

MULTILATERAL TRADE LIBERALIZATION: SCENARIOS FOR THE NEW ROUND AND ASSESSMENT

*Draft version*¹

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ABSTRACT:

Doha's WTO Ministerial Conference marked the launch of a new round of multilateral trade negotiations. Their results are impossible to forecast, but the subjects to be discussed have been broadly defined, and a built-in agenda has been set up. The aim of this paper is to build a set of possible scenarios for negotiations' outcome, to evaluate accurately their significance in terms of applied protection (on the basis of the most detailed information, as provided by *MAcMaps*), and finally to assess their impact on world economies with *Mirage*, a CGE model conceived to study trade policies. Incidentally, we aim at providing to the *GTAP* network a standard set of scenarios, in *GTAP* nomenclature, as a follow-up to this contribution to the conference.

JEL Classification: D58 ; F12 ; F13

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1. Introduction

Despite concerns as of its chances of success, the Doha Ministerial has succeeded in launching a new round of multilateral trade negotiations. This is good news for world trade after the emblematic failure of Seattle. But is it possible to run a Round in a similar manner as before Seattle? Certainly not. Protests by the civil society, as well as raising concerns about openness strategies in developing countries have deeply modified the picture. It would now be difficult to elaborate a scenario of success omitting a specific treatment for developing countries. On the expertise side, it has also become more and more obvious than the picture drawn in the Marrakech was a *trompe l'œil*. The dismantling of quantitative restrictions has resulted in numerous tariff peaks and an increased complexity of tariff schedules, with a strong element of gray protection and possible discrimination (definition and administration of tariff quotas for instance). The reduction in tariffs has been compensated by the increasing enforcement of anti-dumping duties. Last but not least, regional initiatives have spread, resulting in an increase in the degree of distortion associated with a given average level of protection. The combination of all these elements is particularly striking for agricultural products, as well as for certain sensitive sectors. These outcomes delimitate what sounds as a reasonable agenda for negotiations.

As far as the societal context is concerned, an attempt to take into account the protests of the civil society, as well as the growing importance of developing countries in the multilateral arena, have led to a declaration raising new issues. Noticeably, after having acknowledged the benefits and rejected the use of protectionism, the declaration immediately raises the issues of economic development and poverty alleviation. Market access and balanced rules are the corresponding recommendations that can be modeled using CGEM tools. Technical assistance and capacity-building programs will back up this policy but can hardly be taken into account in general equilibrium evaluations of the agenda.

As far as the work program is concerned, a large set of issues have been addressed including implementation, agriculture, services, market access for non-agricultural products, TRIPs, trade and investment, competition policy, government procurement, LDCs, special and differential treatment etc. Among those issues, agriculture, services, market access for manufactures and a special treatment offered to poor countries are unambiguously the main issues to be considered. This is also where the ambitions of the negotiators are the more clearly affirmed.

On agriculture, the official purpose is “to correct and prevent restrictions and distortions in world agricultural markets”. Export subsidies, domestic support as well as tariff protection are concerned. Any interpretation of such agenda should however stress the major change occurred as a result of the last round: agriculture has proceeded to a tariffication of its previous quantitative obstacles at the border, what has led to often complex and very distorsive tariff schemes. In the same time, domestic support has been

greened, with reference to the color boxes classifying instruments. Lastly, the US farm bill has shed light on a consensus over farm support. In total, the negotiations should stick on tariffs and export subsidies.

On manufactures, the objective is “to reduce or as appropriate eliminate tariffs, including the elimination of tariff peaks, high tariffs and tariff escalation, as well as non-tariff barriers, in particular on products of export interest to developing countries”. Three categories of tariffs have to be distinguished as of the interpretation of this objective. A first category corresponds to tariffs that can be eliminated without too much care: these are very low tariffs that are much more an obstacle to trade flows than a true protection. These “nuisance tariffs” could be dropped easily. The second category is moderate tariffs: they do protect industries, since the price elasticity of demand can be high. Progress could be made easily here by simply linearly cutting these tariffs by a certain percentage to be advertised as the “reduction of tariffs” during the round. Lastly, tariff peaks are a more sensitive issue: cutting these tariffs would be good news for world trade. However, there is no guarantee that an agreement will be found here, in particular if one adopts a formula which dramatically reduces the highest tariffs, such as the one implemented during the Tokyo round.

On services, proposals have been submitted by Members as a result of the negotiations launched in January 2000. However, in contrast with the two previous issues, it is rather difficult to assess the potential impact of any agenda on services using a CGEM. This is why this important issue will be neglected in this paper.

Given the concerns referred to above, economic expertise in the field of expected impacts of various scenarios will be the more important in this Round. The questioning over benefits will be systematic, and promoting any sensible conclusion of the Round will require a sound general equilibrium arguing. Indeed, it will be difficult to promote liberalization in agriculture or in (highly protected) sensitive sectors: this is why there is a need for a having, upward, a clear and articulated discussion among experts in CGE modeling over the benefits (if any) of the various scenarios for the Round. This is why CGE modeling should rely on multinational models and should integrate the last developments of the literature. This is where a community like the GTAP one could be mobilized in order to run reproducible and systematic exercises, on the basis of a common set of scenarios defined at the level of the product lines.

Initiating such dynamics of research is the very purpose of this paper. The definition of the relevant scenarios requires first to identify the main areas to be discussed (such as agriculture, textile, environment goods, anti-dumping, least developed countries, etc.). For each of these areas, a set of negotiations' possible outcomes is to be defined. The corresponding hypotheses may concern ad valorem tariffs, specific duties, prohibitions, tariff quotas, tariff peaks and anti-dumping duties, at the most detailed level of existing information (Harmonized System, 10, 8 or 6 digits). On the basis of MAcMaps², the large database of trade barriers developed by ITC and CEPII, we formulate in a first step detailed scenarios of

liberalization in merchandise trade. For instance we can cut by $x\%$ all tariffs between $y\%$ and $z\%$; or we can apply a non linear formula aiming at dramatically reducing, or on the contrary maintaining, tariff peaks. We can define differently tariff peaks in agriculture and for manufactures, etc. Such detail level of analysis authorizes to identify products lines on which negotiations will be held: for instance, a detailed list of environment-friendly goods defined at the 6 digits level will be mobilized. A broad notion of timing may also be introduced in the liberalization's hypotheses. The liberalization hypotheses are translated in terms of protection variations, using tariff equivalents for each of these instruments, on a bilateral basis for 137 countries and 220 suppliers. By so doing, we are able to take accurately into account the very complex initial protection patterns, and their possible evolutions by product in terms of instruments as well as of geographic coverage. Despite the high level of detail in MAcMaps, our exercise will consider cutting applied tariffs, whereas negotiations do handle bound tariffs. However, there is no big difference between bound and applied for many countries... and bound tariffs are not available.

To give this information a synthetic and usable form, we then aggregate the data in the GTAP5 sectoral classification, gathering countries into a limited number of geographic areas. The aggregation procedure defined in MAcMaps minimizes the traditional endogeneity bias by relying on imports of reference groups. The possible outcomes thus defined for each main area are then combined in a coherent way to build a set of plausible scenarios for the new round of multilateral trade negotiations.

The impact of these scenarios are then assessed using MIRAGE³, a dynamic AGE model incorporating imperfect competition, foreign direct investment and immobility of installed capital. The sequential dynamic structure of the model enables the liberalization's timing to be taken into account. With the exception of protection data, for which MAcMaps is used as a source, as described above, the model is calibrated using the GTAP 5 database. Five scenarios are defined as a first experiment. When finalized, the set of scenarios will be available to the GTAP community according to GTAP sectors and aggregated regions defined here, in order to compare the results obtained by the various models and sets of assumptions⁴.

The rest of the paper is organized as follows. Section 2 stresses the need for a disaggregated approach to the definition of scenarios, on the basis of recorded trade barriers. Tariff peaks, prohibitions, tariff quotas, anti-dumping as well as a high and intricate system of preferences are pointed out. Section 3 presents the model used to simulate the scenarios. Section 4 defines the scenarios. Section 5 draws the first conclusions. Section 6 concludes.

² Market Access Maps. See Bouet et al., 2001.

³ Modeling International Relationships in Applied General Equilibrium

⁴ Thus, this is different from GTAP for MAcMaps, a database prepared for the consortium and using both sectors and regions as defined in GTAP. See Bouet et al, 2002, paper prepared for this conference.

2. An overview of current protection

Basically, given that one focuses on trade in merchandises, three types of instruments of protection can be considered: border measures, domestic support and export subsidies. Domestic support and export subsidies are recorded in the GTAP database. On the contrary, bilateral tariff data at the detailed level requested by the definition of any sensible scenario must rely on more detailed sources of information. This section focusing on tariff data, prohibitions and anti-dumping is based on MAcMaps (Market Access Maps). This paper illustrating the definition of scenarios using MAcMaps, we will not introduce any change concerning the other instruments: there will be no change in various support and subsidies. Accordingly, the difference in results obtained will be attributed to changes in tariffs only. This is important, since welfare gains or trade enhancement associated to the conclusion of the Round would be larger than the figures referred to below.

MAcMaps is a bilateral measure of market access which has been constructed to integrate the major instruments of protection (ad valorem and specific duties, prohibitions, tariff quotas, anti-dumping duties) at the most detailed level (tariff lines), as well as all discriminatory regimes. Source information is derived from TRAINS (UNCTAD) source files, AMAD, country sources (official journals, circulars and customs web sites), and notifications to the WTO regarding anti-dumping regimes. These files are combined with trade data from the COMTRADE (UNSD) database. The reference year is 1999. A first release of MAcMaps aimed at exploring the possibilities of programming such a tool, while largely relying of source files of TRAINS. AMAD data and antidumping notifications were taken into consideration too. The corresponding results have been published in Bouët et al. (2001). The current exercise is based on a second release, that departs from the initial one by relying on national sources as often as necessary, by extensively covering anti-dumping practices, by endogenously defining the reference groups used in the aggregation procedures and lastly by fully covering the preferential agreements. In the following, we will refer to MAcMaps2 by default.

