

**MARKET ACCESS MAPS FOR GTAP:
A BILATERAL MEASURE
OF MERCHANDISE TRADE PROTECTION**

Draft version

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Paper prepared for the GTAP conference, Taipei, June 2002¹

¹ Authors acknowledge excellent research assistance by Xavier Pichot, University of Pau and ITC.

Abstract

MAcMaps (Market Access Maps) for GTAP 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, before aggregating in GTAP nomenclature using a procedure that minimizes the endogeneity bias while accounting for the importance of products in international trade. 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.

Keywords: protectionism, market access, custom duties, tariff quotas, anti-dumping duties.

JEL Classification: F02, F13, F15, F18

1. INTRODUCTION

Trade regimes of countries are usually very discriminatory. The vast majority conduct a single trade regime. However, these are generally the smaller countries. Large countries have a much more complex trade policy, which is often highly discriminatory.

For instance, the EU is a member of the WTO and applies an MFN tariff to all other member states. It has also negotiated the GSP (Generalized System of Preferences) agreement that grants a lower tariff rate than the MFN status to member countries of the WTO (Albania, India, Zimbabwe...) and non-members such as China, Iran or Iraq. On the other hand, the European Union has signed agreements with LDCs (Least Developed Countries) and has granted them an even lower tariff than the GSP. Some of them are members of the WTO (Myanmar, Tanzania...) while others are not (Nepal, Vanuatu...). Among these LDCs, some will benefit until the end of 2001 from the lowest tariff rates, being countries having already signed the ACP agreement. The Cotonou agreements in 2001 suspended the ACP scheme and replaced it with bilateral agreements. In the case of ACP countries, some are WTO members (Tanzania, Sierra Leone...) and others are not (Tuvalu, Kiribati...). Then European Union has for many years negotiated asymmetric agreements with some Mediterranean countries,

and is progressively switching to a free trade area. Among these Mediterranean countries, some are WTO members and have also signed the GSP agreement (such as Egypt and Tunisia), others are not WTO members but are GSP countries (such as Syria and Algeria), and others are WTO members but not GSP countries (Malta). Some countries negotiated a free trade agreement with the EU on industry and agriculture to fight against drug trafficking (countries from the Andean Pact). For the same reasons, the European Union signed the same kind of agreement, but only for agriculture with countries from the CACM (Central America Common Market). All are WTO members and also signed the GSP accord. Some countries such as North Korea are neither members of the WTO, nor have they entered into any agreement with Europe. The recent initiative referred to as « Everything but arms », that grants free access to LDCs, should also be quoted.

The USA, Japan, and Switzerland as well as other nations have extremely complex trade policy regimes too. To sum up the argument, it is not consistent to summarize the trade policy of these countries by one single (multilateral) tariff. As a result, the problem is not two-dimensional (products * importing country), as it is referred to in several databases (see for example, OECD, 1997 or Messerlin, 2001, or even Francois, McDonald & Nordström, 1995). It is four-dimensional: products * importing countries * exporting countries * instruments of protection and will be reduced to a three-dimensional one in *MAcMaps* for *GTAP*: sector * exporting country/region * importing country/region, by aggregating all instruments in a single tariff equivalent.

This exercise is of crucial importance for CGE modeling. The level of protection must be carefully tackled on a bilateral basis to estimate the true impact of any trade policy measure. This is what **MAcMaps for GTAP** aims at doing, as a result of a co-operative agreement between the International Trade Centre (ITC – Geneva) and the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII – Paris).

A first release of *MAcMaps* aimed at exploring the possibilities of programming such a tool, while largely relying on 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). *MAcMaps for GTAP* is based on a second release, that departs from the initial exercise 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.

MAcMaps for GTAP aggregates all this information for the 69 country/regions in GTAP5 at the level of the 40 GTAP-sectors (excluding services) for the year 1999.

This paper details how MAcMaps for GTAP is constructed.

2. DATA

2.1. Instruments of protection

The database integrates 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. Additional taxes that may be levied on imports are not reported.

MAcMaps does not have information on quotas in the textile and clothing sector. Thus, modelers should merge MacMaps data with the relevant information in GTAP5.

Lastly, it must be emphasized that protection data only is taken into consideration. Data relative to support policies, noticeably in the agricultural sector, is already documented in GTAP5, on the basis of country notification to the WTO (see GTAP book, chapter 4, section 2); indeed, since such measures have no bilateral dimension, it was worthless computing once again this information.

2.2. Sources

Source information is derived from country sources reported to UNCTAD (TRAINS), AMAD, additional 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. This information checked using various other databases, and complemented as follows.

To evaluate tariff quotas, the AMAD (Agricultural Market Access Database) provides the source information (www.amad.org). Inside Quota Tariff Rates, Outside Quota Tariff Rates, notifications of quotas and notifications of imports within the quotas are documented. The basic information on quotas and related imports is based on country notifications to the WTO, reported on the WTO web site (http://docsonline.wto.org/gen_search.asp). On the same site, the method for administrating quotas is documented too, and we grasp this information (see

document G/AG/NG/S/8/Rev.1) in order to calculate our tariff equivalents. The 33 countries listed in Table 1 below are documented in the latter reference.

Table 1: countries with exhaustive information administration of tariff quotas

Australia	
Barbados	Mexico
Brasil	Morocco
Canada	New Zealand
Colombia	Nicaragua
Costa Rica	Norway
Czech republic	Philippines
European Union	Poland
Korea	Romania
El Salvador	Slovakia
Guatemala	Slovenia
Hungary	South Africa
Indonesia	Switzerland
Iceland	Thailand
Israel	Tunisia
Japan	Venezuela
Malaysia	United States

As far as anti-dumping duties are concerned various sources have been used.

National notifications made to the WTO is the first set of information: related documents are available on the WTO web site (http://docsonline.wto.org/gen_search.asp). These notifications, issued each semester, provide investigations, affected products and definitive duties enforced as well as affected exporting countries. These documents are recorded using the reference GDAP/N/N° of semester/ISO3 country code. The information starts on the first July of 1994 and covers countries in Table 2 below.

Table 2. Countries reporting AD to the WTO

South Africa	Korea
Argentina	Malaysia
Australia	Mexico
Brazil	New Zealand
Canada	Nicaragua
Chile	Peru
Colombia	Philippines
Czech republic	Poland
Egypt	Singapore
European Union	Thailand
Guatemala	Trinidad and Tobago
India	Turkey
Indonesia	United States

Israel Japan	Venezuela
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TRAINS has been used in order to complete these notifications with HS tariff codes (not provided on the WTO web site) for the following countries : South Africa, Argentina, Australia, Brazil, Korea, Egypt, USA, Indonesia, Malaysia, New Zealand, Peru, Turkey, EU.

