6.6 | 16.0 | 16.0 |
| Beverages / tobacco | 7.7 | 1.5 | 3.1 | 3.1 |
| Live animals | 26.6 | 6.9 | 0.0 | 0.0 |
| Animal products | 5.6 | 3.7 | 7.0 | 7.0 |
| Forestry and fishery | 2.4 | 1.2 | 0.5 | 0.5 |
| Energy and products | 0.7 | 0.8 | 0.4 | 0.4 |
| Minerals and metals | 1.8 | 0.8 | 1.0 | 1.0 |
| Textile and apparel | 10.9 | 4.9 | 12.6 | 12.6 |
| Wood and paper | 2.3 | 0.7 | 1.0 | 1.0 |
| Transportation /mach. | 3.3 | 1.1 | 3.5 | 3.5 |
| Construction | 0.0 | 0.0 | 0.0 | 0.0 |
| Electronics | 2.1 | 1.9 | 0.7 | 0.7 |
| Services | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 5.7 | 1.6 | 2.3 | 2.3 |

Source: McDougall (2002).

Table 5 - Modeling Scenario 1 (EU Liberalization Only)

| Region | Total welfare (equiv. variation) | of which: | | EV/ GDP | Change in GDP | Change in Exports |
|------------------------|---|-------------------|---------|------------|---------------------|-------------------------|
| | Allocative Efficiency | Terms of Trade | | | | |
| ----- \$ Million ----- | | | | | | |
| Australia / NZ | (1) | 0 | (1) | 0.00 | 0.00 | 0.00 |
| China | (82) | (15) | (67) | -0.01 | -0.03 | -0.03 |
| East Asia | (248) | (41) | (207) | 0.00 | -0.02 | -0.01 |
| South Asia | (100) | (32) | (69) | -0.02 | -0.07 | -0.09 |
| United States | (300) | (13) | (288) | 0.00 | -0.03 | -0.02 |
| Canada | 6 | 6 | (0) | 0.00 | -0.01 | -0.02 |
| Mexico | (10) | (2) | (8) | 0.00 | -0.02 | -0.02 |
| Latin America | (149) | (43) | (106) | -0.01 | -0.06 | -0.05 |
| European Union | (276) | 860 | (1,135) | 0.00 | -0.08 | 0.03 |
| Other Europe | (4) | 5 | (9) | 0.00 | -0.04 | -0.04 |
| Former Soviet Union | (30) | (5) | (25) | 0.00 | -0.04 | -0.04 |
| N. Africa / M. East | 2 | 3 | (1) | 0.00 | -0.03 | -0.04 |
| Sub-Sahara Africa | (6) | (2) | (5) | 0.00 | -0.02 | -0.01 |
| Least 48 | 2,496 | 576 | 1,920 | 0.53 | 2.30 | 3.00 |
| World | 1,298 | 1,298 | 0 | 0.00 | --- | --- |

Table 6 - Modeling Scenario 2 (US Liberalization Only)

| Region | Total welfare (equiv. variation) | of which: | | EV/ GDP | Change in GDP | Change in Exports |
|---------------------|---|-------------------|-------|---------------------|---------------------|-------------------------|
| | Allocative Efficiency | Terms of Trade | | | | |
| | ----- \$ Million ----- | | | ----- Percent ----- | | |
| Australia / NZ | (2) | 0 | (2) | 0.00 | 0.00 | 0.00 |
| China | (57) | (33) | (24) | -0.01 | -0.02 | -0.02 |
| East Asia | (99) | (25) | (74) | 0.00 | -0.01 | -0.01 |
| South Asia | (45) | (20) | (25) | -0.01 | -0.03 | -0.04 |
| United States | (21) | 152 | (173) | 0.00 | -0.02 | 0.05 |
| Canada | (16) | (2) | (14) | 0.00 | -0.02 | -0.02 |
| Mexico | (24) | (2) | (21) | -0.01 | -0.04 | -0.02 |
| Latin America | (73) | (20) | (53) | 0.00 | -0.03 | -0.03 |
| European Union | (95) | (27) | (68) | 0.00 | 0.00 | 0.00 |
| Other Europe | (3) | 0 | (3) | 0.00 | 0.00 | 0.00 |
| Former Soviet Union | (3) | (2) | (2) | 0.00 | 0.00 | 0.01 |
| N. Africa / M. East | 6 | 2 | 4 | 0.00 | 0.00 | 0.00 |
| Sub-Sahara Africa | 2 | 0 | 1 | 0.00 | 0.01 | 0.01 |
| Least 48 | 617 | 163 | 454 | 0.13 | 0.54 | 0.73 |
| World | 188 | 188 | 0 | 0.00 | --- | --- |

