

ECONOMIC EFFECTS OF THE DOHA DEVELOPMENT AGENDA :

A CGE SIMULATION ANALYSIS

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Abstract This paper investigates the economic consequences on EU, US and major trading developing countries/regions of the new round of multilateral trade agenda and evaluates the countries' interests (welfare gains and losses in each scenario, variations in sectorial productions and trade flows). For this purpose, the framework is a general equilibrium model with a multi-region and multi-sector specification, that follows the standard theoretical specifications of trade focused CGE models. The base year is 1997 and most of the data come from the database of the Global Trade Analysis Project (GTAP), version 5.0. Several comparative static analyses are carried out from this benchmark. We use a 11-countries/20-sectors version of our CGE model. Each of the manufacturing industries is assumed to be imperfectly competitive, with a number of firms producing differentiated products, production being subject to increasing returns to scale. Our objective is to examine comparatively the economic implications of three kind of proposal (EU, US, and China proposals) which deals with formula approaches and consequently to provide a comprehensive analysis of the challenges and opportunities offered by the round of multilateral negotiations at Doha.

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1. INTRODUCTION

After the debacle of the Third WTO Ministerial Conference at Seattle, the conference at Doha has led to a new round of multilateral trade negotiations. The so-called *Doha development agenda* was dominated by a desire of consensus, trust and openness and improving market access for agricultural and non agricultural goods constitute the core of progress in the new round. Nevertheless, “*Although average levels of protection are now relatively low, their dispersion and the presence of tariff peaks still create strong distortions*⁴”.

That’s why, the market access for agricultural and industrial goods will always focus on general reductions in tariffs and the eliminations of tariff peaks. Most of the large tariff reductions achieved in multilateral trade negotiations have involved tariff-cutting formulas such as the Swiss formula. Moreover, the increase in the numbers of WTO members increases the interest showing in formula approaches, but the wider dispersion of initial tariffs create a need for a more flexible way (Francois & Martin,1998).

Our objective is to evaluate comparatively the economic implications of three kind of proposal which deals with formula approaches and consequently to provide a comprehensive analysis of the challenges and opportunities offered by the round of multilateral negotiations at Doha. This paper examines what proposals have been made for further reform and focuses on three sets of actors in the multilateral trading system: the United States, the European Union and developing countries which integer China, new official member of the WTO. Developing countries have long been part of the world trading system, and are naturally interested in expanding their markets.

In this context, we will investigate the economic consequences on EU, US and major trading developing countries/regions of the new round of multilateral trade agenda and evaluate the countries interests (welfare gains and losses in each scenario, variation in sectorial productions and trade flows). To this end, our framework is a general equilibrium model with a multi-region and multi-sector specification, that follows the standard theoretical specifications of trade focused CGE models. The base year is 1997 and most of the data come from the database of the Global Trade Analysis Project (GTAP), version 5.0. Several comparative static analyses are carried out from this benchmark. We use a 11-countries/20-sectors version of our CGE model. We analyse the liberalization of trade in industrial sectors, which is yet to be decided pending

⁴ Fontagné L, Guérin J.L. et Jean S., 2002, « Market Access : The Objectives after Doha », La Lettre du CEPII.

agreement among the WTO members on the Doha agenda and in agricultural sectors which is one of the most important issues in Doha (reduction barriers by 35%). Indeed, we applied various formulas proposed by the WTO members. These “harmonizing” formulas may reduce the dispersion of the tariff profile in eliminating or/and reducing three categories of tariffs : nuisance tariffs, moderate tariffs and tariffs peaks. Consequently, we study three potential future scenarios for the reduction/elimination of the *ad valorem* duties limiting market access for non agricultural products:

- the first one assumes **US proposal** (it consists to eliminate lows tariffs of 5% or less, eliminate tariffs in highly-traded goods and harmonize remaining tariffs to less than 8%),
- the second one studies **EU proposal** (it proposes to reduce all tariffs by compressing them into a flatter range and eliminate tariff peaks and high tariffs) ,
- the last one presents **China proposal** (it proposes to adopt a uniform formula for tariff reduction which is a variant of the Swiss formula with a Member specific coefficient).

Moreover, each scenario assumes a uniform 35% reduction on the initial level of protection for agricultural products.

The paper proceeds as follows. Section 2 describes the basic structure of our multiregional computable general equilibrium model. Section 3 contains the empirical implementation, including the description of the benchmark data set and the calibration of the model. Section 4 presents the scenarios. Section 5 offers results and some concluding remarks.

2. THE STRUCTURE OF THE CGE MODEL

Our framework is a **general equilibrium model with a multi-region and multi-sector specification** that follows the standard theoretical specifications of trade focused CGE models⁵. Let us shortly describe the model.

2.1. The supply side

The model includes four factors of production: unskilled labour, skilled labour, capital and natural resources. Labour and capital are completely mobile across sectors, but immobile internationally. Natural resources are sector-specific and are only used in agriculture and mining activities.

At the first level, intermediate goods and value added are assumed to be perfectly complementary, as reflected by the use a Leontieff function. At the second level, value-added is

⁵ This CGE model has been developed in the CATT by Antoine Bouët, Estelle Dhont-Peltrault, Sophie Tarascou and Anne Yapaudjian-Thibaut. David Laborde has constituted all the social accounting matrices.

obtained by combining specific factor and the aggregate of skilled labour and capital and unskilled labour. The combination of production factors is represented in three stages with Constant Elasticity of Substitution (CES) functions, which allow characterizing the degree of substitution between factors. A first CES function gathers unskilled labour and the aggregate of skilled labour and capital; the latter aggregate being represented though a same function with a lower elasticity of substitution. It aims at reflecting the relative complementarity between capital and skilled labour.

Composite intermediate inputs are a fixed share of total intermediate consumption. Each sector uses intermediate inputs which come from domestic and foreign sources according to a CES function. As with primary factors, demands for intermediate products are the result of profit maximization and reflect substitution possibilities between domestic and imported intermediates. A Constant Elasticity of Transformation function reflects substitution possibilities in sales between domestic and export markets. Exports are differentiated according to their destination. Two nested constant elasticity of transformation functions allow us to capture the imperfect substitution between the different components of the representative firm's supply in each sector. Chamberlin's monopolistic competition is assumed for manufacturing sectors characterized by increasing return to scale. Firms adopt a mark-up pricing behaviour and their perceived price elasticity is equal to the elasticity of substitution between domestic varieties in the industry.