The database groups the following instruments of protection: MFN duties, other ad valorem duties, specific duties, preferential margins, prohibitions, tariff quotas, anti-dumping (specific or ad valorem) duties. Ad valorem equivalents of each instrument are calculated at the 6 digits level of the HS. Additional taxes that may be levied on imports are not reported. For each importing country, one records all the groups of countries that enforce the same trade policy, and for every trade regime the existence or absence of various barriers to trade (ad valorem tax, special tariffs, quotas, etc.). The source information must therefore be structured as a four-dimensional matrix (products * importing countries * exporting countries * instruments of protection). Data can be aggregated in GTAP nomenclature using a procedure that minimizes the endogeneity bias while accounting for the importance of products as well as countries in international trade.

A first glance at ad valorem taxes stresses the relative similarity on average levels in the Triad. This five to six percent average is the outcome on which it is often claimed that tariffs do no longer matter. This is not the case however, since tariff peaks can be very large and disseminated throughout the tariff schedule. One tariff line out of 20 in the US, one out of thirteen in the EU, and one out of 9 in Japan is a tariff peak defined on the basis of more than 15% (Table 2.1).

In addition to this, numerous quantitative barriers have been transformed into specific duties as a result of the Uruguay Round, in particular in agriculture. These duties have particularly spread throughout the US and European tariff schedules. Noticeably, these specific duties, when transformed in ad valorem equivalent using the unit value of the corresponding trade flows, can be very large. The average ad valorem equivalent is much larger than the one of ad valorem taxes, in particular in Europe where it is ten times as large. Moreover, the frequency of (equivalent) tariff peaks is very large too: the two thirds of ad valorem equivalents of specific duties can be referred to as tariff peaks in Europe.

In total, the picture drawn by MACMaps is at the opposite of the common approach: tariffs still matter, they do matter more than in the eighties, and there is scope for negotiating on tariffs.

Table 2.1: Ad valorem taxes and specific duties in the Triad

	USA	Japan	EU
Average duty (ad valorem taxes)	4.9%	6.6%	5.9%
Maximum duty (ad valorem taxes)	350%	60%	88.9%
Duties > 15% (number, ad valorem taxes)	467	870	771
Duty > 15% (freq)	5.4%	11.5%	7.5%
No. of <i>specific</i> duties	1148	418	1059
Average Ad valorem equivalent	12.8%	7.4%	50.0%
Maximum Ad valorem equivalent	310%	171%	326%
Number Ad valorem equivalent > 15%	170	34	679
Freq Ad valorem equivalent > 15%	14.8%	8.1%	64.1%

Source: MACMaps.

The picture is far from being complete however, a limited number tariff quotas, generally enforced in agriculture, must be taken into consideration, as well as anti-dumping duties, dedicated to

manufactures (see Table 2.2). In agriculture the inside quota rate can be very large, in particular in Japan, while antidumping duties are particularly enforced by the US.

Table 2.2: Number of tariff quotas (1999), average IQTR and OQTR and anti-dumping duties in the Triad

	USA	Japan	EU
No. of tariff quotas	21	20	54
Average IQTR	8.7%	17.3%	15.2%
Average OQTR	41.8%	234.8%	60.2%
No. of anti-dumping duties	673	42	367

Source: MAcMaps

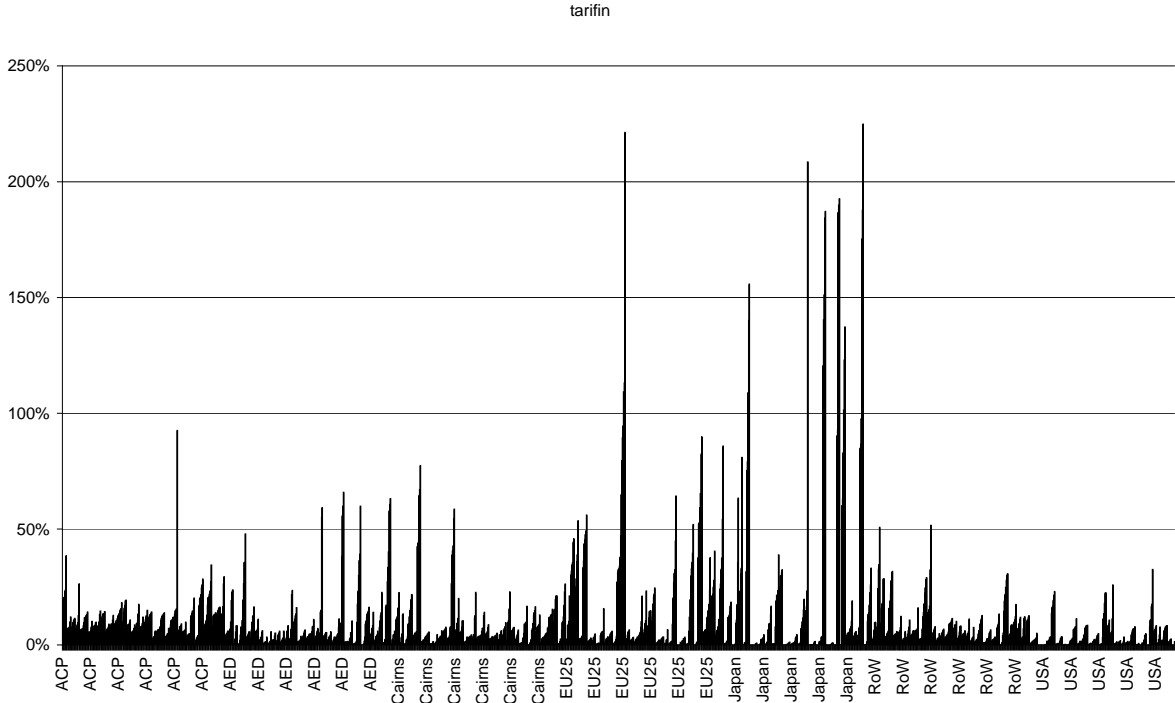
Lastly, one must take into account the preferential regimes granted by the declaring countries. The EU, but Japan too, on a more unstructured basis, grant certain countries preferential access to their markets. As a result, a country having numerous tariff peaks or enforcing on average larger MFN tariffs can have a limited average tariff equivalent of all instruments, thanks to these preferences. This is where a bilateral approach to market access is worth; and this is where a tariff scheme can indeed be highly distortive.

This being said, one needs to aggregate our sample of 137 countries in order to go back to something that can be introduced in the CGE exercise. Convincingly, one can argue that agriculture will be a major topic to be discussed in the next round: the EU, the USA, Japan, the Cairns group will be the major players of the negotiation. This is why these groups must be considered in priority. ACP countries raise specific issues that need to be addressed too. Given the own agenda of enlargement of Europe, EU25 will be considered (it is expected a first round of enlargement in order to authorize countries to take part in the general EU elections in 2004). Besides, market access will be sought on emerging markets by major players such as Europe, the US and Japan: this is why countries such as Brazil, India, China are of major interest. These countries are already integrated in the Cairns group, or will be grouped in the developing Asia (ADE) group. In total the 66 GTAP regions will be grouped into the following 7 regions: USA, Japan, EU25, Cairns, ACP, ADE, RoW.

Adopting the regional classification referred to here, the baseline of our exercise is as follows.

An overview of estimated protection at the aggregated level of this classification highlights that there is much room for negotiation (Graph 2.1). Numerous tariff peaks are recorded, even at the level of the sector, while much tariffs are low enough for being nuisance rather than true protection. Even at this level, there are more than 25% of sectors in which the bilateral protection is lower than 2%, all instruments being considered.

Graph 2.1 : Distribution of tariff equivalents of all instruments at base year.



Source: MAcMaps

First, the highest tariff equivalents of all instruments are enforced in agriculture, especially by Japan: Wheat, Meat, Oil seeds, Processed rice, Paddy rice, Dairy products, Sugar are sectors facing ad valorem equivalents larger than 100%, and up to 225%. Among these 21 observed cases (see Table 2.3), Japan accounts for 18 cases, and Europe 3.

Table 2.3: Highest tariff equivalents of all instruments, by importing and exporting region and sector (1999)

Sector	exporter	importer	tariff
Wheat	Japan	RoW	225%
Meat: cattle, sheep, goat	EU25	USA	221%
Oil seeds	Japan	AED	208%
Processed rice	Japan	Cairns	193%
Processed rice	Japan	RoW	190%
Wheat	Japan	ACP	188%
Paddy rice	Japan	ACP	187%
Processed rice	Japan	ACP	187%
Paddy rice	Japan	Cairns	184%
Wheat	Japan	AED	175%
Dairy products	Japan	RoW	156%
Paddy rice	Japan	RoW	151%
Paddy rice	Japan	AED	140%
Dairy products	Japan	AED	140%
Sugar	Japan	Cairns	137%
Sugar	Japan	RoW	123%
Paddy rice	Japan	EU25	121%
Meat: cattle, sheep, goat	EU25	AED	113%
Meat: cattle, sheep, goat	EU25	RoW	109%
Dairy products	Japan	ACP	109%
Sugar	Japan	ACP	101%

Source: MAcMaps

Within the 50-100% range (Table 2.4), one finds the same sectors, EU25 appearing more often, as well as Developing Asia (AED). Interestingly, the Cairns group does impose, on average, high protection for certain items such as dairy or meat products.

Table 2.4: Tariff equivalents [50%, 99%] by importing and exporting region and sector (1999)

Wheat	Japan	USA	98%	Cattle, sheep, goase	Japan	AED	63%
Meat: cattle, sheep, goat	EU25	ACP	95%	Wheat	AED	RoW	63%
Paddy rice	ACP	Japan	93%	Sugar	Japan	EU25	63%
Processed rice	Japan	AED	93%	Wheat	AED	Cairns	61%
Processed rice	Japan	EU25	90%	Sugar	Japan	USA	60%
Sugar	EU25	AED	90%	Paddy rice	AED	Cairns	60%
Meat: cattle, sheep, goat	EU25	Japan	90%	Processed rice	AED	RoW	60%
Wheat	Japan	EU25	87%	Sugar	EU25	Cairns	59%
Wheat	Japan	Cairns	85%	Oil seeds	AED	USA	59%
Sugar	Japan	AED	83%	Meat products nec	Cairns	AED	59%
Sugar	EU25	RoW	82%	Wheat	AED	USA	58%
Cereal grains nec	Japan	RoW	81%	Dairy products	EU25	Cairns	56%
Dairy products	Japan	Cairns	79%	Paddy rice	AED	USA	56%
Dairy products	Cairns	EU25	77%	Oil seeds	AED	Cairns	55%
Dairy products	Japan	EU25	75%	Meat products nec	Cairns	Cairns	54%
Dairy products	Cairns	Japan	67%	Wheat	EU25	AED	54%

Paddy rice	AED	RoW	66%	Sugar	EU25	ACP	53%
Sugar	EU25	USA	65%	Processed rice	EU25	USA	52%
Meat: cattle, sheep, goat	EU25	Cairns	65%	Meat: cattle, sheep, goat	RoW	RoW	52%
Dairy products	Cairns	Cairns	64%	Cattle, sheep, goase	RoW	AED	51%
Paddy rice	EU25	USA	64%				

Source: MAcMaps

3. The model Mirage

This Section proposes a very brief overview of the model *Mirage*.⁵ The main characteristics of the model concern the assumptions made about products quality ranges, imperfect competition, capital, and dynamic aspects. Given the difficulty to gather satisfactory data for the rather detailed classification used here, FDI is not taken into account here.