Lastly, national sources have been mobilized for the following countries :

- Canada : the web site of the Canada Customs and Revenue Agency provides the codes of affected products (www.ccra-adrc.gc.ca/customs/business/sima/index-e.html) ;
- India : duties are provided by the Central Board of Excise and Customs, by producer and even by product category. However, product codes are generally provided at 6 digits at the most (www.cbec.gov.in/cae/customs/cs-mainpg.htm) ;
- Peru : The Superintendencia Nacional de Aduanas del Perú provides codes for affected products at the 10 digits level, as well as affected countries, exporters and the full history of enforced measures (www.aduanet.gob.pe/aduanas/operatividad/operatividad.htm).
- European Union : the Belgian Ministry of Finance disseminates a database relying on a compilation of Official Journals of The European Community. Affected products and exporting countries as well as corresponding products codes in Combined Nomenclature and the full history of cases are available (http://minecogovbe/organization_market/index_en.htm)

2.3. Geographical coverage

Within the compilation phase, MACMaps analyses the trade policy of 147 countries (including the 15 EU countries sharing the same trade policy) and 220 suppliers (the list of countries taken into account in the estimation phase is provided in Annex 1). This is the level on which the estimation of tariff equivalents rely ; then, these equivalents are aggregated into the GTAP regional nomenclature.

3. METHODOLOGY

The heterogeneous instruments referred to above (specific tariffs, tariff quotas...) need to be homogenised by the calculation of 'ad valorem' equivalents. This is the first step of our methodology.

Then the issue of the aggregation of these tariff equivalents remains. Economic literature in this regard (Balassa, 1965; Laird, 1996; Bouët, 2000) acknowledges this difficult issue. Some methods fail to take into account the importance of products in international trade, while others face an endogeneity bias. It is nevertheless possible to establish an aggregation method that minimizes these biases and at the same time acknowledges the importance of products in international trade. This is our second step.

These two steps, computing tariff equivalents and aggregating are now detailed, before exposing the treatment of special cases and the remaining limitations of the methodology.

3.1. Computing tariff equivalents

MACMaps for GTAP relies on very disaggregated information. It is of key importance to tackle the bilateral dimension of the various elements of protection. A given importer will apply various tariff regimes to various groups of exporting countries. In addition, certain instruments are enforced vis-à-vis specific partners only (e.g. anti-dumping duties, prohibitions, ...). In total, the first issue to consider is trade regimes. 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).

3.1.1. Trade regimes

The first issue to be addressed is trade regimes. The classification of supplier countries is not the same for all products. In fact, a Harmonized System (HS) position may be characterized by a unique tariff for all WTO members, or by a WTO tariff and a GSP tariff, or by five different trade regimes. Hence, it is compulsory to create several partitions of supplier countries. Lastly the list of GSP countries changes from one nation to the other: Poland has signed GSP agreements with 41 countries, New Zealand with 85 countries and Japan with 120 countries.

To illustrate this point and the underlying difficulties, let us assume that there are ten countries in the world: the European Union, USA, Japan, Australia, Tunisia, Argentina, Albania, Afghanistan, Angola and Benin. We study the trade policy of the European Union. For simplicity we further assume that all countries in the group are WTO members, and that the EU only has two discriminatory regimes: GSP towards Tunisia, Argentina, Albania, Afghanistan, Angola, Benin, and an LDC policy for Afghanistan, Angola, and Benin. Assuming that there exists a WTO regime for all HS positions, each HS position can be characterized according to four different clustering as illustrated in Table 3.

Table 3: Classification according to discriminatory trade regimes

Trade regimes	Classification of countries
WTO	WTO = {USA, Japan, Australia, Tunisia, Argentina, Albania, Afghanistan, Angola, Benin}
WTO and GSP	WTO = {USA, Japan, Australia} GSP = {Tunisia, Argentina, Albania, Afghanistan, Angola, Benin}
WTO and LDC	WTO = {USA, Japan, Australia, Tunisia, Argentina, Albania} LDC = {Afghanistan, Angola, Benin}
WTO, GSP and LDC	WTO = {USA, Japan, Australia} GSP = {Tunisia, Argentina, Albania} LDC = {Afghanistan, Angola, Benin}

Hence, if for an HS position there is a WTO and an LDC tax, the three least advanced countries will support the LDC tariff and not the WTO tariff, and we therefore remove these three LDCs from the WTO tariff group. If on the contrary, only the WTO tariff exists, all supplier countries would be taxed accordingly.

If the European Union signs a bilateral treaty with a country such as Tunisia, the number of possibilities exceeds 8 in this illustrative example: (WTO), (WTO, Tunisia), (WTO, GSP), (WTO, GSP, Tunisia)...

3.1.2. Variety of trade restrictions

The second issue to be addressed is the variety of trade restrictions to be tackled : ad valorem tariffs, specific duties, prohibitions, tariff quotas, anti dumping duties. All this information must be compiled before estimating a global tariff equivalent.

- Ad valorem tariffs

Information on ad valorem duties is maintained at the most disaggregated level possible: HS10, HS8 or HS6.

- Specific duties

A specific duty has particular properties as compared to an ad valorem duty, such as the impact on quality of domestically produced goods, since the degree of protection varies with the price of the good, and variations in the degree of protection itself occur when world prices vary. All these effects cannot be considered in general : hence, an ad valorem equivalent is calculated in MAcMaps for every specific duty, by dividing the specific tariff by the unit value of bilateral imports (see below how this unit value is computed). This is done after having harmonized units to which specific duties are referring (kg, tons, liters, etc...) and after conversion of the duty expressed in national currency in dollars.

- Prohibitions

Indeed, it is difficult to consider a prohibition in the same way as a duty. However, it is important to integrate such barriers to trade in the calculation of the global tariff equivalent, by considering an arbitrary tariff equivalent of prohibitions.

- Tariff quotas

The Uruguay Round Agricultural Agreement attempted to normalize the agricultural sector by asking each country to convert all their existing instruments of protection into customs ad valorem duties before proceeding to lower the tax rate. Faced with resistance from the countries, tariff quotas were negotiated, i.e. the combination of quantitative restrictions and classic taxes. A tariff quota is defined as an annual import volume quota and two taxes. The smallest tariff referred to as the Inside Quota Tariff Rate (IQTR) places a tax on the first set of imports. When the quota has reached its limit, it is possible to further import more goods, but these are charged at a higher tax called the Outside Quota Tariff Rate (OQTR).

