

**Trade Preferences, WTO Negotiations and the LDCs:
the case of the "Everything But Arms" Initiative***

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Abstract

This paper aims to estimate benefits of the recently adopted "Everything But Arms" (EBA) initiative of the EU to the Least Developed Countries (LDCs) and to show how these benefits will be eroded in the presence of possible further multilateral trade liberalization under the WTO. Simulation results indicate that total welfare impacts of the EBA are less than US\$300 million for all the LDCs and that a great deal of these gains are associated with three "sensitive" products that are subject to lengthy implementation period, especially sugar. Impacts of the EBA on the EU and third countries appear to be negative but quite small. Considering its limited product coverage (mainly agricultural goods) and the existing preferences granted in the past, these results are not surprising. Multilateral trade negotiations exert pressures on the EU to reduce its protections, which may lower the high domestic prices in the EU and decrease the attractiveness of the EBA. Further results indeed show that gains for the LDCs from the EBA will be greatly reduced under a series of "plausible" WTO scenarios in which the EU cuts its protections. However, not pursuing multilateral trade liberalization for the purpose of keeping these preferences meaningful would cause much greater welfare losses to the whole world and ultimately would harm the LDCs in the long run. This study concludes that other policy options should be made available in conjunction with trade policy reforms to ease LDCs' dependency on trade preferences and to foster their supply capacities.

Key Words: "Everything But Arms" initiative, least developed countries, preferential trading agreement, WTO, agricultural trade negotiation

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1. Introduction

The "Everything But Arms" initiative (EBA) of the European Union (EU) has recently been adopted for the purpose of further improving LDC's access to the EU market. Under the EBA, all restrictions on imports except arms from LDCs to the EU are to be removed on a non-reciprocal basis (European Community, 2001a). Non-reciprocal preferential trading agreements are part of a complex web of Preferential Trading Agreements (PTA) between the EU and its many trading partners. The EBA is a continuation of the non-reciprocal preferential approach taken by the ACP (Africa, Caribbean and Pacific) preferences and the Generalized System of Preferences (GSP). This move further enhances the favorable treatment for imports originated from the Least Developed Countries (LDCs). Indeed, from the perspective of the EU, this is a very significant step to fulfill the objective of the Doha Development Agenda and it has been included in its WTO agricultural negotiation proposal (European Commission, 2003). Reactions from other countries vary. For example, the proposal by the US (United States Department of Agriculture, 2002) does not extend similar offer, whereas many of the African countries continue to ask for special and differential treatment close to the EBA initiative (WTO, 2001a). Despite the different reactions, its impact has been felt in the current agricultural negotiations, as the recent compromise offered by the WTO negotiation chair Stuart Harbinson contains a proposal similar to the EBA (WTO 2003b).

The objective of this study is two-fold. The first objective is to provide an economic assessment of the likely impact of the EBA on the LDCs. Several previous studies have examined this issue but consensus on its quantitative effects has not been achieved. For example, a study by UNCTAD (2002) showed that the EBA would bring about welfare gains in the range of over USD\$ 200 million. This result was concurred by a slightly earlier study (Ianchovichina et al., 2000), which estimated similar welfare gains for Sub-Saharan Africa alone, while another study (Trueblood and Somwaru, 2002) estimated the benefits at several times higher. The differences in the welfare estimates in the above studies may be attributed to the fact that the tariff cuts employed and the bases from which these cuts are applied vary from one another. In fact, one of those studies (Trueblood and Somwaru, 2002) lacks of an accurate account of the existing preferences which the LDCs have already received and therefore grossly overstates its potential impact. As such, further evaluating the EBA by taking into account of the existing preferences is warranted.

The second and perhaps more important objective of this study is to examine how the ongoing WTO negotiations affect the benefits from the EBA. By offering tariff concessions to all WTO members, multilateral trade liberalization resulted from these negotiations will likely reduce the benefits to the recipients of trade preferences. Specific to the EBA, policy makers have to attain the following two objectives simultaneously: achieving a fair and market-oriented trading system and assisting economic development in the LDCs. As declared in the Doha Ministerial Declaration, the first objective is to be attained *through a program of fundamental reform encompassing strengthened rules and specific commitments on support and protection in order to correct and prevent restrictions and distortions*, whereas the second is to be realized through the so-called "differential and preferential treatment". The "Harbinson" proposal (WTO 2003) on negotiation "modalities" includes measures for achieving both objectives, including substantial cuts in import tariffs, elimination of export subsidies and dramatic reductions of domestic support proposed for developed countries, less stringent requirements for developing countries, and in some cases exemptions for the LDCs (e.g. duty and quota-free access along the lines of the EBA). The problem is that these measures tend to place negative influence on each other. Even with the assumption that the concessions of the EBA can be fully realized and that possible influences of the safeguard

clause and other conditions of the EBA are minimal, gains from such an arrangement will become less and less attractive as other countries also gain more access to the major markets during the multilateral trade liberalization process. Specific to the EBA, this is bound to happen as the LDCs are asking for the benefits that are built on the high EU internal prices. Since the EU is under pressure to reform its Common Agriculture Policies (CAP), due to the budgetary pressure and its WTO obligations, such high internal prices are not likely to be sustainable. On the other hand, keeping these preferences meaningful to the LDCs by opposing multilateral liberalization will be quite difficult to understand as it may entail enormous economic cost. In light of this discussion, it is of highly relevance to assess whether or not and to what extent the benefits of the EBA will be eroded in the presence of the WTO negotiations, and if so, what could be done in conjunction with trade policy changes to ease possible negative consequences on the LDCs.

This rest of the paper is structured as follows. The second section offers a general understanding of the EBA through a detailed description. Section 3 briefly discusses the model and data used for the quantitative assessment of the EBA. Section 4 starts with the design of a series of policy scenarios, followed by results of these scenarios, including analyses on the impact of the EBA, and the joint impact of the EBA and plausible WTO scenarios. A summary of the welfare cost associated with keeping the EBA "meaningful" concludes this section. In the last section some concluding remarks are offered.

2. The Everything But Arms initiative in the EU's preferential trading framework

In addition to its participation in the multilateral trading agreements under the WTO, the EU also maintains a complex system of regional and preferential trade agreements. According to Panagariya (2002), these PTAs range from custom unions such as the European Union itself, free trade areas such as the European Economic Area, the Mediterranean Partnerships, and various non-reciprocal preferences. This "multi-layer" system extends to virtually all its trading partners, except for six countries/regions that enjoy the Most Favored Nation (MFN) status. Among these agreements, there are two systems of non-reciprocal trade preferences concerning the LDCs, namely, the ACP preferences and the GSP schemes. These two systems are the predecessors of the EBA.

The legal basis of the ACP preferences dated back to 1957 with the establishment of the European Economic Community, when former colonies of France received preferential treatment. The first formal agreement between the EU and the ACP countries were established in 1975 under the first Lomé Convention. The structure and coverage of these preferences have changed through several generations of the Lomé Convention and have recently been replaced by the Cotonou Agreement. The current ACP preferences now cover 77 countries, of which 40 are classified as LDCs by the UN (European Commission, 2003a). Like the Lomé Convention, the GSP scheme consists of a series of unilateral concessions made by developed countries, including the EU, to developing countries. Currently, 146 independent countries and 25 dependent or administered territories benefit from the European GSP scheme (European Communities, 2001b). All the LDCs defined by the UN are part of the GSP. There is considerable overlapping between the ACP and the GSP. In fact there are only 9 LDC countries that are included in the GSP but not in the ACP. These countries are mostly South Asian countries, including Bangladesh, Bhutan, Cambodia, Lao, Maldives, Myanmar, Nepal, and Yemen. In general, the ACP preferences are more favorable than the GSP, so it is natural for the LDC to adopt the ACP preferences where available.

The EBA initiative is a direct extension of the GSP¹, as adopted in the European Council Regulation No. 416/2001 (European Communities, 2001a). A brief introduction of the ACP and the GSP preferences is offered in this section, followed by a detailed exposition of the EBA itself.

2.1 ACP preferences: from Lomé to Cotonou

The ACP preferences have been granted through the Lomé Conventions. The first Lomé Convention has been established in 1975. These preferences are characterized by its non-reciprocal nature, under which the EU has permitted almost completely duty-free access for most of the products originated from the ACP countries. The exceptions are mostly agricultural products, some of which are covered by the CAP. There have been exclusions or restrictions in the form of tariffs and/or quantitative or seasonal restrictions, while the so-called "sensitive products" such as sugar, beef & veal, bananas and rum imports have been regulated through separated protocols (European Commission, 2000a).

Despite the concessions provided through the ACP preferences, their impact has been moderate, if not disappointing. Even though for most ACP countries, the EU is their main trading partner—exports into the EU represent 29 percent of their total export in 2000, their share in EU's total import has declined from 13.3 percent in 1976 to 3.7 percent in 2000. Exports from the ACP to the EU are hardly diversified and concentrate in raw materials and agricultural products. Possible explanations for the underachievement of the agreement could be that market access for some key products is still restricted or that the development impact of the agreement has failed.

The unimpressive performance of the ACP preferences has led to a re-design and renegotiated of the Lomé Convention (European Commission, 2002a). As a result of this effort, the latest Lomé Convention (Lomé IV, expired in 2000) has been replaced by the Cotonou agreement, which ambitiously aims at “reducing and eventually eradicating poverty consistent with the objectives of sustainable development and the gradual integration of the ACP countries into the world economy” (European Commission, 2002b). Four pillars are declared in the Cotonou Agreement: participatory approaches, a strengthened focus on poverty reduction, a comprehensive political dimension, and a new framework for economic and trade cooperation. The first two pillars are the non-trade component of the agreement, the third pillar concerns the political dimension, whereas the fourth pillar is the trade component. At present, the trade component of the Cotonou is only a framework for the EU and the ACP countries to renegotiate Regional Economic Partnership Agreements (REPA), with the aim of liberalizing all bilateral trade between them on a reciprocal basis, thereby making the agreements fully WTO-compatible. In the meantime the present trading regime will be maintained during the preparatory period beginning from 2002 and ending at 2008 at the latest. After that, the REPAs will enter into force gradually, with a transition period of 12 years. Until now, only EU and South Africa has finished negotiating on an REPA.