3.1. Demand

The demand side is modeled in each region through a representative agent, whose utility function is intratemporal, with a fixed share of the regional income allocated to savings, the rest used to purchase final consumptions. Below this first-tier Cobb-Douglas function, the preferences across sectors are represented by a nesting with a LES-CES function. Each sectoral subutility function is a nesting of CES comparable to the standard nested Armington – Dixit-Stiglitz function, with two exceptions:

- Products originating in developing countries and in developed countries are assumed to belong to different quality range. Their substitutability is therefore assumed to be weaker than the substitutability between products from the same quality range, that is for products from developed (developing) countries between each other.

- Domestic products benefit from a specific status for consumers, making them less substitutable to foreign products than foreign products between each other, within a given quality range.

3.2. Supply

Production makes use of five factors: Capital, Labor (skilled and unskilled), Land and Natural Resources. The first three are generic factors, whereas the last twos are specific ones.

⁵ A detailed presentation of the technical aspects of *Mirage* is available in Bchir et al. (2002).

The production function assumes perfect complementarity between value added and the intermediate consumptions. The sectoral composition of the intermediate consumptions aggregate stems from a CES function. For each sector of origin, the nesting is exactly the same as for final consumption, meaning that the sector bundle has the same structure for final and intermediate consumption.

The structure of value added is intended to take into account the well-documented skill-capital relative complementarity. These two factors are thus bundled separately, with a lower elasticity of substitution (0.6), while a higher substitutability (elasticity 1.1) is assumed between this bundle and all other factors.⁶

3.3. Competition

Aside competitive, constant returns to scale sectors, rather well suited to describe agricultural sectors, in particular, the model also includes oligopolistic sectors. Perfectly competitive sectors face constant returns to scale (CRTS) in production. In oligopolistic industries, firms face a constant marginal cost and a fixed cost, expressed in output units. Firms compete à la Cournot, with zero conjectural variations, no Ford effect, and no strategic interaction.

As far as the dynamics of market structure is concerned, two kinds of oligopolistic sectors are considered, fragmented and segmented ones. The difference between these two sector classes lies in the number of firms evolving more slowly in segmented sectors than in fragmented ones.⁷ The zero-profit assumption is thus the long-term target, but the sticky entry-exit of firms makes the adjustment progressive, with longer delays in segmented sectors.

3.4. Capital and investment

Capital, whatever its provenance, domestic or foreign, in a given region, is assumed to be obtained by assembling intermediate inputs with the same nesting as in intermediate consumption. Only the share coefficients differ, and no factor service is needed. The capital good is the same whatever the use sector.

Installed capital is considered to be totally immobile. This putty-clay hypothesis is very important, because it implies that the adjustment in the capital stock is gradual. As a consequence, capital stock allocation may be under-optimal, and capital reward may differ between sectors. In addition, the capital market clearing only concerns new capital.

⁶ According to many studies, using a Cobb-Douglas function would not be unrealistic, but using a CES preserves the possibility for sensitivity analyses.

⁷ Practically this is done by assuming, for each new period, that profits are lowered by 20% in segmented sectors and by 50% in fragmented ones, compared to the level they would have reached, had the number of firms been constant

This gives investment an important role, as the only adjustment device for capital stock. The investment description in *Mirage* intends to propose a generic model for investment, that is coherent with a rational behavior of investors. The basic principle is that the allocation of investment across sectors stems from sectoral capital rates of return. The parameters are such that, for a variety of small commercial shocks, half the adjustment of capital stocks towards the long run target would be made in around 4 years.

3.5. Closure and markets clearing

Product markets clearing is obtained by equating, for each variety, output to the three kinds of uses, namely intermediate consumption, final consumption, and part of capital good. The full employment of resources hypothesis is made. However, imperfect mobility of some production factors is assumed so as to better take into account the problems caused by massive reallocation effects.⁸ As outlined above, installed capital is immobile, and market clearing only concerns savings and investment. Natural resources are also perfectly immobile and may not be accumulated. The prices of those last two factors may thus differ among sectors of use. The two forms of Labor, as well as Land, are perfectly mobile among sectors⁹. Except capital, all factors are immobile internationally.

The macroeconomic closure is obtained by assuming that for capital movements other than FDI (that could be called the purely financial component of capital movements, as opposed to the industrial motivation of FDI), the net balance is exogenous (and equal to its initial value). As a result, the current balance of each area only depends on net FDI flows. And of course, the revenue of capital accrues to the source country's income.

3.6. Dynamic issues

Dynamic gains from trade can be assessed using *Mirage*, since the immobility of installed capital and the inertia in the adjustment of the number of firms allow a realistic description of the adjustment process to be proposed. As the dynamic setting is recursive, the time scope can be freely chosen¹⁰ (here, 12 years), and a shock can be introduced at each period. The reallocation of either totally or partially mobile factors is complete between each considered period. Factor endowment evolutions and training (the transformation of unskilled labor into skilled labor) between periods are given. Total factor productivity gains are not included in this version of the model: they can however easily be simulated given the structure of demand and production trees. *The continuous liberalization does impact the various sectoral rental rates of capital: this in turn does lead to an impact on investment (and FDI) allocation.* At the same time, the

⁸ The program checks that the Walras' law is always respected.

⁹ The stickiness of some factor markets may strongly modify the impacts of liberalisation episodes. For tractability sake, we however decided to leave aside considerations of short-run unemployment and wages rigidities.

¹⁰ This may change the time spend in solving the model, but it has no impact on the feasibility.

profit rate and the number of firms in imperfectly competitive sectors do also evolve toward the long run conditions under free entry of firms.

4. Scenarios

In order to provide a basis for simulation work, the possible evolutions mentioned above need to be translated in scenarios, that is in quantified changes of trade barriers in each sector, for each bilateral trade flow. This exercise is carried out here based on the *MAcMaps* database. It allows the most detailed information to be taken into account, but it is subject to various constraints.

Five types of protection instruments are taken account: ad-valorem tariffs, specific duties, tariff quotas, prohibitions, anti-dumping duties. The information used refers to the ad-valorem equivalent tariff of these instruments taken together, and there is no possibility at this stage to work separately on one of them. This implies that scenarios definition cannot be based on any criterion other than this ad-valorem equivalent tariff. This excludes, for instance, building scenarios on changes conditional to the initial level of output subsidies, or export subsidies. However, although it is not done in this paper, scenarios could be based on specific assumptions for a given list of HS-6 products.

Each scenario is thus based on a systematic evolution rule, conditional to the initial level of ad-valorem equivalent tariff. As services are not covered by *MAcMaps*, this restricts the scope of topics studied to changes in ad-valorem equivalent tariffs of the five above-mentioned instruments in agriculture and industry. This is already a large scope, since agriculture and manufacturing account for the bulk of international trade, and since the main protection instruments are accounted for.

For the sake of clarity and simplicity, the analysis is focused on a handful of scenarios, covering as far as possible a large scope of possible outcomes. Each scenario is based on a systematic rule, but some balance must be reached in some cases between sectors, because agriculture and agrofood industry differs deeply from manufacturing industries (and energy and raw materials), as far as the level and outlook of protection is concerned. That is why, in a rather standard way, we define tariff peaks as those superior to 15% in manufacturing, energy and raw materials, and those above 85% in agriculture and agrofood (see Annex for details). The scenarios neither need to be exactly uniform across countries. It seems realistic to assume that a lesser degree of liberalization, or at least a longer adjustment, is conceded to developing countries.

The scenarios thus share the following characteristics:

- They are based on a systematic rule of evolution of the ad-valorem tariff equivalent of the five protection instruments (ad-valorem tariffs, specific duties, tariff quotas, prohibitions, anti-dumping

duties) taken together. The definition of the rule may however differ for developing countries, and for agriculture-agrofood sectors. Protection in services sectors is not considered;

- The rule of evolution may be conditional to the initial level of the ad-valorem equivalent tariff;
- The agreement is to be applied progressively within six years by developed countries, and within ten years by developing countries, through identical yearly steps in both cases. However, this different timing is applied for regions as a whole, assuming that the Cairns group, developing Asia, ACP countries and the rest of the world are developing regions;
- Each scenario includes a removal of nuisance tariffs, defined as HS-6 products with an ad-valorem equivalent tariffs inferior to 2%. So low tariffs are not likely to be very costly a priori. But they are also unlikely to benefit to anybody. Common sense suggests that the revenue earned with such tariffs be not worth the efforts spent in recovering it. For the sake of simplicity, their removal is assumed invariably in the following scenarios.

Concretely, four scenarios are considered:¹¹

- (a) Uniform: Lowering of the ad-valorem equivalent tariff by 35% for each product. This is a natural benchmark-scenario, if not necessarily a realistic outcome.
- (b) Uniform, except peaks: Lowering of the ad-valorem equivalent tariff by 35% for each product, except for those protected initially by a peak (i.e., HS-6 products with an initial ad-valorem equivalent superior to 15% in manufacturing, and to 85% in agriculture). As far as economic rationality is concerned, such an outcome would almost by definition be a failure, since tariff peaks are considered to be the most costly in terms of welfare. However, the motives (whatever they may be) that lead to maintaining these peaks so far may also succeed in upholding them during the next Round;
- (c) Evening out ("truncated Swiss formula"): Non-peak ad-valorem equivalent tariffs are lowered by 35%, while tariff peaks are cut through a Swiss formula (by which the initial tariff t_{ini} lowered to t_{final} , defined by $t_{final} = \frac{at_{ini}}{a + t_{ini}}$). The coefficient a of this formula is defined such as to ensure the continuity of the lowering percentage of the tariff as a function of its initial level ($a = 0.28$ in manufacturing, 1.58 in agriculture).¹² This scenario is more consistent with economic rationality, as it combines a minimum 35% lowering of tariffs with a severe cut in tariff peaks. Following the

¹¹ The removal of nuisance tariffs is not recalled in each definition, but it is included in each scenario. Even the "uniform" scenario is thus not exactly uniform.