2.2.The demand side

There is a single private household in each country that saves a constant proportion of disposable income and buys consumption goods. The household in each country owns capital, labour and all natural resources such that it receives all factor remunerations.

In each country, the preferences of the representative household are supposed to be homothetic and the representative consumer behaviour is modelled in four stages. The first level describes the distribution of demand between the composite agricultural good and all final industrial commodities and service sectors. Referring to Armington (1969), domestic and foreign goods are distinguished by their origin. The second and the third level highlight the choice between products from different geographical origins through CES functions.

The last level of this nesting is a Dixit-Stiglitz formulation for products coming from only one country. Indeed, the consumer chooses between horizontally-differentiated varieties of each good with a constant elasticity of substitution.

2.2. Equilibrium of the model and Closure.

Once the model has been specified, an equilibrium solution can be computed. It is given by a set of goods and factor prices for which all markets clear.

Hence, the general equilibrium is reached if the following conditions are satisfied:

- Equilibrium in the domestic good's market in every country.
- Equilibrium in factor markets in every country.
- Equilibrium between import demand and export supply in the bilateral trade of each good.
- Equilibrium of the world current account.

The model's numeraire is the domestic price of services in the Rest Of World.

3. DATA, CALIBRATION AND NUMERICAL RESOLUTION.

a. Benchmark Data set

The framework of analysis is a general equilibrium model with a multi-region and multi-sector specification, that follows the standard theoretical specifications of trade focused CGE models. The base year is 1997 and most of the data come from the database of the Global Trade Analysis Project (GTAP), version 5.0. Several comparative static analyses are carried out from this benchmark.

There are 11 regions (EU, US, others industrialized countries, first generation of new industrialized countries, second generation of new industrialized countries, China, Eastern European Countries, Asia Central, North Africa, South of America, Rest of World).

Regions are linked through trade. Each country is endowed with four primary factors of production: skilled labor, unskilled labor, capital, land and natural resources. 20 sectors are integrated: 7 agricultural, 6 light manufactures, 6 heavy manufactures and 1 services. Each of the manufacturing industries is assumed to be imperfectly competitive, with a number of firms producing differentiated products, production being subject to increasing returns to scale.

b. Elasticities

The key elasticities in our model are the skilled-unskilled substitution elasticity, as well as the elasticity of substitution between capital and the aggregate labour input. The degree of substitutability between skilled and unskilled labour determines the change in relative wage induced by a policy change. We are using elasticities of factor substitution based on those used by Hamermesh (1993) and Cortes and Jean (1996). Because of the lack of detailed regional data our

elasticities are identical across regions. Therefore, we set the elasticity of substitution between unskilled labour and the aggregate skilled-capital using previously quoted sources.

On the demand side of the model, the most important one are the elasticities controlling substitution between imports coming from different partners and summing up in a composite, and those controlling substitution between domestic goods and aggregate imports. They are derived from the GTAP database.

Using these data and other behaviour parameters found in the literature, we calibrated the others parameters in order to replicating the base data. The calibration process and the numerical resolution of the model follow classic procedures used in most static CGE models. Then, we solve the model numerically with the software GAMS (General Algebraic Modelling Systems) and the solver Conopt3.

4. AN OVERVIEW OF PROPOSALS SUBMITTED.

We simulate several scenarios of multilateral trade liberalization. In this way, we adopt a formula and sectorial approach.

Scenario 1 examines US proposal. The United States proposes that WTO members agree to eliminate all tariffs on all non agricultural products by 2015. As a first step of negotiations, the U.S. proposal eliminates lows tariffs of 5% or less, eliminates tariffs in highly-traded goods and harmonizes remaining tariffs to less than 8%. So for all other tariffs above 5%, we applied a harmonizing Swiss Formula with a coefficient of eight.

$$\text{The formula : } T_1 = \frac{T_0 * 8}{T_0 + 8}$$

With T_1 represents the new tariff

T_0 represents the current tariff

The impact of the Swiss formula is to widen the gap between the initial and final tariff rate as the initial tariff rate increases indicating that the cuts are greatest for the higher tariff rate.

Scenario 2 simulates EU proposal.

The EU proposes that WTO members reduce all tariffs by compressing them into a flatter range and eliminate tariff peaks and high tariffs that impede developing and least developed countries from reaping the benefits of such a liberalisation. Hence, the compression mechanism will reduce

considerably tariff rates with a lower dispersion. The mechanism must result to a situation in which all Members benefit from tariff cuts across non agricultural products. It considers two lower and upper limits in base bracket (B_0^L / B_0^U) and two lower and upper limits in the new bracket (B_1^L / B_1^U) :

$$T_1 = B_1^L + (T_a - B_0^L) * \frac{(B_1^U - B_1^L)}{(B_0^U - B_0^L)}$$

Moreover, Members agree to deeper cuts for textiles, clothing and footwear with a view to bringing these tariffs within a narrow common range as close to zero as possible.

Lastly, **Scenario 3** is designed to measure the impact of China proposal.

China proposes that non agricultural market access negotiations shall be conducted in accordance with the mandate embodied in the Doha Ministerial Declaration with a view to balancing the interests of the WTO Members at different levels of development. It shall safeguard the benefits of developing countries through implementing the principle of “less than full reciprocity”. To achieve this goal, China proposes to adopt a uniform formula for tariff reduction which is a variant of the Swiss formula with a member specific coefficient. So, the formula includes a variable factor based on the simple average of the initial rates, and a peak factor. The properties of such formula are very similar to the Swiss formula: “higher cuts for higher rates”.

$$T_1 = \frac{(A + B * P) * T_0}{(A + P^2) + T_a}$$

T_1 represents the new tariff

T_0 represents the current tariff

A simple average of base rates

P Peak factor, $P = T_0/A$

B Adjusting coefficient . For the year 2010, $B=3$.

The formula reflects the characteristics of harmonization and non linear reduction. Through the function of peak factor P, tariffs peaks could be effectively reduced. Through the function of adjusting coefficient B, the final reduction levels appears by far the most sizeable (see table 1).