2.2 The Generalized System of Preferences

The GSP scheme was allowed under the WTO through its Enabling Clause, which states that preferential treatment under the GSP has to be non-discriminatory, non-reciprocal and autonomous. There should be no discrimination between developing countries, except for the benefit of least

¹ Although the EU adopts the EBA as an extension of the GSP, prior to the EBA, some LDCs actually enjoyed more favorable preferences offered through the ACP. In this study we take the view that the EBA is an extension of the "applied" preferences granted to the LDCs.

developed countries (WTO, 1979). The EU was the first to implement such a scheme in 1971. In operation, the GSP scheme of the EU follows a cycle of ten years. The present cycle began in 1995 and will expire in 2004. Regulations of the scheme are only valid for a period of 3 to 4 years and in January 2002 a new regulation entered into force (European Commission, 2003b).

The scheme operates at two levels: the general arrangement provides basic trade preferences based on traditional objectives of economic development, and a special incentive clause regarding sustainable development. The general system provides tariff preferences depending on the sensitivity of the product, known as modulation. Products are classified according to four different categories and preferences are granted accordingly:

- Very sensitive products where the tariff is 85% of the MFN rate
- Sensitive products for which the tariff is 35% of the MFN rate
- Semi-sensitive products with a tariff 35% of the MFN rate
- Non-sensitive products which enter the EU-market duty-free

The Common Custom Tariff schedule in the EU covers approximately 10500 HS-8 tariff lines in total and the MFN rates are zero for at least 2000 of these tariff lines. The GSP scheme covers around 7000 of the dutiable products, of which 3300 are classified as non-sensitive and 3700 are classified as sensitive (European Commission, 2003b).

The special incentive clauses are related to the respect of social rights and protection of the environment. With these clauses, the preferences as specified in the general arrangement can either be increased or reduced. For example, those countries that respect social and environmental standards in relevant international agreements receive more favorable treatment, often in the forms of a doubling of the normal preferences. In addition, the EU is also allowed to reduce or withdraw the preferences for individual countries or specific sectors if they reach a certain level of competitiveness. The benefit of the GSP scheme may also be suspended if certain safeguard clauses are triggered. In summary, together with stringent rules of origin, these clauses give the EU the flexibility to adjust the magnitude and the coverage of the preferences.

The LDCs (together with countries affected by drug production) have been part of a special arrangement in the GSP scheme for many years. These countries have traditionally received more favorable treatment and have enjoyed duty-free access for a large part of industrial and agricultural products (European Communities, 2001b). Before the EBA, there were only slightly over 900 products (at HS8 level) that were subject to duties. Further, since 1998 the EU has tried to extend similar preferences as contained in the ACP preferences to the 9 LDCs that are part of the GSP scheme but not part of the ACP. The initiative to further improve market access for LDCs was followed up in February 2001 when the EU formally adopted the “Everything But Arms” regulation (European Communities, 2001a).

2.3 A detailed exposition of the EBA

The decision on the EBA followed a series of initiatives taken by the EU after the WTO Ministerial Conferences in Singapore in 1996, where developed countries committed themselves to improve market access for LDC products (European Communities, 2001a). It amends the GSP scheme in several ways. First, the EBA offers the LDCs higher degree of market access. For virtually all products this means quota and duty free access. Second, all LDCs are equally given this duty and

quota-free access to the EU market under the EBA, whereas the GSP scheme provides different treatments for different beneficiary countries and for different products. Third, unlike the GSP scheme, the EBA has no time limits. However, the European Commission will review the functioning of EBA in 2005, when amendments can be introduced (European Communities 2001a and b). Detailed discussions are followed in the rest of this section as well as in the next section.

2.3.1 Country and products coverage

All the forty-nine LDC countries as designated by the UN are included in the EBA. The Economic and Social Council of the UN reviews the list every three years and uses four criteria for determining LDC. A complete list of countries and selection criteria is included in Appendix 1.

Under the EBA, all restrictions on imports (except for arms) originated from LDC to the EU are to be removed, without the reciprocal action by the LDC on EU's exports. This initiative took effect on March 5, 2001, with the elimination of tariffs and Tariff Rate Quotas (TRQ) for virtually all products (except arms). The EBA affects 919 tariff lines at HS-8 level. The new list leaves out just 25 HS-8 tariff lines related to trade with arms.

Table 1. Product coverage of the EBA at HS-8 level

Description	Number of EBA products (HS8)	Percent as total number of EBA products
Sugar	9	1.0
Vegetables, fruit and nuts	35	3.8
Cereals grains nec	12	1.3
Vegetables oil and fats	10	1.1
Other processed Food products	290	31.6
Beverages	108	11.8
Processed rice	17	1.8
Other Meat products	153	16.6
Bovine meats products	48	5.2
Other Animal products	19	2.1
Paddy Rice	16	1.7
Dairy products	165	18.0
Bovine cattle, sheep and goats, horses	14	1.5
Other Crops	0	0.0
Plant based fibers	0	0.0
Chemical, rubber and plastic	17	1.8
Fishing	0	0.0
Oil seeds	0	0.0
Wool, silk-worm cocoons	0	0.0
Wheat	3	0.3
Sugar cane, sugar beet	3	0.3
Total	919	100

Source: European Commission (2000b)

Table 1 illustrates the distribution of EBA products across product categories according to the classification of the Global Trade Analysis Project database (GTAP² for short). It can be seen that virtually all the EBA products are agricultural and food products. In terms of number of tariff lines, meat products, processed food products, and dairy contain the most HS-8 items. Each of these three categories claims a share of over 10 percent of total EBA products and their combined share is over 60 percent. The categories of beverage, vegetable and fruits, and bovine meats are also important parts of the EBA.

2.3.2 Sensitive Products in the EBA

Although the duty and quota free access has been granted for most of the 919 products with immediate effects, this treatment for 43 items will take place in three progressive stages. These items belong to the three sensitive product groups, namely, sugar, rice and bananas (EC 2001, Council Regulation No 416/2001). Specifically, for sugar, duties will be eliminated in three stages, with a 20 percent reduction on July 1, 2006, 50 percent on July 1, 2007 and 80 percent on July 1, 2008. By July 1, 2009, duties will be fully eliminated. For rice, duties will be eliminated according to a schedule identical to the one for sugar, starting on September 1, 2006. And for bananas, duties will be reduced by 20 percent annually, starting on January 1, 2002 and ending on January 1, 2006 the latest. To compensate for these delays, the EU will offer immediate and real market access through the creation of duty-free quotas for sugar and rice, initially based on the best figures for LDC exports during the 1990s, plus 15 percent. These will increase by 15 percent each year during the interim period (see Table 2 below).

Table 2. Tariff rate quotas for rice and raw sugar for LDC in 1,000 tons.

	2001-02	2002- 03	2003- 04	2004-05	2005-06	2006-07	2007-08	2008-09
Rice (1)	2,517	2,895	3,329	3,829	4,403	5,063	5,823	6,696
Sugar (2)	74,185	85,313	98,110	112,827	129,751	149,213	171,595	197,335

(1) Marketing years September 2001 to September 2009

(2) Marketing years July 2001 to July 2009

Source: calculation based on European Communities (2001a)

2.3.3 Safeguard Measures in the EBA

The safeguard measures specified in the GSP are largely retained in the EBA. Some amendments have also been made. Most notable among the amendments is the addition of the situation of "massive imports into the EU market" as a trigger for withdrawing the preferences. With regard to the three sensitive products of bananas, rice and sugar rice, the EU is allowed to suspend the preferences entirely if imports cause serious disruptions to the EU's mechanisms regulating these products. Serious disruptions refer to, among other things, reduction in market shares of European

² The GTAP database is a global database containing detailed input-output tables at country or regional level, and bilateral trade flows. By providing a "snapshot" of the world economy at a certain point (current version has a base year of 1997), it aims to support policy analysis of trade, agriculture and environmental issues at global level. It has been used extensively by applied researchers, especially modelers of computable general equilibrium models. For detailed documentation of the database, see Dimaranan and McDougall (2002). The current version contains information for 76 regions/countries and 57 industries.

producers, reduction in their production, increases in their stocks, closure of their production capacity, bankruptcies, low profitability, low rate of capacity utilization, employment, trade and prices (European Communities, 2001a and 2001b). In addition, the rules of origin specified in the GSP also apply to the EBA initiative.

These safeguard measures and rules of origin are clear reminiscent of the GSP. Some economists (e.g., Panagariya, 2002) have pointed out that exactly due to the many pretexts these preferences have been rendered ineffective. Whether or not the objective of the EBA can be achieved is also contingent on how these measures are applied in reality. For this reason, some caution should be exercised when evaluating the potential effects of the EBA.

2.4 Concessions offered in the EBA and its potential impact

To elicit the significance of the EBA, it is important to understand the trade and protection situations on the EBA products prior to its inception. For this purpose, we first examine trade data on exports from the LDCs to the EU (in particular, the EBA exports). Then the tariff concessions implied by the EBA are drawn out. Based on this, we offer a preliminary assessment of the potential effects of the EBA.

Figure 1 illustrates export values of major products from the LDC to the EU in 1999. These are extracted from the TRAINS database (compiled by UNCTAD) and are aggregates according to the classification of the GTAP database. Only four aggregated products have exports exceeding US\$100 million, including processed food products, other crops, plant fibers, and vegetable and fruits. Exports of fish, sugar, oil seeds, animal products, and cereal grains are between 10 and 100 million dollars. Total agricultural and food exports from the LDC to the EU amount to just over a quarter of all merchandise exports or US\$2.5 billion in 1999 (Trains 2001). Overall, exports from the LDCs constitute a small fraction of total imports of the EU, suggesting that the impact of the EBA might be small for the EU.