¹² In manufacturing, for instance, coefficient a is calculated such that an initial tariff of 15% is lowered by 35%. It is therefore equal to $0.15 * (1-0.35) / 0.35 = 0.28$.

conventional wisdom that the cost of a tariff is a quadratic function of its level, this scenario is likely to be significantly more beneficial, in average, than the previous two.

- (d) Evening out, smoother for developing countries: This scenario is identical to the previous one for developed countries. For developing countries, a "truncated Swiss formula" is also applied, but with a lowering of 20% for non-peak tariffs, and with a coefficient of the Swiss formula applied to peaks calculated, as before, so as to ensure the continuity of the lowering rate of tariffs ($a = 0.60$ in manufacturing, 3.40 in agriculture). This hypothesis, and the corresponding coefficients, is applied for each country separately, before aggregating into regions (see Annex for the distribution of countries into developed and developing ones). This scenario combines economic rationality with the often-quoted necessity to allow developing countries enjoying a preferential treatment in the negotiations.

In addition to quantifying the consequences of a uniform liberalization, these scenarios are focused on the treatment of tariff peaks. For non-peak products, the magnitude of liberalization is the same in all scenarios in developed countries, and in three out of four in developing countries.

The impact of these scenarios on the applied level of protection is illustrated through Table A1 to A7 in Annex. For each region, the corresponding Table shows, for the benchmark (year 1999) and after the complete application of each scenario, the average AVE tariff applied. *MAcMaps* tariffs are used at the bilateral level in the model but here, for the sake of illustration, a trade-weighted average is calculated across partners. To illustrate the discrimination underlying this average level, the standard-deviation of AVE tariffs across partners is also shown. This standard deviation is calculated without any weighting, in order to avoid any endogeneity bias, likely to be especially high as far as discrimination is concerned.

5. Results

As outlined above, the rather simple assumptions used to build liberalization scenarios actually lead to a complex set of changes in the applied level of protection, given the structure of initial protection. Simulating the consequences of each scenario allows a broad assessment to be proposed. The main results are summarized in Table 5.1 to 5.4. Trade details can also be found in the tables of Annex 2.

The uniform-35% lowering simulated through scenario (a) raises welfare of the representative agent in each area, between 0.2% and 0.9%. The gains are largest, by far, in Japan and in developing Asia (+0.9% and +0.8%, respectively). This is due to the highly uneven cross-sectoral structure of the protection of these areas. That apply a rather low (actually, almost zero in Japan) protection in industry, while AVE tariffs are very high in agriculture. The liberalization impact is thus concentrated in agriculture, but the corresponding consumers' gains are sizeable. Corresponding tariff revenue losses are moderate (most of all in Japan), both because of the initial low level of imports in these sectors, and because of the rather

high price-sensitivity of imports. Unsurprisingly, natural resources and land suffer a real loss in both areas, especially in Japan.

Table 5.1 : Main macro-economic results, scenario (a) ("uniform")
(Variations in %, compared to the reference, 14 years after the agreement)

	EU-25	USA	Japan	Cairns	Dev'g Asia	ACP	Row
Welfare	0.4%	0.2%	0.9%	0.3%	0.8%	0.4%	0.5%
GDP (volume)	0.1%	0.1%	0.3%	0.1%	0.3%	0.5%	0.5%
Prod'n factors real reward :							
Unskilled labor	0.3%	0.2%	0.4%	0.4%	0.8%	1.2%	0.5%
Skilled labor	0.3%	0.2%	0.6%	0.3%	1.2%	1.2%	0.8%
Capital	0.3%	0.2%	0.3%	0.2%	0.6%	0.8%	0.6%
Natural resources	-0.3%	-0.2%	-3.3%	0.0%	-1.0%	1.1%	2.2%
Land	-0.4%	1.6%	-5.0%	2.8%	-0.1%	1.5%	-1.7%
Dual price index of utility	0.3%	0.0%	-0.5%	-0.3%	-0.4%	-1.4%	0.2%
Exports (volume)	6.4%	6.0%	6.6%	7.0%	13.1%	9.3%	8.7%
Imports (volume)	7.4%	5.2%	7.6%	6.8%	12.6%	7.8%	8.8%
Tariff revenue	-19.1%	-30.7%	-2.6%	-22.0%	-18.6%	-25.3%	0.5%

Source: Authors' simulations using *Mirage*.

To a lesser extent, the EU and the rest of the world exhibit the same pattern of results. As Japan and developing Asia, these two regions lowered significantly their protection in agriculture, giving raise to higher gains, but also to a loss in land's real revenue. The mirror image is given by the impact on the US and the Cairns Group and ACP countries. As strong net exporters of agricultural goods, these regions experience a significant increase in the external demand addressed to the agricultural producers, and land's real reward is strongly increased. Wholly speaking, however, welfare gains are weak in both areas.

The situation of ACP countries appears as intermediate. The real reward of land and natural resources in increased, due to the leading role of the primary sector in this region's exports, but the real reward to labor is of the same order of magnitude. The most striking result for this region is probably the terms-of-trade loss. Indeed, this region has initially a rather high level of protection in general, and in industry in particular. The liberalization effort conceded is therefore higher than for other areas. As a consequence, the trade balance equilibrium can only be reached at the price of a real depreciation, that is of a terms of trade deterioration. This is the reason why gains are moderate in ACP countries.

Scenario (b) allows the specific impact of tariff peaks to assessed, by comparison to scenario (a). Exempting tariff peaks from liberalization drastically change the results (even though the order of magnitude remains small, in absolute). Broadly speaking, welfare gains and trade creation in volume are halved, and the variability of results across production factors and across countries is strongly reduced. As can be seen in table A2.1, trade creation falls sharply for some sectors, especially in agriculture.

Table 5.2 : Main macro-economic results, scenario (b) ("uniform, except peaks")

(Variations in %, compared to the reference, 14 years after the agreement)

	EU-25	USA	Japan	Cairns	Dev'g Asia	ACP	Row
Welfare	0.3%	0.1%	0.3%	0.1%	0.3%	0.3%	0.2%
GDP (volume)	0.0%	0.1%	0.2%	0.1%	0.1%	0.2%	0.3%
Prod'n factors real reward :							
Unskilled labor	0.1%	0.1%	0.2%	0.2%	0.3%	0.5%	0.3%
Skilled labor	0.1%	0.1%	0.3%	0.1%	0.4%	0.5%	0.4%
Capital	0.2%	0.2%	0.2%	0.1%	0.2%	0.3%	0.3%
Natural resources	0.1%	0.1%	-3.3%	0.2%	-0.5%	0.8%	0.7%
Land	-0.5%	1.0%	-1.4%	1.5%	-0.1%	0.5%	-1.0%
Dual price index of utility	0.1%	0.0%	-0.2%	0.0%	-0.1%	-0.6%	0.1%
Exports (volume)	4.3%	4.5%	4.4%	3.5%	4.7%	2.9%	4.3%
Imports (volume)	4.8%	3.8%	5.0%	3.4%	4.6%	2.4%	4.4%
Tariff revenue	-13.3%	-23.8%	-10.5%	-12.2%	-7.3%	-10.4%	0.2%

Source: Authors' simulations using *Mirage*.

The most important change, compared to scenario (a), is probably for Japan, where agriculture's liberalization is very limited when tariff peaks are excluded. This reflects the very high and uneven level of protection of the Japanese agriculture. More generally, the lesser liberalization of agriculture is the main specificity of this scenario. The higher loss in land's real reward in the EU in this scenario may appear as surprising at first glance, but this due to a more general phenomenon. Indeed, the EU enjoyed a significant gain in terms of trade in the first scenario, thanks to its strong position in industrial exports. Here, this terms of trade improvement almost vanishes, because of the lesser liberalization of industrial sectors in other areas.

A bilateral sectoral survey of trade evolutions backs these points: whereas, in scenarios (a), (c) or (d), some trade flows in the processed rice, dairy products or vegetable oils sectors saw the most important increases, the list given in Table A2.2 shows that for scenario (b), the order of magnitude of the most importantly affected trade flows is ten times lower than in the other three scenarios and is found for different sectors and partners.

Starting from scenario (a), scenario (c) appears as the mirror image of scenario (b), since tariff peaks are evened out (see Table 5.3). Compared to scenario (a), trade creation is higher, by 10% to 30%. In terms of welfare, however, the gain is hardly changed for each region, except Japan, developing Asia and the rest of the world, where it is significantly increased.

Table 5.3 : Main macro-economic results, scenario (c) ("evening out")

(Variations in %, compared to the reference, 14 years after the agreement)

	EU-25	USA	Japan	Cairns	Dev'g Asia	ACP	Row
Welfare	0.4%	0.2%	1.5%	0.4%	1.1%	0.4%	0.8%
GDP (volume)	0.1%	0.2%	0.4%	0.1%	0.4%	0.4%	0.6%
Prod'n factors real reward :							
Unskilled labor	0.4%	0.2%	0.5%	0.5%	1.2%	1.4%	0.6%
Skilled labor	0.5%	0.2%	0.9%	0.5%	1.3%	2.0%	0.9%
Capital	0.5%	0.2%	0.4%	0.2%	0.7%	1.0%	0.8%
Natural resources	-0.7%	-0.5%	-2.7%	-0.5%	-1.7%	0.3%	4.1%
Land	-0.6%	1.8%	-11.6%	3.7%	0.4%	1.4%	-1.6%
Dual price index of utility	0.2%	0.0%	-0.6%	-0.4%	0.0%	-1.6%	0.3%
Exports (volume)	7.3%	6.8%	7.7%	8.8%	18.8%	10.9%	12.3%
Imports (volume)	8.6%	6.0%	8.9%	8.6%	18.0%	9.2%	12.4%
Tariff revenue	-25.6%	-33.5%	7.5%	-28.6%	-22.1%	-32.8%	0.8%

Source: Authors' simulations using *Mirage*.

