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Schemes for aggregating preferential tariffs, export volume effects and African LDCs¹

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Abstract

This study argues that aggregated preferential tariffs calculated according to the trade-weighted aggregation scheme tend to underestimate the true import barriers imposed on imports originated from the LDCs. This downward bias impacts numerical simulations aiming at estimating preference erosion effects of multilateral trade liberalization and export promotion effects of expanding preferences in the spirit of the Hong Kong WTO declaration. Two specific claims are offered. The first of these states that the downward bias would likely lead to underestimating the preference erosion effect. The second claim says that the export promotion effect would also be under-estimated with the biased aggregated preferential tariffs.

Taking advantage of a global bilateral tariff database at the HS-6 level, an alternative simple average based aggregation scheme is developed and the resulting aggregated preferential tariffs imposed on the African LDCs are presented. These modified tariffs are generally higher than the trade-weighted tariffs contained in the GTAP databases. Numerical simulations of policy scenarios pertaining to preference erosion and preference enhancement are conducted against both the modified and original GTAP database. Results from these simulations provide support to the two claims. Having established these results, this study illustrates the merits of the Hong Kong WTO declaration regarding expanding preferences for the LDCs.

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1. Introduction

The recent Hong Kong WTO Ministerial Declaration adopted on December 18, 2005 (WTO, 2005) reconfirmed the Doha ministerial decision that “...developed-country Members, and developing-country Members declaring themselves in a position to do so, agree to implement duty-free and quota-free market access for products originating from LDCs”.² Underlying this declaration is the concern of preference erosion in connection with the next round of multilateral trade liberalization.

For policy analysts, examining the extent of erosion of agricultural trade preferences requires accurate measurement of the prevailing Most Favored Nation (MFN) tariff rates imposed on non-preferential imports and the corresponding preferential rates levied on imports originated from the recipient countries by preference-granting countries, the differences of which are often called the preference margins. Reducing preference margin through MFN tariff reforms may lead to preference erosion (see for example, Yu and Jensen 2005). Since model-based numerical assessments of preference erosion are often conducted on aggregated product categories (such as the GTAP classification), it is necessary for analysts to aggregate tariff rates at detailed line levels to product categories – as is done in the GTAP database (Dimaranan and McDougall, 2002) where trade flows are used as weights in the aggregation. This practice, however, may lead to under-estimation of the true market access barriers imposed by many countries on imports originated from the LDCs, due to the fact that the LDCs typically only export a handful of products with very small volumes, implying that the aggregate tariff for lots of products would turn out to be zero or nearly zero.

This under-estimation of tariffs imposed on LDCs’ exports has two serious implications for assessing the extent of preference erosions and for evaluating the merits of expanding current preferential treatment to the LDCs (as agreed in the Hong Kong declaration). The main hypothesis of this paper is that a smaller-than-actual trade-weighted preferential tariff will likely lead to an underestimation of the preference erosion effect of multilateral liberalization (in terms of reduced exports from the LDCs). Second, the trade-promotion effect of enhancing preferences by granting duty and quota free access to the LDCs will also be underestimated when using the lower-than-actual trade-weighted tariff. Thus, the seriousness of preference

² This was also included in the so-called July Package of 2004 (WTO, 2004).

erosions and the desirability of granting duty and quota free market access to the LDCs would be regarded as inconsequential, as claimed in a number of recent publications.

The objective of the paper is to provide preliminary theoretical discussion and numerical support for the above propositions regarding the consequences of incorrectly aggregating preferential tariffs on measuring preference erosion and on evaluating the desirability of using enhancing preferences as a means to mitigate the negative impact of multilateral trade liberalization on the LDCs. In addition, an alternative scheme for aggregation preference tariffs for exports from the LDCs is suggested. The advantage of this scheme is drawn from a series of simulation exercises. Due to a large concentration of LDCs in Africa, the focus of this study is on the African LDCs (ALDCs hereafter).

The paper is organized as follows. Section 2 introduces the policy issues of preference erosion and expanding preferential treatment for LDCs. This brings out the relevance of correctly representing aggregated preferential tariffs in numerical models for analyzing these issues. Section 3 contains informal theoretical discussion on the likely consequences (in terms of export quantities) of under-estimating levels of preferential tariffs on the extent of preferences erosion and on the desirability of expanding preferential treatment. This discussion is in the context of a three-country setting. Section 4 proposes an alternative method for aggregating preferential tariffs and conducts numerical simulations to compare the different export effects of using different aggregation schemes. A comparison of simulation results based on the trade-weighted and the alternatively aggregated preferential tariffs provides numerical support to the propositions. Section 5 concludes.

2. Preference erosion and enhancing preferential treatment for LDCs

Despite the above-cited Hong Kong WTO Ministerial declaration concerning preferences for LDCs, there have been ongoing debates on the desirability and feasibility of adopting the proposal. Some worry about the inability of preferences in promoting agriculture exports and economic development in the LDCs and discount the value of preferences as an effective measure of Special and Differential Treatment. This worry is compounded by the fear that the preferential approach may slow down the multilateral liberalization process. Others point out that developing countries in general could gain more from market access reforms based on the MFN approach and that the erosion of preferences does not appear to be a serious issue if

substantial MFN reforms are conducted multilaterally. Still others argue that the LDCs do not necessarily gain from multilateral trade reforms, that the existing preferences are important to their interests, and that enhanced preferences would help mitigate any adverse effects from multilateral reforms.³ Lastly, many have noticed that various conditions, clauses and rules attached to existing preference programs may have hindered recipient countries from taking full advantage of these programs and therefore preferences per se should not be held responsible for the poor export performance of the LDCs. Instead of giving up on preferences altogether, some argue that improving these rules will make them more effective.