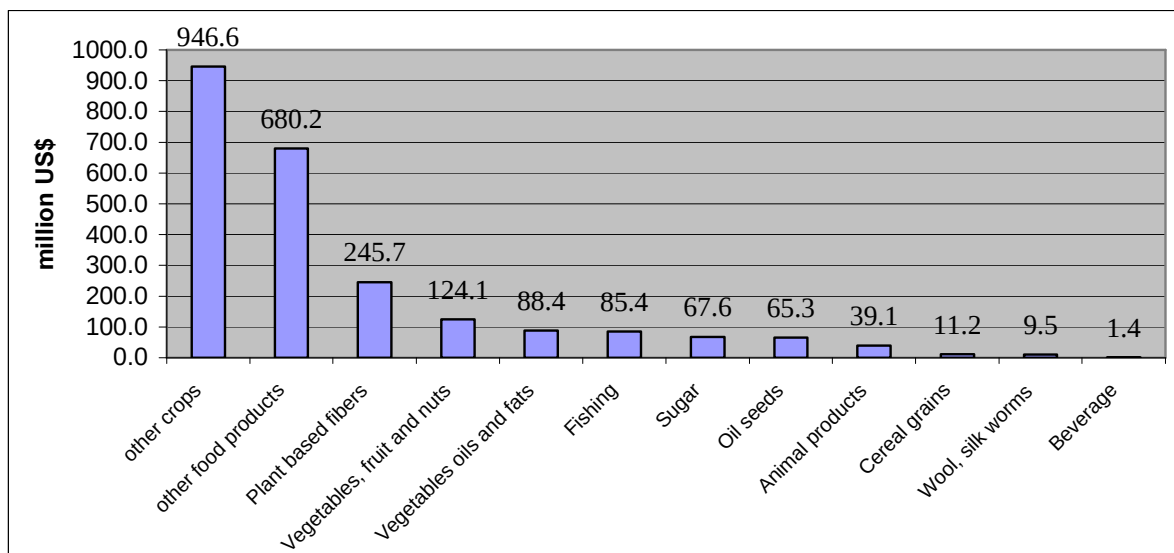


Figure 1 Exports of agricultural products from the LDC to the EU, 1999

Source: UNCTAD Trains database, 2001.

As the EBA only involves a small fraction of the products that are included in the EU Custom (919 HS-8 products), its potential effects on promoting exports from the LDCs are likely to be limited. To illustrate this point, Table 3 provides an overview of the EBA, including its product coverage, tariff concessions (in terms of the differences between pre-EBA average tariff rates and zero), and export values in 1999. Specifically, columns 2,3 and 4 of the table display, respectively, for each product groups, number of total HS6 lines, number of EBA products at HS6 level, and number of EBA products at HS8 level. The last three columns show the corresponding export values of the EBA products and all products, as well as the shares of EBA exports in total exports.

It is natural to begin the discussion with the first row of Table 3, as the product groups (the rows in the table) are ordered by export values of the EBA products. Sugar is by far the largest EBA product, which boosts an export value of over US\$ 67 million in 1999. The first three columns of the table indicate that all the 7 HS-6 sugar items are covered by the EBA and therefore they are all subject to tariff reduction. Pre-EBA tariff rates for the sugar items range from 75 to 103 percent. These indicate that there are substantial potential gains to be reaped when fully implementing the EBA concessions. The reservations by the EU, in the form of gradual removal of these import restrictions on sugar, certainly testify the "sensitiveness" of this product in the LDC-EU trade relationship.

The second row in Table 3 concerns vegetables and fruits. Although the export value of the EBA component of this category (mainly bananas) only accounts for 14 percent of its total trade, still it reaches US\$17 million. However, the fact that the pre-EBA tariff rates are only 2.3 percent indicates that potential gains to the LDC are likely to be much smaller, as compared to sugar. In this sense, the EU's position on applying special treatment on bananas is difficult to understand. The category of other cereal grains is the third biggest EBA category, which covers 9 out of the possible 10 HS-6 lines. In fact, these 9 EBA products claim all the exports for this category. The pre-EBA tariff rates of 37 percent imply that there is much to be gained from the EBA. Other than the above mentioned three product groups, the EBA seems to have minor potential effects, either due to the very low existing export values, or due to the very low pre-EBA tariff rates. Among this latter group, perhaps there is some potential for rice. Pre-EBA tariff rates for rice are over 87 percent and the export value in 1999 is about US\$ 0.4 million. Again, rice is listed as a sensitive product and is subject to a special phasing out clause in the EBA.

Overall, the export value of all the EBA products only amounts to just below US\$100 million in 1999, representing only a 4 percent share in total agricultural and food exports from the LDC to the EU for that year. For several products, such as sugar, cereal grains and rice, there seems to be some scope of further export expansion for the LDCs after implementing the EBA. However, the special arrangement regarding sugar, rice and banana will likely delay such gains. For other EBA products, the tariff rates have already been low and/or the current exports are quite small. Therefore the potential expansion of LDC exports seems to be limited for these products.

Table 3. The EBA: an illustration of product coverage, tariff rates and LDC exports

GTAP categories	Number of HS items			Ave. pre-EBA tariff ⁴	Export of EBA products	Total LDC exports	Share of EBA exports
	Total (HS6) ¹	EBA (HS6) ²	EBA (HS8) ³		1,000US\$	1,000US\$	%
Sugar	7	7	9	75-103	67,618	67,618	100.0
Vegetables, fruit and nuts	89	18	35	2.3	17,203	124,124	13.9
Cereals grains nec	10	9	12	37.1	11,283	11,283	100.0
Vegetables oil and fats	47	7	10	0.2	1,667	88,401	1.9
Food products nec	248	120	290	2.1-2.5	475	680,237	0.1
Beverages	30	9	108	1.2	432	1,379	31.3
Processed rice	2	2	17	87.4	399	399	100.0
Meat products nec	43	33	153	9.7-19.2	378	940	40.2
Bovine meats products	29	19	48	9.7-19.2	217	217	100.0
Animal products nec	48	9	19	2.8-4.5	149	39,055	0.4
Paddy Rice	2	2	16	61.6	38	38	100.0
Dairy products	24	24	165	51.2	21	36	58.3
Bovine cattle, sheep and goats, horses	8	3	14	2.8-4.5	16	16	100.0
Crops nec	62	0	0	0.0	0	946,585	0.0
Plant based fibers	8	0	0	0.0	0	245,746	0.0
Chemical, rubber and plastic	987	5	17	-	0	156,942	0.0
Fishing	40	0	0	0.0	0.0	85,439	0.0
Oil seeds	15	0	0	0.0	0	65,298	0.0
Wool, silk-worm cocoons	6	0	0	0.0	0.0	9,531	0.0
Wheat	2	2	3	-	0	0	n/a
Sugar cane, sugar beet	2	2	3	-	0	0	n/a
Total	1,709	271	919		99,896	2,523,284	4.0

Notes: ¹ Number of total HS6 lines for each GTAP category; ² Number of HS6 lines covered by the EBA (Trains, 2001); ³ Number of HS8 lines covered by the EBA (European Commission, 2000); ⁴ Tariff rates adopted from UNCTAD (2002); ⁵ Total exports of EBA products from the LDC to the EU in 1999 (Trains, 2001); ⁶ Total exports from the LDC to the EU in 1999 (Trains, 2001)

3. Methodology and data

To realize the two objectives of the study, relevant policy scenarios are formulated and experiments are carried out to simulate the possible effects of these scenarios. Due to the multi-regional and multi-sectoral nature of the EBA initiative, we choose to conduct such simulations within a global computable general equilibrium framework. The GTAP model (Chapter 2 of Hertel, 1997) and database are identified as well suited for handling these tasks. The GTAP model is a standard global model that features inter-sectoral linkages through nested Constant Elasticity of Substitution production functions, international trade linkages through the so-called Armington specifications. The demand side of the model is driven by a Constant Difference Elasticity demand systems. Standard neoclassical assumptions such as constant return to scale, perfect competition, profit and utility maximization are applied. With this modeling structure, explicit welfare analysis and decomposition are possible.

The accompanying GTAP database (Dimaranan and McDougall, 2002) is based on detailed regional input-output tables and detailed bilateral trade flows. It gives a snapshot of the world economy at a given time and satisfied the usual equilibrium conditions. Agricultural and food products are well presented in the database. This study applies an aggregated version of the most recent GTAP database, covering 19 regions and 20 sectors. Individual LDCs that are presented in the aggregation are Malawi, Mozambique, Tanzania, Zambia, and Uganda. Other LDCs are largely included in the aggregated Sub-Sahara African (SSA) regions. Most of the agriculture and food sectors are incorporated in the aggregation as individual ones, including paddy rice, wheat, cereal grains, vegetable and fruits, oil seeds, plant fiber, other crops, other animal products, beef, other meats, vegetable oil, dairy, processed rice, sugar, and other processed food products. In addition to these, non-agricultural products are aggregated into natural resources, textile and clothing, manufacturing and services. A complete list of the aggregated sectors and regions is contained in Appendix 2. Agricultural protections are contained in the database in the forms of import tariffs, export subsidies and various domestic support measures (output subsidies, intermediate input subsidies, factor-based payments, etc). Since the existing preferential arrangements between the EU and the LDCs are not adequately represented in the database, we need to adjust the tariff rates in the original GTAP database so that the applicable preferential tariff rates are accounted for. After this adjustment, the starting point of the subsequent simulations contains the same EU-LDCs tariff rates as compiled by UNCTAD (2002), which are listed in the fifth column of Table 3³.

³ This involves using a simulation routine called "ALTERTAX" (Malcolm 1998) to exogenously shock the MFN tariff rates in the GTAP database to the actual preferential rates, while keeping the trade data as close to the original database as possible. Note these pre-EBA tariff rates are taken from the UNCTAD study. We have independently replicated some of the tariff rates using the TRAINS database and reached similar estimates.