Once again, the Japanese agriculture appears as an outlier, as witnessed by the 11.6% loss in land's real reward. Landowners also suffer higher losses in the EU. The increase is less spectacular than in Japan, but it is not significant, most of all given that, except natural resources, other factors enjoy higher gains. The conflict of interest between agricultural and industrial producers, that is between land owners and capital-labor, is thus exacerbated in this scenario in the EU and in Japan (with higher aggregate gains only in the latter, however). This is far less clear in the US, where the whole gain as well as its distribution are hardly modified. The increased gain of landowners in the Cairns group is no surprise in this context, but it does not increase significantly welfare in this region. Finally, ACP countries still enjoy limited gains, due to their terms of trade deterioration, that is even stronger than previously.

What would be the consequences of a smoother liberalization for developing countries? According to the simulation of scenario (d), such a concession indeed gives raise to a redistribution of the gains from developed to developing countries. However, the magnitude of this redistribution is limited, around 0.1 point of welfare gain for each region.

Table 5.4 : Main macro-economic results, scenario (d) ("evening out, smoother for developing countries")

(Variations in %, compared to the reference, 14 years after the agreement)

	EU-25	USA	Japan	Cairns	Dev'g Asia	ACP	Row
Welfare	0.3%	0.1%	1.3%	0.4%	0.9%	0.3%	0.7%
GDP (volume)	0.1%	0.1%	0.4%	0.1%	0.3%	0.2%	0.5%
Prod'n factors real reward :							
Unskilled labor	0.4%	0.1%	0.5%	0.4%	0.9%	1.0%	0.4%
Skilled labor	0.5%	0.2%	0.9%	0.5%	0.9%	1.2%	0.6%
Capital	0.5%	0.2%	0.4%	0.2%	0.4%	0.6%	0.6%
Natural resources	-0.7%	-0.4%	-2.5%	-0.7%	-1.4%	-0.6%	3.4%
Land	-0.7%	1.2%	-11.5%	2.7%	0.7%	1.3%	-0.6%
Dual price index of utility	0.1%	0.0%	-0.2%	-0.1%	0.6%	-0.8%	0.3%
Exports (volume)	7.2%	5.9%	6.6%	7.1%	13.3%	6.3%	9.4%
Imports (volume)	8.2%	5.2%	7.7%	6.9%	12.8%	5.4%	9.5%
Tariff revenue	-25.9%	-34.1%	6.5%	-18.3%	-9.4%	-19.6%	0.7%

Source: Authors' simulations using *Mirage*.

Given the trade balance constraint, the main channel through which the redistribution is obtained is the real exchange rate, and therefore the terms of trade. Their deterioration is far weaker in ACP countries, and developing Asia enjoy a significant gain. For the Cairns group, the welfare gain is unchanged, but its distribution is different. Land owners' gains are less high, while less deteriorated terms of trade is a source of gain.

6. Conclusion

The aim of this paper was to build a set of possible scenarios in *GTAP* nomenclature for future multilateral negotiations outcomes, to evaluate accurately their significance in terms of effective protection (on the basis of the most detailed information, as provided by *MAcMaps*), and finally to assess their impact on world economies with *Mirage*, a CGE model conceived to study trade policies.

The various scenarios are based on a systematic rule of evolution of the ad-valorem tariff equivalent of protection tabulated at the 6-digit level of the SH nomenclature, which can be conditional to the initial level of the ad-valorem equivalent tariff. They also cover two specific issues: tariffs peaks and different treatment for developing countries.

Contrary to the popularized view that tariff protection has vanished, our evaluation of the scenarios in terms of effective protection show that there is still scope for liberalization even in industrial sectors. But as a result of evolutions in the protection instruments in agriculture following the Uruguay round, the issue of the treatment of tariffs peaks needs also to be addressed. This issue is tackled here, and extended

to manufactures as well, on the basis of a different definition of tariff peaks in the latter sector. Interestingly, trade and welfare gains are halved when excluding peaks from the negotiations. This is not a surprising outcome for trade specialists; the value added of this paper is to authorize tackling such issue in a CGEM.

This paper is the milestone in a larger research program on negotiation issues: the changes in the pyramids of trade preferences associated to increased multilateralism remains to be tackled, as well as various other formulas of tariff descalation, or preferential access granted to developing countries. Lastly, reduction in domestic support remains to be added too, but can easily be handled with the GTAP database.

When finalized, the set of scenarios in GTAP nomenclature will be made available to the GTAP community in order to launch a series of studies using comparable assumptions.

7. References

Bouët A., Fontagné L., Mimouni M & Pichot X. (2001), Market Access Maps: A Bilateral and Disaggregated Measure of Market Access, Document de travail CEPII, 2001-18.

Bouët A., Fontagné L., Mimouni M. & von Kirchbach F. (2002), Market Access Maps for GTAP: A Bilateral Measure of Merchandise Trade Protection. Paper presented at the GTAP Conference, Taipei.

Bchir M. H., Decreux Y., Guérin J.-L. & Jean S. (2002), Key Assumptions in AGE Trade Models: An Assessment using the Mirage Model. Paper presented at the GTAP Conference, Taipei.

Annex 1: Average and standard-deviation of tariffs in the benchmark and as a result of each scenario, for each region

Table A1: ACP countries

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pdr	Paddy rice	0,18	0,12	0,12	0,12	0,14	0,45	0,48	0,46	0,51	0,49
2	wht	Wheat	0,18	0,12	0,16	0,09	0,12	0,08	0,11	0,08	0,14	0,11
3	gro	Cereal grains nec	0,11	0,07	0,08	0,07	0,09	0,03	0,06	0,05	0,07	0,05
4	vaf	Vegetables, fruit, nuts	0,34	0,22	0,27	0,19	0,24	0,08	0,15	0,11	0,18	0,13
5	osd	Oil seeds	0,04	0,03	0,03	0,03	0,03	0,02	0,03	0,03	0,03	0,03
6	cab	Sugar cane, sugar beet	0,10	0,06	0,06	0,06	0,08	0,04	0,05	0,05	0,05	0,04
7	ocr	Crops nec	0,16	0,10	0,11	0,10	0,13	0,05	0,08	0,07	0,08	0,06
8	ctl	Cattle	0,15	0,10	0,10	0,10	0,12	0,02	0,06	0,06	0,06	0,04
9	oap	Animal products nec	0,11	0,07	0,07	0,07	0,09	0,01	0,04	0,04	0,04	0,03
11	fish	Fishing	0,19	0,12	0,13	0,12	0,15	0,02	0,07	0,07	0,07	0,04
12	cmt	Bovine meat products	0,20	0,13	0,13	0,13	0,16	0,05	0,09	0,09	0,09	0,07
13	omt	Meat products nec	0,23	0,15	0,15	0,14	0,18	0,03	0,08	0,08	0,09	0,06
14	vol	Vegetable oils and fats	0,17	0,11	0,11	0,11	0,14	0,04	0,07	0,07	0,07	0,06
15	mil	Dairy products	0,19	0,12	0,12	0,12	0,15	0,02	0,07	0,07	0,07	0,04
16	pcr	Processed rice	0,26	0,17	0,19	0,15	0,19	0,04	0,09	0,08	0,10	0,07
17	sgr	Sugar	0,32	0,21	0,24	0,20	0,25	0,06	0,14	0,10	0,15	0,10
18	ofd	Food products nec	0,18	0,12	0,12	0,11	0,14	0,01	0,07	0,06	0,07	0,04
19	bat	Bevg. and tob. Prod.	0,32	0,21	0,25	0,18	0,23	0,11	0,17	0,13	0,20	0,15
20	pfb	Plant-based fibers	0,11	0,07	0,09	0,07	0,09	0,03	0,05	0,04	0,05	0,04
21	wol	Wool	0,08	0,05	0,05	0,05	0,06	0,02	0,03	0,03	0,03	0,02
22	forest	Forestry	0,15	0,10	0,10	0,10	0,12	0,05	0,07	0,07	0,07	0,06
23	prim	Coal, oil, gas, min. nec	0,07	0,04	0,05	0,03	0,04	0,00	0,02	0,01	0,03	0,02
24	ias	Ferrous metals	0,10	0,06	0,08	0,05	0,06	0,02	0,04	0,02	0,05	0,04
25	nfm	Metals nec	0,09	0,06	0,08	0,05	0,06	0,01	0,03	0,02	0,04	0,03
26	tex	Textiles	0,15	0,09	0,14	0,07	0,10	0,02	0,05	0,02	0,07	0,05
27	wap	Wearing apparel	0,22	0,14	0,21	0,10	0,14	0,03	0,08	0,03	0,12	0,08
28	lea	Leather products	0,15	0,09	0,14	0,08	0,10	0,01	0,05	0,02	0,06	0,04
29	lum	Wood products	0,14	0,09	0,14	0,08	0,11	0,01	0,05	0,02	0,07	0,04
30	nmm	Mineral products nec	0,14	0,09	0,13	0,07	0,09	0,03	0,06	0,04	0,08	0,06
31	fmp	Metal products	0,12	0,08	0,11	0,07	0,09	0,01	0,05	0,02	0,06	0,04
32	omf	Manufactures nec	0,18	0,12	0,17	0,10	0,13	0,02	0,07	0,02	0,09	0,06
33	ppp	Paper prod., publishing	0,09	0,06	0,08	0,05	0,06	0,01	0,03	0,01	0,04	0,03
34	pac	Petroleum, coal prod.	0,15	0,10	0,13	0,07	0,09	0,03	0,06	0,04	0,08	0,06
35	crp	Chem., rubber	0,10	0,06	0,08	0,05	0,07	0,01	0,04	0,02	0,05	0,03
36	mvh	Motor vehicles and parts	0,14	0,09	0,12	0,08	0,10	0,01	0,05	0,02	0,06	0,04
37	otn	Transport equipment nec	0,07	0,05	0,05	0,04	0,05	0,02	0,03	0,02	0,03	0,03
38	ele	Electronic equipment	0,09	0,06	0,07	0,05	0,06	0,01	0,03	0,02	0,04	0,03
39	ome	Mach'y & equip't nec	0,09	0,06	0,08	0,05	0,07	0,01	0,04	0,02	0,05	0,03
41	Ser	Services	0,04	0,02	0,04	0,04	0,04	0,01	0,02	0,01	0,01	0,01

Source: *MAcMaps*, authors' calculations.