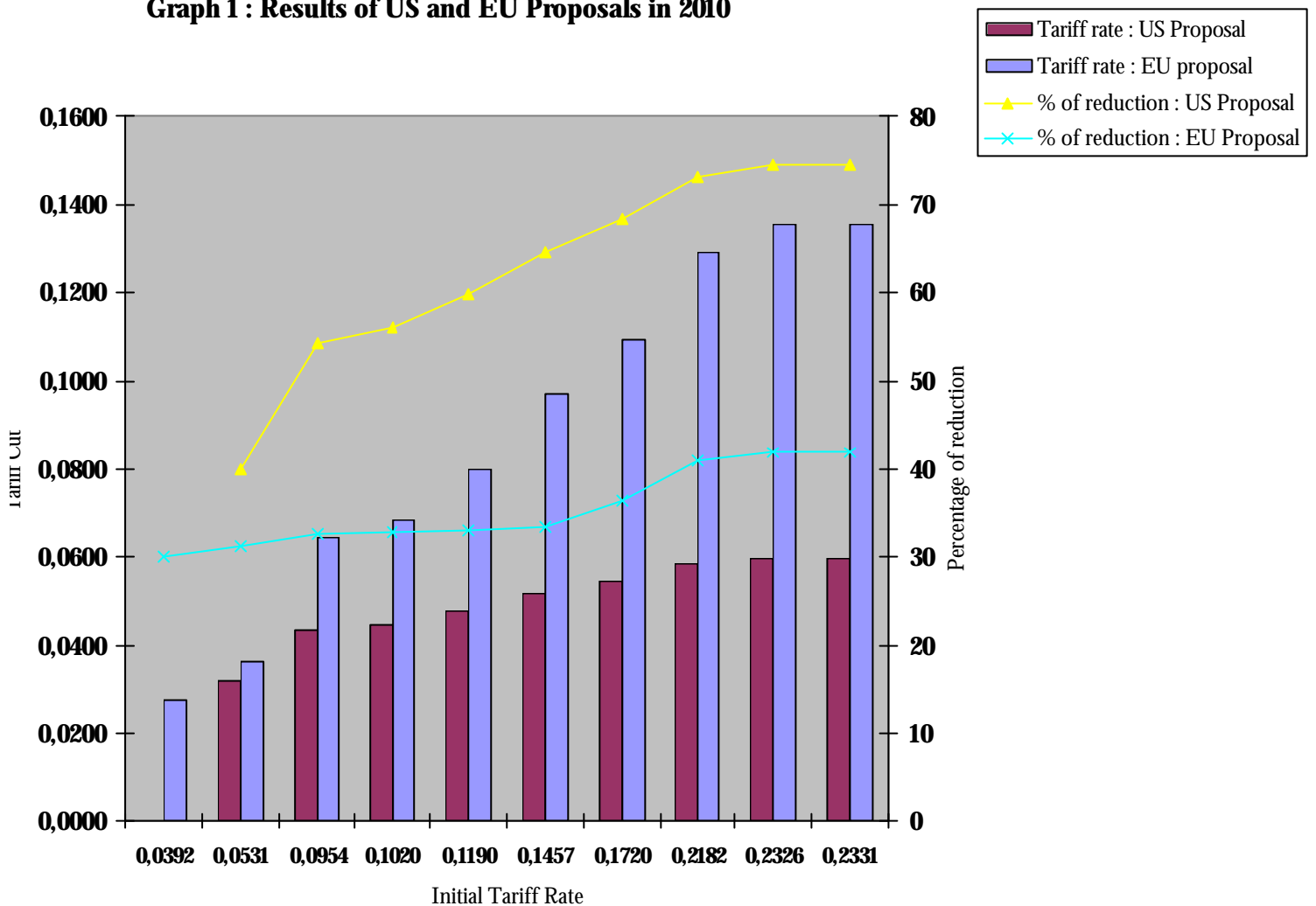
Moreover, each scenario assumes a uniform 35% reduction on the initial level of protection for agricultural products.

Table 1 :Tarif Rate after EU, US and China Proposals.

Initial Tariff Rate	Tariff Rate after Compression	Percentage of reduction : EU Proposal	Tariff Rate after Correction	Percentage of reduction : US Proposal	Tariff Rate after China proposal	Percentage of reduction : China Proposal
0,0392	0,0000	30	0,0275	100	0,0012	97
0,0531	0,0319	31	0,0365	40	0,0017	97
0,0954	0,0435	33	0,0642	54	0,0010	99
0,1020	0,0448	33	0,0685	56	0,0028	97
0,1457	0,0516	33	0,0971	65	0,0034	98
0,1720	0,0546	36	0,1094	68	0,0035	98
0,2182	0,0585	41	0,1292	73	0,0053	98
0,2326	0,0595	42	0,1353	74	0,0056	98
0,2331	0,0596	42	0,1356	74	0,0049	98

Graph shows effects of the “Tariff Equalizer” Formula and compression mechanism. The first one appears more drastic. For example, a tariff of 23% is reduced to 13% under EU proposal. Under US proposal, that same 23% initial tariff would decline to 5%.

Graph 1 : Results of US and EU Proposals in 2010



For each scenario, we study macroeconomic and sectorial effects.

	Formula Approach	Sectoral Approach <i>“The Zero for Zero initiative”</i>
<ul style="list-style-type: none"> US Proposal 	<ul style="list-style-type: none"> -For all tariffs above 5% harmonizing Swiss Formula with a coefficient of eight. -Elimination of nuisance tariffs on all products with tariffs below 5% 	<ul style="list-style-type: none"> - Elimination tariffs Fishing Wood, paper products Chemical Metal products Transport equipment Electronic equipment Machinery and equipment
<ul style="list-style-type: none"> EU Proposal 	<ul style="list-style-type: none"> - Compression Mechanism -Elimination of nuisance tariffs on all products with tariffs below 1,25% 	<ul style="list-style-type: none"> Textiles Wearing apparel
<ul style="list-style-type: none"> China Proposal 	<ul style="list-style-type: none"> - Uniform formula for tariff reduction - Principle of less than full reciprocity 	

6. POLICY SIMULATIONS AND MAIN MACRO-ECONOMIC RESULTS.

Scenario 1: Agricultural liberalization is modelled as a 35% reduction in agricultural import tariffs and we apply US Proposal for non agricultural sectors.