Box 1. Policy Scenarios

A. Scenarios associated with the EBA only

Scenario 1 (EBA Scenario)

Reducing EU's import tariffs imposed on all products from the six LDC regions to zero.

Scenario 1B (EBA Scenario without Sensitive Products)

Maintaining EU's import tariffs for the three sensitive products (sugar, rice, vegetable and fruits), while reducing EU's import tariff rates imposed on all other products from the six LDC regions to zero.

B. Scenarios related to preference erosion

Scenario 2 (Market Access Scenario)

Scenario 1, plus reducing EU's import tariff rates imposed on agricultural and food products from all third regions by 50%.

Scenario 2B (Market Access Scenario without EBA)

reducing EU's import tariff rates imposed on agricultural and food products from all third regions by 50%.

Scenario 3 (Export Subsidy Scenario)

Scenario 1, plus removing EU's export subsidies on all agricultural and food products.

Scenario 3B (Export Subsidy Scenario without EBA)

removing EU's export subsidies on all agricultural and food products.

Scenario 4 (Domestic Support Scenario)

Scenario 1, plus reducing all domestic support in the EU by 35%.

Scenario 4B (Domestic Support Scenario without EBA)

reducing all domestic supports in the EU by 35%.

C. Combined WTO scenarios

Scenario 5 (WTO Scenario)

Scenario 1, plus: a) reducing EU's import tariff rates imposed on agricultural and food products from all third regions by 50%; b) removing EU's export subsidies on all agricultural and food products; c) reducing all domestic supports in the EU by 35%.

Scenario 5B (WTO Scenario without EBA)

a) reducing EU's import tariff rates imposed on agricultural and food products from all third regions by 50%; b) removing EU's export subsidies on all agricultural and food products; c) reducing all domestic supports in the EU by 35%.

4. Policy Scenarios and Results

Three sets of policy scenarios are simulated using the GTAP model and the adjusted database, as illustrated in Box 1. The first set of scenarios considers the potential effects of the EBA.

Specifically, Scenario 1 (called the EBA Scenario) is a simple comparative static scenario where EU's import tariff rates for all commodities from the six LDC regions are shocked to zero. Note that the tariff cuts are not identical across products. In fact, according to Table 3, the biggest cuts are for sugar, cereal grains, processed rice, dairy, and the livestock sectors. Scenario 1 deviates from the actual EBA agreement in that the duty-free and quota-free access granted to the LDCs are achieved simultaneously and instantaneously for all the products, whereas in the actual EBA initiative the targets for sugar, rice and banana are to be achieved gradually. To highlight the significance of the sensitive products, Scenario 1B is conducted. Under 1B, pre-EBA tariff rates for the sensitive products are maintained while those of other agricultural and food products are cut to zero.

The second set of scenarios (Scenarios 2, 3, 4 and 2B, 3B, 4B) is intended to illustrate how the EBA preferences are "eroded" in the presence of a series of "plausible" WTO trade liberalization scenarios, in which the EU reforms its trade policies in three major negotiations areas⁴. In Scenario 2, in addition to the EBA shocks (as in Scenario 1), the EU cuts import tariff rates for imports from all third countries by 50 percent. This is termed "*market access scenario*". In Scenario 3, in addition to the EBA shocks, the EU also removes all its export subsidies. This is termed "*export subsidy scenario*". In Scenario 4, in addition to the EBA shocks, the EU also reduces all its domestic support measures by 35 percent⁵. This is termed "*domestic support*" scenario. Each of these scenarios reflects the joint impacts of the EBA and the possible reform in the corresponding area of negotiations. In order to understand how much of the joint impact can be attributed to the various WTO reforms, three extra scenarios are constructed to show their individual impacts. These scenarios are named Scenario 2B, 3B, and 4B, or more accurately, market access scenario without EBA, export subsidy scenario without EBA, and domestic support scenario without EBA. It can be readily seen that the results of Scenario 2 are simply the combined results from Scenario 1 and Scenario 2B. The same relationship holds for Scenarios 3 and 4.

The last set of scenarios (Scenario 5 and 5B) is conducted for showing the combined impact of reforms in all the three negotiation areas. In Scenario 5, the reforms in market access, export subsidies, and domestic support are carried out simultaneously, together with the EBA shocks. In Scenario 5B, the impacts of the WTO reforms are considered separately.

4.1 Potential gains from the EBA (scenario 1)

4.1.1 Effects on trade and production

Table 4 presents percentage changes in LDCs' exports to the EU and the corresponding post-EBA export values. These are the results from the Scenario 1. Not surprisingly, exports increase the most for the sectors with the highest tariff cuts, especially for wheat, cereal grains, meats, dairy, rice and

⁴ These scenarios are formulated based on a recently released policy paper on the proposed negotiation "modalities" by the Chair of the Agriculture Committee of the WTO (Danish Research Institute of Food Economics, 2003).

⁵ We choose a simplistic approach to implement the reduction of domestic support in the EU. As the GTAP database breaks down total domestic support into output subsidies, intermediate input subsidies, and land and capital based subsidies, we shock all these instruments by 35 percent to achieve the overall reduction target. As different instruments have different effects, other approach may achieve different results.

sugar. The most notable changes are for sugar, whose exports reach US\$113 million, 180 million, 164 million and 423 million in Malawi, Tanzania, Zambia and Sub-Sahara African, respectively. Due to the fact that pre-EBA exports of wheat, cereal grains and dairy were quite low, high percentage changes in exports (shown in the upper panel of Table 4) do not translate into significant increases in value terms. As can be seen from the middle panel, post-EBA export values for these sectors remain quite small. In contrast, exports of the products with smaller tariff cuts decrease slightly, reflecting strong inter-sectoral resource reallocations in the LDC countries. These products include oil seeds, plant fiber, other crops, and vegetable oil.

The production patterns in the LDCs are similarly impacted by the EBA. As can be seen in Table 4, output of sugar increases dramatically—in Malawi and Zambia, it is more than doubled, whereas in Mozambique, Tanzania, and Sub-Sahara Africa, it is increased by more than 10 percent. Outputs for rice and cereal grains also increase in most LDCs. On the other hand, decreases in some other products are also observed, especially plant fiber and other crops. This is because the sharp decreases in their exports dampen total demand for these products. Also, expansion of outputs in other sectors leads to outflow of resources from these sectors. Aside from the above-mentioned products, output changes in other products vary across countries. Most of these changes are quite small and can be attributed to the changes on the export side.

Table 4. Exports from LDCs to the EU: quantity changes and post-EBA values

	Wheat	Cereal grains	Veg & fruit	Oil-seeds	Plant fibers	Other crops	Oth. animal prod.	Bovine meats	Other meats	Veg oil	Dairy	Rice	Sugar	Proc. Food prod.
Changes in export quantities, percent														
Mwi	240.3	238	-5.1	-12	-9.6	-11.4	-1.3	24.1	24.7	-14.9	417.2	1120.1	679	-6.8
Moz	280.9	277.2	5.6	-2.5	-2.4	-4.2	13.4	43.1	43	-2.5	492.4	1287.6	858.6	7
Tza	256.7	241.9	-3.5	-13.9	-8	-12	-17.1	35	34.8	-9.2	434.7	1145.6	1562.1	-3.1
Zmb	300.5	227.4	-7.4	-23.1	-15.1	-19.3	-6.3	28.6	28.4	-15.1	449.1	1197.4	517.2	-1.2
Uga	295.7	291.9	8.9	-1.4	-0.6	-0.7	18.2	113.9	113.6	-0.2	506.4	1344.8	1145	8
SSA*	289.6	286.1	7.4	-2.6	-1.8	-2	18.7	75.3	75.1	-1.3	500.4	1319.9	895.1	7.4
Post-EBA export values, US\$ million														
Mwi	0	0.7	0.9	0.3	0.5	182.9	0.5	0	0.1	0	0.2	0	113.1	0
Moz	0	0.4	2.1	4.4	19.6	1.2	0	0	0	0	0	0.1	4.5	0.1
Tza	0	16.2	7.6	0.7	16.4	123.5	3.6	1.4	2.8	1.2	0.2	4.3	180.8	2.3
Zmb	0	1	7.2	0	0.2	20	0.3	0.1	0.3	0.1	0	0.4	164.3	0
Uga	0	0.2	5.5	0.1	11.5	312.7	2.9	0.6	0	0	1.7	0.4	1.3	0
SSA	0.7	14.6	617.9	53.4	362.9	2568.2	58.1	5.3	3	232.4	3.3	113.9	432.7	8.8
Changes in outputs, percent														
Mwi	0.3	0.4	0.1	-4.1	-9.6	-8.4	3.3	-0.3	0.1	0	0.8	-0.7	397.1	0.4
Moz	-0.5	0.2	0	-1.2	-2.4	0.1	0.5	-0.9	0.1	-0.4	-1.6	0	16.3	1.1
Tza	-1.9	1.2	-2.1	-1.4	-7.7	-3.1	-0.2	0.7	0.7	-5.4	0.7	6.4	39.3	-0.3
Zmb	3.5	0.1	-1.1	1.6	-5.9	-0.4	0.3	-0.3	-0.1	-0.2	0.2	0.5	268.4	-0.1
Uga	0.1	0.1	0	0	-0.4	-0.6	0.3	0.9	0.1	-0.3	0.5	1.3	1.4	1.5
SSA	0.3	0.4	0.7	-0.1	-1.1	-0.8	0.3	0.3	0	-0.2	0.1	0.9	14.8	1

Source: simulation results.

Note: the abbreviations Mwi, Moz, Tza, Zmb, Uga and SSA refer to, respectively, Malawi, Mozambique, Tanzania, Zambia, Uganda, and Rest of Sub-Saharan Africa.