Clearly, this debate has important implications for the LDCs. If indeed preference erosion appears not to be a serious concern, then there would be no point in worrying about possible negative consequences of the multilateral agenda. On the other hand, if preference erosion is non-negligible, then the call for expanding preference programs should be taken seriously.

Numerical model-based simulation exercises have a role to play in this debate. For example, using the GTAP model and database, one can conduct simulations of policy scenarios involving MFN tariff reduction by preference-granting countries to find out the magnitude of preference erosion. In addition, simulating the effect of expanding preferences can be used to evaluate the desirability of doing so. With a correct representation of the MFN and preferential trade barriers, these exercises may generate useful policy insights. Nevertheless, simulation exercises involving MFN and preferential tariffs by many countries have high data requirement and most likely these exercise can be only conducted with dataset covering aggregated product categories, which requires aggregation of tariff lines.

In the case of LDCs, preferences enjoyed by these countries are typically more favorable than what are offered to other developing countries. However, even for them, product coverage of available preferences is less than universal and often the excluded products have high MFN tariffs. For instance, data from the USITC data web show that out of around 1800 US tariff lines, about 400 MFN tariff lines are duty free. Among the remaining tariff lines, about 1100 lines are duty free for the LDCs through the US preference programs.⁴ However, these preferences only

³ A recent OECD study (OECD, 2004) showed that agricultural preferences granted by the EU and US were largely utilized by the beneficiary countries. Other papers on the importance of agricultural preferences based on their utilization rates include: Wainio and Gehlhar (2004), Wainio and Gibson (2004), and Inama (2004).

⁴ These are drawn from the summary compiled by Breton and Ikezuki (2004), and Wainio and Gehlhar (2004).

lower the simple average tariffs faced by the LDCs marginally (from an overall simple average of 9.7 percent to 5.6 percent for the GSP-LDC countries). This is because the dutiable tariff lines not covered in the preference programs generally have higher tariffs than those of covered products. Therefore, one would expect non-trivial trade barriers for the excluded products that originate from the LDCs. Ideally, this protection pattern should be correctly presented in the aggregated databases that are used in quantitative studies aiming at analyzing the issues relating to preferences and multilateral trade liberalization. Failing to preserve the protection pattern may lead to biased estimates regarding the extent of preference erosion. The specific consequences are explored in the next section.

3. Schemes for aggregating preferential tariffs and consequences for numerically simulating export quantity effects

Typical aggregation exercise using trade weights – as is done in the GTAP database – may distort the structure of preferential tariffs facing the LDCs, due to the fact that typical LDC exports only a narrow range of products and volumes of these exports may also be quite small. As such, the trade-weighted aggregated tariff may very well be under-estimated. Appendix Tables A1 and A2 provide the bilateral exports of 17 agricultural and food products (GTAP classification) from two aggregated Sub-Saharan African groups. The first group, SSA-1, includes six individual African LDCs (Malawi, Mozambique, Tanzania, Zambia, Madagascar and Uganda) appearing in the original GTAP database version 6, whereas other African LDCs are largely included in an aggregated Rest of Sub-Sahara African (SSA-2) region. In the table, bilateral exports less than US\$1 million are shaded. Obviously a large portion of the two tables are shaded, with many cells actually being zeroes. With this trade pattern, many trade weights employed in computing aggregated tariffs will be zeroes, leading to smaller-than-actual protection imposed on imports originated from the ALDCs for many aggregated product categories.

Again, use the US as an example. Contrasting the product coverage of the US preference programs and the ALDC groups' export pattern to the US illustrates the above point. The middle panel of Table 2 lists trade-weighted aggregated tariffs for agricultural exports from the ALDCs to the US and other countries. These are all zeroes except for sugar and other crops. Recalling earlier description of the protection pattern obtained from the USITC data web, this picture is clearly in contradiction with the reality. Not surprisingly, export data gathered in Appendix Tables 1 and 2 shows that sugar and other crops are two of the three products which

registered non-negligible exports from the two African groups to the US. Because these African countries are not able to export to the US in most other products, tariff barriers they are facing disappear in the trade-weighted aggregation process, despite the possibilities that in the absence of such barriers, these countries might be able to export those products.

So what does this imply for evaluating the extent of preference erosion and for examining the merits of expanding preference programs? First, underestimating the preferential tariff rates facing the LDCs would lead to a downward bias in predicting the export promotion effect of expanding preference programs (as stipulated in the Hong Kong WTO ministerial declaration), which implies that the need to enhance preferential treatment for LDCs for the purposes of compensating LDCs' loss from preference erosion would be downplayed. Second, using a database with smaller-than-actual preferential tariff rates would likely predict smaller preference erosion effects in terms of reduced export volumes.

Intuitions of these claims can be revealed from a three-country setting. Suppose country G is the preference-granting country, who gives a lower specific preference tariff p to the favored preference-receiving country R and imposes a higher specific *MFN* tariff m on imports from the rest of world W . For simplicity, assume that there is only one good being traded, with G the importer and R and W the exporters. Now consider two initial situations characterized by the same *MFN* tariff rate m , the same preferential exports x from R to G , but different specific preferential tariff rates. Specifically, let us assume Situation A is defined by a higher initial preferential tariff p_h , whereas Situation B is featured by a lower preferential tariff p_l . By construct, the initial preferential margin in A (i.e. $m - p_h$) is smaller than that in B (i.e. $m - p_l$). This setting mimics the aggregation problem well: Situation B describes the preferential protection pattern depicted in the GTAP database where trade-weighted preferential tariffs are lower than the actual preferential protection in the Situation A . With this, it is possible to give a preliminary discussion on the two claims.