The Marrakech agreement clearly reinforced the proliferation of *anti-dumping duties*. The WTO has authorized each member nation to adopt a national anti-dumping

legislation. The number of applied anti-dumping duties had thus gone beyond 1,121 on 30th June 2000, of which 330 belonged to the USA and 190 to the EU. The most targeted countries are China, Korea, and Indonesia. But what is really new is that developing countries are now using this form of protection in greater measure. Since 30 June 2000 onwards, South Africa has imposed 104 anti-dumping duties, India 90, and Mexico 80 (WTO, 2001 Report). Antidumping duties are treated separately in MacMaps for GTAP : antidumping duties are *not* included in the synthetic tariff equivalent, but provided separately.

3.1.3. Calculation of an ad valorem tariff equivalent of instruments

The third issue is to calculate a synthetic ad valorem equivalent of the above measures.

- **Specific duties**

As far as specific duties are concerned, one needs the reference unit value by which to divide the specific duty in order to compute the ad valorem equivalent at the bilateral level. The general principle is to prioritize a bilateral perspective. Accordingly, we calculate unit values in bilateral trade and use this unit value to compute the ad valorem equivalent of all non tariff instruments.

- **Prohibitions**

Excluding prohibitions would tend to under-estimate the protection of an economy (it would be equivalent to a 0% ad valorem import duty). Thus we add a tariff of 200 per cent on the corresponding HS position.

- **Tariff quotas**

As far as tariff quotas are concerned, we calculated an ad valorem equivalent for each one, either by using a weighted average or by using the inside rate according to the mode of administration, as being notified by the reporting country.

- **Anti-dumping**

As stressed above, MACMaps for GTAPs identifies separately anti-dumping duties, on the basis of national notifications sent to the WTO, as well as other sources referred to above.

According to the WTO, 1,097 anti-dumping measures had been enforced as of 30 June 1999, out of which 671 had been reported over the period 1995-99 (Table 4); we were able to recover 85% of these average 140 yearly notifications. All declaring

countries are covered by MAcMaps, with the exception of Argentina, Chile, Colombia, the Czech Republic, Nicaragua, Thailand and Venezuela : while notifying antidumping measures, these reporting countries do not document the antidumping duty imposed. The missing information represents 15% of notified cases, of which two thirds are concentrated on Argentina alone (Table 4 below).

Table 4: reporting of antidumping practices since 1995

	1995	1996	1997	1998	1999	Total
All notifications of duties	118	86	124	162	181	671
Total missing in MAcMaps	18	21	19	17	24	99
<i>Of which:</i>						
Argentina	13	20	11	13	9	66
Chile	2	0	2	2	0	6
Colombia	1	1	1	0	6	9
Czech Republic	0	0	0	0	0	0
Nicaragua	0	0	0	0	1	1
Thailand	0	0	1	2	0	3
Venezuela	2	0	4	0	8	14

Source : based on WTO : « AD measures by reporting party from 01/01/95 »

MAcMaps therefore integrates 2996 anti-dumping practices (including Canada) and recovers them on 1204 position lines. The maximum tax levied is 451 per cent (Mexican's duty on propelling or sliding pencils, refills for ballpoints pens and similar accessories of Chinese origin). Protection adopted through these procedures is thus extremely high. Table 5 gives the number of notifications for the 25 countries, as well as the 65 affected countries. The corresponding practices are heavily concentrated on a limited number of reporting countries as well as affected ones. Two thirds of measures are notified by the three NAFTA members, while one third is applied by all notifying countries on China, Korea and Russia.

Table 5: Number of anti-dumping notifications by reporting and partner country in MAcMaps

Reporting country		Partner		Partner	
Canada	904	China	720	New Zealand	9
USA	673	Korea	239	Korea, Dem. P. Rep.	9
Mexico	423	Russian Federation	145	Hong Kong	9
EU15	367	Japan	140	Finland	9
SACU	119	USA	128	Hungary	8
New Zealand	98	Ukraine	126	Greece	8
Egypt	54	South Africa	97	Czech Republic	8
Brazil	51	Taiwan	95	Bulgaria	7
Indonesia	44	India	91	Austria	7
Japan	42	Germany	86	Slovakia	6
Malaysia	34	Canada	86	Ireland	6
Peru	28	Thailand	79	Colombia	6
Australia	28	Italy	77	Chile	6
Korea	22	Brazil	76	Egypt	5
Colombia	22	France	67	Croatia	5
Israel	21	Mexico	61	Ecuador	4
India	21	United Kingdom	50	Norway	3
Turkey	19	Pakistan	46	Latvia	3
Venezuela	17	Netherlands	43	Estonia	3
Singapore	2	Indonesia	43	Saudi Arabia	2
Guatemala	2	Sweden	40	Philippines	2
Chile	2	Belarus	35	Lithuania	2
Trinidad	1	Spain	33	Yugoslavia	1
Poland	1	Malaysia	31	Burkina Faso	1
Philippines	1	Romania	30	Former Yugoslav	1
		Belgium and Lux.	27	Trinidad and Tobago	1
		Argentina	26	Slovenia	1
		Denmark	25	Viet Nam	1
		Turkey	22	Israel	1
		Poland	22	Bangladesh	1
		Singapore	19		
		Australia	18		
		Venezuela	17		
		Portugal	11		
		Kazakstan	10		
TOTAL	2996				2996

Source: MAcMaps

3.2. Aggregation method

Economic literature has always presented evidence of the difficulties encountered in the construction of a sectoral aggregation of tariffs (Bach & Martin, 2000). We propose here a solution minimizing the corresponding difficulties.

3.2.1. Identifying aggregation problems

Since we have to aggregate different tariffs to measure the global protection of a sector or an economy, we would first use national imports as weights. Since these imports depend on the tariff, there is an endogeneity bias: a high (low) tariff generates limited (large) imports and its contribution to the overall protection is then reduced (increased). Using imports as weights leads to an under-valuation of the protection level of a country.

The same problem arises while aggregating exporting countries. For instance European imports originating from New Zealand taxed at 50 per cent will be weak while European imports originating from Australia taxed at 5 per cent will be more important; the EU tariff vis-à-vis the group (New Zealand and Australia) will be under-estimated by this method.

In short, sectoral as well as geographical aggregation of exporters using this method of weights systematically under-estimates the rates of protection levied.

