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How Important are Market Access Issues for Developing Countries in the Doha Agenda?

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Abstract
The aim of this paper is that of going "back to basics", focusing on the importance of market access issues for developing countries in the WTO negotiations begun in Doha in 2001. Data on protection patterns in agriculture and manufacturing are analysed, with a special focus on the issues of tariff peaks and escalation. The likely impact of several liberalisation scenarios is evaluated using GTAP. The broad conclusion is that developing countries still have sizable potential gains from improved market access in merchandise trade, but the size and the distribution of these gains depend much on the extent to which developing countries will be active in the liberalization process and on the agreed negotiation targets and modalities.

Outline

1. INTRODUCTION

The relationship of the developing countries with the WTO system has been at the centre of a serious debate since the failed WTO Third Ministerial Meeting in Seattle in 1999. Since the end of the Uruguay Round, developing countries have expressed considerable concern about the implementation of the WTO agreements. On the one hand, market access gains in developed countries' markets did not materialize as expected. In agriculture, the process of tariffication of non-tariff measures aggravated to some extent the phenomena of tariff peaks and tariff escalation and the widespread use of tariff-quotas and specific tariffs contributed to keep low the degree of transparency of agricultural protection (Hathaway and Ingco, 1996). Moreover, some of the expected gains from the removal of protection in textiles and clothing were offset by the use of anti-dumping duties and special safeguards. On the other hand, while many developing countries extended tariff bindings and lowered bound MFN tariffs on merchandise trade after the Uruguay Round, their applied rates remained in many cases lower than the new bound levels, generating few computable welfare gains (Safadi and Laird, 1996). Concerning the new issues of trade in services, investment and intellectual property rights, the commitments resulting from the Uruguay Round were often poorly understood by developing countries and their implementation made difficult by the lack of institutional and technical capacity (Stiglitz, 2000; Rodrik, 2001). Overall, the significant economic gains that the Uruguay Round should have brought to the developing countries according to estimates by scholars and international organizations simply never showed up.[1] Hence, while there were many points of disagreement in Seattle, development-related issues were central, and have dominated the debate in the WTO in the whole period starting from the failure of Seattle to the Doha Ministerial Meeting.

In Doha, WTO Ministers agreed in November 2001 to launch "a broad and balanced work programme which includes an expanded negotiating agenda and other important decisions and activities necessary to address the challenges facing the multilateral trading system".[2] The agenda contains matters for immediate negotiation, matters for future negotiations that are subject to "explicit consensus" among WTO Members on

1 For a tentative comparison of ex-ante and ex-post effects of the Uruguay Round on developing countries, see Francois (2000).

modalities, to be decided at the Fifth Ministerial Meeting (scheduled for 2003), and matters for further examination in relevant WTO bodies. Among the matters on which negotiations already started there are agriculture, services, industrial goods, environment, anti-dumping subsidies and countervailing measures, dispute settlements, regional agreements, and fisheries subsidies. So, in spite of the fact that "new issues" are increasingly at the centre of WTO activism (services, investment, intellectual property, competition policy, and so on), with the Doha Ministerial Meeting "traditional" market access issues in merchandise trade have been revived in part because, going "back to basics", it is in merchandise trade that developing countries can realize most gains from improved market access conditions. This is a prerequisite for any round aiming at addressing the major concerns of developing countries. While negotiations on reducing trade barriers and support measures in agriculture were part of the "built-in agenda" established during the Uruguay Round, market access in industrial products was added to the negotiating agenda in Doha.[3] Moreover, in response to the demands of developing countries, at Doha it has been agreed the need reduce not only the average level of merchandise tariffs but also the distortions brought about by tariff peaks and tariff escalation.

The objective of this paper is twofold. The first aim of the paper is to provide a descriptive analysis of the current pattern of protection faced by developing countries' merchandise exports in major markets, with a special focus on the issues of tariff peaks and tariff escalation. It is shown that the post-Uruguay Round protection pattern is characterized by a high dispersion in tariff rates, with a large number of tariff peaks concentrated on products of interest to developing countries in agriculture, food, textiles, apparel and some mid-technology products. Moreover, tariff escalation appears to be a pervasive phenomenon both in agriculture and industrial goods, and characterizes both developed and developing countries markets. This evidence supports the view that in the definition of liberalization modalities an appropriate role should be given not only to the reduction of average rates but also to the elimination of the distortions that characterize the sectoral structure of protection in many markets.

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2 WTO document, WT/MIN(01)/DEC/1 of 20 November 2001

3 Support for negotiations in market access for industrial products, essentially tariff negotiations, grew up to and beyond Seattle. This support seems to have been based on the realization that inclusion of industrial products

The second objective of the paper is to assess the impact of several trade policy reform scenarios on developing countries' economies through computable general equilibrium simulations. We will address several "strategic" questions from the developing countries' perspective: will developing countries benefit from further reducing their own applied tariff rates in agricultural sectors? Will they gain from the inclusion of industrial goods in the next round of multilateral liberalization? How liberalization gains (and losses) will be split across different developing countries' groups? Compared with existing work, we have modified data on tariff preferences contained in the GTAP5 database to take into account preferential tariff regimes using UNCTAD TRAINS data. It is estimated that a 50 per cent reduction of tariffs in agriculture would increase world welfare by about $20 billion, a figure that is in line with those obtained in recent studies. All world regions would gain from agricultural liberalization. Moreover, there is no developing world region that would gain by *not* participating actively in further efforts to liberalize agriculture. As found in previous analyses, reducing export subsidies may impact negatively on some developing net food importing regions (e.g., North Africa and Middle East), due to adverse terms of trade developments. Finally, extending liberalization to all merchandise trade would almost double the aggregate gains to developing countries. However, the distribution of gains and losses from a comprehensive liberalization scenario would be unequal across different groups of developing countries. While most Asian countries would gain substantially if tariff cuts in manufacturing were added to liberalization in agriculture, Sub-Saharan Africa may not.

The remainder of the paper is structured as follows. Section 2 illustrates aspects of the patterns of protection in merchandise trade of special interest to developing countries. Section 3 presents the CGE modelling framework and the simulated impact of several alternative liberalization scenarios in merchandise trade. Section 4 concludes with some policy suggestions.

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would permit some cross sectoral trade-offs with the built-in market access negotiations on agriculture and services.

II. THE PATTERN OF PROTECTION FACED BY DEVELOPING COUNTRIES' MERCHANDISE EXPORTS: SOME SALIENT FEATURES

Tables 1 and 2 provide aggregate evidence on the world pattern of protection, taken from the GTAP database, version 5, as modified to incorporate our new data on reciprocal or unilateral (GSP, Cotonou, etc) preferences.[4] The tables show *ad valorem* protection rates separately for 12 aggregate importing regions. Sectors are aggregated into 6 broad categories; food and processed agriculture is shown separately from primary agriculture goods.

Table 1 show the expected worldwide concentration of protection in agriculture and textiles and apparel. The only regions in which manufactures are still substantially protected are South Asia, Africa, Transition Economies and Latin America. In general, processed agriculture is more protected than primary agriculture (a notable exception are Asian NICs). Those regions that protect more agriculture are Western Europe, Japan and North Africa. Textiles are particularly protected in South Asia, Sub-Saharan Africa and Latin America. By contrast, Table 2 reports the *ad valorem* protection rates faced by different exporting regions in the world market. The world regions that face higher protection against their agricultural exports are China, Oceania and North America. In manufacturing, the regions that face the highest levels of protection are Japan and China, whereas in textiles they are China, Asian NICs and Transition Economies.