The intuition of the first claim is straightforward. To see this, consider a preferential tariff reduction action by G that reduces p to zero. In Situation B , with a low initial preferential tariff p_l , the effective increase in the preference margin is smaller than that in Situation A (where the initial preferential tariff is higher at p_h) because the absolute value of $\Delta p_l (= -p_l)$ is smaller than

that of $\Delta p_h (= -p_h)$. It is then reasonable to expect that the export promotion effect of lowering p is smaller in Situation B than in Situation A. Essentially Claim 1 can be expressed as follows:

$$0 > \frac{\Delta x(m, p_l)}{\Delta p_l} > \frac{\Delta x(m, p_h)}{\Delta p_h} \quad \text{where } x(m, p_l) = x(m, p_h) \quad \text{and} \quad p_l < p_h \quad (1)$$

Note that as $\frac{\Delta x(m, p_l)}{\Delta p_l}$ and $\frac{\Delta x(m, p_h)}{\Delta p_h}$ are expected to be negative, equation (1) can be

written as:

$$0 < \left| \frac{\Delta x(m, p_l)}{\Delta p_l} \right| < \left| \frac{\Delta x(m, p_h)}{\Delta p_h} \right| \quad (1')$$

In other words, *the export promotion effect of enhancing preferences is smaller when the initial preferential tariff is underestimated*. This intuitive result can again be better explained by using the case of the US as an example. If the trade-weighted aggregated preferential tariff in the GTAP database is used for evaluating the desirability of implementing the Hong Kong decision, meaningful concession would be achieved for only two product categories (see Table 1 for the aggregated preferential tariffs of the US presented in the GTAP database). This surely will lead to smaller trade promotion effect, as compared to what would be obtained with a correct representation of the initial preferential protection structure.

To reveal the intuition of Claim 2, allow the preference-granting country G to implement an MFN tariff cut Δm , which results in a lower MFN tariff $(m - \Delta m)$ and preference margins $(m - \Delta m - p_l)$ and $(m - \Delta m - p_h)$ respectively for Situations A and B. While absolute reductions to the preference margins are the same for both A and B, the relative reductions to the preference margins differ between the two situations. Specifically, the relative reduction to the (larger) preference margin will be $\Delta m / (m - p_l)$ in Situation B, which is smaller than $\Delta m / (m - p_h)$, the relative reduction to the (smaller) preference margin in Situation A. That is, the smaller initial preference margin under A would be reduced/eroded relatively more than the larger initial preference margin under B. Since by assumption the two initial preference margins result in the same initial preferential export flow x from the preference receiving country R to the granting country G, one would expect that the effective impact of a relatively larger erosion of preference margin (as in Situation A) on the preferential export flow would be larger. With the normal assumption that lowering MFN tariff reduces preferential exports, this claim can be summarized algebraically in the following:

$$0 < \frac{\partial x(m, p_l)}{\partial m} < \frac{\partial x(m, p_h)}{\partial m} \quad \text{where } x(m, p_l) = x(m, p_h) \quad \text{and} \quad p_l < p_h \quad (2)$$

In other words, *the preference erosion effect of reducing the MFN tariff (in terms of reduced preferential exports) is smaller when the initial preferential tariff is underestimated.*

4. Numerical results under alternative aggregation schemes

To check the validity of the above claims, an aggregation scheme superior to the trade-weighted method is needed, with which a series of experiments pertaining to MFN tariff reforms and the Hong Kong WTO declaration can be conducted. Results from these exercises will then be compared to those obtained from the same simulations based on the trade-weighted preferential protection data. Such a comparison can be used to provide numerical evidence for the two claims summarized in equations (1) and (2).

4.1 An alternative representation of protections imposed on exports from ALDCs

One way to avoid using a sparse matrix of export values in aggregating tariff is to apply the simple average scheme, whereby all reported tariff lines under each aggregated product category are used for generating a simple average tariff. Owing to the fact that there are usually only a few tariff lines that are reported for typical individual LDC, following this simple average scheme on a bilateral basis would lead to an incomplete representation of actual barriers. This is because most likely prohibitive tariffs and tariffs for non-produced or non-exported products will not carry any aggregation weights. The number of the latter tariff lines may be much greater than the number of reported tariff lines. Therefore, in calculating the simple averages, tariff lines reported for all ALDCs are pooled together. In doing so, it is assumed that for any given export destination, all ALDCs face the same import barriers.⁵ This assumption can be justified by observing that ALDCs are typically grouped together under existing preference programs and generally face the same preferential or MFN tariff barriers in a given market. As such, a certain tariff line recorded for one LDC (which is producing that product) but not for another (which is not producing or exporting that product) may very well be the applicable rate for the latter, when the latter starts to produce/export under that line.

The above procedure is applied to the MacMaps protection data set (which is the source data underpinning the protection data in the GTAP version 6 database. See Bouet et al., 2004),

⁵ Of course, the ALDCs face different barriers in different export destinations.

resulting in a different representation of agricultural trade barriers (including existing preferential tariffs) facing the ALDCs (denoted as “modified” hereafter).^{6,7} The upper panel of Table 1 reports modified tariffs imposed by selected countries on imports originated from the ALDCs. As compared to the original trade-weighted tariff data from the GTAP database (“original” hereafter), the corresponding modified tariffs are generally larger. In the case of the US, tariff rates for oil seeds, sugar and milk are notably higher. For Japan, the difference is larger than 10 percentage points for seven products. For the two largest developing economies (China and India), the modified tariffs for many products are also significantly higher.⁸

Using the program ALTERNATE (Malcolm, 1998), bilateral import tariffs imposed on exports from the ALDCs in the original GTAP database is shocked to the modified tariffs. While doing so, the program also seeks to minimize the impact to the trade flows recorded database. This procedure results in a GTAP database characterized by the modified tariffs (denoted modified database hereafter).