Table A2: Cairns Group

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pdr	Paddy rice	0,12	0,08	0,11	0,08	0,10	0,12	0,13	0,12	0,13	0,12
2	wht	Wheat	0,17	0,10	0,13	0,10	0,12	0,08	0,12	0,11	0,12	0,11
3	gro	Cereal grains nec	0,20	0,13	0,15	0,12	0,15	0,07	0,10	0,08	0,11	0,09
4	vaf	Vegetables, fruit, nuts	0,02	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
5	osd	Oil seeds	0,09	0,06	0,07	0,05	0,07	0,03	0,04	0,03	0,04	0,03
6	cab	Sugar cane, sugar beet	0,04	0,02	0,02	0,02	0,03	0,09	0,09	0,09	0,09	0,09
7	ocr	Crops nec	0,05	0,03	0,04	0,03	0,04	0,01	0,02	0,02	0,02	0,01
8	ctl	Cattle	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02
9	oap	Animal products nec	0,14	0,09	0,12	0,08	0,09	0,11	0,12	0,11	0,12	0,12
11	fish	Fishing	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02
12	cmt	Bovine meat products	0,09	0,06	0,06	0,05	0,06	0,09	0,10	0,10	0,10	0,10
13	omt	Meat products nec	0,30	0,20	0,28	0,18	0,19	0,24	0,31	0,24	0,33	0,33
14	vol	Vegetable oils and fats	0,09	0,06	0,06	0,05	0,06	0,03	0,04	0,04	0,04	0,04
15	mil	Dairy products	0,99	0,64	0,98	0,54	0,55	0,35	0,43	0,35	0,47	0,47
16	pcr	Processed rice	0,13	0,09	0,11	0,08	0,10	0,07	0,08	0,07	0,08	0,07
17	sgr	Sugar	0,14	0,09	0,12	0,09	0,10	0,06	0,09	0,07	0,09	0,08
18	ofd	Food products nec	0,11	0,07	0,08	0,07	0,08	0,06	0,08	0,07	0,08	0,07
19	bat	Bevg. and tob. Prod.	0,20	0,13	0,17	0,10	0,10	0,06	0,10	0,07	0,13	0,12
20	pfb	Plant-based fibers	0,10	0,06	0,09	0,06	0,08	0,01	0,04	0,02	0,04	0,03
21	wol	Wool	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
22	forest	Forestry	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
23	prim	Coal, oil, gas, min. nec	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
24	ias	Ferrous metals	0,06	0,04	0,05	0,04	0,04	0,02	0,03	0,02	0,03	0,03
25	nfm	Metals nec	0,03	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
26	tex	Textiles	0,12	0,08	0,11	0,07	0,08	0,03	0,06	0,04	0,06	0,06
27	wap	Wearing apparel	0,19	0,12	0,18	0,10	0,11	0,02	0,07	0,02	0,09	0,08
28	lea	Leather products	0,11	0,07	0,08	0,07	0,07	0,01	0,04	0,03	0,04	0,03
29	lum	Wood products	0,05	0,04	0,05	0,03	0,04	0,03	0,04	0,03	0,04	0,03
30	nmm	Mineral products nec	0,05	0,03	0,04	0,03	0,04	0,01	0,02	0,01	0,02	0,02
31	fmp	Metal products	0,07	0,04	0,06	0,04	0,05	0,01	0,03	0,02	0,03	0,02
32	omf	Manufactures nec	0,05	0,03	0,04	0,03	0,04	0,01	0,02	0,02	0,03	0,02
33	ppp	Paper prod., publishing	0,05	0,03	0,04	0,03	0,04	0,02	0,03	0,03	0,03	0,03
34	pac	Petroleum, coal prod.	0,13	0,08	0,12	0,05	0,06	0,04	0,05	0,04	0,06	0,06
35	crp	Chem., rubber	0,07	0,04	0,05	0,04	0,05	0,01	0,03	0,02	0,03	0,02
36	mvh	Motor vehicles and parts	0,13	0,08	0,12	0,06	0,08	0,03	0,05	0,03	0,06	0,05
37	otn	Transport equipment nec	0,03	0,02	0,02	0,02	0,02	0,03	0,04	0,03	0,04	0,04
38	ele	Electronic equipment	0,03	0,02	0,02	0,02	0,02	0,01	0,01	0,01	0,01	0,01
39	ome	Mach'y & equip't nec	0,05	0,03	0,04	0,03	0,04	0,01	0,02	0,01	0,02	0,01
41	Ser	Services	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01

Source: *MACMaps*, authors' calculations.

Table A3: Developing Asia

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pdr	Paddy rice	0,89	0,58	0,88	0,51	0,66	0,37	0,43	0,37	0,45	0,40
2	wht	Wheat	0,90	0,59	0,90	0,52	0,68	0,34	0,41	0,34	0,43	0,38
3	gro	Cereal grains nec	0,54	0,35	0,53	0,33	0,41	0,19	0,24	0,19	0,26	0,21
4	vaf	Vegetables, fruit, nuts	0,05	0,03	0,03	0,03	0,04	0,03	0,03	0,03	0,03	0,03
5	osd	Oil seeds	0,84	0,55	0,84	0,49	0,63	0,36	0,38	0,36	0,39	0,37
6	cab	Sugar cane, sugar beet	0,06	0,04	0,04	0,04	0,05	0,05	0,05	0,05	0,05	0,05
7	ocr	Crops nec	0,10	0,07	0,07	0,06	0,08	0,04	0,05	0,05	0,05	0,04
8	ctl	Cattle	0,02	0,01	0,01	0,01	0,01	0,04	0,04	0,04	0,04	0,04
9	oap	Animal products nec	0,05	0,03	0,03	0,03	0,04	0,01	0,02	0,02	0,02	0,02
11	fsk	Fishing	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,03	0,03	0,03
12	cmt	Bovine meat products	0,06	0,04	0,04	0,04	0,05	0,12	0,12	0,12	0,12	0,12
13	omt	Meat products nec	0,06	0,04	0,04	0,04	0,05	0,04	0,04	0,04	0,04	0,04
14	vol	Vegetable oils and fats	0,21	0,14	0,19	0,13	0,16	0,09	0,11	0,09	0,11	0,10
15	mil	Dairy products	0,12	0,08	0,08	0,08	0,10	0,07	0,09	0,09	0,09	0,07
16	pcr	Processed rice	0,56	0,36	0,56	0,32	0,42	0,25	0,29	0,25	0,31	0,27
17	sgf	Sugar	0,19	0,13	0,13	0,13	0,15	0,04	0,08	0,08	0,08	0,05
18	ofd	Food products nec	0,08	0,05	0,05	0,05	0,06	0,02	0,03	0,03	0,03	0,03
19	bat	Bevg. and tob. Prod.	0,31	0,20	0,26	0,18	0,20	0,12	0,14	0,13	0,15	0,14
20	pfb	Plant-based fibers	0,02	0,01	0,01	0,01	0,01	0,00	0,01	0,01	0,01	0,00
21	wol	Wool	0,09	0,06	0,06	0,06	0,07	0,03	0,03	0,03	0,03	0,03
22	forest	Forestry	0,02	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02
23	prim	Coal, oil, gas, min. nec	0,01	0,00	0,01	0,00	0,00	0,01	0,01	0,01	0,01	0,01
24	ias	Ferrous metals	0,06	0,04	0,04	0,03	0,04	0,02	0,02	0,02	0,03	0,02
25	nfm	Metals nec	0,03	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
26	tex	Textiles	0,13	0,09	0,13	0,07	0,09	0,06	0,07	0,06	0,08	0,07
27	wap	Wearing apparel	0,10	0,06	0,10	0,04	0,06	0,11	0,12	0,11	0,12	0,12
28	lea	Leather products	0,06	0,04	0,05	0,03	0,04	0,03	0,03	0,03	0,04	0,03
29	lum	Wood products	0,03	0,02	0,02	0,02	0,02	0,02	0,03	0,02	0,03	0,03
30	nmm	Mineral products nec	0,06	0,04	0,05	0,04	0,05	0,02	0,03	0,02	0,04	0,03
31	fmp	Metal products	0,05	0,03	0,04	0,03	0,04	0,02	0,03	0,02	0,03	0,03
32	omf	Manufactures nec	0,04	0,03	0,04	0,02	0,03	0,02	0,03	0,02	0,03	0,02
33	ppp	Paper prod., publishing	0,05	0,03	0,05	0,03	0,04	0,05	0,05	0,05	0,06	0,05
34	pac	Petroleum, coal prod.	0,11	0,07	0,09	0,06	0,08	0,04	0,05	0,05	0,06	0,05
35	crp	Chem., rubber	0,07	0,04	0,06	0,04	0,05	0,02	0,03	0,02	0,03	0,02
36	mvh	Motor vehicles and parts	0,16	0,11	0,16	0,06	0,08	0,03	0,06	0,03	0,11	0,09
37	otn	Transport equipment nec	0,02	0,01	0,02	0,01	0,02	0,01	0,02	0,01	0,02	0,02
38	ele	Electronic equipment	0,10	0,06	0,08	0,06	0,07	0,03	0,05	0,03	0,05	0,04
39	ome	Mach'y & equip't nec	0,07	0,04	0,06	0,04	0,05	0,01	0,03	0,02	0,03	0,02
41	Ser	Services	0,00	0,00	0,00	0,00	0,00	0,02	0,02	0,02	0,02	0,02

Source: *MAcMaps*, authors' calculations.