Overall, the structure of protection in major markets - developed and developing - appears to be biased against sectors of interest for developing countries (agriculture, textiles and clothing). The aggregate data presented in Tables 1 and 2 also provides *prima facie* evidence on tariff escalation in agriculture: tariffs tend to increase with the level of processing. What is not possible to capture with such broad sectoral aggregates is the strong dispersion of tariff rates that characterizes many important markets. In spite of relatively low average protection rates, particular product categories, defined at a possibly very disaggregate level, may be subject to high or very high tariffs. We now turn to the issue of tariff peaks and tariff escalation from the perspective of developing countries' market access.

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4 See Section 3.1 for details on the GTAP protection database and the procedure followed to include preferences.

II.i Tariff peaks

It is widely agreed among the economic profession that a relatively uniform tariff structure is preferable to one exhibiting considerable dispersion. At least two reasons are advanced as justifying a flat tariff structure. First, the costs in terms of welfare and economic inefficiency of a tariff regime increase as the degree of dispersion increases. Second, the case for a uniform tariff structure receives strong support from the political economy arguments that uniform tariff rates more transparent and easier to administer than non-uniform tariffs, and that they are less likely to be determined by the relative political power of domestic industries.

Despite such arguments, the tariff structure of most countries continues to show a remarkable degree of dispersion, reflecting the outcome of pressures from domestic lobbies. The reduction in average tariff rates achieved in the past decades in many countries (following seven GATT rounds, more than 100 active regional trade agreements and extensive unilateral trade policy reforms) coincided to a certain extent with reduced rate dispersion in most countries. However, after the implementation of the Uruguay Round, and the consequent tariffication of non-tariff protection in agriculture, dispersion in tariff rates did not fall substantially, and even increased in some instances. Especially in the case of agriculture, protection was lowered mostly on the items already characterized by relatively low barriers, while the tariffication procedures did little to reduce protection on highly protected goods such as dairy, meat, sugar and so on. Overall, the phenomenon of tariff peaks seems to have been aggravated.

In major developed countries' markets, a relevant number of tariff peaks concerns products of interest for developing countries. Consistently, after the conclusion of the Uruguay round, the developing countries' strongest demands in terms of market access in developed countries were less targeted against overall applied MFN tariffs but more importantly towards the reduction of distortions affecting trade in agriculture and other specific products of interest.

The degree to which tariff peaks in developed countries' markets affect various agricultural developing countries' exports can be assessed by looking at Table 3, which presents statistics for weighted average applied MFN tariff rates in selected products. The highest tariff dispersion is found in tobacco products and in some dairy products. The products with the highest standard deviations are also the ones where the highest maximum tariffs are found (even above 300 per cent). In terms of frequency of tariff peaks across agricultural products (expressed as the percentage of lines affected by tariff peaks in the total number of lines) the most affected sectors by domestic tariff peaks (i.e., tariff rates above 3 times the national average) are beef (more than 52 per cent) and chocolate (more than 32 per cent). The highest frequency of international tariff peaks (i.e., rates above 15 per cent) is also found in beef, followed by diary products (milk and butter). It is important to remark that looking at *ad valorem* tariffs is not enough to capture the incidence and magnitude of tariff peaks in agriculture, since many items are subject to specific rates. Taking into account of these duties would increase substantially the *ad valorem* equivalents of protection in a number of product categories.

Industrial products have been on the multilateral agenda from the very beginning of the GATT, and successive rounds of negotiations have reduced the overall tariffs much more than in other sectors. As a result, average MFN tariffs on manufactures are quite low, while applied rates have fallen even lower under unilateral reforms. Despite these trends, as shown in Table 4 tariff rates in most major markets remain quite dispersed. Standard deviations and the spread between minimum and maximum rates are quite high, confirming the wide presence of tariff peaks. When looking at the percentage of domestic peaks, among developed markets North America counts more than Western Europe or Japan, while Latin America has the highest value among developing country groups.[5] Concerning the sectoral incidence of tariff peaks, Table 5 presents data on weighted average applied MFN tariff rates in Quad markets on developing country exports by product categories defined according to their technological sophistication. The highest tariff dispersion is found in textiles (Canada, Japan, US), automotive (EU), and medium technology process industries. In terms of domestic peaks, their incidence

5 In the case of Latin America for instance, many countries in the region maintain a flat bound tariff rate on industrial products (WTO, 2001) but applied rates vary significantly. Therefore, for these individual countries the average number of domestic peaks is equal to zero.

is higher in the US and Canada, and affect especially textiles, low technology manufactures, and medium technology process industries.

II.ii Tariff escalation

The practice of tariff escalation (higher protection for more processed goods) biases exports towards unprocessed resource-based commodities, characterized by low value added. This may cause difficulties to commodity-dependent developing countries in their attempt to diversify their export base. Although these claims have been well evidenced and long voiced, the extent of tariff escalation remains still significant. An issue to be resolved in order to identify the extent to which tariff escalation is present concerns the identification of different production chains and how different products can be classified as raw, semi-finished or finished. In Table 6 MFN tariff rates in Quad markets are presented for selected product categories distinguishing the stage of processing (raw, finished, semi-finished). With few exceptions, post-Uruguay round tariffs escalate not only between raw and semi-finished but also, where appropriate, between semi-finished and finished. On average, the escalation in Canada and Japan and the EU is higher between finished and raw while in the US the highest average escalation is found between semi-finished and finished goods. The same phenomenon appears in industrial products where the average post-Uruguay Round tariff for all industrial products ranges from 0.8 per cent on raw materials to 4.8 per cent on the finished product. Table 7 shows that tariff escalation is present both in developed and developing countries.[6]

In summary, the data shows that although average tariff rates on manufactures in developed countries have been reduced to fairly low levels, tariff peaks appear to be concentrated on products of interest to developing countries like textiles and low-medium technology products. Moreover, the phenomenon of tariff escalation is quite widespread, affects both agricultural and industrial products, and is present in markets of both developed and developing countries. Any round intended to address effectively the

6 As noted in the case of Quad countries' markets, in most cases escalation in developing countries is greatest between raw and finished products. However, similar to the case of the US, in Asian NICs, there is de-escalation between raw and semi-finished products, and the highest escalation is found between finished and semi-finished products.

market access concerns of developing countries must find solutions to reduce the distortions brought about by the presence of tariff peaks and the bias against products of low-medium stages of processing.

III ESTIMATED GAINS FROM MULTILATERAL TRADE LIBERALIZATION

In recent years, several CGE analyses of the effects of trade policy reforms in a future WTO Round have been produced. Some of them only consider agricultural liberalization, other include manufacturing tariff reform. Only a few analyses consider the impact of service trade liberalization, mainly because of poor data on trade flows in the services sector and poor measurement of service trade barriers. Table 8 summarizes the findings of recent CGE work concerning the global gains associated with future possible trade liberalization scenarios. Results differ quite widely, especially when broad liberalization scenarios are considered (i.e., when manufacturing and services liberalization are included).[7] The sources of the discrepancies are several. Much of the difference in the estimated gains is to be attributed to a different assessment of the liberalization prospects. Some studies assume deeper or more comprehensive cuts in trade barriers than other. However, results are also sensitive to the model specification. In particular, liberalization gains are higher in models allowing for increasing returns to scale and imperfect competition in the manufacturing sector. The gains are further enhanced in specifications allowing for dynamic effects of trade liberalization, associated with trade-related changes in savings and investment or with developments in productivity. A further motive for differences in results has to do with the chosen baseline. In most recent studies, the GTAP dataset is used to replicate the world economy, and the most recent versions of the dataset tend to yield lower estimates of the liberalization effects since the trade barriers have been modified to reflect recent liberalization. Finally, the estimates from CGE models are quite sensitive to their dimensionality (the number of sectors and regions considered), the chosen values for elasticity parameters and the followed closure rule.[8]

7 Among noteworthy attempts to compare the effects of the Uruguay Round obtained from alternative CGE experiments, see Martin and Winters (1996), Francois (2000) and Whalley (2000).