When aggregating importing countries, different problems arise. Suppose that we have to aggregate taxes on the imports of Australian electronic conductors imposed by United States and Mexico. The weights must reflect a higher purchasing power of the first country (United States is much richer, thus it imports more and the American tariff should have a greater influence on the level of imports of the group USA+Mexico) and a difference of development between the two countries, that is to say differences in the structure of imports: for example, as Mexico is less developed than United States, the latter is self sufficient concerning this product when the former imports it in great quantity. Thus the level of the Mexican tariff should be more weighted.

3.2.2. Defining weights for the aggregation of products and exporters.

We first study the weighing scheme in the case of an aggregation of products and exporting countries.

Global imports can be used as weights, but they may constitute import structures that are radically different from those of the region considered. A value-added weight, or even a simple average, have little chance too of being representative of the potential imports of the countries in question. Hence, we have retained the option of weighing the imports of a country by those of a reference group the country belongs to, the assembling criteria being detailed below.

For every importer and every supplier, on every HS position, we add 4 ad valorem equivalents out of 5 instruments integrated in MACMaps source files (remind that anti-dumping duties are not integrated in the calculation of the tariff equivalent but provided separately). Once we have for every importing country vis-à-vis every supplier nation on each position of the HS, an ad valorem equivalent representing all the instruments of protection, we aggregate by transforming a matrix $147 \times 220 \times 10,000$ into a matrix $r \times r \times n$ where 'r' is the number of global regions and 'n' the number of sectors: e.g. we consider that $r=8$ and $n=6$.

Reference groups are used in the following procedures in MACMaps for GTAP :

- Definition of a reference group unit values, when unit values in the bilateral trade of a country reporting a specific duty is missing (see next section on treatment of special cases);
- Definition of a reference group unit values, when unit values in the bilateral trade of a country reporting a specific duty diverges from the one of the other countries in the same group (less than 0.2 or more than 5 times the average - see next section on treatment of special cases) ;
- Aggregation of tariff equivalents and determination of appropriate weights minimizing the expected endogeneity bias.

Hence, defining these groups is a crucial step in our methodology, that deserves much attention. In a first version of MacMaps (see CEPII working paper #2001-18) we divided the world into 3 reference groups based on per capita income. The new version is based on a more satisfactory methodology, that is detailed now.

The basic idea is to hierarchically cluster the observations of our database of trade as well as a joint database on incomes per capita (World Bank). Similarities in specialization as well as demand patterns are considered, since the three canonical variables considered are per capita PPP GDP and per capita imports and exports. The distance between two clusters is the average distance between pairs of observations, one in each cluster, according to the procedure of Sokal & Michener (1958).

We first calculate the covariance matrix of the three canonical variables. The first variable alone (PPP GDP per capita) accounts for 99% of the total variation (table 6 below), what suggests that a simple clustering on this criterion alone could have made sense. However, the important criteria is the decrease in the proportion of variance

accounted for by joining two clusters. When the data are grouped into 5 clusters, the proportion of variance accounted for the clusters is about 96% (RSQ). The corresponding percentage obtained with 3 clusters only would suggest stopping at this level. In addition, there is a local peak of the cubic clustering criterion at five clusters. This is confirmed by the pseudo F statistic which exhibits the largest value for five clusters too.

Table 6: Results of the clustering of countries into reference groups

Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	1.21766E11	1.2109E11	0.9940	0.9940
2	676561739	623847780	0.0055	0.9996
3	52713958.5		0.0004	1.0000

Root-Mean-Square Total-Sample Standard Deviation = 202068.8
Root-Mean-Square Distance Between Observations = 494965.4

Cluster History

NCL	-----Clusters Joined-----	FREQ	SPRSQ	RSQ	ERSQ	CCC	PSF	PST2	Norm RMS Dist	T i e
5	CL8 CL20	10	0.0031	.964	.958	1.38	836	8.7	0.3883	
4	CL9 CL18	92	0.0471	.917	.936	-2.2	461	242	0.3946	
3	CL7 CL6	27	0.0307	.886	.888	-.12	492	62.5	0.6375	
2	CL4 CL3	119	0.2322	.654	.750	-3.7	240	253	0.9266	
1	CL2 CL5	129	0.6543	.000	.000	0.00	.	240	2.1819	

To put it differently, 5 clusters are necessary to explain over 99% of the variation in the supply and demand characteristics referred to here. The corresponding clustering tree is reproduced below, with the R squared on the horizontal axis : names of countries have been dropped by stake of clarity (figure 1). In addition, a sixth cluster has been created after completion of the procedure for countries for which any data was missing. The final list of countries within the five clusters is provided in table 7.