4.2 Experiment design

Two sets of simulation exercises are conducted to respectively test the two claims listed in equations (1) and (2). Each of these simulations is conducted separately using the two databases (original and modified). These simulations are conducted using the GTAP model (Hertel, 1997), a standard global computable general equilibrium model that is in frequent use of analyzing trade policy issues.

The first involves MFN agricultural tariff reductions by a large preference granting region for the purposes of comparing the different preference erosion effects resulting from the two different representations of preferential tariffs. Here, a 50% across-the-board MFN tariff reduction by the EU25 is assumed.

⁶ The original MacMaps data set at HS-6 level has been transferred into a MS Access database. An SQL query is developed to compute the simple averages.

⁷ The MacMaps protection data for all the original agricultural and food products in GTAP are re-aggregated according the simple average scheme. Protections for non-agricultural products remain unchanged.

⁸ Tariffs calculated for the EU25 is based on the applied ad valorem tariff and tariff equivalents of other protection measures recorded in the MacMaps data set. These numbers apparently reflect a pre-EBA protection structure on products from the LDCs. Also, they correspond to the pre-EU Enlargement situation.

The second set of simulations (containing two experiments) aims at evaluating the export promoting effects of implementing the Hong Kong declaration on expanding preferential treatment for the ALDCs, in the presence of MFN tariff reforms at the multilateral level. Specifically, the Hong Kong declaration is interpreted as “deepening”, “widening” and “broadening” trade preferences for the ALDCs (see Yu, 2005). Developed countries can “deepen” their preference programs by granting the ALDCs duty and quota-free market access to all agricultural products that are covered in existing programs. They can “widening” the coverage of their preference programs by extending the duty and quota-free access to currently un-covered agricultural products. Preferential market access for ALDC exports can also be “broadened” to include advanced developing countries to the group of preference-granting countries. The “deepening” and “widening” scenario is simulated in the first experiment, where the ALDCs are granted duty and quota free access to the agricultural and food markets of all developed countries, in conjunction with a 50% across-the-board MFN agricultural tariff reduction by all non-LDC countries. The second experiment adds another dimension to the enhancement of preferences for boosting exports from the African LDCs by “broadening” preferences. Taken together, the two experiments constitute the policy scenario envisioned by the Hong Kong WTO declaration.

4.3 Results

Claim 1 can be examined vis-à-vis the results on changes in export quantities from the two African groups, which are reported in Table 2. The upper panel of Table 2 compares the different export effects from using the original and the modified databases in the simulations. The preference erosion effect is reflected in the negative changes of exports for a number of products, especially vegetable and fruits, meats, sugar, and other food. It can be verified from the table that in general percentage changes in exports simulated from the modified database are smaller than those obtained from the original database, implying that when the initial exports and the MFN tariff rates are the same, the situation with lower initial preferential tariff rates (i.e. the original database) underestimates the extent and degree of preference erosions, as compared to the situation with higher initial preferential tariff rates (i.e. the original database). Therefore, this result is consistent with Claim 1.⁹

⁹ Nevertheless, the differences in the percentage changes – all of which are below one percentage point – seem to be quite small. One possible explanation is that export flows in the original and modified databases are not exactly the same following the adjustment made in the modified database. Therefore, the condition specified in equation (1)

Claim 2 can be evaluated against the results presented in the middle and lower panels of Table 2, which show the different export promoting effects of enhancing preferences. Specifically, the middle panel reports the results from the deepening and widening scenario. In general, percentage changes in export quantities simulated from the modified database are significantly higher than those obtained from the original database, suggesting that the export promotion effect is greater when the initial preferential tariff rates are higher.¹⁰ In other words, the trade promotion effects would be underestimated should one choose to take the original GTAP database as given for examining the desirability of implementing the Hong Kong declaration. Numbers reported in the lower panel of Table 2 report similar results. Understandably, the differences tend to be larger than those listed in the middle panel, suggesting that broadening trade preferences leads to extra export promotion. It is also worth noting that these differences are generally much more significant than those obtained from the upper panel of the same table, possibly implying a stronger support for Claim 2 than for Claim 1.

So far, the two theoretical claims as well as the numerical simulation results seem to point out that using trade-weighted preferential tariff rates may risk underestimating both the erosion effects of MFN tariff reforms and the export promotion effects of enhancing preferential treatment. In addition to these, it is also of interest to gauge the benefits to the ALDCs and the costs to the non-LDC countries arisen from implementing the Hong Kong declaration. Results reported in Table 4 serve this purpose. There, an additional scenario of multilateral tariff cuts involving a 50% MFN agricultural tariff reduction by all non-LDCs is simulated, together with the deepening and widening scenario and the broadening scenario discussed above.

While multilateral MFN tariff reforms would benefit most non-LDC countries, the welfare effects turn out to be negative for the two African groups (losses of about US\$50 million and 184 million for SSA-1 and SSA-2, respectively). In particular, in addition to lost export volumes, negative export price effect also plays an important role. This negative export price effect is due

that export flows in the two databases should be the same is not strictly enforced. Attempt to strictly control for the export flows in the two databases is needed for a more rigorous test of the claim.

¹⁰ Some percentage changes shown in the middle and lower panels of Table 2 are actually negative, due to the strong preference erosion effects of the multilateral MFN tariff cuts. Enhancing preferences help to bring down the negative changes. Furthermore, from Table 3 it can be seen that by taking into account the world market price effect of reducing MFN tariffs, it is clear that export volumes measured in US dollars are increasing for most products (see the middle and lower panels of Table 3).

to two reasons. On the one hand, multilateral MFN reforms would lead to lower prices in the export markets and hence lower prices for those ALDC exports covered in preference programs. At the same time, lowering MFN market access barriers would lead to higher prices for exports from countries not receiving preferential treatment. Hence, non-LDCs countries would be able to export and crowd out exports originated from the ALDCs. On the other hand, preferential access granted to the ALDCs would actually "trap" their exports and prevent them from shifting to other markets, thereby further dampening the prices of ALDCs' exports.