8 The closure rule specifies which variables are considered exogenous in the model. In particular, the modeller has to choose whether to allow for an endogenous determination of the trade balance or to fix it at the same value as that in the *status quo*. As far as elasticity parameters are concerned, it is to note that higher values for substitution elasticities in demand tend to be associated with bigger liberalization effects.

It is worth noting the very large gains that have been estimated for liberalization of trade in services (Brown, Deardoff and Stern, 2001; World Bank, 2001). These large gains are due to two basic reasons. First, services account for a large share in consumption in most middle and high-income countries, much larger for instance than that of agriculture. Second, services are major inputs in the production of manufactures (and of other services). Hence, any trade-related reduction in the prices of services will translate into a widespread productivity gain for liberalizing economies. For these reasons, CGE models tend to yield high gains from the liberalization of the service sector, especially when trade-induced effects on productivity are taken into account (see, e.g., World Bank, 2001). Having said that, the CGE modelling of liberalization in the service is still very tentative. The limitations of these exercises are not only found in the lack of reliable and comprehensive data on trade flows and trade barriers in services, but also in the difficulties encountered in making operational such measures in CGE analysis and in representing adequately the major links through which trade liberalization in service trade affects the whole economy.

A final caveat to be mentioned with the use CGE models concerns the usual assumption of efficient factor markets and the neglect of supply side rigidities and bottlenecks. In developing countries, factor markets are far from efficient (mainly due to underdeveloped institutions and imperfect inter-sectoral mobility) and supply rigidities are quite widespread. Ignoring these characteristic features of developing economies may lead to an overestimation of the short-run allocation gains associated with trade liberalization.

Notwithstanding the notable differences in results coming from different CGE analyses, it is possible to identify a number of common findings. First, the global welfare results concerning agricultural liberalization are quite similar across models and studies. This convergence of estimates for agricultural liberalization is to a large extent due to a consensus of modelling agriculture as a constant returns to scale sector where trade-related dynamic gains are quite limited. A second common feature of static, constant returns to scale CGE models is that the share of global gains associated with (full) agricultural liberalization are not very different from those originating from trade

liberalization in manufactures. Concerning the source of the gains, almost all studies show that the major source of the gains accruing to each country is its own liberalization, rather than that of partner countries.[9] As for the distribution of the global gains between developed and developing countries, in the majority of the studies it is found that the gains are shared quite equally between the two groups. Among developing countries, Asian countries will reap the biggest gains (especially if manufacturing is also liberalized), while the gains for Latin American and African countries will be more limited.

III.i Simulated liberalization scenarios

In this section, we evaluate the effects on the world economy of alternative liberalization scenarios using computable general equilibrium (CGE) techniques, focusing on merchandise trade, in particular agriculture for which the effects of both tariffs and export subsidies are analysed. The assumed liberalization scenarios should not be considered as an attempt to reproduce closely the outcome of the current WTO trade negotiations.[10] The aim is rather that of defining a range for the possible magnitude of gains and losses associated with possible trade policy reforms that may be implemented in the years ahead and to assess how these gains and losses might be distributed across countries. Two main features characterize the following analysis with respect to previous studies. First, the status-quo protection figures take into account the existence of preferential tariff schemes associated with non-reciprocal arrangements (e.g., the GSP) and with all major regional trade arrangements. Second, the eventuality of non-reciprocal liberalization in agriculture is considered, based on the fact that WTO commitments concern the level of bound tariffs, and that for many developing countries actual tariffs in agriculture are quite low compared with bound rates.

The model used in the simulation is the standard static GTAP model, with perfect

9 See, on this point, Safadi and Laird (1996) and World Bank (2001), p. 1671.

10 There are several difficulties in simulating the outcome of actual multilateral trade agreements. First, what are negotiated at the WTO are bound tariffs, not applied tariffs. Databases for CGE analysis such as GTAP only include values for applied rates, and not for bound rates (see, however, Francois, 2000b) for a study using bound instead of applied tariff rates). Second, the committed cuts in protection may be quite different from those actually implemented. This is one of the basic reasons why the early studies on the Uruguay Round effects estimated bigger gains compared with later studies (see, e.g., Francois, 2000a and Whalley, 2000).

competition in all sectors and constant returns to scale.[11] In spite of the well-known limitations of standard CGE models (absence of dynamic effects, perfect market clearing, lack of robustness with respect to model parameters, and so on), they are useful tool for assessing an order of magnitude for the distribution of gains and losses of trade liberalization, especially when the major trade reforms are assumed to take place in agriculture. In the experiment, the structure of the model is kept simple, so that liberalization gains and losses emerging from simulation analysis are easy to interpret, being associated with changes in allocative efficiency and in the terms of trade. While sectors will be kept quite aggregate, countries will be relatively disaggregated in the analysis, and will be grouped according to geography and level of development.

The database is GTAP5, modified in order to account for tariff preferences (available from the UNCTAD TRAINS database) as illustrated in Tables 1 and 2. The protection data are based on applied MFN tariffs and the *ad valorem* equivalents for non-tariff protection in agriculture and in textiles and clothing.[12] Thus, GTAP protection data give a convenient *ad valorem* assessment of most of the trade barriers currently used by governments. The preferences rates that we have added include non-reciprocal agreements, such as GSP and the Cotonou Agreement (successor to the Lomé Agreement covering EU-ACP preferences), as well as reciprocal regional trade agreements (NAFTA, EFTA, EU, etc.).

The main focus of the experiments is on agricultural liberalization, which is both part of the built-in WTO agenda and one of the major pillars of the WTO Doha Declaration.

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[11] For a description of the GTAP model see Hertel (1997). Consumers have the same non-homothetic preferences, according to which allocate income between private consumption, public consumption and savings. Products are differentiated à-la Armington. The elasticity of substitution between any pair of domestic and imported goods is constant within each sector, and the elasticity of substitution between each pair of imported goods originating from different countries is twice higher than that between domestic and foreign goods. On the production side, intermediate inputs and primary factors are used in fixed proportions while the subsititutability between different inputs and between different production factors is captured by a CES aggregator. Returns to production factors accrue to households in terms of income. Private income, in turn, feeds into consumption demand and savings after being taxed or increased by public transfers. Households' savings finance investment, and investment does not affect the current capital stock. Countries can borrow and lend abroad. In the closure used for our simulations total world savings add up to total world investment and expected rates of returns on savings are equalized across world regions.

12 For agriculture, the protective power of specific duties, combined duties and TRQs are translated into *ad valorem* equivalents. Non-tariff protection in textiles and apparel takes often the form of voluntary export restraints administered by exporters under the Multi-Fibre-Agreement. In GTAP, this is modelled as a vector of *ad valorem* export taxes.

The aggregation of six sectors and 12 world regions is chosen to isolate the sectors most likely to be greatly affected by trade liberalization, allowing for an analysis of the effects of tariff escalation in agriculture and to aggregate countries to the smallest number of regions with some degree of geographical and economic homogeneity.