Table A4: 25-country European Union (EU-25)

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pdr	Paddy rice	0,57	0,37	0,43	0,32	0,32	0,22	0,30	0,26	0,32	0,32
2	wht	Wheat	0,43	0,28	0,37	0,26	0,26	0,21	0,27	0,22	0,30	0,30
3	gro	Cereal grains nec	0,51	0,33	0,44	0,32	0,32	0,12	0,19	0,14	0,20	0,20
4	vaf	Vegetables, fruit, nuts	0,25	0,16	0,18	0,16	0,16	0,07	0,11	0,09	0,11	0,11
5	osd	Oil seeds	0,29	0,19	0,19	0,19	0,19	0,08	0,12	0,12	0,12	0,12
6	cab	Sugar cane, sugar beet	0,19	0,12	0,12	0,12	0,12	0,11	0,12	0,12	0,12	0,12
7	ocr	Crops nec	0,10	0,06	0,07	0,06	0,06	0,04	0,05	0,05	0,05	0,05
8	ctl	Cattle	0,53	0,34	0,42	0,33	0,33	0,19	0,26	0,22	0,28	0,28
9	oap	Animal products nec	0,09	0,06	0,07	0,05	0,05	0,04	0,05	0,05	0,05	0,05
11	fsk	Fishing	0,06	0,04	0,04	0,04	0,04	0,03	0,04	0,04	0,04	0,04
12	cmt	Bovine meat products	1,23	0,80	1,16	0,62	0,62	0,77	0,99	0,77	1,29	1,29
13	omt	Meat products nec	0,49	0,32	0,40	0,29	0,29	0,05	0,18	0,10	0,22	0,22
14	vol	Vegetable oils and fats	0,40	0,26	0,35	0,22	0,22	0,10	0,15	0,11	0,17	0,17
15	mil	Dairy products	0,80	0,52	0,73	0,48	0,48	0,09	0,27	0,14	0,31	0,31
16	pcr	Processed rice	0,56	0,36	0,44	0,35	0,35	0,15	0,24	0,18	0,25	0,25
17	sgf	Sugar	0,94	0,61	0,82	0,51	0,51	0,27	0,44	0,29	0,56	0,56
18	ofd	Food products nec	0,15	0,09	0,10	0,09	0,09	0,06	0,08	0,07	0,08	0,08
19	bat	Bevg. and tob. Prod.	0,15	0,10	0,11	0,08	0,08	0,10	0,13	0,11	0,14	0,14
20	pfb	Plant-based fibers	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
21	wol	Wool	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
22	forest	Forestry	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01
23	prim	Coal, oil, gas, min. nec	0,07	0,05	0,07	0,01	0,01	0,03	0,03	0,03	0,04	0,04
24	ias	Ferrous metals	0,04	0,02	0,03	0,02	0,02	0,01	0,02	0,02	0,02	0,02
25	nfm	Metals nec	0,04	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
26	tex	Textiles	0,09	0,06	0,07	0,06	0,06	0,03	0,04	0,04	0,04	0,04
27	wap	Wearing apparel	0,10	0,06	0,07	0,06	0,06	0,05	0,06	0,05	0,06	0,06
28	lea	Leather products	0,08	0,05	0,06	0,05	0,05	0,03	0,04	0,03	0,04	0,04
29	lum	Wood products	0,02	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02
30	nmm	Mineral products nec	0,04	0,03	0,03	0,03	0,03	0,02	0,02	0,02	0,02	0,02
31	fmp	Metal products	0,06	0,04	0,04	0,03	0,03	0,02	0,03	0,02	0,03	0,03
32	omf	Manufactures nec	0,04	0,03	0,03	0,02	0,02	0,01	0,02	0,01	0,02	0,02
33	ppp	Paper prod., publishing	0,04	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
34	pac	Petroleum, coal prod.	0,02	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01
35	crp	Chem., rubber	0,05	0,03	0,04	0,03	0,03	0,02	0,02	0,02	0,02	0,02
36	mvh	Motor vehicles and parts	0,08	0,05	0,06	0,05	0,05	0,03	0,04	0,04	0,04	0,04
37	otn	Transport equipment nec	0,02	0,01	0,02	0,01	0,01	0,03	0,04	0,03	0,04	0,04
38	ele	Electronic equipment	0,03	0,02	0,02	0,02	0,02	0,01	0,01	0,01	0,01	0,01
39	ome	Mach'y & equip't nec	0,03	0,02	0,02	0,02	0,02	0,01	0,01	0,01	0,01	0,01
41	Ser	Services	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01

Source: *MAcMaps*, authors' calculations.

Table A5: Japan

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pd	Paddy rice	1,56	1,02	1,56	0,61	0,61	0,97	1,20	0,97	1,56	1,56
2	wh	Wheat	1,43	0,93	1,43	0,75	0,75	0,85	1,15	0,85	1,57	1,57
3	gr	Cereal grains nec	0,37	0,24	0,25	0,23	0,23	0,32	0,37	0,33	0,42	0,42
4	vf	Vegetables, fruit, nuts	0,16	0,11	0,14	0,09	0,09	0,07	0,09	0,08	0,10	0,10
5	os	Oil seeds	0,45	0,29	0,45	0,17	0,17	1,14	1,16	1,14	1,24	1,24
6	cb	Sugar cane, sugar beet						0,00	0,00	0,00	0,00	0,00
7	oc	Crops nec	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01
8	ct	Cattle	0,24	0,16	0,18	0,15	0,15	0,32	0,35	0,33	0,35	0,35
9	oa	Animal products nec	0,04	0,02	0,03	0,02	0,02	0,02	0,02	0,02	0,02	0,02
11	fs	Fishing	0,05	0,03	0,03	0,03	0,03	0,01	0,02	0,02	0,02	0,02
12	cm	Bovine meat products	0,46	0,30	0,30	0,30	0,30	0,04	0,16	0,15	0,16	0,16
13	om	Meat products nec	0,38	0,24	0,29	0,23	0,23	0,14	0,18	0,16	0,19	0,19
14	vo	Vegetable oils and fats	0,05	0,03	0,03	0,03	0,03	0,02	0,03	0,03	0,03	0,03
15	ml	Dairy products	1,17	0,76	1,13	0,57	0,57	0,64	0,83	0,64	1,07	1,07
16	pr	Processed rice	1,81	1,18	1,81	0,65	0,65	1,10	1,29	1,10	1,62	1,62
17	sg	Sugar	1,96	1,28	1,92	0,77	0,77	0,44	0,68	0,45	0,90	0,90
18	of	Food products nec	0,18	0,12	0,12	0,11	0,11	0,07	0,09	0,09	0,09	0,09
19	ba	Bevg. and tob. Prod.	0,19	0,13	0,13	0,13	0,13	0,04	0,09	0,09	0,09	0,09
20	pf	Plant-based fibers						0,00	0,00	0,00	0,00	0,00
21	wl	Wool	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
22	fo	Forestry	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
23	pr	Coal, oil, gas, min. nec	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
24	ia	Ferrous metals	0,01	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
25	nm	Metals nec	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
26	te	Textiles	0,07	0,05	0,05	0,04	0,04	0,01	0,03	0,02	0,03	0,03
27	wa	Wearing apparel	0,07	0,05	0,05	0,05	0,05	0,03	0,04	0,04	0,04	0,04
28	le	Leather products	0,17	0,11	0,17	0,10	0,10	0,05	0,08	0,05	0,09	0,09
29	lu	Wood products	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01
30	nm	Mineral products nec	0,01	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
31	fm	Metal products	0,01	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01
32	om	Manufactures nec	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
33	pp	Paper prod., publishing	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
34	pa	Petroleum, coal prod.	0,05	0,03	0,03	0,03	0,03	0,02	0,02	0,02	0,02	0,02
35	cr	Chem., rubber	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
36	mv	Motor vehicles and parts						0,00	0,00	0,00	0,00	0,00
37	ot	Transport equipment nec						0,00	0,00	0,00	0,00	0,00
38	el	Electronic equipment						0,00	0,00	0,00	0,00	0,00
39	om	Mach'y & equip't nec	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
41	Ser	Services						0,00	0,00	0,00	0,00	0,00

Source: *MAcMaps*, authors' calculations.

Note: Blanks refer to nil values.

Table A6: United States

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pdr	Paddy rice	0,02	0,00	0,00	0,00	0,00	0,02	0,02	0,02	0,02	0,02
2	wht	Wheat	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
3	gro	Cereal grains nec	0,01	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
4	vaf	Vegetables, fruit, nuts	0,02	0,01	0,01	0,01	0,01	0,04	0,04	0,04	0,04	0,04
5	osd	Oil seeds	0,10	0,07	0,07	0,07	0,07	0,12	0,13	0,13	0,13	0,13
6	cab	Sugar cane, sugar beet	0,01					0,01	0,01	0,01	0,01	0,01
7	ocr	Crops nec	0,30	0,19	0,19	0,19	0,19	0,10	0,13	0,13	0,13	0,13
8	ctl	Cattle	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
9	oap	Animal products nec	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
11	fish	Fishing	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
12	cmt	Bovine meat products	0,12	0,08	0,08	0,08	0,08	0,02	0,04	0,04	0,04	0,04
13	omt	Meat products nec	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
14	vol	Vegetable oils and fats	0,03	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
15	mil	Dairy products	0,30	0,20	0,20	0,20	0,20	0,05	0,11	0,11	0,11	0,11
16	pcr	Processed rice	0,04	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,03	0,03
17	sgr	Sugar	0,28	0,18	0,18	0,18	0,18	0,13	0,15	0,15	0,15	0,15
18	ofd	Food products nec	0,12	0,08	0,08	0,08	0,08	0,04	0,05	0,05	0,05	0,05
19	bat	Bevg. and tob. Prod.	0,04	0,03	0,03	0,03	0,03	0,02	0,02	0,02	0,02	0,02
20	pfb	Plant-based fibers	0,10	0,07	0,07	0,07	0,07	0,01	0,04	0,04	0,04	0,04
21	wol	Wool	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
22	forest	Forestry	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
23	prim	Coal, oil, gas, min. nec	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
24	ias	Ferrous metals	0,03	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
25	nfm	Metals nec	0,01	0,00	0,00	0,00	0,00	0,01	0,02	0,02	0,02	0,02
26	tex	Textiles	0,10	0,06	0,08	0,06	0,06	0,01	0,04	0,02	0,04	0,04
27	wap	Wearing apparel	0,11	0,07	0,09	0,07	0,07	0,01	0,04	0,03	0,04	0,04
28	lea	Leather products	0,14	0,09	0,12	0,08	0,08	0,02	0,05	0,03	0,06	0,06
29	lum	Wood products	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
30	nmm	Mineral products nec	0,05	0,03	0,04	0,03	0,03	0,02	0,03	0,03	0,03	0,03
31	fmp	Metal products	0,03	0,02	0,03	0,02	0,02	0,02	0,02	0,02	0,02	0,02
32	omf	Manufactures nec	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
33	ppp	Paper prod., publishing	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01
34	pac	Petroleum, coal prod.	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
35	crp	Chem., rubber	0,04	0,02	0,03	0,02	0,02	0,01	0,02	0,02	0,02	0,02
36	mvh	Motor vehicles and parts	0,01	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01
37	otn	Transport equipment nec	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02
38	ele	Electronic equipment	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
39	ome	Mach'y & equip't nec	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
41	Ser	Services						0,00	0,00	0,00	0,00	0,00

Source: *MACEmaps*, authors' calculations.