Table 5. Changes in exports from the rest of the world to the EU, percent

	<u>AUS& NZL</u>	<u>Japan</u>	<u>ASEAN</u>	<u>SAARC</u>	<u>East Asia</u>	<u>United States</u>	<u>Canada</u>	<u>Latin America& Caribbean</u>	<u>E.Eur. & FSU</u>	<u>Middle East</u>	<u>Rest of Africa</u>
Wheat	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0
Cereal grains	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	-0.7
Veg/fruit	-0.3	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Oils seeds	-0.1	0	0	0	0	0	0	0	0	0	0.1
Plant fibers	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6
Other crops	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Oth. animal prod.	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1
Bovine prod.	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0
Other meats	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Veg oil	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0
Dairy	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Rice	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
Sugar	-15.6	-15.6	-15.6	-15.6	-15.5	-15.6	-15.6	-15.5	-15.6	-15.6	-15.5

Source: simulation results.

These results clearly show that the LDCs have some comparative advantage in the production of some products, especially sugar. With the implementation of the EBA, they also have some potential to export these products. Moreover, as the LDCs' exports constitute only a small share of the EU's total imports, the impact of the EBA on the EU and the rest of the world appear to be quite insignificant. This is evident from Table 5, where percentage changes in other regions' exports into the EU are presented. In general, other regions' exports into the EU only decrease slightly (in the range of 0.1 to 0.8 percent), except for rice and sugar, where notable decreases are observed. For example, exports of sugar from other regions to the EU decrease by over 15 percent. For a few products such as plant fiber and other crops, exports from other regions to the EU actually increase slightly, due to the decreases of exports from the LDCs.

4.1.2 Macroeconomic and welfare effects

Implementing the EBA leads to welfare improvement for the LDCs. The left panel of Table 6 shows percentage changes in utility and GDP, as well as total welfare changes in terms of equivalent variation (EV) for the LDCs and the EU. Percentage changes in GDP range from 4.7 percent in Malawi, 2.4 percent in Zambia, to 1.1 percent in Mozambique and 0.5 percent in Sub-Saharan Africa. Changes in utility level range from 1.2 percent in Malawi to 0.1 percent in Sub-Saharan Africa. In monetary terms, welfare gains are the highest in Sub-Saharan Africa (US\$169 million), followed by Tanzania (US\$59 million), Malawi (US\$30 million), Zambia (US\$11 million), Mozambique (US\$8 million) and Uganda (US\$2.4 million). Clearly, welfare gains in dollar terms are quite limited.

These changes in welfare can be mostly attributed to allocation efficiency effects and terms of trade effects. Allocation efficiency is improved for the LDCs countries due to the reallocation of resources to the products with more trading possibilities, while terms of trade improve with higher relative exporting prices. Both of these effects are directly linked to the unilateral removal of import tariffs by the EU on a number of agricultural and food products. Table 6 shows that all the LDCs benefits from terms of trade improvement and in most LDCs this effect dominates the total welfare results. For example, over US\$ 117 million of the total US\$ 169 million gains for Sub-Saharan

Africa are due to improved terms of trade. Allocation efficiency also improves for all LDCs but Zambia, which suffers an efficiency loss of over US\$13 million⁶.

Table 6. Macroeconomic and welfare effects for the LDCs and the EU

	EBA					EBA without sensitive products				
	Changes in GDP (%)	Chng in utility (%)	Efficiency (\$ mil)	TOT (\$mil)	Total welfare (\$mil)	Changes in GDP (%)	Chng in utility (%)	Efficiency (\$ mil)	TOT (\$mil)	Total welfare (\$mil)
EU	0	0	-2.2	-178.5	-184	0	0	0.7	-30.3	-30.8
Malawi	4.7	1.2	9.5	22.7	30.4	0.1	0	0.1	0.3	0.3
Mozambique	1.1	0.3	1.3	3.8	8.5	0.7	0.2	0.8	2.5	5.4
Tanzania	3.5	0.9	15.2	32.2	59.7	0.4	0.1	1.1	3.6	5.9
Zambia	2.4	0.3	-13.5	26.1	11.3	0	0	-0.1	0.1	0
Uganda	0.3	0	0.2	1.5	2.4	0.2	0	0.1	0.9	1.3
Sub-Sahara Afr.	0.5	0.1	29.4	117.5	169.2	0.1	0	8.9	27.6	41.8
World	39.7		39.7	-1.3	38.2			10.3	0	10.2

Source: simulation results.

For the EU, a total welfare loss of US\$184 million occurs, almost entirely due to the unfavorable terms of trade effects resulted from the unilateral tariff cuts. However, this loss is inconsequential to the EU and in fact, there are no noticeable losses in either its utility or real GDP. Most of the third regions (not shown in the table) experience very minor losses in welfare but no noticeable declines in either utility or GDP, signaling that the trade diversion effects are quite small. The aggregated welfare effects of US\$38 million for the whole world appear to be positive but very small.

4.1.3 Role of the sensitive products

As the results indicate the importance of the three sensitive products (sugar, vegetables and fruits, and rice) for the LDCs, we conduct Scenario 1B to explicitly highlight the importance of these products in the EBA agreement. In this simulation, pre-EBA tariff rates for the sensitive products are maintained while those of other agricultural and food products are cut to zero.

Under Scenario 1B, total welfare gains are reduced markedly (presented in the right panel of Table 6). Except for Sub-Sahara Africa, all the other LDC regions have welfare gains below US\$6 million. For Sub-Sahara Africa, the gain of US\$ 41 million is less than a quarter of the welfare gains under the EBA scenario, whereas for Malawi and Tanzania, the gains are less than 10 percent of those under the EBA scenario. A decomposition of the welfare results show that except for Sub-Sahara Africa, there are no significant allocation efficiency gains and terms of trade effects are also minimal. In terms of utility and GDP, all the six LDC regions experience less than 1 percent increases.

In light of these results, the EBA initiative is not likely to generate significant welfare gains for the LDCs, due to its limited product coverage and its limited tariff concessions. Furthermore, a great deal of the gains will likely come from the three sensitive products that are subject to lengthy implementation, especially sugar. Lastly, the negative impact on the EU and third countries seems

⁶ This is mainly due to the presence of an output tax on manufacturing goods in Zambia. Reduced manufacturing output leads to a loss of tax revenue.

to be quite small, indicating that granting duty and quota free access to the LDCs does not cost the EU as well as the third countries.

4.2 Preference erosion and impact of possible WTO reform scenarios (scenarios 2-4)

The attractiveness of the EBA initiative and its predecessors is made possible by the protection measures that the EU maintains against other exporters. In fact, the multi-instrument Common Agricultural Policy (CAP) of the EU pushes internal EU prices much higher than the prevailing world market prices. The CAP consists of export subsidies, high import tariffs and quantitative restrictions (import quotas specified in Tariff Rate Quotas—TRQs for various products and production quotas), as well as domestic support measures that are directly linked to outputs of or inputs and factors used in agricultural sectors. With the EBA and its predecessors (ACP and GSP preferences), the LDCs are able to exploit the higher internal EU prices, thereby gaining preferential advantages over low cost producers in the rest of the world. Take sugar, the central piece of the EBA initiative, as an example. The EU sugar regime features restrictions on imports through high import tariff, domestic intervention price and production quotas within the EU, and preferential access to the EU market through Tariff Rate Quotas to the ACP countries (Frandsen et al., 2003). This policy results in an internal EU sugar price of about one or two times higher than the world market price (EC, 1998 *The Agricultural Situation in the European Union*). As a consequence of this policy, the EU is a major exporter of sugar in the world market, and some of its members maintain production capacity of sugar beets under unsuitable weather condition.

The ongoing WTO agricultural negotiation and the imminent enlargement of the EU pose serious pressure on the EU to reform the CAP. On the one hand, many WTO members exert pressure on the EU to cut import tariff, export subsidies and trade-distortion domestic supports (see FOI, 2003 for a summary of negotiation positions of key WTO members). On the other hand, extending the same supports as enjoyed by the existing EU members to the newly admitted ones would put serious pressure on the EU budget. Against this background, it is conceivable that the EU will at least partially reduce these trade-distortion measures, thereby effectively reducing the preference margins applicable to the LDCs. In this section, we conduct further simulations to investigate how the preferences margin as granted by the EBA would diminish under a series of "plausible" WTO scenarios. The results of these scenarios will demonstrate the cost associated with keeping the preferences meaningful.

As illustrated in Box 1, Scenarios 2, 3, and 4 explores respectively the joint impact of the EBA and possible reforms in the three negotiation areas, whereas Scenario 5 shows the combined impact of the EBA and the reforms in the three areas. In addition, for each of the above-mentioned scenarios, a supplementary scenario is conducted to separate the impact of the various WTO reforms. These scenarios are labeled as Scenarios 2B, 3B, 4B, and 5B accordingly. In the presentation of the results below, we discuss mainly the combined results from the WTO reforms and the EBA initiative, by which the "erosion" of the EBA preferences is illustrated. These are the results from Scenarios 2-5. Where needed, we also draw out the results from the EBA scenario (Scenario 1) and the supplement scenarios (scenario 2B, 3B, 4B and 5B) to explain how the presence of WTO reforms reduce or erode the gains from the EBA.

4.2.1 Impact of market access reform in the EU (scenario 2)

Reducing tariff rates on imports from all trading partners except the LDCs by 50 percent (Scenario 2B) will reduce the composite domestic prices of imports in the EU, more than under the EBA scenario, due to the small share of imports from the LDCs in total EU imports. This leads to an increase in total imports into the EU. However, preferential margins available to the LDCs are reduced significantly and exports from these countries face more competitions from the third countries. The competition is most fiercely for vegetable and fruits, other food, plant fiber, other crops, other animal products, beef, and vegetable oil. Due to the fact that the EBA does not offer any further tariff reductions for many of the above-mentioned products to the LDCs, whereas other countries receive quite significant concessions from the EU, the LDCs lose some of their export market shares for these products.