Figure 1 : the clustering tree

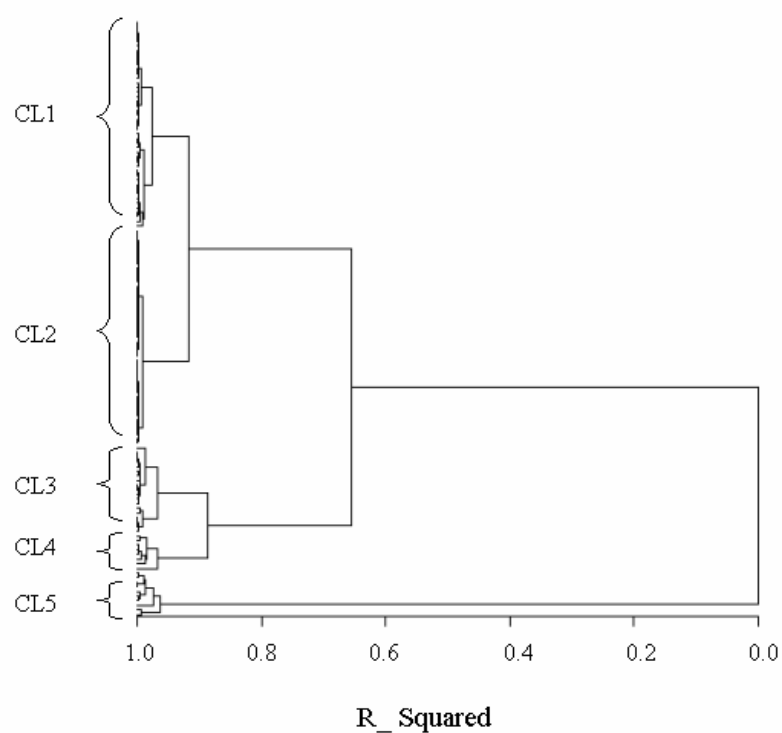


Table 7: the reference groups in MAcMaps for GTAP

1	2	3	4	5
Armenia	Albania	Antigua and Bar	Australia	Bahamas
Bangladesh	Algeria	Argentina	Brunei Darussal	Barbados
Benin	Belarus	Bahrain	Canada	Czech Republic
Bhutan	Belize	Chile	Europe	Israel
Bolivia	Bosnia and Herz	Costa Rica	Hong Kong	Malta
Burkina Faso	Botswana	Croatia	Iceland	New Zealand
Cameroon	Brazil	Estonia	Japan	Taiwan
Central African	China, People's	Hungary	Singapore	United Arab Emi
Chad	Colombia	Malaysia	Switzerland	
Congo	Cuba	Mauritius	United States	
Congo, D.R.	Dominica	Mexico		
Cote d'Ivoire	Dominican Rep.	Oman		
Ecuador	Egypt	Poland		
Ethiopia	El Salvador	Saudi Arabia		
Georgia	Equat. Guin	Seychelles		
Ghana	Gabon	Slovenia		
Guinea	Grenada	South Korea		
Guinea-Bissau	Guatemala	Trinidad and To		
Honduras	Guyana	Uruguay		
India	Iran			
Indonesia	Jamaica			
Kenya	Jordan			

Kyrgyzstan	Kazakhstan			
Lesotho	Latvia			
Madagascar	Lebanon			
Malawi	Lithuania			
Mali	Macedonia, Repu			
Mauritania	Maldives			
Moldova, Rep	Morocco			
Mozambique	Namibia			
Nepal	Panama			
Nicaragua	Paraguay			
Niger	Peru			
Nigeria	Philippines			
Pakistan	Romania			
Papua Nw G.	Russian Federat			
Rwanda	Serbia and Mont			
Senegal	Sri Lanka			
Solomon Islds	Suriname			
Sudan	Thailand			
Tanzania	Tunisia			
Togo	Turkey			
Uganda	Turkmenistan			
Uzbekistan	Ukraine			
Viet Nam	Venezuela			
Zambia				
Zimbabwe				

3.2.3. Aggregating using the reference groups' weights

- Tariff aggregation on products

We have to aggregate a 147*220*10,000 matrix into an 8*8*6 matrix.

Firstly, to aggregate the 147*220*10,000 matrix into a 147*220*6 one, we use the following procedure. Assume that a country 'k' (from 1 to 147) on an HS position 's' (from 1 to 10,000) imposes different tariffs $t_{k,u}^s$ on every potential supplier 'u' (220 suppliers). We have to aggregate these 10,000 tariffs into 6 tariffs (remind that we want to aggregate into eight regions and six sectors). These 6 sectors are indexed by $z=1$ to $z=6$, and each sector z includes several HS positions s .

$$\forall k=1,2,...,147; \forall u=1,2,...,220, \forall z=1,2,...,6, \quad t_{k,u}^z = \frac{\sum_{s \in z} m_{ZR(k),u}^s \times t_{k,u}^s}{\sum_{s \in z} m_{ZR(k),u}^s} \quad (1)$$

where 's' is the index that defines the HS positions that make up sector 'z'. The tariff on product 's' of country 'k' originating from 'u' is thus weighted by the imports of 's' made by the reference group of 'k' originating from 'u'.

Thus the tariff imposed on product ‘s’ by country ‘k’ on supplier ‘u’ is not weighted by imports of ‘k’ originating from ‘u’, but by the imports of the group of countries whose GDP per capita, exports and imports per capita are closer to ‘k’, originating from ‘u’.

- Aggregation of the suppliers of a particular country.

Assume that a country ‘k’ on product ‘z’ imposes different tariffs $t_{k,u}^z$ on every potential supplier ‘u’ (220 suppliers). These tariffs $t_{k,u}^z$ have been estimated at the previous step of aggregation (aggregation of products). We have now to aggregate different tariffs imposed by one importing country ‘k’ on one sector ‘z’ originated from different exporting countries ‘u’. We have to aggregate these 220 tariffs into 8 tariffs.

$$\forall k = 1, 2, \dots, 147 ; \forall j = 1, 2, \dots, 8 ; \forall z = 1, 2, \dots, 6 ; t_{k,j}^z = \frac{\sum_{u \in j} m_{ZR(k),u}^z \times t_{k,u}^z}{\sum_{u \in j} m_{ZR(k),u}^z} \quad (2)$$

‘u’ is a supplier country that belongs to one of the eight trading zones (zone ‘j’). The tariff $t_{k,u}^z$ levied by ‘k’ on imports of ‘z’ originating from ‘u’ is weighted by the imports of ‘k’ ’s reference zone (and not by imports of country ‘k’) originating from ‘u’ i.e. $m_{ZR(k),u}^z$, this is to avoid the traditional endogeneity bias.

3.2.4. Defining weights for aggregation of importers

We then study the weighting scheme in the case of an aggregation of importing countries.

Imagine that we have to define the average tariff of the group (USA+Mexico) on electronic conductors coming from Australia. In this case, we have to integrate two elements:

- firstly, the purchasing power of each of the two countries which we assess by total national imports.
- Secondly, the importance of the product in the imports structure of each country which we assess by the share of the product in total imports by the reference group of the country.

Thus the American tariff on electronic conductors imported from Australia is weighted by American total imports multiplied by the share of electronic conductors in total imports of the reference group of the United States.

3.2.5. Tariff aggregation of importing countries

We have now a 147*8*6 matrix. $t_{k,j}^z$ represents the tariff levied by country 'k' on product 'z' originated from trading zone 'j'. They have been calculated at the previous step of aggregation (aggregation of exporting countries). We have now to aggregate 147 importing countries into 8 importing zones. To obtain a new matrix having the form 8*8*6, we use the following method of aggregation:

$$\forall v=1,2,\dots,8; \forall j=1,2,\dots,8; \forall z=1,2,\dots,6; \quad t_{v,j}^z = \sum_{k \in v} \frac{t_{k,j}^z \times \frac{\sum_{j'} m_{ZR(k),j'}^z}{\sum_{z'} \sum_{j'} m_{ZR(k),j'}^{z'}} \times \left(\sum_{z'} \sum_{j'} m_{k,j'}^{z'} \right)}{\sum_{k \in v} \left\{ \frac{\sum_{j'} m_{ZR(k),j'}^z}{\sum_{z'} \sum_{j'} m_{ZR(k),j'}^{z'}} \times \left(\sum_{z'} \sum_{j'} m_{k,j'}^{z'} \right) \right\}} \quad (3)$$

Country 'k' belongs to importing zone 'v'. The tariff levied by country 'k' on the imports of 'z' originating from group 'j' is thus weighted by the product of two elements: the share of product 'z' in total imports of the reference group of 'k' - $ZR(k)$ – and the total imports of country 'k'.