Note: Blanks refer to nil values.

Table A7: Rest of the World

No.	Code	Description	Trade-weighted average (across partners) AVE tariff					Unweighted std-dev of AVE tariffs across partners				
			Initial	Scenario				Initial	Scenario			
				(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1	pdr	Paddy rice	0,12	0,08	0,08	0,08	0,09	0,04	0,06	0,06	0,06	0,04
2	wht	Wheat	0,16	0,11	0,12	0,10	0,13	0,06	0,08	0,07	0,08	0,07
3	gro	Cereal grains nec	0,32	0,21	0,26	0,20	0,24	0,15	0,17	0,15	0,18	0,16
4	vaf	Vegetables, fruit, nuts	0,13	0,09	0,09	0,08	0,10	0,07	0,09	0,08	0,09	0,08
5	osd	Oil seeds	0,04	0,03	0,03	0,03	0,03	0,04	0,05	0,05	0,05	0,04
6	cab	Sugar cane, sugar beet	0,03	0,02	0,02	0,02	0,03	0,05	0,05	0,05	0,05	0,05
7	ocr	Crops nec	0,15	0,10	0,10	0,10	0,12	0,03	0,06	0,05	0,06	0,04
8	ctl	Cattle	0,35	0,22	0,33	0,20	0,25	0,25	0,28	0,25	0,30	0,27
9	oap	Animal products nec	0,05	0,03	0,03	0,03	0,04	0,01	0,02	0,02	0,02	0,02
11	fsk	Fishing	0,09	0,06	0,06	0,06	0,06	0,05	0,06	0,06	0,06	0,05
12	cmt	Bovine meat products	0,23	0,15	0,19	0,12	0,15	0,11	0,14	0,12	0,16	0,14
13	omt	Meat products nec	0,31	0,20	0,27	0,17	0,22	0,10	0,15	0,11	0,17	0,14
14	vol	Vegetable oils and fats	0,12	0,08	0,09	0,08	0,09	0,03	0,05	0,04	0,05	0,04
15	mil	Dairy products	0,35	0,23	0,28	0,21	0,26	0,10	0,16	0,13	0,17	0,13
16	pcr	Processed rice	0,12	0,08	0,08	0,07	0,09	0,04	0,05	0,05	0,06	0,05
17	sgf	Sugar	0,34	0,22	0,27	0,21	0,26	0,09	0,16	0,11	0,17	0,13
18	ofd	Food products nec	0,09	0,06	0,06	0,06	0,07	0,03	0,05	0,05	0,05	0,04
19	bat	Bevg. and tob. Prod.	0,26	0,17	0,20	0,15	0,17	0,08	0,12	0,10	0,13	0,12
20	pfb	Plant-based fibers	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
21	wol	Wool	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
22	forest	Forestry	0,04	0,02	0,02	0,02	0,03	0,02	0,03	0,03	0,03	0,03
23	prim	Coal, oil, gas, min. nec	0,03	0,02	0,02	0,02	0,02	0,01	0,02	0,02	0,02	0,02
24	ias	Ferrous metals	0,07	0,04	0,05	0,04	0,05	0,02	0,03	0,02	0,03	0,02
25	nfm	Metals nec	0,04	0,02	0,03	0,02	0,03	0,02	0,02	0,02	0,02	0,02
26	tex	Textiles	0,09	0,06	0,08	0,04	0,05	0,04	0,05	0,04	0,06	0,05
27	wap	Wearing apparel	0,11	0,07	0,10	0,03	0,04	0,07	0,07	0,07	0,09	0,08
28	lea	Leather products	0,13	0,08	0,12	0,04	0,05	0,06	0,07	0,06	0,09	0,08
29	lum	Wood products	0,04	0,02	0,03	0,02	0,03	0,02	0,03	0,03	0,03	0,03
30	nmm	Mineral products nec	0,07	0,05	0,06	0,04	0,05	0,02	0,03	0,02	0,04	0,03
31	fmp	Metal products	0,08	0,06	0,07	0,05	0,06	0,04	0,06	0,05	0,07	0,06
32	omf	Manufactures nec	0,07	0,05	0,07	0,03	0,04	0,04	0,05	0,04	0,06	0,05
33	ppp	Paper prod., publishing	0,04	0,03	0,03	0,03	0,03	0,02	0,03	0,03	0,03	0,03
34	pac	Petroleum, coal prod.	0,02	0,01	0,02	0,01	0,02	0,01	0,02	0,01	0,02	0,01
35	crp	Chem., rubber	0,06	0,04	0,04	0,04	0,04	0,01	0,03	0,02	0,03	0,02
36	mvh	Motor vehicles and parts	0,07	0,05	0,07	0,04	0,05	0,03	0,04	0,03	0,05	0,04
37	otn	Transport equipment nec	0,03	0,02	0,02	0,02	0,02	0,03	0,04	0,03	0,04	0,04
38	ele	Electronic equipment	0,06	0,04	0,04	0,04	0,04	0,02	0,03	0,02	0,03	0,02
39	ome	Mach'y & equip't nec	0,07	0,04	0,06	0,04	0,05	0,02	0,03	0,02	0,03	0,02
41	Ser	Services	0,01	0,00	0,01	0,01	0,01	0,03	0,03	0,03	0,03	0,03

Source: *MAcMaps*, authors' calculations.

Annex 2: Impacts on trade flows

Table A2.1: Impact on world trade by commodity

No.	Code	Description	World trade in value by commodity				
			Reference	Scenario			
			(a)	(b)	(c)	(d)	
1	pdr	Paddy rice	0.123	11%	7%	17%	16%
2	wht	Wheat	1.646	14%	3%	17%	12%
3	gro	Cereal grains nec	1.657	9%	5%	9%	6%
4	vaf	Vegetables, fruit, nuts	3.689	7%	5%	7%	7%
5	osd	Oil seeds	1.955	7%	3%	12%	10%
6	cab	Sugar cane, sugar beet	0.004	-7%	0%	-12%	-11%
7	ocr	Crops nec	3.912	6%	6%	5%	5%
8	ctl	Cattle	0.387	11%	3%	14%	10%
9	oap	Animal products nec	1.359	2%	2%	2%	2%
10	rmk	Raw Milk	0.017	-4%	0%	-7%	-7%
11	fsh	Fishing	0.836	1%	1%	2%	2%
12	cmt	Bovine meat products	1.633	15%	8%	23%	21%
13	omt	Meat products nec	2.066	43%	20%	57%	46%
14	vol	Vegetable oils and fats	3.655	30%	14%	37%	28%
15	mil	Dairy products	1.473	85%	33%	116%	96%
16	pcr	Processed rice	0.570	67%	24%	126%	94%
17	sgr	Sugar	1.247	71%	36%	94%	71%
18	ofd	Food products nec	9.948	25%	23%	25%	22%
19	bat	Bevg. and tob. Prod.	3.901	40%	27%	49%	44%
20	pfb	Plant-based fibers	1.161	2%	1%	2%	2%
21	wol	Wool	0.320	3%	3%	3%	3%
22	forest	Forestry	1.219	1%	1%	1%	1%
23	prim	Coal, oil, gas, min. nec	33.323	1%	0%	3%	3%
24	ias	Ferrous metals	11.484	11%	7%	13%	10%
25	nfm	Metals nec	13.776	6%	4%	7%	5%
26	tex	Textiles	16.306	20%	6%	29%	23%
27	wap	Wearing apparel	13.912	18%	8%	28%	24%
28	lea	Leather products	7.254	15%	6%	28%	24%
29	lum	Wood products	8.969	6%	3%	7%	5%
30	nmm	Mineral products nec	7.723	12%	7%	15%	12%
31	fmp	Metal products	8.846	12%	6%	18%	14%
32	omf	Manufactures nec	15.242	8%	4%	13%	10%
33	ppp	Paper prod., publishing	9.575	6%	3%	7%	5%
34	pac	Petroleum, coal prod.	9.432	12%	6%	18%	15%
35	crp	Chem., rubber	44.589	9%	6%	9%	7%
36	mvh	Motor vehicles and parts	34.356	10%	5%	15%	12%
37	otn	Transport equipment nec	14.725	5%	3%	6%	5%
38	ele	Electronic equipment	72.010	5%	3%	6%	4%
39	ome	Mach'y & equip't nec	84.027	7%	4%	7%	6%
40	TrT	Transport	37.374	0%	0%	1%	1%
41	Ser	Services	70.782	0%	-1%	-1%	-1%

Source: Authors' simulations using *Mirage*.

Note: The reference is the level, expressed in tens of billions dollars, of world trade in the reference (i.e., without any liberalization), after 14 years. Changes are expressed in percent of this reference value.

Table A2.2: Most affected sectoral bilateral trade flows

scen (a)	pcr	EU25	Japon	2085%
	pcr	Row	AED	763%
	omt	AED	Cairns	636%
	mil	Row	Japon	506%
	vol	Japon	ACP	439%
	mil	EU25	Japon	429%
	vol	Japon	Row	415%
	mil	Japon	EU25	406%
	pcr	Row	Japon	400%
	pcr	ACP	Japon	394%
scen (b)	sgr	Japon	EU25	550%
	pcr	Japon	EU25	208%
	mil	Japon	EU25	191%
	sgr	Row	USA	175%
	mil	Japon	USA	174%
	mil	ACP	EU25	138%
	pcr	Cairns	EU25	126%
	mil	ACP	AED	122%
	omt	Japon	Cairns	116%
	ofd	EU25	Japon	115%
scen (c)	pcr	Row	Japon	6445%
	vol	Japon	ACP	5750%
	vol	Japon	Row	5565%
	pcr	EU25	Japon	4511%
	vol	Japon	Cairns	4216%
	vol	Japon	USA	3721%
	mil	Row	Japon	3262%
	vol	Japon	EU25	3134%
	vol	Japon	AED	2752%
	sgr	AED	EU25	2664%
scen (d)	pcr	Row	Japon	5900%
	vol	Japon	ACP	4863%
	vol	Japon	Row	4779%
	pcr	EU25	Japon	4456%
	vol	Japon	Cairns	4190%
	vol	Japon	USA	3637%
	mil	Row	Japon	3181%
	vol	Japon	EU25	3072%
	vol	Japon	AED	3045%
	sgr	AED	EU25	2602%