In the first experiment, a worldwide reduction of 50 per cent in all agricultural tariffs brings about an aggregate welfare gain of $21.5 billion (Table 9), an overall estimate that is in line with other studies using the GTAP5 database, but the distributional effects are different. All the world regions appear to gain, but gains differ widely both in absolute and relative terms. The largest absolute gains are captured by Japan, North America, the Newly Industrializing Asian Countries (NICs), North Africa and Middle East, and Oceania. In percentage terms, those regions that appear to gain most are Oceania, the Asian NICs and North Africa. The estimated percentage gain for Sub-Saharan Africa and Latin America is lower than in other studies conducted under similar assumptions (e.g., Diao, Somwaru, and Roe, 2001, van Meijl and van Tongeren, 2001). This is likely because of the inclusion of tariff preferences in the protection database. Since Africa and Latin America are among the major beneficiaries of preferential schemes, it seems likely that the gains from liberalization for these countries in other studies could be overstated when full account is not taken of tariff preferences as has been done here.

Looking at aggregate trade indicators (Table 10), the value of exports rise in all regions after liberalization. Lower worldwide protection in agriculture translates into increased worldwide import demand and improved trade opportunities in all areas. Not all regions, however, profit equally from the increased trade potential. While the value of exports rise considerably in relative terms in Africa, Oceania and Latin America, export gains are quite modest for Western Europe.[13] As for terms of trade changes, the improvement is substantial for Oceania, while the biggest losses are observed in Japan, North Africa and South Asia.

13 As found, for instance, in Diao, Somwaru and Roe (2000) and van Meijl and van Tongeren (2000). Francois (2000), in a model including both imperfect competition and dynamic investments related effects, finds much bigger gains for Western Europe.

The second experiment is the elimination of export subsidies in agriculture, without parallel changes in tariffs.[14] The results show modest worldwide welfare losses (Table 11). These losses are mainly explained by worsened resource allocation within countries, as export subsidies are eliminated while other major distortions remain. After the elimination of subsidies, all regions except Europe start increasing their agricultural value added.[15] However, since many countries still face high protection against their agricultural exports, this shift appears to be counterproductive. Most regions actually stand to lose from the elimination of subsidies, while the gains appear to be very concentrated in Western Europe - which is the area characterized by the highest value of initial subsidies - and in regions that are net agricultural exporters, like Oceania and Latin America.[16] Western Europe gains both from better resource allocation (the elimination of subsidies brings the specialization pattern of this regions more in line with its comparative advantages) and improved terms of trade. The removal of export subsidies directly reduces the agricultural exports of Western Europe, thus leading to a lower world supply for these goods and to improved terms of trade for Europe, whose exports are sold now at higher prices on international markets. As for the terms-of-trade effects on the other regions, they depend on their agricultural export pattern. Countries that are net agriculture and food exporters (like North America, Oceania and Latin America) are likely to gain, while those that are not may lose (e.g. Asian NICs and North Africa).

Aggregate trade data (Table 12) show that trade flows are reduced in some regions and increased in others by the elimination of subsidies. The largest percentage drop in exports occurs in Sub-Saharan Africa and in Western Europe. Western Europe exports drop because of the direct effect of the elimination of export subsidies. The fall in Sub-

14 GTAP data on exports subsidies are derived from countries' notifications to the WTO (year 1998) concerning their subsidy expenditures. Only a limited number of countries notified export subsidies: the UE and EFTA, some Eastern Europe transition economies (Hungary, Poland and Czech Republic), the US (dairy products only) and a few other middle and low-income countries (Colombia, South Africa, Turkey). The simulation consists of setting to zero the value of export subsidies in primary and processed agriculture in Western Europe and Transition Economies and in the US for what concerns processed agriculture (which comprises dairy products).

15 This simulation result is not reported (yet it is available on request). Intuitively, after the elimination of subsidies, domestic prices fall compared with world prices in the subsidizing regions (e.g., the EU), leading to a shift of resources away from agriculture in these regions. Conversely, the reduced supply from subsidizing regions translates into higher world prices. This induces a shift towards agricultural production in non-subsidizing regions.

Saharan Africa exports is mainly associated with reduced agricultural imports by Western Europe coming from that region. In fact, after the elimination of export subsidies, agricultural imports (in value) fall in the EU (due to a reduced difference between domestic and world prices) and the region suffering most from that is Africa, for which the European market is of great relevance. Conversely, the exports of Latin America, Oceania and South Asia increase substantially in value, mainly as a result of improved terms of trade (higher world prices for agricultural products).[17]

In the third experiment, intended to look at the effects of tariff escalation in agriculture, tariffs are reduced by 50 per cent on processed agriculture only. Under this scenario, the global gains are roughly half those obtained in the prior simulation of liberalization in all agricultural sectors (Table 13). However, the distribution of the gains is quite different. While North America, Oceania and all Asian regions achieve gains that are considerably smaller than those arising under liberalization of all agricultural sectors, Africa and Latin America obtain gains of a similar size, and Western Europe even finds the option of limiting liberalization to processed agriculture preferable. The lesser gains for South Asia than under the full liberalization scenario is explained by the high level of protection in primary agriculture in that region (Table 1). Limiting liberalization to processed agriculture results in terms of trade losses for Western Europe, but the allocation gains would prevail. As for North America and Oceania, the lower gains than under the full liberalization scenario are mainly due to unexploited terms of trade gains: both regions are net exporters of primary agriculture and would gain from its liberalization in terms of better export prices. Finally, the fact that African and Latin American regions appear to gain mostly from liberalization in processed agriculture is associated with the heavy protection faced by their processed agriculture and food exports, especially in Western Europe and Japan. These findings therefore support the thesis that developing countries bear the larger share of costs arising from tariff escalation in agriculture.

16 Similar results are obtained, for instance, in Harrison, Rutherford and Tarr (1996) and Diao, Somwaru and Roe (2001).

17 Should the removal of export subsidies in agriculture be coupled with reduction in domestic support, the positive terms of trade effect on countries that are net agricultural exporters (e.g., Latin America, Oceania) would be strengthened further. In such a case, however, domestic production in Europe would fall even more, and this would lead to a more modest reduction in European imports, which would be of particular advantage to African countries.

Many developing countries apply agricultural tariffs that are well below the values bound as a result of the Uruguay Round negotiations. The fourth experiment, therefore, consists of a liberalization scenario in which developing countries, either because they are already applying rates lower than the bound ones, or for some other reason, are not reducing their applied tariffs in agriculture. For the purposes of this exercise, a "broad" definition of developing country is considered: only Western Europe, North America, Japan and Oceania are treated as developed. In this scenario, only these regions make a policy change, by making a 50 per cent cut in their agricultural tariffs. Under this scenario, there is a considerable reduction in global gains compared with those arising from a worldwide tariff cut (Table 15). Under the assumptions of the model, developing countries would not benefit from not participating into liberalization. Conversely, the larger share of the gains is captured by Japan, Oceania and North America, i.e., by liberalizing countries. In spite of the fact that all developing countries would benefit from improved terms of trade (the better market access conditions in developed countries are not reciprocated), the allocation gains are so small that no developing country would benefit by not joining agricultural liberalization. While non-reciprocal liberalization can be helpful to beneficiary countries when targeted to a restricted number of beneficiaries, due to a "fallacy of composition" argument the positive effects on the terms of trade are very small when the beneficiaries are the developing countries as a whole.[18] So, all regions fare less well than in the case of a tariff reduction implemented worldwide. Interestingly enough, those regions that lose more with respect to worldwide liberalization are not developed countries, but some highly protected developing regions that do not have a comparative advantage in agriculture, such as Asian NICs, South Asia and North Africa. Looking at export changes (Table 16), it may be noted that, by not joining liberalization, developing countries compromise their own export expansion possibilities, since resources remain employed in import-competing sectors. The increase in exports of each developing region is higher when liberalization occurs worldwide.