With preferences being deepened and widened, the negative welfare effects on the two African regions would be more than offset, leading to improved terms-of-trade and efficiency gains for them. For SSA-1, the total welfare improvement from the previous scenario would be over US\$110 million, whereas for SSA-2 this would be almost US\$800 million. Lastly, broadening preferences would generate similar exports expansion and welfare gains to the ALDCs. However, these additional gains are smaller than those obtainable from the action of deepening and widening preferences.

The gains to non-LDCs from multilateral MFN reforms would be only reduced marginally due to the deepening, widening and broadening actions. Table 4 shows that deepening and widening trade preferences would lead to small terms-of-trade losses for developed countries, which for instance amount to total welfare losses of US\$582 million to the EU25, a paltry number in comparison to the gains obtained from the multilateral reforms. For non-LDC developing countries, the negative impact of widening and deepening preferential treatment for the ALDCs would also be very small, implying that the expansion of exports from the ALDCs would generally not be a big concern for them. For example, China and India would only suffer welfare losses of about 4 and 17 million US dollars, respectively. Moreover, broadening preferences by the advanced developing countries would lead to very minor welfare losses for themselves as well. In summary, the cost of broadening and deepening preferences for ALDCs appear to be very minor to other countries. Although not presented here, the trade diversion effects are also very small, a result that is consistent with the ALDCs' very small export share in total world trade. Therefore, the concern on trade diversion does not appear to be a serious issue.

5. Concluding remarks

This study argues that aggregated preferential tariffs calculated according to the trade-weighted aggregation scheme tend to underestimate the true import barriers imposed on imports originated from the LDCs, due to two reasons. First, the LDCs typically only export a narrow range of products. Second, the associated export volumes are generally very small. This downward bias impacts numerical simulations aiming at estimating preference erosion effects of multilateral trade liberalization and export promotion effects of expanding preferences in the spirit of the Hong Kong WTO declaration. Two specific claims are offered. The first of these states that the downward bias would likely lead to underestimation of preference erosion effect of multilateral MFN tariff cuts. The second claim says that the export promotion effect would also be under-estimated with the biased aggregated preferential tariffs.

Taking advantage of a global bilateral tariff database at the HS-6 level, an alternative simple average based aggregation scheme is developed and the resulting aggregated preferential tariffs imposed on the African LDCs are presented. These modified tariffs are generally higher than the trade-weighted tariffs contained in the GTAP database. Numerical simulations of policy scenarios pertaining to preference erosion and preference enhancement are conducted against both the modified and original GTAP database. Results from these simulations provide support to the two claims. Having established these results, it seems that there are ample reasons for supporting the Hong Kong WTO declaration regarding expanding preferences for the LDCs. More specifically, developed and other developing countries can expand the preferential treatment on products of LDC origins by deepening, widening and broadening actions.

Table 1. Modified (simple average-based) vs. original (trade-weighted) GTAP tariffs (%)

Modified tariff based on a simple average scheme										
	Aus & NZL	China	Japan	ASEAN	Indian	Canada	USA	Argentina	Brazil	EU25*
wheat	0.0	1.0	117.3	3.1	100.0	1.4	2.4	5.8	5.8	3.8
grains	0.0	1.2	19.8	10.3	47.1	0.0	0.3	5.1	5.9	1.7
Veg & fruits	0.3	17.4	31.3	12.4	39.6	0.1	1.3	9.6	9.6	6.6
oil seeds	0.5	12.5	1.9	9.5	35.9	0.0	9.9	5.2	5.5	1.0
plant fiber	0.0	2.6	0.0	1.5	11.8	0.0	1.2	7.6	8.9	0.3
other crops	0.0	16.2	2.1	19.4	38.8	0.1	2.3	10.4	10.6	2.7
other animal	0.0	8.1	0.9	1.7	8.0	1.5	0.2	5.4	4.7	1.6
bovine meats	0.0	28.6	29.8	11.3	32.5	6.3	1.9	11.5	11.9	14.1
other meats	0.4	16.6	36.9	10.5	59.4	47.8	0.7	11.3	12.5	11.2
vege oil	0.7	21.3	5.5	7.9	70.4	1.1	1.3	10.1	10.2	2.0
Milk	0.5	32.1	102.7	9.6	43.6	105.0	18.6	16.5	19.5	13.3
Rice	0.0	1.0	950.5	20.2	74.5	0.0	3.9	12.3	15.6	45.3
Sugar	2.8	18.1	207.1	21.4	52.8	2.5	25.4	17.5	17.5	63.9
other food	0.4	19.5	10.5	11.0	38.2	1.9	1.2	12.1	12.2	4.8
Original trade-weighted tariff as shown in the GTAP-6 database										
Wheat	0	0	0	0	0	0	0	0	0	0
Grains	0	0	0	0	0	0	0	0	0	0
Vege & fruits	0	13.1	2.6	0.2	35.7	0	0	0	3.6	0.6
oil seeds	0.3	0	0	1.2	34.9	0	0	0	0	0
plant fiber	0	2.5	0	1.8	5.9	0	0	0	0	0
other crops	0	11.6	0	3.1	36.3	0	11.2	14.7	15.3	3.1
other animal	0	8.1	0	1.1	10.9	0.4	0	0	4.9	0.1
bovine meats	0	0	0	0	0	0	0	0	0	0
other meats	0	0	0	0	0	0	0	0	0	0.1
vege oil	0	0	0	8.6	0	0	0	0	0	0
milk	0	0	12.7	3.9	0	0	0	0	0	0
rice	0	0	0	11.3	0	0	0	0	0	13.6
sugar	0	0	0	14.8	42.8	0	20.4	0	17.4	93.9
other food	0	15.4	1.2	34.8	28.5	0	0	0	0.8	0
differences in percentage points = modified -original										
wheat	0	1	117.3	3.1	100	1.4	2.4	5.8	5.8	3.8
grains	0	1.2	19.8	10.3	47.1	0	0.3	5.1	5.9	1.7
Vege & fruits	0.3	4.3	28.7	12.2	3.9	0.1	1.3	9.6	6	6
oil seeds	0.2	12.5	1.9	8.3	1	0	9.9	5.2	5.5	1
plant fiber	0	0.1	0	-0.3	5.9	0	1.2	7.6	8.9	0.3
other crops	0	4.6	2.1	16.3	2.5	0.1	-8.9	-4.3	-4.7	-0.4
other animal	0	0	0.9	0.6	-2.9	1.1	0.2	5.4	-0.2	1.5
bovine meats	0	28.6	29.8	11.3	32.5	6.3	1.9	11.5	11.9	14.1
other meats	0.4	16.6	36.9	10.5	59.4	47.8	0.7	11.3	12.5	11.1
vege oil	0.7	21.3	5.5	-0.7	70.4	1.1	1.3	10.1	10.2	2
milk	0.5	32.1	90	5.7	43.6	105	18.6	16.5	19.5	13.3
rice	0	1	950.5	8.9	74.5	0	3.9	12.3	15.6	31.7
sugar	2.8	18.1	207.1	6.6	10	2.5	5	17.5	0.1	-30
other food	0.4	4.1	9.3	-23.8	9.7	1.9	1.2	12.1	11.4	4.8