3.3. Treatment of special cases

3.3.1. Diverging unit values

There is a case in which the unit value of the reference group is to be used as a denominator in the calculation of the tariff equivalent: when the bilateral unit value diverges by large from the one of the reference group the importer belongs to. The reason for this may be insufficient breakdown of the nomenclature: since trade is available at the HS-6 digits level only, whereas specific duties are defined at a more disaggregated level, the unit value can diverge by large from the one expected for limited flows concentrated on certain sub-categories of products. More generally, given the large number of records in the database (5000 products, 140 importers and 223 exporters) the tails of the distribution can entail fooling records that must be cleaned. Our rule of thumb is the following: if the bilateral unit value is at least five times larger, or at most five times smaller than the one of the reference group, the latter must be preferred.

3.3.2. Various methods of tariff quotas administration

As far as *tariff quotas* are concerned, the difficulty is that the quotas are generally not fully utilized. The utilization ratio lies between 66 per cent and 85 per cent in Canada, the USA, Japan and Europe. The previous definition of a tariff quota is theoretical. Different methods of administrating quotas exist around the world. There are nine principles²:

- « levied duties »: products are imported without any quantitative restriction and the duty is always (at the most) the IQTR;
- « Order of presentation of requests »: until the quota is reached, the first imports are taxed by the IQTR, the others by the OQTR.
- « Licenses on request »: after examination, licences are delivered or not, according to the quantities asked at the inside quota.
- “Adjudication”;
- « Traditional importers »: Import licences are shared among the previous period suppliers and the tax paid is the IQTR;
- “Public monopoly of import”: tariff quotas are allocated to (or through) public monopolies;
- “Groups of producers”: quotas are attributed exclusively or in priority to local producers that import the product;
- “Other methods”
- “Mixed methods”; any combination of the above principles.

Notwithstanding such complexity, a major part of these methods (actually more than 90 per cent of tariff quotas) use the IQTR for all imports, except in the case of the second method.

Since we have access to all the information stored on the AMAD database, and to the information made available on the WTO web site, (notably concerning the management methods), we have proceeded as follows.

² See corresponding section on the WTO website located at G/AG/NG/S/8/ or OECD 1999a.

We first compare the quota with imports notified to the WTO by the country enforcing the measure. Notice that notified imports do not necessarily match observed imports. If notified imports do not fill the quota (whatever observed imports are), there is clear evidence that the importing country does not enforce the OQTR. Hence, only the IQTR is to be considered for all observed imports. If the quota is notified as filled, the IQTR is applied to the quota, while the remaining part of observed imports do face the OQTR.

In total, we calculated an ad valorem equivalent for each tariff quota,

- either by using a weighted average when the quota is administered on the basis of the second method, or administered on the basis of any “mixed” or “other” method (the inside tariff is weighted by the quota, the outside tariff by imports outside the quota)³. We proceed in the same way if the method of administration is not documented;
- or by using the inside rate in the remaining cases.

If the tariff quotas relies on a specific duty, it must be converted in an ad valorem rate on the basis of the method described above.

3.3.3. Missing unit values

If it is impossible to calculate a unit value for the pair of countries under consideration, as a result of missing trade, two cases can arise depending of whether the exporting country exports or not to the reference group the importer belongs to.

If the exporter does export to the latter reference group, defined as a set of countries similar to the country under review (see above how the 6 reference groups⁴ have been determined), we apply the unit value calculated for imports of the group from the exporter under consideration.

If, on the contrary, the exporter does not export toward this group, there should be no potential export to the market considered, there is no reason for tabulating a unit value since we do not take into account such tariff.

³ Incidentally, we have cleaned AMAD, which entails some inconstancies such as certain IQTR rates larger than OQTR ones.

⁴ The same reference groups are used in the aggregation procedure.

We thus avoid any reference to a world unit value that could be largely different from the unit value of this importing country, while not considering tariffs on exports that could not arise.

Let us just consider two simple (hypothetical) examples.

First, Brazil exports maize towards the reference group Switzerland belongs to, but not to the latter country. Switzerland, on his own, imposes a specific tariff of CHF 450 per ton of maize. The unit value of Brazilian exports towards the reference group is USD 900 (corresponding to US imports in this case). Here we consider the latter unit value (corresponding to CHF 1,500), what leads to a 30% tariff equivalent: a level which is high enough to deter Brazilian exports of maize towards Switzerland.

Second, Brazil does not export towards the reference group Switzerland belongs to (group 4): it exports to other countries such as Paraguay (group 2) for instance. In this case, we apply a zero tariff to Brazilian exports of maize to Switzerland. Such rule of thumb is justified on the ground of non competing imports: we consider here 6 digits HS products which must be very different products at a more disaggregated level (the tariff line) on which the protection is applied. This rule is of particular relevance for manufactured products for which the degree of differentiation is much more important than for the example considered here.

3.4. Remaining limitations

Mixed tariffs (eg: 15%, up to a maximum of \$12/kg) are not correctly tackled: only the percentage is taken into consideration by stake of simplicity.

Technical duties are also a source of remaining difficulties: as far as beverages are concerned, for example, tariffs can be defined on the basis of the alcoholic content. The latter has been broadly defined in MAcMaps (10%, 20%, 40%), what may slightly distort the corresponding tariff equivalents for certain products. More generally, technicalities cannot be tackled in detail at such a degree of generality: the composition of sugar, milk, metal etc. could only be taken into consideration in detailed studies limited to a given sector.

Bound tariffs are not integrated in the MAcMaps; hence, the protection considered is levied duties and related instruments. Since bound tariffs are generally much larger than applied tariffs, it is sometimes argued that the true threat for exporters is bound tariffs.

As already stressed, tariff-line trade data, which is required for the calculation of ad valorem equivalents is not available (MacMaps relies on COMTRADE trade data). This the price to pay for the worldwide coverage of the database. Limiting the exercise to EU trade in agricultural products, for instance, authorizes INRA (France) to produce a database – TARAGRO- tackling tariff equivalents at the level of the tariff line). Including OECD and EU trade data at the tariff line level could be envisaged, as well as additional data for additional individual countries. However, we would lose the benefit of using reference groups defined on world basis. Lastly, if there is any bias in calculating tariff equivalents by using 6 digits trade data, at least the bias is common to all countries in MacMaps.