These negative impacts on LDCs greatly reduce the expansion effects from the EBA (Scenario 1), as can be seen from the combined effects of the market access reform and the EBA (Scenario 2, reported in Table 7, upper left panel). For many products, exports from the LDCs to the EU actually decrease. For example, SSA's exports of vegetable and fruits, and other crops decrease respectively by 2.4 and 4.4 percent, indicating a worse-off situation as compared to the pre-EBA case. For other agricultural products, such as wheat, cereal grains, dairy, and sugar, even though the preference margins offered by the EBA remain positive for these products, other major exports are able to increase their exports to the EU as well. As a result, exports from the LDCs increase at much slower paces than in the EBA scenario. To see this, one can compare the percentage changes in the EBA (Scenario 1, shown in Table 4) and Scenario 2 (Table 7). For the case of sugar, exports originated from SSA increases by less than 600 percent in Scenario 2, as compared to nearly 900 percent increase in Scenario 1.

In terms of welfare, all LDCs are worse off, either due to deteriorations in allocation efficiency or terms of trade or both (see upper left panel of Table 8). Take SSA as an example. Total welfare changes in this region will be reduced from a gain of US\$169 million in the EBA Scenario to a loss of US\$ 25 million in Scenario 2. For the other LDC countries, welfare results in Scenario 2B are moderate but negative, thereby reducing the gains from the EBA scenario and resulting in welfare losses or smaller gains for these regions. To understand these welfare results, we focus on the negative export price effects, which dominate the total terms of trade effects. These negative export price effects are due to two reasons. Consider the case of Scenario 2B. On the one hand, MFN tariff cuts by the EU lead to a substitution away from imports originated from the LDCs in Scenario 2B and relatively smaller increases in imports from the LDCs in Scenario 2. This point can be illustrated by the smaller percentage increases shown in the upper left panel of Table 8, as compared to the corresponding changes contained in Table 6. On the other hand, the preferential access granted to the LDCs actually "traps" the exports from the LDCs and prevents them from shifting to other markets, thereby dampening the prices of LDCs' exports. This is supported by the simulation results (not shown here) that increases in LDCs' exports into other markets are quite limited.

For the EU, effects of the market access reform as carried out in scenario 2B far exceed that of the EBA initiative alone. Instead of maintaining their import patterns more or less unchanged as under the EBA Scenario, in Scenario 2 the EU experiences quite significant import increases in those sectors that are currently protected with very high tariff rates. For example, imports for beef, sugar and rice all increase by over 20 percent (shown in the upper left panel of Table 7). Accordingly,

outputs of these products decrease in the EU. The last column of the upper left panel of Table 7 shows that outputs for rice and sugar decrease by 18.3 and 8.7 percent, respectively. The net welfare results for the EU are positive in Scenario 2B and are negative when the effects of the EBA are accounted for (i.e., Scenario 2). In either case, allocation efficiency gains are partially or completely canceled out by terms of trade losses, resulting in very marginally total welfare changes. The effects on the third countries are positive and many times over the potential losses to the LDCs. In fact, the worldwide welfare gain will be more than US\$10 billion with or without considering the effects of the EBA. This number clearly suggests an overwhelming benefit of the market access reform to the world, despite that it might impact the LDCs negatively by eroding the trade preferences granted to them.

4.2.2 Impacts of eliminating export subsidies in the EU (scenario 3)

Eliminating export subsidies in the EU (Scenario 3B) leads to an increase in prices for EU's exports, especially for the products with significant subsidies, namely, wheat, cereal grains, rice, beef, other meats, dairy and sugar. This in turn reduces EU's exports of these products to the world market and at the same time pushes up the corresponding world market prices as the EU is a "large" trader in the world market. Accordingly, outputs of these products in the EU decrease. For products with little or no subsidies, this reform is actually favorable and expands their outputs as they absorb resources that move out of the previously subsidized sectors. Consequently, exports of these products actually increase. These effects are also generally observed in the results of the combined scenario of removing export subsidies and implementing the EBA (i.e., Scenario 3). The upper right panel of Table 7 shows the opposite movements of outputs of different products in the EU under Scenario 3. For example, outputs for oil seeds and plant fiber increase by just below 1 percent, while that for sugar decreases by over 10 percent. Overall, total exports and outputs in the EU decrease and world market prices increase.

From the results of Scenario 3, it is observed that the decline of exports from the EU (not shown here), in terms of percentage points, far exceeds that of outputs in the EU (last column of upper right panel in Table 7), which implies that a significant portion of the outputs must be sold within the EU, suggesting a possible substitution of imported products with domestically produced products. In this case, those products that would be exported now compete for EU's domestic market against imported products. This substitution happens due to the Armington specification used in the GTAP model, which defines imported and domestic products as imperfect substitutes. When world market prices rise because of less export from the EU, the "home bias" structure results in less imports into the EU, thereby generating this seemingly paradoxical result, i.e., trading partners of the EU does not gain directly from the EU's removal of export subsidies. From Table 7, we can see that except for sugar and rice, total imports for all other products decline by up to 1.5 percent⁷.

Although their exports to the EU are adversely impacted by the removal of its export subsidies, net food exporting countries are generally able to redirect their exports to markets other than the EU and in some cases increase exports to these markets. The EU itself enjoys positive welfare gains of nearly US\$3.8 billion (shown in Table 8) as a result of removing its export subsidies, due to gains

⁷ It is worth of noting that in both Scenario 3 and 3B, tariff barriers are maintained for the EU, by which the EU producers are protected from more competitions. Removing the tariffs would no doubt lower the import prices in the EU market and would lead to more imports.

from both allocation efficiency and terms of trade. The negative effects for the EU caused by the EBA will only marginally reduce this gain to over US\$3.6 billion.

The impact on the LDCs is quite different from the EU. Higher import prices for agricultural products lead to terms of trade losses for the LDCs. Again, we use SSA as an example. From Table 8 we can see that under Scenario 3B, SSA suffers terms of trade losses of over US\$163 million from higher import prices due to its position of a net importer. The gains from the EBA are not enough to offset the negative welfare results caused by the removal of EU's export subsidies. In fact, the combined effects of the EBA and the removal of EU's export subsidies (i.e., Scenario 3) remain negative for the SSA. Due to their trade patterns with the EU and the world, the other LDC countries are affected marginally by this reform. The combined welfare effects under Scenario 3 are positive but slightly small less than that of the EBA alone.

4.2.3 Impact of domestic support reform in the EU (scenario 4)

Reducing different types of domestic support measures has different effects on producers in the EU. For example, reducing output subsidies for a product will in general raise its price, which in turn puts downward pressure on its outputs. A reduction of intermediate input subsidies tends to cause significant substitution among different inputs and in general also impacts its final outputs. Land and capital based payments are among the most important policy instruments within the framework of the CAP. Reductions of these payments will push down the rental prices of land and capital and cause significant reallocations of these factors. The exact effects of this reform depend on both the quantities of the existing supports and their distribution across different instruments and different products. These impacts on the EU will also be felt on the world market through changes in trade pattern changes and terms of trade.

The results of Scenario 4 confirm the above discussion. On the input side, it is found that resources generally move out of agriculture, and that the prices of factors that are specific to agriculture, such as land, drop significantly. On the output side, the net effects of reducing these domestic support measures vary across products. Prices of wheat, grains, oil seeds, and meats and animal products increase significantly, whereas prices of vegetable and fruits, plant fiber, other crops decrease. Prices of rice, sugar and dairy also decrease, but to a less degree. Outputs of the first product group decrease (shown in the lower left panel of Table 7), whereas that for the second group goes up. The most notable output decreases happen in oil seeds (over 16 percent, according to Table 7), followed by wheat and grains (over 8 percent), whereas outputs for vegetable and fruits, and other crops increases by 3.5 and 4.2 percent, respectively. World market prices change accordingly, although not as significant as changes in domestic prices in the EU, due to the fact that other major exporters adjust their production and trade so as to absorb some of the shocks to the world market prices.

For the LDCs, as the world market prices of some of their key exporting goods (such as vegetable and fruits, other crops, rice and sugar) drop, the gains from the EBA diminish. This is especially the case for SSA, which is by far the largest exports among the LDCs. Under Scenario 4B (domestic support reform only), SSA suffers considerable terms of trade losses, particularly due to the unfavorable price effects in wheat, grains, and other crops. In monetary terms, domestic support reform in the EU will lower the welfare of SSA by over US\$140 million (lower left panel of Table 8), resulting in a combined welfare gain of only US\$ 27 million under Scenario 4 (i.e., implementing the EBA and the domestic support reform at the same time). For most other LDC

countries, the negative impacts of the domestic support reform seem to be limited and are not enough to offset the gains from the EBA.

The EU is understandably gaining significantly from the domestic support reform through budgetary savings and by using resources more efficiently. Its terms of trade also improve, adding to a total welfare gain of nearly US\$10 billion when the loss from the EBA is not considered (Table 8). Other regions are affected negatively, mainly due to terms of trade losses from the higher world market prices. Overall, the world would enjoy a welfare gain about US\$578 million from the EU's domestic reform alone, which far outstrips the combined welfare results from the EBA alone. When the net effects of the EBA are included (as in Scenario 4), the welfare gain worldwide is about US\$582 million.

These results support the hypothesis that domestic reform by the EU will reduce high EU prices in some key commodities that hold special interest to the LDCs. Consequently this reduces the terms of trade gains from the EBA for the LDCs. Still, these losses to the LDCs appear to be quite small compared to the overall gains achieved. The EU stands to gain significantly from such a reform and as such, the losses to the LDCs can be compensated through some forms of transfer.

4.3 Welfare cost associated with maintaining meaningful preferences for the LDCs (scenario 5)

The above results demonstrate that the benefits of the EBA to the LDCs would diminish or even totally disappear, should the EU carry out a series of "plausible" WTO reforms. As a summary of the three individual experiments, the last panel of Table 8 reports the welfare results of implementing the three reforms simultaneously with the EBA. It is shown that simultaneously implementing the three reforms will contribute to welfare losses for all the LDCs concerned in the study, especially for the SSA, which will suffer a loss of over half billion US dollars, thereby turning the gains obtained from the EBA scenario to a loss of nearly four hundred million US dollars under Scenario 5 (when the EBA and the three reform scenarios are implemented at the same time, see results in Table 8). Therefore, our results justify the concerns of preference erosion and the fear of marginalizing the interests of the LDCs in the WTO negotiations. As the EBA initiative aims at eliminating tariff and quantitative restrictions imposed on LDCs exports, there will be nothing more for the EU to offer the LDCs along the line of the preferential treatment.