Table 7 - Modeling Scenario 3 (EU and US Liberalization)

| Region | Total welfare (equiv. variation) | of which: | | EV/ GDP | Change in GDP | Change in Exports |
|---------------------|---|-------------------|---------|---------------------|---------------------|-------------------------|
| | Allocative Efficiency | Terms of Trade | | | | |
| | ----- \$ Million ----- | | | ----- Percent ----- | | |
| Australia / NZ | (3) | 0 | (3) | 0.00 | 0.00 | 0.00 |
| China | (139) | (47) | (92) | -0.02 | -0.04 | -0.05 |
| East Asia | (347) | (66) | (281) | -0.01 | -0.02 | -0.01 |
| South Asia | (145) | (51) | (94) | -0.03 | -0.10 | -0.13 |
| United States | (321) | 140 | (461) | 0.00 | -0.04 | 0.03 |
| Canada | (10) | 4 | (14) | 0.00 | -0.03 | -0.04 |
| Mexico | (34) | (4) | (30) | -0.01 | -0.06 | -0.03 |
| Latin America | (222) | (63) | (159) | -0.01 | -0.10 | -0.08 |
| European Union | (370) | 833 | (1,203) | 0.00 | -0.07 | 0.03 |
| Other Europe | (7) | 5 | (12) | 0.00 | -0.03 | -0.04 |
| Former Soviet Union | (33) | (7) | (27) | 0.00 | -0.03 | -0.03 |
| N. Africa / M. East | 8 | 5 | 4 | 0.00 | -0.03 | -0.04 |
| Sub-Sahara Africa | (5) | (2) | (3) | 0.00 | -0.01 | 0.00 |
| Least 48 | 3,113 | 738 | 2,374 | 0.66 | 2.85 | 3.74 |
| World | 1,486 | 1,486 | 0 | 0.01 | --- | --- |

Table 8 - Modeling Scenario 4 (EU and US Liberalization, Low Supply Response)

| Region | Total welfare (equiv. variation) | of which: | | EV/ GDP | Change in GDP | Change in Exports |
|---------------------|---|-------------------|---------|------------|---------------------|-------------------------|
| | Allocative Efficiency | Terms of Trade | | | | |
| | ----- \$ Million ----- | | | ----- | Percent ----- | |
| Australia / NZ | (2) | 1 | (3) | 0.00 | 0.01 | 0.00 |
| China | (138) | (47) | (91) | -0.02 | -0.03 | -0.05 |
| East Asia | (323) | (59) | (264) | -0.01 | -0.02 | -0.02 |
| South Asia | (141) | (50) | (92) | -0.03 | -0.09 | -0.14 |
| United States | (283) | 142 | (426) | 0.00 | -0.03 | 0.03 |
| Canada | (9) | 5 | (14) | 0.00 | -0.02 | -0.03 |
| Mexico | (33) | (4) | (29) | -0.01 | -0.05 | -0.03 |
| Latin America | (214) | (59) | (154) | -0.01 | -0.08 | -0.08 |
| European Union | (326) | 853 | (1,178) | 0.00 | -0.07 | 0.03 |
| Other Europe | (7) | 5 | (12) | 0.00 | -0.03 | -0.04 |
| Former Soviet Union | (29) | (5) | (24) | 0.00 | -0.02 | -0.04 |
| N. Africa / M. East | 10 | 6 | 4 | 0.00 | -0.02 | -0.04 |
| Sub-Sahara Africa | (5) | (1) | (4) | 0.00 | -0.01 | 0.00 |
| Least 48 | 936 | 544 | 2,286 | 0.20 | 2.28 | 4.08 |
| World | (564) | 1,330 | 0 | 0.00 | --- | --- |

Appendix Table 1 - World Commodity Price Changes

| Commodities | Scen. 1 | Scen. 2 | Scen. 3 | Scen. 4 |
|-----------------------|----------------|----------------|----------------|----------------|
| Rice | 0.20 | 0.04 | 0.24 | 0.25 |
| Wheat | 0.07 | 0.01 | 0.09 | 0.09 |
| Other grains | 0.15 | 0.02 | 0.17 | 0.16 |
| Fruit / veg. | 0.12 | 0.02 | 0.13 | 0.13 |
| Dairy products | 0.00 | 0.01 | 0.01 | 0.01 |
| Meats | 0.00 | 0.00 | 0.00 | 0.01 |
| Oilseed and prod. | 0.04 | 0.01 | 0.05 | 0.06 |
| Sugar | 0.05 | 0.01 | 0.06 | 0.06 |
| Wool and fiber | 0.14 | 0.03 | 0.17 | 0.17 |
| Other misc. foods | 0.03 | 0.01 | 0.04 | 0.04 |
| Beverages / tobacco | 0.02 | 0.01 | 0.02 | 0.03 |
| Live animals | 0.05 | 0.01 | 0.06 | 0.06 |
| Animal products | 0.02 | 0.01 | 0.03 | 0.03 |
| Forestry and fishery | 0.14 | 0.03 | 0.18 | 0.16 |
| Energy and products | 0.00 | 0.00 | 0.00 | 0.00 |
| Minerals and metals | -0.01 | 0.00 | -0.01 | 0.00 |
| Textile and apparel | 0.00 | 0.00 | -0.01 | 0.00 |
| Wood and paper | -0.01 | 0.00 | -0.01 | 0.00 |
| Transportation /mach. | -0.02 | 0.00 | -0.03 | -0.02 |
| Construction | -0.01 | 0.00 | -0.01 | 0.00 |
| Electronics | -0.02 | 0.00 | -0.02 | -0.01 |
| Services | -0.01 | 0.00 | -0.01 | -0.01 |