4. RATES OF PROTECTION IN MAC MAPS

Rates of protection in Mac Maps are given in annex 2, according to seven trading zones:

- ACP: African – Caribbean – Pacific countries;
- AED: developing Asia;
- Cairns: 18 countries belonging to Cairns group;
- EU25: European Union (enlarged to 25 countries)
- Japan
- USA: United States of America
- Row : rest of the world

For six products (wheat, sugar, manufacture of dairy products, textile, wearing apparel, motor vehicles and parts), the market access into each importing zone is estimated for each exporting zone. Let us briefly comment these results:

- the rate of protection is extremely high in European Union and Japan in the three agricultural and food industry products;
- Protection of industrial sectors is quite low in developed countries, except for textile and wearing apparel in Japan and USA where it is greater than 10%.

- Discrimination among exporting zones is very large; it is the result of numerous discriminatory tariff regimes, but it is also the consequence of anti-dumping duties (which are discriminatory) and specific tariffs; applied to very different unit value of bilateral imports, the ad valorem equivalents of this kind of protection are very different for exporting zones and often penalizes developing countries of which unit value of exports are low.

5. CONCLUSION

A comparison between MAcMaps and the OECD database is difficult because the OECD records only MFN ad valorem duties, preferential agreements and other instruments like specific tariffs and tariff quotas are not included. It means that multilateral protection databases provide significantly biased information. Comparing MAcMaps2 for GTAP estimation of market access to GTAP5 protection data according to the same geographical and sectoral classification, points out significant differences (corresponding data are presented in Annex). Absolute differences are not great in weakly protected sectors, but are great in the textile and clothing sector and are huge in cereals and agri-food sectors. For example, Japanese imports of cereals from Australia are taxed by a 195.8% ad valorem equivalent according to the GTAP5 database, while they are taxed by a 6.5% ad valorem equivalent according to MAcMaps. Reciprocally, Moroccan exports of cereals towards Switzerland face a 130.5% EAV in MAcMaps, to be compared with 39.8% only in GTAP. In the latter case, for instance, the difference lies in a very discriminatory specific tariff imposed by the importing country.

Such discrepancies underscore the benefits of integrating all protection instruments as well as preferential regimes in a bilateral perspective. MAcMaps for GTAP could thus be very useful to CGE modelers. It is already used in Mirage, the multinational CGEM developed by CEPII in collaboration with ITC, that will be mobilized in other papers presented in this conference. MAcMaps for GTAP has been provided to the Consortium in order to be made it public to all participants in the network.

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7. ANNEXES

Annex 1: Rates of protection in the GTAP5 database

Levels of protection used in the GTAP5 database according to the classification indicated in the main text body are given in the 5 following tables – the importing countries are listed in the columns:

Table A1-1: Market access for cereals (%)

	Austral.	Japan	Moro.	Eur. Union	USA	Brazil	Switz.	China
<i>Australia</i>		195.8	23.1	25.1	21.3	9.0	78.2	94.0
<i>Japan</i>	2.7		33.3	3.1	21.4	9.4	35.7	2.9
<i>Morocco</i>	1.2	77.8		11.3	12.9	7.5	39.8	0.0
<i>Eur. U.</i>	2.7	22.2	22.2		19.1	8.9	40.1	65.7
<i>USA</i>	2.7	62.7	18.1	20.4		8.4	56.5	51.0
<i>Brazil</i>	2.7	22.1	19.2	3.1	21.5		35.7	39.2
<i>Switzerland</i>	2.9	22.7	0.0	3.4	21.5	9.4		14.6
<i>China</i>	2.4	51.8	19.3	15.5	19.0	9.8	46.3	

Source : GTAP5

Table A1-2: Market access for other agricultural products and food industry (%)

	Austral.	Japan	Moro.	Eur. Union	USA	Brazil	Switz.	China
<i>Australia</i>		69.4	72.9	29.6	11.4	18.3	168.3	19.0
<i>Japan</i>	5.7		46.2	29.0	9.4	16.1	120.6	25.6
<i>Morocco</i>	4.7	39.2		20.2	10.3	17.9	95.9	18.9
<i>Eur. U.</i>	6.4	49.6	67.9		8.0	17.4	136.7	48.8
<i>USA</i>	4.9	48.3	64.4	14.5		10.8	127.8	54.1
<i>Brazil</i>	5.3	47.7	45.1	16.2	15.4		166.7	63.6
<i>Switzerland</i>	5.6	53.1	60.8	38.7	16.3	16.5		17.7
<i>China</i>	5.1	39.4	36.1	18.3	8.3	11.3	202.2	

Source : GTAP5

Table A1-3: Market access for other primary products (%)

	Austral.	Japan	Moro.	Eur. union	USA	Brazil	Switz.	China
<i>Australia</i>		0.5	0.0	0.0	0.4	0.2	0.2	3.4
<i>Japan</i>	0.1		0.0	0.0	0.3	0.8	0.0	3.9
<i>Morocco</i>	0.0	1.9		0.0	0.2	0.1	0.0	0.0
<i>Eur. U.</i>	0.5	-0.2	5.7		0.4	3.1	0.0	2.9
<i>USA</i>	0.1	-0.1	2.5	0.2		1.4	0.1	2.6
<i>Brazil</i>	0.2	0.2	2.5	0.0	0.5		0.1	0.1
<i>Switzerland</i>	5.2	0.0	10.4	0.0	0.5	5.7		3.3
<i>China</i>	0.1	-0.9	0.2	0.1	0.7	0.8	0.4	

Source : GTAP5

Table A1-4: Market access in the textile and clothing sector (%)

	Austral.	Japan	Moro.	Eur. Union	USA	Brazil	Switz.	China
<i>Australia</i>		2.2	16.2	3.3	9.0	8.8	1.5	15.9
<i>Japan</i>	15.3		17.5	8.7	10.9	16.9	2.1	27.9
<i>Morocco</i>	28.4	15.9		12.1	11.8	21.4	1.8	0.0
<i>Eur. U.</i>	15.5	12.4	30.9		9.7	15.4	0.0	19.7
<i>USA</i>	14.4	12.1	22.6	8.8		16.3	2.1	17.0
<i>Brazil</i>	18.3	9.6	5.3	6.3	8.5		1.7	12.0
<i>Switzerland</i>	13.9	13.2	25.1	0.0	9.6	15.6		27.1
<i>China</i>	23.6	12.1	33.2	10.1	13.4	22.2	2.6	