Table 2 : Main Macroeconomic Results

In %	EU	US	RICH	NIC1	NIC2	CHIN	CEECs	ASIA	MEDI	LACs	ROW
GDP	-0.2	-0.3	1.8	0.6	-0.8	-0.5	-0.8	-0.9	1.1	0.4	2.7
Total Exports	44.1	38.4	-38.1	2.5	-3.6	6.1	-0.5	22.6	18.9	-15.9	-33
Total Imports	-17.2	-19.9	55	6	13	17.3	15.5	4.8	-2.5	35.2	67.3
Real remunerations											
Unskilled Labour	1.4	0.03	2.1	2.3	2.4	2	2.6	1.36	0.2	1.18	4.2
Skilled Labour	-0.67	-0.8	3.9	1.95	5	3.2	5.4	-3	-5	6.5	16.5
Capital	-0.8	-0.6	1.9	2.1	2.5	1.9	3.6	1.66	2.8	0.7	3.8
Tariff revenues	-65	-71.8	-13.9	-61.2	-74.6	-74.5	-64.5	-79.4	-60.5	-70.3	-56.8
Total Production	1.35	1.2	-2.5	0.3	-0.5	-0.09	-0.6	0.8	-0.13	-1.1	-1.5

Table 2 provides aggregate results from the multilateral scenarios as mentioned above for the 11 countries/regions that have been modelled. The results reported include percentage changes in imports, exports, real wage rate, production and tariff revenues. Disaggregated sectorial results are presented in Appendix.

The US Proposal raises gross domestic output in Japan (1.8%), in North Africa (1,1%), in First generation of new industrialized countries (0,6%), in Latin America and the Caribbean (0,4%): Opening an economy to international trade implies an expansion of activity in some sectors while production is reduced in others. Along these production effects, economic efficiency could be increased, especially in the case of multilateral liberalization: industries and consumers are able to buy cheaper (intermediate) commodities, in such a way that real income is increased.

Nevertheless, GDP slightly decreases in EU, US, China, CEECs, Asia (respectively -0.2%, -0.3%, -0,5%, -0,8%, -0,9%) because of the higher reduction in their tariff revenues induced by the US proposal. Tariff revenue losses are very strong (-65%, -72%, -74,5 % and -79,4% respectively for EU, US China and Asia).

For EU, US and Asia, the proposal generates a great impact on export performance. Indeed, global exports increase by 44.1% for EU, 38,4% for US, 22,6% for Asia and 18,9% for Mediterranean countries while exports decreases by 23,8% in the others industrialised countries and by 15,5 % in ROW.

Removal of agricultural and manufacturing trade protection by all countries and the subsequent rise in world prices increases net global GDP. The net gains come from increases in income as countries reallocate their resources to the production in which they have a comparative advantage. Consequently, the US proposal has a positive effect on production where each area has its comparative advantage (see table A1 in appendix): it is essentially heavy manufactures sectors in developed countries : EU's production in the transports equipment sector is increased by 33.5 and US's production of electronic equipment increases by 24,2%, by 23.6% of metal product. For Asia, it is the case of textiles (12.3%), wearing apparel (27,8%) and leather products (+52%). On the other side, production is reduced in sectors where a zone has a trade disadvantage. In Europe and US, production is reduced, especially services (-2.94%). In Asia, the most affected sectors are motor vehicles and parts (-25%) and transport equipment (-21%).

The effects on the real wages are substantial in each region: increases between 2 % and 4% for unskilled labour, increases for skilled labour except in Asia and LAC (-5% and -3% respectively) reflecting a Stolper Samuelson effect - in favour of the abundant factor in those developing countries (Unskilled labour).

Table 3 illustrates the geographical breakdown of variation in trade flows after US proposal.

Geographical breakdown of variations in trade flows (exporting countries in rows, importing ones in columns).

IN %	EU15	US	RICH	NIC1	NIC2	CHIN	CEECs	ASIA	MEDI	LACs	ROW
EU15		14.2	93.8	48.5	59.6	70.8	35.4	35.2	18	79	145.9
US	4.8		92	47.5	54.6	65	35	28.4	10.15	53.7	124
RICH	-30.8	-36.4		-15.7	-3.75	-2.5	-9.94	-25.8	-32.5	-0.8	28
NIC1	-17	-8.8	54.8		26.1	38.5	9.5	30.5	-12	49.1	83
NIC2	-13.8	-7.6	50.6	7.15		33.4	9.3	21.9	-8	35.1	78
CHINA	-7.5	-1.4	61	20.3	36.9		17	28.5	-4.1	55.9	111
CECC	-4.5	-2.9	73.4	19.4	26.7	32.6		7.8	-4.5	34.5	70.3
ASIA	14.2	22.6	57.7	30.8	44.8	39.5	27.4		10.2	64	111
MEDI	22.3	10	39.4	29.8	23.8	53	34	72.5		40.8	86
LAC	-8.8	-12	35.2	8.3	13.15	12.8	5	-2.6	-3.7		59.2
ROW	-25	-16.6	6.2	-19.3	-15	-11	-14.9	-23.2	-31.1	-3.8	

EU expands its exports to each market. The stronger increases are exports to ROW (145%), Japan (93,8%), China (70,8%) and Latin American countries (79%).

In a similar way, US increases its exports to the ROW (124%), Japan (93,8%) and China (65%). For Asia, exports are especially rise to ROW (+111%), LAC (64%), Japan (57,7%), NIC2 (44,8%), China (39,5%) because of their geographical proximity.

The increase of LAC's exports to industrialized countries is quite substantial (+22,3%) to EU, (39,4%) to Japan, and (+72,5%) and to developing countries : Asia .

In a similar way, Mediterranean countries increase their total exports by 18.9%. More precisely, their bilateral exports reveal an increase to each area, particularly to rich countries by 39.4% , by 53 % to China and 72.5% to Asia.

According to imports, some sectors are not competitive enough to benefit from improving foreign market access. This is the case of Metal products, Motor vehicles and parts and transport equipment in developing Asia, Latin American Countries and Mediterranean countries (see percentage changes in production). In developed countries, except for the Aggregate "rich countries", sectors are not affected by the foreign competition.

Finally, the gains are largest by far in developed countries.

By virtue of their wealth, the United States and the EU expand their markets to each area. The simulations show beneficial effects on trade, production and GDP in the industrialized countries. There will gains for some developing countries. For many developing countries US proposal may be detrimental. China, NIC2, CEECs reduce their total production (-0.09%, -0.5%, -0,6% respectively).

The Developing countries with the largest gain are NIC1, developing Asia and Mediterranean countries which appear major winners of such proposal. Improving access markets for the exporting sectors (Leather products, textile and wearing apparel) are the key parameter for their own benefits.