Certainly, maintaining the existing protection measures in the EU unchanged would be an option to keep these preferences meaningful. However, this option entails an enormous cost that distorts the world trade and harms the economic welfare of the whole world. Our results (Table 8) show that the worldwide welfare gains from the "plausible" WTO scenario (the three reforms combined) amount to nearly US\$15 billion! In fact, most regions covered in this study gain from such a move by the EU, with the EU itself being the biggest beneficiary with a welfare gain of nearly US\$13 billion. The LDCs, the Mid-East and North African region, and Japan are the lone losers under this scenario. As discussed in details in the three previous subsections, about two-third of the total welfare gains come from the conjectured market access reform by the EU, whereas the domestic support reform provides much of the remaining one-third of the total gains. Removing export subsidies does not seem to generate significant gains for the rest of the world. However it does add to the welfare of the EU. Since these gains cannot be achieved if the EU wants to keep the preferences meaningful to the LDCs, the world would have to forgo welfare gains of 15 billion dollars for the sake of keeping the preferences meaningful. Our results have shown that the additional benefits offered through the EBA will only amount to a small fraction of the above-

mentioned gains. For the EU to forgo the benefits at such a scale for itself and for the world at large would be difficult to justify from a purely economic perspective.

While the study shows that the worldwide welfare effects from WTO trade liberalization far exceeds the potential harms to the LDCs, the question remains unsolved from the LDCs' perspective: how to protect the interests of these poor countries when the rest of the world stands to further gain from the new round of trade liberalization. The notion that just because the losses of the LDCs are small they can simply be neglected and forgotten is certainly not acceptable. On the contrary, this issue has received ample attention during the Doha meeting. In fact, as agreed by the WTO members in the Doha ministerial Declaration, the interest of the LDCs within the overall objective of multilateral trade liberalization has been explicitly stressed. The difficulty raised in this paper, however, is that they conflict each other, i.e., multilateral liberalization might diminish the benefits of special and differential treatment while the later could slow down the progress of the former. Facing this dilemma, one has to realize that trade policy is only one of many possible handles to deal with economic development in the LDCs. In many cases, a set of policies should be implemented simultaneously. For example, the EU, with all the potential welfare gains from reforming its protection measures, can team up with other developed countries to compensate the LDCs for the possible losses. This compensation can be offered as, among other forms, development aid that targets various supply side constraints that prevent the LDCs from effectively competing in the world market. For example, in the case of the Sub-Sahara African region, our analysis shows that there are potentials for these countries to export sugar, vegetable and fruits, other crops, rice and plant fibers. Therefore, the EU and other developed countries can target their development aid to these sectors in order to boost their productivities. Productivity gains in these sectors will no doubt boost export performance of these sectors.

5. Concluding remarks

Our investigation of the EBA initiative shows that it only covers a limited number of products, mainly food and agricultural goods (including sensitive products such as sugar, rice and bananas). In addition, current exports of these products from the LDC to the EU are quite limited. Therefore, we only expect some positive effects for the EBA products in the concerned LDC countries. Given the limited scope of the agreement and the preferences granted in the past, it is unlikely that this initiative will generate sizable gains at the macro-level. As shown by our analysis, total welfare gains from such a move are less than US\$ 300 million for all the LDCs. Further, a great deal of the gains will come from the three sensitive products that are subject to lengthy implementation period, especially sugar. Lastly, the negative impact on the EU and third countries seems to be quite small, indicating that granting duty and quota free access to the LDCs does not cost the EU very much and does not pose a big threat to exports from the third countries.

Multilateral trade liberalization under the auspice of WTO requires that the EU reduce its distortionary protection measures. It is these measures that support the high EU domestic market prices and that keep the preferences attractive to the LDCs. Our further analysis demonstrate that the preference margin as well as gains from these preferences will be greatly diminished under a series of "plausible" WTO scenario in which the EU cuts its market access barriers, export subsidies and domestic support measures. In fact, most LDCs will suffer welfare losses under such scenarios. These results suggest that further trade liberalization actually harms the LDCs. However, using this result as an argument for maintaining EU's (and other countries') protections and for opposing the WTO route toward trade liberalization would cause much bigger potential welfare losses to the

whole world and ultimately would harm the LDCs in the long run. The WTO scenarios are shown to generate sizable gains for the world in general, which far exceed the potential losses to the LDCs. The losses to the LDCs can be easily recouped through effective development aid and investment, through which these poor countries can greatly improve their supply capacity, thereby enabling them to compete effectively in the world market.

Table 7. Changes in import and output in the EU under various WTO scenarios, percent

Market access scenario (scenario 2)									Export subsidy scenario (scenario 3)								
Imports from LDCs							Total import	Total output	Imports from LDCs							Total import	Total output
	Mwi	Moz	Tan	Uga	Zam	SSA*	EU	EU	Mwi	Moz	Tan	Uga	Zam	SSA	EU	EU	
Wheat	171.2	200.0	177.6	203.0	197.2	200.3	4.1	-7.6	231.0	266.0	245.2	283.6	288.7	272.6	-1.2	-3.3	
Cereal grains	184.8	215.2	185.6	219.0	176.7	214.0	0.8	-5.5	225.4	260.5	227.3	276.1	215.8	268.2	-1.5	-7.1	
Veg/fruit	-10.8	-2.0	-10.5	-1.2	-12.6	-2.4	1.3	-2.8	-6.2	3.7	-5.0	7.3	-8.3	5.3	-0.4	0.4	
Oil seed	-8.4	-0.8	-9.9	0.5	-16.5	-0.9	-2.4	1.2	-12.1	-2.9	-14.2	-1.6	-22.9	-3.5	-0.6	0.9	
Plant fibers	-7.5	-0.5	-6.9	-0.1	-11.3	-1.1	-2.9	0.0	-9.1	-2.3	-7.7	-0.2	-14.5	-2.0	-0.2	0.9	
Other crops	-11.7	-4.0	-12.1	-3.1	-17.2	-4.4	-1.4	0.2	-12.1	-5.6	-13.0	-1.7	-19.7	-3.5	-0.9	0.7	
Other animal prod.	-7.2	5.4	-23.1	5.8	-12.4	6.4	0.6	-2.8	-2.7	10.6	-18.6	16.0	-7.5	15.4	-1.1	-0.4	
Bovine prod.	-9.2	2.8	-3.6	49.0	-8.2	22.1	25.1	-6.5	23.9	41.6	34.3	112.6	28.3	73.2	-0.5	-1.5	
Other meats	21.1	36.6	27.9	98.1	21.8	62.2	3.6	-1.0	24.2	41.2	33.8	111.9	27.8	72.6	-0.2	-0.4	
Veg oil	-17.5	-8.0	-14.2	-7.3	-18.0	-8.1	2.1	-1.5	-15.0	-3.2	-9.6	-0.6	-15.2	-2.2	-0.5	-0.1	
Dairy	368.7	426.7	378.7	430.7	386.5	424.2	8.2	-2.6	412.0	477.0	420.1	496.7	442.8	476.2	-0.7	-2.7	
Rice	640.8	733.5	652.3	731.5	669.2	729.8	20.4	-18.3	1121.8	1278.2	1141.6	1337.2	1198.2	1310.7	2.7	-6.5	
Sugar	461.4	564.4	1065.1	756.3	367.7	582.4	36.3	-8.7	662.4	832.0	1521.0	1110.6	506.5	861.9	7.7	-11.4	
Domestic support scenario (scenario 4)									Combined scenario (scenario 5)								
Imports from LDCs							Total import	Total output	Imports from LDCs							Total import	Total output
	Mwi	Moz	Tan	Uga	Zam	SSA	EU	EU	Mwi	Moz	Tan	Uga	Zam	SSA	EU	EU	
Wheat	413.2	454.4	419.5	498.6	473.6	466.1	3.9	-8.1	274.0	297.3	270.2	318.3	291.3	294.8	7.8	-19.1	
Cereal grains	417.5	462.2	404.1	508.9	382.8	475.9	3.4	-8.4	299.6	330.3	287.0	352.5	276.8	327.4	2.9	-19.5	
Veg/fruit	-11.1	-3.7	-12.3	2.8	-16.0	-1.8	-1.1	3.5	-16.3	-10.4	-18.3	-6.8	-20.1	-10.9	-0.3	0.8	
Oil seed	12.4	19.2	7.2	28.5	-4.6	21.5	9.1	-16.2	16.5	21.2	11.9	29.9	4.0	22.7	5.5	-14.2	
Plant fibers	-8.3	-2.8	-9.0	1.8	-16.2	-2.1	-0.9	1.9	-6.0	-0.7	-7.4	2.3	-11.5	-1.4	-3.6	2.1	
Other crops	-16.2	-11.0	-18.3	-3.9	-25.6	-8.5	-2.4	4.2	-16.6	-11.1	-18.4	-6.8	-23.2	-11.3	-4.0	4.2	
Other animal prod.	20.3	33.6	-3.2	45.5	8.8	39.6	2.4	-1.7	11.5	22.3	-11.2	28.1	1.2	22.6	2.1	-5.2	
Bovine prod.	36.1	53.6	43.9	136.2	36.4	87.4	1.0	-0.8	-1.8	8.6	1.7	61.9	-3.4	28.2	26.5	-9.0	
Other Meats	39.3	56.1	46.1	140.9	38.4	90.4	0.3	-0.7	34.1	47.5	37.8	120.8	30.9	73.9	3.7	-2.3	
Veg oil	-6.7	4.1	-3.2	9.9	-9.7	5.5	1.2	-1.2	-10.4	-2.8	-9.0	0.9	-13.1	-2.9	2.9	-2.8	
Dairy	428.8	495.8	434.7	535.1	445.8	502.4	-0.1	0.0	374.4	418.4	367.5	445.6	380.3	406.8	7.1	-5.4	
Rice	1146.9	1292.2	1143.8	1377.1	1187.1	1324.2	2.9	-2.9	660.2	737.3	654.4	748.8	669.6	732.7	20.0	-21.7	
Sugar	696.8	866.3	1565.7	1202.6	517.5	901.8	11.0	-2.4	461.1	553.3	1041.8	768.3	360.4	565.2	32.3	-17.3	

Source: simulation results. Note: see the explanations of the abbreviations from the note under Table 4.