Finally, under the fifth scenario there is a worldwide 50 per cent reduction of all merchandise tariffs. This results in a global welfare gain that is almost twice that arising

18 See, for instance, Ianchivichina, Mattoo and Olarreaga (2001) and Bora, Cernat and Turrini (2001) for recent CGE assessments of the benefits received from LDCs from receiving duty and quota-free access in developed countries' markets.

from liberalization in agriculture only (Table 17).[19] The big gainers from adding manufacturing liberalization to agriculture liberalization are the Asian regions. Some countries, however, do not experience any advantage from extending liberalization beyond agriculture. These are especially North America, Transition Economies and Sub-Saharan Africa, which would suffer from terms of trade losses by adding manufacturing liberalization. All these regions would see their market shares in textiles and clothing and other manufactures eroded by increased imports from Asia.

The removal of all tariff protection boosts exports in all areas (Table 18). The increase is in general much stronger than that associated with the elimination of agricultural tariffs only. The pattern of changes in export values is quite clear. The biggest increases in exports occur in low to middle-income Asian countries (China, South Asia), followed by other developing countries and by Japan and Oceania. Western Europe and North America do not achieve a major expansion of their exports. Overall, these results confirm what has been found in previous studies (e.g., Hertel and Martin, 2000, Hertel et al., 1999), namely, that the inclusion of manufacturing liberalization in a "comprehensive round" of negotiations would be especially interesting for the developing countries. However, while this conclusion holds for developing economies taken as a single broad aggregate, there are regions, markedly Sub-Saharan Africa, that – under the assumptions of the model - might actually lose from extending liberalization from agriculture alone to all merchandise trade.

IV CONCLUSIONS

One of the most challenging tasks for Doha Ministerial Meeting was to ensure that the concerns of the developing countries were reflected in the negotiating mandates, and in the area of market access the texts agreed at Doha provide an opportunity to improve the developing countries' effective participation in the international trade. To this end, the Doha meeting revived the "traditional" market access issues in merchandise trade, and the estimates provided in this paper show that the inclusion of market access is fully justified if Doha is to meet its development objectives.

19 Note that these figures should be considered as lower bounds, since important sources of liberalization gains in manufacturing such as the exploitation of scale economies and the availability of imported inputs are neglected.

The paper shows that, in spite of the now fairly low average levels of MFN protection in major markets, there are biases against exports of interest to developing countries that can be fully understood only by analysing the structure of tariffs at a very disaggregated level. In certain Quad markets (EU and Japan, especially) MFN tariff peaks in some processed agriculture and food categories can be so high as to displace completely exports from developing countries in absence of any preferential regime. Likewise, in textiles and clothing and some low-medium technology manufactures, the share of MFN domestic tariff peaks in US and Canada is remarkably high. Finally, the structure of tariffs tend to escalate with the level of processing in almost all major world markets, a feature that may hamper the transition of developing countries' exports towards products with higher levels of value added.

Tariff peaks and escalation may be tackled in future negotiations by means of a harmonising formula such as the Swiss formula, used in the Tokyo Round (Laird, 1999). In any event, whatever the criterion followed to achieve tariff cuts, the possibility of having exceptions for particular products should be avoided: in general, exceptions tend to concentrate where existing protection is the highest.

Apart from the question of liberalization modalities, there are also certain important questions about liberalization strategies. Will developing countries gain from further reducing their applied rates in agriculture? Would be in their interest adding industrial goods among the sectors to be liberalized? Which world regions would gain most from the next Round? We address the above issues through CGE analysis. Although, because of modelling and data limitations, emphasis on specific numbers and figures arising from CGE analysis should be avoided, some qualitative results seem quite robust and are worth to mention. First, tariff cuts in agriculture would result in higher allocative gains than the elimination of export subsidies. Since the elimination of export subsidies *per se* may hurt some developing world regions (e.g. North Africa and Middle East), due to increased import prices for food and reduced import demand from Europe, reductions in applied tariffs in agriculture need to accompany the elimination of export subsidies. A second key result is that there is no broadly defined developing world region that would gain by not participating into agricultural liberalization. It is a common finding that the

larger share of liberalization gains comes from liberalization of the domestic market than from better market access conditions in other markets. Third, reducing the extent of tariff escalation would improve the situation of a large share of developing countries. The majority of gains from agricultural liberalization accruing to African an Latin American countries comes in fact from the elimination of tariffs on food and processed agriculture only. Finally, on aggregate, developing countries would gain substantially from adding manufacturing liberalization to agricultural liberalization. However, while gains to developing Asia would be high, Sub-Saharan Africa may not gain by adding manufacturing MFN liberalization to liberalization in agriculture.

In evaluating these findings it is important to recall that no account is taken of potential dynamic effects (e.g., through trade and investment linkages), nor of adjustment costs and implementation issues (e.g., replacing foregone tariff revenue with alternative taxes). These cost are likely to be relevant especially in developing countries with undiversified economies, poorly working factor markets and inadequate infrastructure. The provision of technical assistance to develop export capacity in these countries may help them to fully profit from better market access associated with further multilateral liberalization. Programmes targeted at the formation of social safety nets may help to offset the costs of adjustment associated with liberalization in the domestic market or arising from changes in the terms of trade.

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Table 1. Average protection applied by different importing regions (per cent)

Sectors	Asian NICs	China	South Asia	Western Europe	North America	Transition Economies	Sub Saharan Africa	Oceania	North Africa and Middle East	Latin America	Japan	Rest of the World
Natural resources	2.3	1.9	14.1	0	0.2	1.3	4.9	0	4	4.9	0	4.5
Primary agriculture	37.7	15.5	20.6	12.1	8.5	12.6	16.3	1.7	48.7	12.4	30	6.3
Processed agriculture	20.2	15.4	29.4	20.9	10	19.7	26.9	4.6	57.8	16.5	46	12.5
Textiles and apparel	8	12.9	27.5	5.1	10.3	13.5	20.5	15.5	13.4	14.7	6	14.2
Manufactures	4.8	6.1	23.8	1.9	1.3	8.8	10.9	3.2	8	10.7	0.3	9.2
Services	0	0	0	0	0	1	1.8	0	0.2	0.7	0	0

Source: Computations by the authors, based on the UNCTAD TRAINS database.
Note: Rates include MFN and preferential tariffs, as well as estimates of non-tariff protection (GTAP source). GTAP5 data are referred to 1997.

Table 2. Average protection faced by exporters of different regions (per cent)

Sectors	Asian NICs	China	South Asia	Western Europe	North America	Transition Economies	Sub Saharan Africa	Oceania	North Africa and Middle East	Latin America	Japan	Rest of the World
Natural resources	3.9	3.1	3.7	4	2.6	2.4	4	2.9	3.1	2.3	2.5	3.2
Primary agriculture	14.8	23.8	18	15.1	23.4	12.2	16.9	24.1	19.5	21	16	17.6
Processed agriculture	20.6	24.5	14	27.4	25	21.1	14.85	35	19.4	20.6	27.8	28.6
Textiles and apparel	15.7	17.7	12.7	14	14.1	13.7	10.6	9	13.8	9.3	14.3	16.8
Manufactures	8.1	8.9	6.7	7.8	6.2	6.9	6.5	7.1	7.8	6.2	10.2	6.8
Services	0.4	0.3	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.3

Source: Computations by the authors, based on the UNCTAD TRAINS database.

Note: Rates include MFN and preferential tariffs, as well as estimates of non-tariff protection (GTAP source). GTAP5 data are referred to 1997.