Scenario 2: Agricultural liberalization is modelled as a 35% reduction in agricultural import tariffs and we apply EU Proposal for non agricultural sectors.

Table 4 : Main Macroeconomic Results

In %	EU	US	RICH	NIC1	NIC2	CHIN	CEECs	ASIA	MEDI	LACs	ROW
GDP	.	-0.2	-0.16	1.3	-0.08	-0.2	-0.3	-0.2	1.3	-0.2	-0.24
Total Exports	9.15	-5.3	6.4	-7.6	5.8	18.9	8.4	16.8	-11.5	14.6	9.3
Total Imports	-1.2	9.15	1.2	8.7	1.75	1.35	0.8	4	26.8	-5.2	-0.9
Real remunerations											
Unskilled Labour	0.4	0.2	0.35	1.9	1.6	1.2	1.7	1.1	3.1	0.08	0.2
Skilled Labour	0.2	0.5	0.5	4	-0.1	-2.3	0.2	-1.7	11.2	-2.4	-1
Capital	0.05	0.5	0.4	1.6	1.4	0.9	1	1	2.2	0.4	0.5
Tariff revenues	-44	-52.4	-37.3	-27	-36.5	-44.3	-41.3	-43.5	-18	-43.9	-43.6
Total Production	0.2	-0.3	0.3	-1.1	0.5	0.53	0.2	0.9	-0.56	0.4	0.06

The European Proposal is negative for the most of 11 areas studied, between -0.2 and 0.3 % for US, others industrialised countries, China, CEECs, Asia, Latin America, and positive for first generation of new industrialized and Mediterranean countries (an increase of 1.3 % for the both). Variation in national income due to the application of the EU proposal is not significantly different from 0 for European Union.

From a global point of view, exports (in volume) increase except for three areas: US exports decrease by 5.3 %, first generation of new industrialized by 7.6 %, and Mediterranean countries by 11.5 %. European Union and rest of world's exports rise by 9 %, China by 19 %, Asia by 17 % and LAC by 14.6 %.

The effects on the real wages are substantial in all countries: in particular for first generation of new industrialized (+ 2% for unskilled labour, +4 % for skilled labour and +1.6 % for capital). The variations for China and Asia are similar: + 1 % for unskilled, - 2 % for skilled and +1 % for capital traducing a Stolper Samuelson effect in favour of unskilled workers.

The stronger variations are for Mediterranean countries (+3 % for unskilled labour, +11 % for skilled labour, 2.2 % for capital). For EU and US, the increase for all factors are by less 0.5 %.

Tariff revenues decrease between 30 and 50 % in most of countries, the decrease is smaller in the case of Mediterranean countries and first generation of new industrialized respectively 18 % and 27 %, this can explain in part of the positive result on GDP.

Table 5 illustrates the geographical breakdown of variation in trade flows after the application of the proposal. The European Union expands its exports to the US market by 6 %, to NIC1 by 11%, to Mediterranean countries by 31.5 %, and decrease by 2.4 % to LAC and by 2 % to ROW. Total US's exports decrease in most of countries except for first generation of new industrialized countries (+ 2.2 %) and Mediterranean countries (+20%).

First generation of new industrialized countries decrease its exports to all areas except for Mediterranean countries (+12.5 %).

For Mediterranean countries, exports decrease to all countries between 10 and 15 % except for Asia (+ 4.3 %). Its imports from all others countries increase strongly (from EU by 31.5 %, 36.6 % by China, between 20 and 25 % for others.

China's exports rise to all partners, the stronger increase are for Asia (+23.1 %) and Mediterranean countries (36.6 %).

Asia and LACs are both net exporters. As regards Table 5, the Asia's and LACs' exports rise to each area according to the effects induced in their production variation (+0.9% for Asia and 0.4% for LAC).

Table 5 :Geographical breakdown of variations in trade flows (exporting countries in rows, importing ones in columns).

IN %	EU15	US	RICH	NIC1	NIC2	CHIN	CEECs	ASIA	MEDI	LACs	ROW
EU15		5.9	1.4	11	2.5	0.3	-2	1.1	31.5	-2.4	-1.96
US	-9.8		-7.5	2.2	-5.5	-6.9	-9.3	-8	20	-13.6	-10.1
RICH	-2.9	6.3		8.3	5.3	3.8	-3.9	0.85	27	-3.4	-3.8
NIC1	-13.1	-4.4	-9.7		-8.3	-2.1	-13.4	-2.7	12.5	-12.3	-13.5
NIC2	-3	8.2	0.2	4.1		4.5	-2.7	7	23.4	-4.5	-2.8
CHINA	6.4	13	14.4	13	14		18.5	23.1	36.6	11.8	16
CECC	3.4	7.2	6.1	9	0.9	-0.75		0.19	24.5	-4.3	-4
ASIA	11.9	22.3	6.6	7.2	8.7	5.2	3.7		24.3	6.4	14.3
MEDI	-11.3	-9.75	-9.7	-8.8	-8.7	-9.2	-13	4.3		-15.9	-15.5
LAC	4.3	11	7.7	14.5	7.4	8	3	5	28.7		3.5
ROW	3.3	6.2	6.8	7.9	5.3	3.9	0.1	5	18.3	-1.6	

The EU proposal has a positive impact on production where the country has a comparative advantage (see table A2 in annex). The production of developing countries in textiles, wearing apparel and leather products sectors increase to the detriment of sectors in heavy manufactures. For first generation of new industrialized, their production rise in the sector textiles (+ 12 %) and for the second generation of new industrialized in wearing apparel (+18.5%), in textiles (+7 %). China increases its domestic production (in textiles (+9.5 %), in wearing apparel (+25.5 %) and in

leather products (+22 %), in electronic equipment (+12 %) and decreases by 11 % for motor vehicles and parts. Production of Asia increases by 14 % in textiles, 52 % in wearing apparel and 23 % in leather products to the detriment of motor vehicles and parts (13.8 %) and 10.5 % for transport equipment nec. The CEECs specialize in wearing apparel (25 %) and textiles (+7 %). Conversely, developed countries that have a comparative disadvantage in sectors textiles, wearing apparel, particularly the US (- 14% in wearing apparel, -27 % in leather) and others industrialised countries (-10.3 % in two sectors) and Mediterranean countries where textiles' production decrease by 19 %, wearing apparel 's 9.3% and 11.4 % for leather, 13 % in metallurgical industry. In US, the positive impact on the domestic production is in agricultural sectors notably silviculture (+ 11%) and fishing (+13 %). For others industrialised countries, these are the cereals (+11 %) and motor vehicles and parts (+ 9 %) sectors.