Sources: GTAP 6 database and own calculations based on the MacMaps data at the HS-6 level.

*: Tariff data for the EU25 are aggregated from tariff lines for the year 2001. The Everything but Arms initiative is not reflected here.

Table 2. Export quantity effects (% changes) under modified and original preferential tariffs, various scenarios

EU25 MFN tariff cuts; no changes to 2001 preferential tariff						
	SSA-1			SSA-2		
	Original	Modified	Modified – original	Original	Modified	Modified – original
wheat	2.17	2.18	0.01	0.65	0.64	-0.01
grains	-0.39	-0.43	-0.04	0.2	0.16	-0.04
Vege & fruits	-2.51	-2.6	-0.09	-6.87	-6.92	-0.05
oil seeds	3.84	3.86	0.02	4.7	4.42	-0.28
plant fiber	1.6	1.61	0.01	1.91	1.9	-0.01
other crops	0.15	0.14	-0.01	-0.46	-0.5	-0.04
other animal	0.37	0.36	-0.01	-0.28	-0.31	-0.03
bovine meats	-13.6	-14.26	-0.66	0.8	0.78	-0.02
other meats	-1.94	-2.09	-0.15	-3.06	-3.12	-0.06
vege oil	0.93	0.94	0.01	-6.06	-6.09	-0.03
milk	-0.21	-0.31	-0.1	-2.98	-3.06	-0.08
sugar	-15.94	-16.05	-0.11	-47.12	-47.56	-0.44
other food	-3.49	-3.51	-0.02	-2.95	-2.94	0.01
Multilateral MFN tariff cuts + deepening and widening preferences*						
wheat	-3.3	0	3.3	-22.3	-14.1	8.2
grains	-5.3	-2.3	3	-15.5	-10.7	4.8
Vege & fruits	-15.7	-11.7	4	16.9	22.5	5.6
oil seeds	-6.3	0.8	7.1	345.4	30.6	-314.8
plant fiber	-4.6	-4.4	0.2	-10.3	-6.9	3.4
other crops	0.9	-3.4	-4.3	-19.6	-13.6	6
other animal	-6	0.4	6.4	-9.3	-4.4	4.9
bovine meats	-34.4	-13.7	20.7	-27.2	-20.3	6.9
other meats	-20.6	13.3	33.9	58.5	31.6	-26.9
vege oil	-14.3	-13.3	1	-26	-17.5	8.5
milk	-14.4	166.1	180.5	5.5	52.4	46.9
sugar	237.2	243.2	6	602.4	629.3	26.9
other food	-9.7	-5.4	4.3	-10.8	-7.9	2.9
Multilateral MFN tariff cuts + deepening & widening + broadening preferences**						
wheat	-7.6	-3	4.6	-24.4	-14.9	9.5
grains	-7.2	-3.5	3.7	-16.1	-10.3	5.8
Vege & fruits	30.4	41.4	11	23.9	30.9	7
oil seeds	-8	-1.9	6.1	343.7	28.5	-315.2
plant fiber	-3.3	-1.2	2.1	-5.8	0.1	5.9
other crops	2.3	0.4	-1.9	-18.9	-12.4	6.5
Other animal	-6.9	-1.4	5.5	-9.5	-3	6.5
bovine meats	-37.3	-3.5	33.8	-26.8	-18.3	8.5
other meats	82.1	69.2	-12.9	62.2	50.3	-11.9
vege oil	-10.1	-9.3	0.8	-27	-18.1	8.9
milk	-14.7	167	181.7	5	56	51
sugar	229.5	233.1	3.6	597.8	625.1	27.3
other food	-8.2	-6.5	1.7	-4.8	-6	-1.2

Source: simulation results.

*: results reported here are due to both the multilateral MFN tariff cuts and deepening and widening preferences.

***: results reported here are due to the joint impact of the multilateral MFN tariff cuts, deepening and widening preferences, and broadening preferences.