Table 3. MFN tariff peaks in developed countries' markets on agricultural imports from developing countries (1998-99)

Product	Standard Deviation	MFN Weighted Average Tariff	Maximum MFN Tariff	Domestic peaks (per cent of total lines)	International peaks (per cent of total lines)
Beef	16.16	12.89	41.35	52.11	29.58
Sheep meat	9.02	0.84	21.25	3.45	3.45
Poultry	33.33	8.16	134.3	2.52	2.52
Milk	56.33	22.7	140	17.78	17.78
Milk concentrates	105.02	19.59	308.5	22.15	22.15
Butter	100.54	249.97	336.25	32.47	19.48
Barley	41.73	22.12	101.5	11.43	11.43
Maize	13.19	3.99	50	4.00	4.00
Wheat	28.93	39.51	81.5	13.11	9.84
Banana	9.07	4.27	27.95	22.73	13.64
Citrus fruits	7.1	4.62	25.65	6.10	8.54
Other tropical fruits	8.57	10.68	33.25	14.86	8.11
Non-tropical fruits	5.6	0.77	17.75	1.45	2.90
Chocolate	40.55	22.72	276.5	34.21	14.33
Tobacco	97.97	44.86	350	6.25	6.25
Cigarettes	10.78	2.67	30	4.17	4.17
Cigars	6.95	10.14	17	0.00	10.00
Other tobacco prod.	115.49	168.57	350	16.46	17.72
Tea	5.96	3.82	17.75	11.11	11.11
Oil seeds	24.84	9.56	171	1.02	1.02
Vegetable oils	4.99	1.4	19.95	3.74	1.15

Source: Computations by the authors, based on the UNCTAD TRAINS database.

Table 4. Tariff peaks in industrial products (most recent years available in WITS/TRAINS)

Importer	Standard deviation	Weighted Average	Maximum rate	Domestic peaks (per cent)	International peaks (per cent)
Developing	8.42	8.61	225.00	3.05	22.51
Asian NICs	10.20	6.75	200.00	0.95	19.67
China	5.06	3.27	50.00	0.63	2.43
South Asia	12.57	19.44	200.00	0.81	55.12
Western Europe	1.10	0.16	21.20	1.02	0.01
North America	3.35	1.54	110.00	30.15	0.71
Transition	5.54	7.15	90.00	0.08	8.99
Sub-Saharan Africa	11.21	8.62	225.00	3.21	31.00
Oceania	3.45	3.53	28.00	4.28	0.55
N. Africa & M. East	5.26	8.06	55.00	0.46	10.75
Latin America	7.17	11.60	100.00	4.70	28.36
Japan	1.75	0.83	21.90	0.09	0.11
OECD	6.05	2.16	110.00	9.35	7.28

Source: Computations by the authors, based on the UNCTAD TRAINS database.

Table 5. Tariff peaks in manufactures, by technology-based product groups in Quad markets, 2000

Product group		Canada	EU	Japan	United States
Low Technology, Textile/Fashion Cluster	Standard deviation	7.67	3.60	6.61	7.44
	DomesticPeaks (as a share of total number of lines)	0.75	0.00	0.08	0.87
	InternationalPeaks (as a share of total number of lines)	0.40	0.02	0.09	0.15
	Maximum rate	22,5	17	37,5	48
Low Technology, Manufactures, n.e.s.	Standard deviation	3.60	2.14	1.85	4.03
	DomesticPeaks (as a share of total number of lines)	0.66	0.00	0.00	0.67
	InternationalPeaks (as a share of total number of lines)	0.01	0.00	0.00	0.02
	Maximum rate	18.00	12.00	17.00	38.00
Medium Technology, Automotive Products	Standard deviation	3.12	5.85	0.00	5.25
	DomesticPeaks (as a share of total number of lines)	n.a.	0.00	0.00	0.56
	InternationalPeaks (as a share of total number of lines)	n.a.	0.16	0.00	0.04
	Maximum rate	13.00	22.00	0.00	25.00
Medium Technology, Process Industries	Standard deviation	5.27	3.41	3.70	4.58
	DomesticPeaks (as a share of total number of lines)	0.59	0.00	0.00	0.74
	InternationalPeaks (as a share of total number of lines)	0.12	0.00	0.00	0.07
	Maximum rate	20.50	12.00	27.20	23.10
Medium Technology, Engineering Industries	Standard deviation	3.77	2.03	1.17	2.14
	DomesticPeaks (as a share of total number of lines)	0.37	0.00	0.00	0.38
	InternationalPeaks (as a share of total number of lines)	0.01	0.00	0.00	0.00
	Maximum rate	25.00	14.00	8.40	14.00
High Technology, Electronic/Electrical Products	Standard deviation	2.87	3.37	0.42	2.22
	DomesticPeaks (as a share of total number of lines)	0.36	0.00	0.00	0.48
	InternationalPeaks (as a share of total number of lines)	0.00	0.00	0.00	0.00
	Maximum rate	9.50	14.00	3.30	15.00
High Technology, n.e.s	Standard deviation	2.35	1.75	0.28	2.20
	DomesticPeaks (as a share of total number of lines)	0.27	0.00	0.00	0.38
	InternationalPeaks (as a share of total number of lines)	0.00	0.00	0.00	0.00
	Maximum rate	11.00	7.70	3.90	16.00

Source: Computations by the authors, based on the UNCTAD TRAINS database. The definition of product groups follows Lall (2000).

Table 6. Tariff escalation in Quad countries, by major product group (Weighted average MFN applied tariffs in percentage, most recent years available in Trains)

	Canada			Japan			US			EU		
Product group	R	S	F	R	S	F	R	S	F	R	S	F
Meat products	0.11	10.25	18.83	0.08	12.92	10.66	0.60	6.15	3.38	1.53	5.16	12.95
Dairy and egg products	1.94	..	9.00	18.77	..	17.39	2.82	..	11.56	6.27	..	7.70
Fish products	0.01	1.53	0.01	3.91	5.10	11.58	0.15	1.88	1.96	9.34	14.64	13.31
Sugar products	0.00	6.25	5.76	25.50	1.00	15.40	..	5.82	7.48	17.30	..	13.07
Cereal products	2.75	3.85	4.43	6.37	12.86	20.79	0.87	4.32	3.12	1.35	11.65	11.65
Vegetable oils	0.00	3.00	..	0.14	4.20	..	35.42	1.83	..	0.00	1.10	..
Coffee, tea and spices	0.08	0.00	5.14	1.63	10.60	20.02	0.37	0.07	5.35	0.11	8.63	8.00
Fruits and vegetables	0.89	4.56	3.16	7.07	8.44	17.92	2.94	6.07	3.95	8.12	8.02	19.15
Tobacco	7.79	..	8.17	0.00	..	0.07	68.26	..	350.00	..	..	24.81
Other food	..	5.70	7.90	..	13.43	16.51	..	13.00	6.98	..	8.58	10.47
Animal food	0.01	3.17	0.26	0.00	0.20	0.00	0.61	2.27	0.00	0.71	4.55	0.00
Hides and skins	0.00	0.00	13.05	0.00	0.64	19.47	0.00	0.25	12.49	0.00	0.00	8.54
Chemicals	2.28	..	3.46	2.55	..	1.67	3.84	..	2.10	2.92	..	3.09
Fertilisers and minerals	0.18	..	1.63	0.00	0.00	0.50	0.05	0.00	2.69	0.04	0.00	1.64
Petroleum products	0.00	..	3.17	..	..	1.08	..	..	0.39	0.00	..	0.91
Rubber products	0.00	0.00	5.53	0.00	0.00	0.09	0.00	0.00	2.98	0.00	0.13	3.61
Textiles	0.00	2.79	14.25	0.00	2.54	10.45	0.01	3.84	11.47	0.00	2.81	10.58
Metal products	0.00	..	2.81	0.00	..	0.87	0.00	..	2.19	0.00	..	2.88
Wood and Cork	0.49	0.17	3.21	0.00	1.02	2.38	0.36	0.09	0.83	0.00	0.27	2.26
Coal	0.01	0.82	..	0.04	0.00	..	0.00	0.00	..	0.00	1.29	..
Gas	1.73	6.50	..	0.00	..	..	0.00	0.00	..	0.22	0.00	..