Tariff revenues decrease in the both cases on account of the liberalization of trade, but the variation is lots of higher with the US proposal than with EU proposal. The effects of EU proposal on National Income are less important than with the other proposal, because the decrease of tariff revenues is slighter. The application of EU proposal is to the detriment of the US where its production decreases by 0.3 %, leading to a negative effect on its exports and an increase of its imports (+9%). The others industrialised countries are beneficiary of liberalisation of trade due to the application of this proposal. Mediterranean countries are net importers, the exports' decrease is substantial (-11.5%) and its imports increase by 27 %.

Scenario 3: Agricultural liberalization is modelled as a 35% reduction in agricultural import tariffs and we apply China Proposal for non agricultural sectors.

In %	EU	US	RICH	NIC1	NIC2	CHIN	CEECs	ASIA	MEDI	LACs	ROW
GDP	-0.15	0.06	0.9	3.13	0.74	0.63	1.26	-1.5	1.2	0.55	0.7
Total Exports	66.6	-1.15	-10	-18.7	-13.4	-21	-4	69	32.3	-22.8	-11.2
Total Imports	-26.3	6.9	24.2	25.1	29.5	48.4	20.9	-1.07	-13.7	48.4	33
Real remunerations											
Unskilled Labour	2.23	0.25	1.3	4.2	3.8	3.1	3.1	0.08	-0.37	1.78	2.2
Skilled Labour	-0.8	0.28	2.2	9.3	13.5	14.5	8.4	-17	-10.6	9	8
Capital	-1.2	0.33	1.12	3.8	4.5	3.5	4.87	0.68	3	0.94	2.26
Tariff revenues	-79.8	-83.6	-43.8	-64.4	-83.2	-82.7	-81	-90.7	-74.3	-84.1	-83
Total Production	2	0.05	-0.67	-2.6	-1.6	-1.47	-1.14	4	0.3	-1.36	-0.87

The China Proposal has a positive effect on the national income of all countries except for European Union and Asia, their GDP decrease respectively by 0.15 % and 1.5 %. This can be correlated with the variations of tariffs revenues. In effect, tariff revenues decrease strongly, in particular a decrease by 91 % for Asia, by 80 % for EU.

For EU, Asia and Mediterranean countries, the proposal generates a great impact on export performance. Indeed, global exports increase by 66.5 % for EU, 69 % for Asia, and 32.3 % for Mediterranean countries while exports decrease by 21 % in China and India and by 22.8 % in LAC.

The effects on the real wages are substantial in each region: increases for unskilled labour (between 0.5 and 4 %) and skilled labour (almost 9 % for NPI1, CEECs, LACs and ROW, 13.5 % for NPI2, 14.5 % for China). In the case of Mediterranean countries, real wage decrease by 0.4 % for unskilled labour and by 10.6 % for skilled labour. In Asia, the results are in accordance with Stolper-Samuelson theorem in favour of the abundant factor in this country (+0.08 % for unskilled labour against -17 % for skilled labour).

This scenario of liberalization has a positive effect on EU's production in all sectors except for the sectors of metal products and services: it is essentially sectors textiles (23.4 %), wearing apparel (19.4 %), leather (44.5 %), metal nec(31.3 %) and US's production of transport equipment nec increases by 74.7%.

For US, it is the case in metals products (+1.2 %), motor vehicles (+3.5%) and electronic (+7%). On the other side, production is reduced in sectors where a zone has a trade disadvantage as textiles, wearing apparel, leather products (14 %), other transport nec (12.4%). In the first and second generation of new industrialized, China and CEECs, domestic production is reduced in all sectors except for in the services that increase respectively by 5.4 %, 6.7 %, 9 % and 3.5 %. China's production increases too in the sector of other transport nec by 3.6 %. In Asia, the most affected sectors are motor vehicles and parts (-40.4%) and transport equipment (-37.4%), furthermore others sectors are very beneficiary as textiles (+57.4%), wearing apparel (+96.8 %), leather products (+233 %) and electronic equipment (+68.5 %) where Asia has a strong comparative advantage.

The production of Mediterranean countries decrease by 10.2 % in silviculture, by 34.5 % in beverages and tobacco products, by 32.5 % in motor vehicles, in transport equipment by 37.4%, in services by 14 %. Furthermore, the positive effects are in the sectors textiles (+37 %), wearing apparel (+43 %), metals nec (25 %), electronic equipment (13 %) and manufactures nec (46,4%). The principal disadvantaged of this proposal are the Latin American countries, where its production decreases in all sectors.

IN %	EU15	USA	RICH	NIC1	NIC2	CHIN	CEECs	ASIA	MEDI	LACs	ROW
EU15		44,24	54,44	82,38	85,42	127,6	22,84	0,74	-5,89	112,56	71,56
US	-35,1		5,37	24,02	26,13	46,50	-8,80	-28,04	-36,18	27,19	12,34
RICH	-35,5	-7,65		10,92	29,34	43,04	-17,63	-35,44	-40,29	35,78	1,70
NIC1	-48	-14,1	-9,82		3,99	21,82	-28,57	-17,19	-48,66	22,64	-6,24
NIC2	-39,7	-3,31	-1,95	-2,63		29,57	-17,63	-15,05	-38,21	27,39	0,74
CHINA	-43,9	-13	-4,80	-2,72	12,14		-27,85	-11,87	-44,00	32,45	9,07
CECC	-23,7	10,7	31,84	26,99	23,90	58,03		-20,18	-28,25	42,48	13,12
ASIA	18,5	86,4	45,88	44,08	68,35	75,66	25,40		5,45	139,42	80,05
MEDI	7,84	32,1	18,79	18,76	16,68	81,28	17,92	56,87		54,00	36,89
LAC	-35,5	-16,1	-10,51	-5,22	-3,72	10,29	-23	-31	-32		-5,6
ROW	-25,6E	-3,640	3,57	-2,09	0,02	24,34	-18	-21	-33	20	

EU's exports expands on all markets except for Mediterranean countries (-6 %) ; its exports increase by 44 % to US, 54.4 % to others industrialized countries, almost 80 % to first and second generation of new industrialized., 112.6 % in LAC and 127 % in China. For US, industrialized countries, NIC1 and NIC2 and China, the variations are similar; decreases to EU (between 35 and 48%, NIC1 (US' exports by 24 % and Rich's 11 %), CEECs, Asia, Mediterranean countries (between 36 and 48 %) and increases to China (between 22 and 46 %), LAC and NIC2. For Asia, and Mediterranean countries, its exports increase in all markets: Asia's exports raise of 46 % to others industrialized countries, of 68 % to NIC2, 75.6 % to China 139 % to LAC. For Mediterranean countries the most increase is exports to China (+81.3 %), to Asia (57 %) and to LACs (54 %). The most beneficial of the China proposal are the European Union, Asia and Mediterranean countries.