Table 3. Changes in exports of selected agriculture and food products from SSA-1 and SSA-2

	Multilateral MFN tariff cuts*				Multilateral MFN tariff cuts + deepening and widening preferences**				Multilateral MFN tariff cuts + deepening & widening + broadening preferences***			
	Export volume (million US\$)		% change		Export volume (million US\$)		% change		Export volume (million US\$)		% change	
	SSA-1	SSA-2	SSA-1	SSA-2	SSA-1	SSA-2	SSA-1	SSA-2	SSA-1	SSA-2	SSA-1	SSA-2
Grains	35.8	48.4	-2.6	-9.5	36.3	48.6	1.3	0.4	36.3	49.1	0.1	0.9
vege & fruits	130.0	810.1	-10.9	-8.3	130.2	1109.0	0.2	36.9	212.3	1192.5	63.0	7.5
oil seeds	25.2	236.1	0.7	-21.5	25.5	403.7	1.2	71.0	25.2	398.8	-1.3	-1.2
plant fibers	112.9	896.5	0.3	0.5	108.3	841.8	-4.1	-6.1	113.3	910.7	4.6	8.2
other crops	1040.6	3322.0	-5.9	-4.4	1078.7	3047.9	3.7	-8.3	1137.6	3104.8	5.5	1.9
bovine meats	1.6	25.8	-26.0	-14.4	1.9	24.4	17.6	-5.5	2.1	25.0	12.6	2.7
other meats	7.5	36.4	-11.4	-9.4	9.7	53.8	28.9	47.6	14.6	61.6	50.5	14.5
vege oils	6.8	142.7	-8.4	-7.8	6.5	130.0	-4.5	-8.9	6.8	129.4	5.5	-0.5
dairy	1.1	29.3	-8.0	-5.8	3.3	47.9	191.6	63.5	3.3	49.1	1.1	2.6
rice	5.7	30.9	2.3	1.8	5.5	28.8	-3.7	-6.6	5.3	28.5	-3.8	-1.1
sugar	93.6	169.9	-21.3	-49.8	411.6	2507.8	339.9	1376.1	402.6	2499.4	-2.2	-0.3
other food	508.3	2058.1	-5.6	-5.6	513.7	2034.3	1.1	-1.2	511.4	2079.8	-0.4	2.2
Total Ag & food	2052.1	8226.2	-6.5	-6.9	2415.3	10697.5	17.7	30.0	2555.7	10960.3	5.8	2.5
Total	6569.2	52985.5	-0.7	-0.5	6674.8	53948.0	1.6	1.8	6718.2	54071.2	0.7	0.2

Sources: simulation results.

*: results reported in this panel are due to the multilateral tariff cuts only.

**: results reported in this panel are due to deepening and widening preferences only.

***: results reported in this panel are due to broadening preferences only.

Table 4. Welfare results for selected countries/regions (million US\$)

	Multilateral MFN tariff cuts*			Multilateral MFN tariff cuts + deepening and widening preferences**			Multilateral MFN tariff cuts + deepening & widening + broadening preferences***		
	Efficiency	Terms of trade	Total	Efficiency	Terms of trade	Total	Efficiency	Terms of trade	Total
Australia & New Zealand	4.2	566.2	545.3	1.2	5.8	6.1	-0.2	-6.5	-6.8
China	830.8	-164.6	575.2	3.9	-1.6	-4.4	3.0	-6.1	-2.6
Japan	3263.5	-536.2	2766.7	-4.3	-37.3	-49.3	2.0	-0.7	0.5
Rest E. Asia	1141.5	-32.5	1067.6	-81.5	-27.0	-109.8	2.1	-0.9	1.1
ASEAN	554.7	289.6	760.9	-2.6	9.8	7.1	-7.5	-24.1	-31.2
India	830.8	-216.0	610.9	-6.9	-8.1	-16.6	22.5	-26.9	-4.6
Canada	674.5	-112.9	551.3	1.4	9.7	11.0	0.3	-2.4	-1.8
USA	87.5	957.0	1292.6	14.5	-68.3	-99.4	2.1	-10.7	-18.4
Mexico	321.2	-208.1	108.9	-0.1	6.3	5.8	4.2	-3.5	1.0
Argentina	46.3	259.4	270.1	-0.1	-2.4	-2.2	0.0	-1.8	-1.6
Brazil	162.2	888.0	1098.6	-3.0	-5.4	-10.3	1.2	-5.0	-4.3
EU25	5586.4	-1255.9	4276.2	-72.6	-494.1	-582.3	15.5	-33.0	-19.9
SSA-1	-1.4	-42.5	-50.0	3.9	91.4	111.8	-1.1	48.2	53.5
SSA-2	-38.9	-126.8	-184.2	168.2	527.9	772.4	17.0	66.4	91.2
World	16400.2	-12.2	16387.8	3.6	-4.6	-1.6	62.5	-0.2	62.3

Sources: simulation results.

*: results reported in this panel are due to the multilateral tariff cuts only.

**: results reported in this panel are due to deepening and widening preferences only.

***: results reported in this panel are due to broadening preferences only.

Appendix Table 1. Base case export volumes of SSA-1 (million US\$)