Table 8. Welfare results under various WTO scenarios (EV in US\$ million)

Market access scenarios (scenario 2B and 2)					Export subsidy scenarios (scenarios 3B and 3)			
Without EBA		With EBA			Without EBA		With EBA	
	All. effi.	TOT	Total	Total	All. effi.	TOT	Total	Total
Aus & New Zealand	-51.6	355.9	293.0	293.4	-30.0	134.5	103.5	104.7
Japan	156.9	1141.5	818.4	801.5	-266.8	-255.2	-502.5	-527.8
ASEAN	179.1	712.3	879.8	874.6	-21.0	-83.3	-110.1	-115.9
SAARC	97.4	267.6	368.0	360.2	-23.0	4.1	-21.2	-30.7
East Asia	482.9	1358.4	1679.2	1674.2	-63.7	-132.4	-200.9	-207.5
United States	5.3	1148.0	1392.2	1372.0	-214.2	-22.1	-297.8	-325.9
Canada	16.2	133.5	99.2	99.8	-77.5	5.2	-70.1	-68.9
Latin America & Caribbean	217.1	651.6	932.2	922.9	-53.9	-20.9	-77.1	-79.6
EU	9076.4	-9381.0	16.3	-69.0	1625.4	2105.6	3789.4	3629.1
Eastern Europe & FSU	510.1	1940.2	2555.4	2556.4	-388.1	-505.2	-898.5	-896.9
Middle East	315.8	920.7	1257.9	1269.2	-610.6	-579.9	-1193.0	-1178.9
Malawi	-1.1	-3.1	-4.2	16.9	-0.1	-0.3	-0.3	29.3
Mozambique	-2.1	-5.8	-11.0	-4.3	-0.1	-0.3	-0.3	8.1
Tanzania	-1.7	-3.7	-6.4	34.9	-0.8	-0.8	-1.8	56.4
Zambia	0.5	-4.3	-3.9	3.2	-0.1	-0.5	-0.5	10.5
Uganda	-0.6	-3.5	-5.5	-3.6	-0.4	-1.0	-1.5	0.9
Sub Saharan Africa	-37.3	-89.0	-148.8	-24.9	-72.2	-163.0	-235.6	-71.1
Rest of Africa	257.2	572.6	816.4	805.7	-150.4	-276.2	-427.2	-434.7
World	10738.3	-45.5	10694.0	10750.0	-1046.7	1.1	-1045.6	-994.7
Domestic support scenario (scenarios 4B and 4)					Combined scenario (scenarios 5B and 5)			
Without EBA		With EBA			Without EBA		With EBA	
	All. effi.	TOT	Total	Total	All. effi.	TOT	Total	Total
Aus & New Zealand	-34.8	-50.6	-82.7	-81.6	-118.4	455.5	328.3	328.7
Japan	-37.7	-732.1	-543.7	-568.5	-163.4	164.3	-213.5	-230.2
ASEAN	3.3	-23.7	-19.4	-25.2	159.4	598.2	746.3	741.0
SAARC	10.1	-104.8	-97.6	-107.5	81.9	169.7	250.8	242.9
East Asia	15.2	-189.3	-133.6	-139.8	424.3	1028.0	1341.3	1336.2
United States	-229.3	-535.3	-974.5	-1002.7	-454.2	590.3	115.8	95.7
Canada	-44.7	81.2	62.3	63.5	-109.8	235.7	105.8	106.4
Latin America & Caribbean	-248.0	-244.0	-544.7	-548.5	-86.4	415.1	341.8	332.9
EU	6799.8	3088.3	9883.6	9694.1	16920.5	-4163.0	13070.3	12995.4
Eastern Europe & FSU	-141.8	-364.2	-515.1	-512.2	-37.5	1046.5	1093.1	1093.2
Middle East	-195.9	-360.6	-565.8	-549.6	-508.1	-31.2	-532.5	-522.5
Malawi	-1.9	-5.6	-7.0	23.8	-2.8	-8.0	-10.4	10.5
Mozambique	-0.1	-1.5	-3.3	5.2	-2.3	-7.5	-14.5	-7.9
Tanzania	-1.7	-3.6	-6.7	54.7	-4.1	-7.5	-14.0	27.5
Zambia	1.1	-0.9	0.3	11.4	1.4	-5.7	-4.2	2.5
Uganda	-0.9	-8.4	-12.2	-9.7	-1.8	-11.6	-17.4	-15.5
Sub Saharan Africa	-31.6	-94.7	-140.6	27.5	-140.9	-340.4	-516.8	-396.5
Rest of Africa	-73.5	-215.2	-285.5	-292.5	29.0	76.3	94.2	83.3
World	5785.4	-1.7	5783.7	5817.7	14789.1	-24.2	14765.9	14826.0

Source: simulation results. Note: the first three columns of each panel show the allocation efficiency effects, terms of trade effects, total welfare effects of the scenario without implementing the EBA, while the last column shows the total welfare effects of the scenario plus implementing the EBA.

Appendix 1 Least Developing Countries and the criteria's for selection

The United Nation Conference on Trade and Development (UNCTAD) designates countries that meet a set of criteria as Least Developing Countries (LDCs). Determination of a country as LDC is based not only on income, but also on the "potentials" for development of the country. Thus, countries with particular disadvantages are given priority by being included on the LDC list, whereas a country with similar income may not be included. The LDC list is based on the following criteria (UNCTAD, 2001):

- 1) a low-income criterion based on a three year average estimate of the gross domestic product per capita (Under \$900 for inclusion, above \$1,035 for graduation);
- 2) a human resource weakness criterion, involving a composite *Augmented Physical Quality of Life Index (APQLI)* based on indicators of nutrition, health, education and adult literacy;
- 3) an economic vulnerability criterion, involving a composite *Economic Vulnerability Index (EVI)* based on indicators of instability of agricultural production, the instability of exports of goods and services, the economic importance of non-traditional activities, merchandise export concentration and the handicap of economic smallness;
- 4) a population not greater than 75 million people.

Based on these criteria, the following countries are recognized as LDCs:

Afghanistan	Ethiopia	Nepal
Angola	Gambia	Niger
Bangladesh	Guinea	Rwanda
Benin	Guinea-Bissau	Samoa
Bhutan	Haiti	Sao Tome and Principe
Burkina Faso	Kiribati	Senegal
Burundi	Laos	Sierra Leone
Cambodia	Lesotho	Solomon Island
Cape Verde	Liberia	Somalia
Central African Rep.	Madagascar	Sudan
Chad	Malawi	Tanzania
Comoros	Maldives	Togo
Congo	Mali	Tuvalu
Djibouti	Mauritania	Uganda
Equatorial Guinea	Mozambique	Vanuatu
Eritrea	Myanmar	Yemen

Appendix 2 Regional and sectoral aggregation of the GTAP database

New regions	Original GTAP regions
Aus & New Zealand	Australia, New Zealand
Japan	Japan
ASEAN	Thailand, Vietnam, Indonesia, Malaysia, Singapore, and Philippines
SAARC	India, Bangladesh, Sri Lanka
East Asia	Korea, Hong Kong, China, Taiwan
United States	United States of America
Canada	Canada
Latin America and the Caribbean	Mexico, Central America and the Caribbean, Colombia, Peru, Venezuela, Rest of Andean Pact, Argentina, Brazil, Chile, Uruguay, Rest of South America
EU	European Union
Eastern Europe and FSU	Hungary, Poland, Rest of Central European Associates, Former Soviet Union.
Middle East	Turkey, Rest of Middle East
Malawi	Malawi
Mozambique	Mozambique
Tanzania	United Republic of Tanzania
Uganda	Uganda
Zambia	Zambia
Rest of Sub- Saharan Africa	Rest of Sub- Saharan Africa
Rest of Africa	Morocco, Botswana, Rest of South African Customs Unions, Other Southern Africa, Zimbabwe
Rest of the World	Rest of the World
New sectors	Original GTAP sectors
Paddy rice	Paddy rice
Wheat	Wheat
Cereal Grains	Cereals and grain
Veg/fruit	Vegetables, fruit and nuts
Oil seeds	Oil seeds
Plant fibers	Plant based fibers
Other Crops	Other crops
Other animal prod.	Cattle, sheep, goat, horses and other animal products
Bovine meats	Meat: cattle, sheep, goat and horses
Other meats	Other meat products
Veg. oil	Vegetable oil and fats
Dairy	Dairy products
Rice	Processed rice
Sugar	Sugar cane, sugar beet and sugar
Processed food prod.	Other food products
Bev. & tob.	Beverages and tobacco products
Nat Res.	Forestry, coal, oil, minerals, fishing
Textiles	Textiles, wearing apparel, leather products, wool and silk- worm cocoons
Manufactures	Wood products, paper, products, petroleum,/coal products, chemical/ rubber/ plastic products, mineral products, ferrous metal, metals nec., metal products, motor vehicles and parts, transport equipment nec., electronic equipment nec., machinery and equipment nec., manufactures nec.,
Services	Electricity, gas manufacture/distribution, water, construction, trade, transport nec., sea transport, air transport, communication, financial services nec., insurance, business services nec., recreation and other services, pub adm./health/defence, education, dwellings

Source: Authors' aggregation based on the GTAP database version 5 (Dimaranan and McDougall, 2002)

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