Source: Computations by the authors, based on the UNCTAD TRAINS database.
Note: R-raw materials; S-semi-finished products; F- finished products

Table 7. Tariff escalation in selected regional groupings (weighted average MFN tariffs, most recent years)

	Asian NICs			South Asia			North America			Sub-Saharan Africa			Oceania			North Africa and Middle East			Latin America		
Product group	R	S	F	R	S	F	R	S	F	R	S	F	R	S	F	R	S	F	R	S	F
Beverages	10.71	129.74	199.57	40	230	100	13	0	..	25.83	25	30.71	2.5	..	4.44	26	..	1350	24.19	25.19	25.9
Cereals	1.9	7.91	9.05	0	34	40	0.78	8.44	9.33	11.79	20.24	24.76	0	2.14	4.62	6.17	20.13	20.29	13.33	15.74	17.11
Chemicals	4.66	..	7.3	34.2	..	34.72	4.39	..	2.97	3.95	..	10.1	1.16	..	3.03	11.02	..	15.52	9.58	..	12.29
Dairy	10.74	11.63	12.64	35	0	35	16.44	13.38	11.83	16.12	24.5	24.77	0	0	0	12	13.84	14.75	15.74	29.82	37.89
Animal Feed	4.71	3.59	1.73	40	40	35	0.78	2.34	0	5	5.53	4.42	0	0	0		14.92	5	11	11	10.13
Fertilisers	2.88	4	9.78	25.87	35	38.85	0.26	0	4.9	4.58	12.5	14.07	0.86	..	4.07	13.73	..	21.96	8.27	0	15.36
Fish products	6.39	12.62	12.02	15	15	15	0.72	3.34	1.73	21.58	21.2	22.86	0	0.14	0	7.74	26	30	18.17	19.52	15.88
Fruits and vegetable products	14.09	10.08	11.74	22.54	38.2	40	4.04	8.35	6.27	10.64	12.67	30.15	0.5	2.81	4.77	17.49	17.49	20.33	10.98	14.65	19.26
Leather products	0.52	4.5	11.26	0	14	32.89	0	0.64	9.68	2.78	5	21.14	0	0	7.57	5	5	27.13	5.41	13	22.82
Metal products	1.51	..	8.84	18.68	..	33.06	0	..	2.57	2.52	..	12.19	0	..	4.14	5.38	..	18.81	6.37	..	16.03
Oil Seeds	6.81	2	..	40	..	..	29.56	1.65	..	15.63	25	..	0.83	0	..	8.86	10	..	4.45	14.2	..
Petroleum products	4.2	..	5.08	20	..	37.5	..	..	1.72	2.5		6.67	0	..	0.42	5	..	13.11	1.5	..	11.06
Rubber products	2.68	10.41	14.94	30	40	40	0	0	2.65	3.96	4.89	17.29	0	5	7.41	8.86	9.55	18.69	7.35	12.2	16.98
Sugar products	12.15	12.07	5.42	40	23.33	36.67	..	5.82	6.44	22.69	16.67	24.83	0	2.5	4.78	12	7.25	19.4	20	19.8	19.5
Textiles and clothing	2.96	4.22	14.57	24	32.63	39.32	0.02	2.19	9.74	2.17	8.37	23.04	0.5	0.81	13.12	5	13.68	31.09	10.36	13.37	22.49
Tobacco	154.05	..	204.93	40	..	40	58.33	..	350	5.63	..	33.57	0	..	0	..	..	63.33	24.29	..	31.95
Wood products	4.79	0.34	11.4	20	16.82	37.09	0.14	0.32	1.51	3.57	6.07	16.7	0	3.33	4.34	6.4	11.84	21.28	9.42	11.41	16.1

Source: Computations by the authors, based on the UNCTAD TRAINS database.
Note: R – raw materials ; S: semi-finished products; F-finished products.

Table 8. Estimates of global welfare effects from multilateral trade liberalization

	Model and Dataset*	Policy Experiments	Welfare change (US$b. p.a.)**
Anderson, Hoekman, and Strutt, 1999.	Model: Static, perfect competition. Dataset: GTAP 3.	Full liberalization in all countries in all sectors	260
Nagarajan, 1999.	Model: Static, increasing return to scale and imperfect competition in manufacturing. Dataset: GTAP 4.	50 per cent cut in agricultural protection and implementation of additional trade facilitation measures.	385
Dessus, Fukasaku, and Safadi, 1999	Model: Dynamic, perfect competition. Dataset: GTAP 4.	Full merchandise trade liberalization	284 (exogenous productivity) 1210 (endogenous productivity)
Hertel, Anderson, Francois, and Martin, 1999.	Model: Dynamic, constant returns to scale and perfect competition. Dataset: GTAP 4.	40per cent cut in agricultural tariff, export and production subsidies.	70
Anderson, Francois, Hertel, Hoekman and Martin, 2000	Model: Static, constant returns to scale Dataset: GTAP4.	Full liberalization in agriculture Full merchandise trade liberalization	164 253
Abare, 2000.	Model: Static, perfect competition. Dataset: GTAP 5.	50per cent cut in agricultural support 50per cent cut in agricultural support and 50per cent reduction of import protection in all other sectors	53 (GDP in 2010) 94 (GDP in 2010)
Francois, 2000b.	Model: Dynamic, monopolistic competition and imperfect competition in manufacturing, increasing returns from input variety. Dataset: GTAP 4.	50per cent cut in agricultural protection 50 per cent cut in agricultural, merchandise and service protection	27 (monopolistic competition) 21 (oligopoly) 384 (monopolistic competition) 233 (oligopoly)
Diao, Somwaru, and Roe, 2001.	Model: Static and dynamic with technological spillovers, constant returns to scale. Dataset: GTAP 5.	Full removal of agricultural tariffs and in domestic agricultural support. .	31 (static version) 56 (dynamic version)
Scollay and Gilbert, 2001.	Model: Dynamic, imperfect sectoral labour mobility. Dataset: GTAP 4.	100per cent cut in agricultural tariffs	69.43
World Bank, 2001	Model: Static and dynamic, constant returns to scale. Database: GTAP5	100per cent cut in merchandise protection 100per cent cut in service protection	355 (static version) 830 (dynamic version) 1073 (developing countries only, static version)
Brown, Deardoff, and Stern, 2001.	Model: Static, increasing returns to scale, and monopolistic competition in manufacturing. Dataset: GTAP 4.	100per cent cut in agricultural tariffs 100per cent cut in all merchandise and service protection	33 1857
Van Meijl and Van Tongeren, 2001.	Model: Static, perfect competition. Dataset: GTAP 5.	100 per cent cut in agricultural tariffs and in domestic agricultural support 100 per cent cut in merchandise protection.	44.4 78.3

*Data in the GTAP3, GTAP4 and GTAP databases are referred to, respectively, 1992, 1995, and 1997.
** If not specified otherwise, welfare changes are measured by Equivalent Variation changes, i.e., by the money transfers necessary to make individuals indifferent between the status-quo and the post-reform situation.