6. Concluding Remarks

Our objective in this paper has been to examine the potential benefits on EU, US and major trading developing countries/regions of the new round of multilateral trade agenda and evaluate the countries interests (welfare gains and losses in each scenario, variation in sectorial productions and trade flows).

Using to a world computable general equilibrium, we have simulated three scenarios of trade liberalization: US Proposal, EU Proposal and China Proposal combined simultaneously with a uniform 35% reduction on the initial level of protection for agricultural products,

From a global point of view, the US proposal's effects are beneficial in the industrialized countries in particular the United States and the European Union, while EU and China proposals are harmful to the United States -net importer-. According to the comparative advantage in textiles, wearing apparel and leather products, Asia benefits to the improvement of the market access whatever the proposal studied. For Mediterranean countries, because of the european

sectorial approach, the sectors where it had comparative advantage are not competitive any more enough.

Our study focuses only on market protection issues. Doha's negotiations on exports' subsidies and above all, agriculture's internal supports may alter some of our results.

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6. APPENDIX

A1. Sectorial aggregation

CODE GTAP	Libellé	CODE AGREGATION
pdr	Paddy rice	CER
wht	Wheat	CER
gro	Cereal grains nec	CER
v_f	Vegetables, fruit, nuts	AVEGET
osd	Oil seeds	AVEGET
c_b	Sugar cane, sugar beet	AVEGET
pfb	Plant-based fibers	AVEGET
ocr	Crops nec	AVEGET
ctl	Cattle,sheep,goats,horses	ANMX
oap	Animal products nec	ANMX
rmk	Raw milk	ANMX
wol	Wool, silk-worm cocoons	ANMX
for	Forestry	SYLV
fsh	Fishing	PECHE
col	Coal	MIN
oil	Oil	MIN
gas	Gas	MIN
omn	Minerals nec	MIN
cmt	Meat: cattle,sheep,goats,horse	AGRO
omt	Meat products nec	AGRO
vol	Vegetable oils and fats	AGRO
mil	Dairy products	AGRO
pcr	Processed rice	AGRO
sgr	Sugar	AGRO
ofd	Food products nec	AGRO
b_t	Beverages and tobacco products	ALC
tex	Textiles	TEX
wap	Wearing apparel	HAB
lea	Leather products	CUIR
lum	Wood products	BOIS
ppp	Paper products, publishing	BOIS
p_c	Petroleum, coal products	CHIM
crp	Chemical,rubber,plastic prods	CHIM
nmm	Mineral products nec	CHIM
i_s	Ferrous metals	MET
nfm	Metals nec	MET
fmp	Metal products	FMP
mvh	Motor vehicles and parts	MVH
otn	Transport equipment nec	OTN
ele	Electronic equipment	ELE
ome	Machinery and equipment nec	OME
omf	Manufactures nec	OMF
ely	Electricity	SERV
gdt	Gas manufacture, distribution	SERV
wtr	Water	SERV
cns	Construction	SERV
trd	Trade	SERV
otp	Transport nec	SERV

wtp	Sea transport	SERV
atp	Air transport	SERV
cmn	Communication	SERV
ofi	Financial services nec	SERV
isr	Insurance	SERV
obs	Business services nec	SERV
ros	Recreation and other services	SERV
osg	PubAdmin/Defence/Health/Educat	SERV
dwe	Dwellings	SERV

DEFINITION	
CODE AGREGATION	Libellé (optionnel)
CER	Cereals
AVEGET	Others vegetables
ANMX	Animal products
SYLV	Silviculture
PECHE	Fishing
AGRO	Farm-produce industry
ALC	Beverages and tobacco products
TEX	Textiles
HAB	Wearing apparel
CUIR	Leather products
BOIS	Paper products, publishing
CHIM	Chemical
MET	Metallurgical industrie
FMP	Metal products
MVH	Motor vehicles and parts
OTN	Transport equipment nec
ELE	Electronic equipment
OME	Machinery and equipment
OMF	Manufactures nec
SERV	Services
MIN	Mines and Extraction

A2. Geographical aggregation

ASSOCIATION		
CODE GTAP	Libellé	CODE AGREGATION
aus	Australia	RICH
nzl	New Zealand	RICH
chn	China	CHIN
hkg	Hong Kong	NPI1
jpn	Japan	RICH
kor	Korea	NPI1
twn	Taiwan	NPI1
idn	Indonesia	ASIE

mys	Malaysia	NPI2
phl	Philippines	NPI2
sgp	Singapore	NPI1
tha	Thailand	NPI2
vnm	Vietnam	ASIE
bgd	Bangladesh	ASIE
ind	India	CHIN
lka	Sri Lanka	ASIE
xsa	Rest of South Asia	ASIE
can	Canada	RICH
usa	United States	USA
mex	Mexico	ALAT
xcm	Central America, Caribbean	ALAT
col	Colombia	ALAT
per	Peru	ALAT
ven	Venezuela	ALAT
xap	Rest of Andean Pact	ALAT
arg	Argentina	ALAT
bra	Brazil	ALAT
chl	Chile	ALAT
ury	Uruguay	ALAT
xsm	Rest of South America	ALAT
aut	Austria	UE15
bel	Belgium	UE15
dnk	Denmark	UE15
fin	Finland	UE15
fra	France	UE15
deu	Germany	UE15
gbr	United Kingdom	UE15
grc	Greece	UE15
irl	Ireland	UE15
ita	Italy	UE15
lux	Luxembourg	UE15
nld	Netherlands	UE15
prt	Portugal	UE15
esp	Spain	UE15
swe	Sweden	UE15
che	Switzerland	RICH
xef	Rest of Eur Free Trade Area	RICH
alb	Albania	ROW
bgr	Bulgaria	PECO
hrv	Croatia	PECO
cze	Czech Republic	PECO
hun	Hungary	PECO
mlt	Malta	MEDI
pol	Poland	PECO
rom	Romania	PECO
svk	Slovakia	PECO
svn	Slovenia	PECO
est	Estonia	PECO
lva	Latvia	PECO
ltu	Lithuania	PECO

rus	Russian Federation	RICH
xsu	Rest of Former Soviet Union	ROW
cyp	Cyprus	MEDI
tur	Turkey	MEDI
xme	Rest of Middle East	MEDI
mar	Morocco	MEDI
xnf	Rest of North Africa	MEDI
bwa	Botswana	ROW
xsc	Rest of South Afr C Union	ROW
mwi	Malawi	ROW
moz	Mozambique	ROW
tza	Tanzania	ROW
zmb	Zambia	ROW
zwe	Zimbabwe	ROW
xsf	Other Southern Africa	ROW
uga	Uganda	ROW
xss	Rest of Sub-Saharan Africa	ROW
xrw	Rest of World	ROW