Source : GTAP5

Table A1-5: Market access for other manufactured products (%)

	Austral.	Japan	Moro.	Eur. union	USA	Brazil	Switz.	China
<i>Australia</i>		0.3	13.3	2.0	1.7	14.2	0.3	13.0
<i>Japan</i>	5.7		10.6	5.1	2.4	17.5	0.2	14.4
<i>Morocco</i>	1.8	0.4		5.6	0.9	4.5	0.5	5.5
<i>Eur. U.</i>	4.2	0.7	13.9		2.5	14.7	0.0	12.6
<i>USA</i>	3.4	0.5	11.4	3.3		13.2	0.4	11.1
<i>Brazil</i>	4.6	0.8	11.9	4.0	2.5		10.6	10.4
<i>Switzerland</i>	2.3	0.8	10.3	0.0	3.0	11.2		12.9
<i>China</i>	4.4	1.1	17.7	4.8	2.6	16.2	7.7	

Source : GTAP5

Annex 2: Rates of protection in MacMaps

Levels of protection calculated in MACMaps (release-2) according to the classification indicated in the main text body will be given very soon in the 5 following tables – the importing countries are listed in the columns:

Table A2-1: Market access for wheat (%)

	ACP	AED	Cairns	EU25	Japan	RoW	USA
<i>ACP</i>	45,2%	42,0%	32,5%	50,2%	288,7%	6,8%	1,5%
<i>AED</i>	25,4%	51,5%	24,0%	83,3%	269,7%	19,4%	3,9%
<i>Cairns</i>	20,4%	93,2%	23,5%	40,3%	130,4%	18,3%	0,8%
<i>EU25</i>	18,5%	61,7%	32,6%	132,0%	133,3%	12,3%	2,5%
<i>Japan</i>	40,4%	0,9%	13,2%	14,7%		1,4%	2,0%
<i>RoW</i>	20,8%	97,1%	30,3%	57,6%	345,9%	16,7%	3,6%
<i>USA</i>	17,1%	88,9%	16,0%	37,1%	150,1%	15,9%	

Source : Mac Maps

Table A2-2: Market access for sugar (%)

	ACP	AED	Cairns	EU25	Japan	RoW	USA
<i>ACP</i>		13,6%	9,3%	81,0%	156,0%	33,4%	27,0%
<i>AED</i>	43,7%		10,7%	138,2%	127,6%	22,2%	16,3%
<i>Cairns</i>	33,3%	21,8%		91,2%	211,1%	42,9%	25,4%
<i>EU25</i>	30,9%	17,8%	19,2%		96,9%	29,1%	16,6%
<i>Japan</i>	39,8%	24,9%	25,3%	57,9%		47,2%	12,0%
<i>RoW</i>	37,5%	20,6%	22,8%	126,8%	189,3%		50,1%
<i>USA</i>	26,3%	22,3%	21,3%	100,6%	92,3%	46,3%	

Source : Mac Maps

Table A2-3: Market access for manufacture of dairy products (%)

	ACP	AED	Cairns	EU25	Japan	RoW	USA
<i>ACP</i>		25,1%	67,8%	66,9%	166,9%	48,0%	25,9%
<i>AED</i>	17,9%		65,2%	55,8%	215,4%	24,1%	21,0%
<i>Cairns</i>	18,2%	19,0%		86,2%	121,6%	48,7%	32,9%
<i>EU25</i>	19,0%	4,9%	119,0%		115,9%	29,4%	29,5%
<i>Japan</i>	14,8%	9,8%	103,1%	73,3%		24,3%	35,4%
<i>RoW</i>	21,8%	19,4%	67,4%	75,7%	239,6%		24,9%
<i>USA</i>	19,6%	15,0%	9,2%	69,7%	48,7%	34,1%	

Source : Mac Maps

Table A2-4: Market access for textile (%)

	ACP	AED	Cairns	EU25	Japan	RoW	USA
<i>ACP</i>		2,4%	19,9%	1,7%	5,4%	1,8%	12,8%
<i>AED</i>	16,3%		13,5%	9,4%	7,8%	13,0%	10,2%
<i>Cairns</i>	13,2%	7,8%		8,7%	6,4%	7,2%	8,2%
<i>EU25</i>	11,2%	7,0%	11,2%		8,2%	5,8%	9,7%
<i>Japan</i>	10,4%	21,5%	13,0%	8,5%		13,4%	11,3%
<i>RoW</i>	13,7%	12,7%	12,3%	10,1%	4,5%		9,1%
<i>USA</i>	15,4%	10,9%	9,2%	10,1%	7,5%	6,9%	

Source : Mac Maps

Table A2-5: Market access for wearing apparel (%)

	ACP	AED	Cairns	EU25	Japan	RoW	USA
<i>ACP</i>		1,6%	20,2%	1,3%	5,2%	1,7%	10,5%
<i>AED</i>	23,7%		18,5%	9,7%	6,0%	18,7%	12,8%
<i>Cairns</i>	24,6%	1,3%		8,6%	6,5%	5,2%	12,2%
<i>EU25</i>	20,6%	3,6%	19,7%		11,2%	4,9%	12,8%
<i>Japan</i>	15,7%	26,4%	23,6%	12,3%		17,6%	11,7%
<i>RoW</i>	22,7%	1,2%	17,9%	9,5%	6,1%		9,3%
<i>USA</i>	21,2%	24,9%	18,3%	16,8%	11,8%	10,8%	

Source : Mac Maps

Table A2-6: Market access for motor vehicles and parts (%)

	ACP	AED	Cairns	EU25	Japan	RoW	USA
<i>ACP</i>	12,9%	20,4%	7,5%	0,7%	0,0%	11,9%	0,8%
<i>AED</i>	13,8%	24,7%	9,2%	4,1%	0,0%	10,9%	0,9%
<i>Cairns</i>	14,7%	12,9%	15,9%	8,8%	0,0%	7,0%	0,2%
<i>EU25</i>	13,4%	15,4%	8,1%	1,8%	0,0%	8,0%	1,6%
<i>Japan</i>	12,7%	16,9%	11,9%	8,4%		9,9%	1,7%
<i>RoW</i>	13,3%	19,2%	8,3%	6,5%	0,0%	7,8%	0,4%
<i>USA</i>	16,6%	14,5%	15,9%	10,0%	0,0%	4,4%	

Source : Mac Maps