Table 9. Agricultural tariff liberalization. Welfare changes

Regions	Values (1997 US $ millions			
	Percentage change	Total	Terms of trade effect	Allocative effect
Asian NICs	0.342	3363.6	-417.2	3840.4
China	0.082	964	-379.1	1387.6
South Asia	0.074	361.2	-205	599.5
Western Europe	0.021	1562.1	26.1	1574
North America	0.046	3613.3	3046.7	520.9
Transition Economies	0.118	900.8	-97.4	1023.9
Sub-Saharan Africa	0.072	226.2	-197	437.2
Oceania	0.419	1719.8	1646.7	76.4
North Africa and Middle East	0.387	3033.8	-1720.7	4867.5
Latin America	0.073	1304.7	173.8	1126.9
Japan	0.116	4221.2	-2029.8	6019.8
Rest of the World	0.11	277.1	108	155
Total		21547.9	-44.9	21629

(50 per cent cut in all agricultural tariffs)

Table 10. Agricultural tariff liberalization. Aggregate trade data

Regions	Percentage change	
	Exports	Terms of trade
Asian NICs	0.578	0.037
China	0.697	-0.059
South Asia	1.215	-0.243
Western Europe	0.340	0.038
North America	0.403	0.08
Transition Economies	1.150	-0.039
Sub- Saharan Africa	1.324	-0.22
Oceania	1.425	1.003
North Africa and Middle East	1.706	-0.408
Latin America	1.042	0.042
Japan	1.196	-0.255
Rest of the World	1.843	0.183

(50 per cent worldwide cut in tariffs on processed agriculture)

Table 11 Liberalization in agriculture: export subsidy removal. Welfare changes

	Values (1997 US $ millions)			
Regions	**Percentage change**	**Total**	**Terms of trade effect**	**Allocative effect**
Asian NICs	-0.008	-73.9	-44.0	-10.9
China	-0.015	-178.8	-53.8	-96.4
South Asia	-0.000	-1.9	54.1	-56.3
Western Europe	0.033	2410.0	1699.7	628.8
North America	-0.001	-88.0	94.6	-182.1
Transition Economies	-0.117	-891.5	-515.1	-374.1
Sub-Saharan Africa	-0.113	-354.9	-165.0	-192.3
Oceania	0.024	100.1	107.3	-3.6
North Africa and Middle East	-0.283	-2209.7	-881.5	-1329.5
Latin America	0.004	80.3	82.3	-29.6
Japan	-0.013	-484.9	-251.0	-170.2
Rest of the World	-0.063	-158.7	-124.8	-43.2
Total		-1851.7	2.8	-1859.3

Table 12. Liberalization in agriculture: export subsidy removal Aggregate trade data

	Per centage change	
Regions	**Exports**	**Terms of trade**
Asian NICs	0.008	-0.007
China	0.006	-0.013
South Asia	0.125	0.082
Western Europe	-0.124	0.065
North America	-0.013	0.013
Transition Economies	-0.056	-0.172
Sub- Saharan Africa	-0.234	-0.161
Oceania	0.107	0.119
North Africa and Middle East	-0.148	-0.296
Latin America	0.056	0.035
Japan	-0.047	-0.061
Rest of the World	-0.225	-0.189

Table 13. Liberalization in agriculture: the role of tariff escalation Welfare changes

Regions	Values (1997 US $ Million)			
	Percentage change	Total	Terms of trade effect	Allocative effect
Asian NICs	0.101	994.9	212.6	804.7
China	0.04	475.4	-271	761.9
South Asia	0.047	230.7	-167	418.3
Western Europe	0.022	1613.2	936.2	742.4
North America	0.018	1415.7	946.5	478.1
Transition Economies	0.098	750	-97.1	857.7
Sub- Saharan Africa	0.049	153	-207.9	372.2
Oceania	0.232	951.4	899.4	51.9
North Africa and Middle East	0.26	2036.4	-1168.5	3274.6
Latin America	0.057	1013.8	143.6	867.6
Japan	0.058	2127	-1323.8	3253.5
Rest of the World	0.096	242.1	80.2	140.4
Total		12003.4	-17	12023.3

(50 per cent worldwide cut in tariffs on processed agriculture)

Table 14. Liberalization in agriculture: the role of tariff escalation Aggregate trade data

Regions	Per centage change	
	Exports	Terms of trade
Asian NICs	0.101	0.037
China	0.04	-0.059
South Asia	0.047	-0.243
Western Europe	0.022	0.038
North America	0.018	0.08
Transition Economies	0.098	-0.039
Sub- Saharan Africa	0.049	-0.22
Oceania	0.232	1.003
North Africa and Middle East	0.26	-0.408
Latin America	0.057	0.042
Japan	0.058	-0.255
Rest of the World	0.096	0.183

(50 per cent worldwide cut in tariffs on processed agriculture)

Table 15 Non-reciprocal tariff liberalization in agriculture Welfare changes

Regions	Values (1997 US $ Million)			
	Percentage change	Total	Terms of trade effect	Allocative effect
Asian NICs	0.054	530.7	371.7	212.1
China	0.022	256.4	256.4	69.4
South Asia	0	-0.6	53	-42.8
Western Europe	0.003	220.7	-2158.7	2381.9
North America	0.017	1333.2	956.8	463.9
Transition Economies	0.071	545.5	410.4	129.5
Sub-Saharan Africa	0.054	168.7	125.7	43
Oceania	0.369	1512.2	1447.3	70.2
North Africa and Middle East	0.003	26	54.9	-14.6
Latin America	0.045	812.9	578.8	215.2
Japan	0.109	3984.6	-2272.1	6077.4
Rest of the World	0.096	241.8	151.9	49.3
Total		9632.1	-23.8	9654.6

(50 per cent cut in all agricultural tariffs operated by developed countries only)

Table 16 Non-reciprocal tariff liberalization in agriculture. Aggregate trade data.

Regions	Per centage change	
	Exports	Terms of trade
Asian NICs	0.067	0.065
China	0.13	0.06
South Asia	0.263	0.08
Western Europe	0.369	-0.078
North America	0.556	0.084
Transition Economies	0.204	0.146
Sub-Saharan Africa	0.193	0.131
Oceania	1.968	1.612
North Africa and Middle East	0.031	0.018
Latin America	0.342	0.176
Japan	1.495	-0.456
Rest of the World	0.933	0.365

(50 per cent cut in all agricultural tariffs operated by developed countries only)

Table 17. A comprehensive liberalization scenario Welfare changes

Regions	Values (1997 US $ Million)			
	Percentage change	Total	Terms of trade effect	Allocative effect
Asian NICs	0.674	6636.5	1000.5	5467.6
China	0.424	5017.1	31.3	4727.2
South Asia	0.282	1383.3	-1282.3	2841.4
Western Europe	0.075	5489.6	1537	2968.9
North America	0.023	1778	435.7	1565.7
Transition Economies	0.079	603.1	-1260.8	2080.8
Sub- Saharan Africa	0.004	13.3	-889.5	1022.9
Oceania	0.386	1584.1	1310.5	233
North Africa and Middle East	0.476	3735.8	-2315.7	6350.7
Latin America	0.079	1414	-2358.2	4289.9
Japan	0.307	11207.4	3619.4	7441.4
Rest of the World	0.281	706.3	96.9	706.9
Total		39568.5	-75.1	39696.4

(50 per cent cut worldwide cut in tariffs on all merchandise trade)

Table 18. A comprehensive liberalization scenario Aggregate trade data

Regions	Percentage change	
	Exports	Terms of trade
Asian NICs	3.899	0.168
China	7.458	0.012
South Asia	12.043	-1.747
Western Europe	1.105	0.078
North America	2.591	-0.008
Transition Economies	3.86	-0.483
Sub- Saharan Africa	4.59	-0.927
Oceania	4.265	1.435
North Africa and Middle East	5.004	-0.806
Latin America	5.719	-0.734
Japan	5.512	0.752
Rest of the World	8.789	0.091

(50 per cent cut worldwide cut in tariffs on all merchandise trade)

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