	Australia &New Zealand	China	Japan	ASEAN	India	Canada	USA	Mexico	Argentina	Brazil	EU25	Mid-east N. Africa	S Afr, Custom Union	SSA-1	SSA-2	World
Paddy rice	0	0	0	0	0	0	0.2	0	0	0	0.5	0	0	0.1	1.3	2.5
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.3	0.6
Grains	0.3	0.4	0.9	0.6	0.1	0.5	3.3	0.2	0.2	0.1	8.1	0.6	0.2	10.5	9.3	36.7
Vege &fruits	0.5	0.6	3	3.9	53.6	1.3	6.7	0.3	0.2	0.3	56.8	5.6	2.7	1.2	4.8	145.9
Oil seed	0	0.1	11.2	0.4	0.3	0.3	0.8	0	0	0	4.8	1.2	2.9	0.6	1.5	25
Plant fibers	0	3.4	0.7	18.3	13.8	0.1	0	0.1	0	0	39.3	1.4	12.3	0.6	7.2	112.6
Other crops	11.1	2.5	70.1	105.3	3.7	2.9	115	10.6	1.8	2.1	505	50	22.3	34.6	79.1	1106.1
Other aminal products	0.1	1.9	1.3	2	1	0.2	3.5	0.2	0	0	10.9	2.8	1.1	1	1.9	50
wool	0	0	0	0	0	0	0.1	0	0	0	0.2	0	0	0	0	0.5
Bovine meats	0	0	0.1	0.1	0	0.1	0.4	0	0	0	0.9	0.1	0	0	0	2.2
Other meats	0.1	0.1	0.3	0.2	0	0.1	1	0.1	0	0	2.6	0.2	0.1	1.2	1.6	8.5
Vege oils	0	0	0.1	0.9	0	0	0.3	0	0	0	0.5	0	1.7	0.9	2.3	7.4
Dairy	0	0	0	0.1	0	0	0.1	0	0	0	0.1	0.1	0.1	0.2	0.5	1.2
Rice	0	0	0	0.1	0	0	0.3	0	0	0	0.8	0.1	0.1	0.4	3.3	5.6
sugar	0	0	0	0	0.1	0	16.7	0	0	0.5	37.3	7	1	10.8	44.3	118.8
Other food	0.7	1.3	39.3	12.4	0.2	1	11.4	0.4	0.3	0.2	393	6.2	10.7	3.3	29.5	538.7
Beverage Tobacco	0.3	0.3	1	0.4	0	0.5	3.4	0.2	0.1	0.1	8.4	0.6	1.2	0.3	3.3	22.8
total agfood	13.2	10.7	128.5	145.1	72.8	7.3	164.8	12.2	2.7	3.3	1073	76.3	56.4	66	190.2	2193.7
Total	28.8	104.3	290.6	290	124.4	36.5	643.4	26.6	10.2	14	3206.8	268.8	576.5	130.9	285.4	6614.2

Sources: GTAP database version 6.

Note: For presentation purposes, numbers smaller than 1 million US dollars are shaded in the table.

Appendix Table 2. Base case export volumes of SSA-2 (million US\$)

	Australia &New Zealand	China	Japan	ASEAN	India	Canada	USA	Mexico	Argentina	Brazil	EU25	Mid-east N. Africa	S Afr, Custom Union	SSA-1	SSA-2	World
Paddy rice	0	0	0	0	0	0	0.1	0	0	0	0.2	0	0	0.1	7.4	7.9
Wheat	0	0	0	0	0	0	0	0	0	0	3.7	1.3	0	0.2	2.5	8.1
Grains	0.3	0.7	1.3	0.6	0.1	0.6	4.4	0.2	0.2	0.2	12.6	4.7	0.1	0.2	12.1	53.5
Vege &fruits	0.3	0.6	5.3	2.9	60.7	0.5	8.2	0.4	0.1	0.4	724.9	17.6	0.8	0.3	40.1	883.6
Oil seed	0	0.1	31.3	1.1	0.1	0.9	6.9	0	0	0	65.2	102.7	1.3	0.3	6	300.5
Plant fibers	0.3	3.2	3.4	194.7	107.5	2.8	0.4	7.4	0	32.3	261.5	73.4	2.5	0.3	33.4	891.8
Other crops	6.8	10.9	83.8	34.1	11.6	45.4	346.8	6.7	0.9	18.1	2195.1	225.6	9	10.6	151.5	3474
Other aminal products	0.1	3.4	1.7	7.7	12.3	0.6	7.7	0.9	0	0.1	74.7	7.5	0.4	1.1	5.8	154.1
wool	0.2	0.3	0.9	0.4	1.7	0.3	2.4	0.2	0.1	0.1	5.6	0.4	0.1	0	0.1	14.2
Bovine meats	0.1	0.2	0.3	0.1	0	0.1	1.1	0.1	0	0	3.4	22.7	0.1	0.5	0.5	30.1
Other meats	0.2	1	0.6	0.5	0.1	0.5	2.4	0.1	0.1	0.1	16.5	1.5	0.3	3.2	11	40.2
Vege oils	0.1	0.2	0.8	0.2	0	0.2	8.9	0.1	0	0	86.9	0.3	0.1	4.1	45.7	154.8
Dairy	0.1	0.1	0.2	0.5	0	0.1	0.7	0	0	0	9.1	1.6	0.1	1.4	16	31.1
Rice	0.2	0.4	0.1	0.5	0.1	0.4	2.9	0.2	0.1	0.1	5.8	0.5	0.1	0.1	17.5	30.3
sugar	0.3	0.2	0.2	0.4	0.1	0.2	15.2	0.1	0.1	0.1	295	1.4	0	0.5	17.6	338.6
Other food	9.3	28.9	104.6	59.4	1	8.4	69.7	4.6	1.3	1.9	1465.1	22.2	14.1	20.1	234.5	2180
Beverage Tobacco	0.8	1.1	6.1	1.7	0.3	2.1	15.6	0.8	0.4	0.4	42.1	2.3	0.4	4.9	85.7	173.6
total agfood	19.4	51.7	242	305.3	195.7	63.5	497.3	22	3.4	53.9	5277.3	493.2	30	47.9	728.9	8835.8
Total	144.4	2281.5	1271.5	1226.3	680.4	405.4	14625.9	218.2	109.5	1453.9	21176.1	1300.2	1537.2	381.7	2118.9	53253

Sources: GTAP database version 6.

Note: For presentation purposes, numbers smaller than 1 million US dollars are shaded in the table.

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