DEFINITION	
CODE AGREGATION	Libellé (optionnel)
UE15	European Union (15)
USA	United States
RICH	Others industrialised
NPI1	NPI1
NPI2	NPI2
CHIN	China et India
PECO	CEECs
ASIE	Occidental Asia
MEDI	Mediterranean Countries
ALAT	Latin America
ROW	Rest of world

A3. Increase in production in the three scenarios

Domestic production (variation in percent) : EU proposal

	UE15	USA	RICH	NPI1	CHIN	NPI2
CER	0,18	0,28	-1,67	-6,91	0,96	0,18
AVEGET	0,49	-0,89	-1,58	-2,01	-0,40	0,37
ANMX	0,94	-0,66	-0,64	0,69	-0,22	0,20
SYLV	0,24	-2,18	-0,45	-4,11	-0,60	-1,10
PECHE	-0,24	-2,23	-0,58	-2,50	-0,49	-0,02
AGRO	0,97	-0,38	-0,62	2,80	2,29	1,90
ALC	3,01	0,20	-1,31	-3,40	-2,11	-1,06
TEX	1,37	-8,14	-2,28	11,71	9,37	6,87
HAB	-4,67	-13,93	-10,38	4,85	25,49	18,39
CUIR	-1,15	-26,95	-10,35	-16,10	22,02	-1,73
BOIS	0,67	-0,35	0,34	-3,67	1,04	0,95
CHIM	1,65	-1,77	0,99	-3,81	0,98	-0,41
MET	2,26	-4,84	2,82	-14,30	-0,59	-1,66
FMP	0,10	-1,35	0,79	-3,42	1,56	-1,90
MVH	0,53	-2,88	9,07	-2,17	-11,09	-13,04
OTN	9,57	-2,33	2,73	-12,42	-3,60	7,91
ELE	0,94	-3,57	2,29	-9,54	11,88	5,46
OME	2,37	-1,49	2,59	-7,11	-2,07	4,32
OMF	0,69	-4,54	0,11	-3,83	3,83	1,09
SERV	-0,46	0,55	-0,46	2,36	-3,19	-1,39
MIN	3,29	-2,12	1,57	-5,74	1,40	1,47

	PECO	ASIE	MEDI	ALAT	ROW
CER	-0,61	0,12	-7,50	1,78	0,34
AVEGET	-0,82	0,30	-6,66	2,06	1,33
ANMX	-0,47	-0,09	-4,20	1,01	0,28
SYLV	0,18	0,52	3,12	0,74	0,85
PECHE	0,10	-0,17	-2,09	0,60	0,16
AGRO	0,21	0,52	-4,19	1,92	1,22
ALC	-2,15	-4,30	-2,08	0,18	-1,05
TEX	7,76	14,10	-18,71	1,13	-0,36
HAB	25,06	51,69	-9,30	2,42	10,08
CUIR	0,38	23,33	-11,39	0,51	-7,23
BOIS	1,25	3,14	-1,82	1,09	-0,05
CHIM	1,06	0,51	-4,72	1,44	0,36
MET	1,45	-2,99	-12,96	5,06	7,97
FMP	-1,02	-4,27	0,70	0,20	-2,59
MVH	1,73	-13,75	-3,31	1,59	-7,61
OTN	0,03	-10,47	-4,87	1,19	3,69
ELE	1,74	5,01	1,46	8,67	-3,97
OME	-0,29	-1,18	2,24	2,76	-3,22
OMF	-1,36	-1,01	-14,49	0,66	1,35
SERV	-1,04	-2,10	4,32	-1,52	-0,70
MIN	2,18	1,80	-6,86	4,33	3,78

Domestic production (variation in percent): US proposal

	UE15	USA	RICH	NPI1	NPI2	CHIN
CER	2,19	4,90	11,00	-5,11	0,26	-0,30
AVEGET	5,70	8,13	-6,57	-1,60	-0,96	-0,67
ANMX	5,85	5,25	-6,69	1,89	0,19	-0,50
SYLV	6,55	10,77	-10,18	-0,41	2,02	-0,15
PECHE	1,25	12,95	-4,77	-0,18	-0,74	-0,19
AGRO	5,75	4,46	-6,78	4,58	0,77	0,38
ALC	15,13	6,89	-7,30	-6,19	-4,25	-4,50
TEX	13,41	9,38	-19,57	11,80	-4,11	0,72
HAB	12,78	10,83	-21,00	0,91	-0,14	12,91
CUIR	26,10	19,41	-47,80	-6,23	-12,73	4,22
BOIS	5,31	2,33	-10,17	-0,36	-0,67	-2,51
CHIM	9,68	7,05	-14,62	2,21	-3,45	-2,35
MET	22,37	23,59	-25,85	6,29	3,78	-0,83
FMP	-0,27	8,28	-8,30	1,42	-7,09	-0,30
MVH	7,92	15,90	-32,37	10,09	-1,32	-4,38
OTN	33,53	12,75	-28,81	2,73	47,23	-0,32
ELE	1,67	24,26	-10,14	-5,89	-6,71	2,84
OME	7,06	9,47	-18,74	-0,37	-1,35	-1,70
OMF	5,92	15,98	-7,11	1,13	-2,31	-3,58
SERV	-2,94	-2,63	5,27	-0,47	2,12	0,93
MIN	15,90	11,79	-12,60	-2,97	-1,16	-1,34

	PECO	ASIE	MEDI	ALAT	ROW
CER	-0,64	1,32	0,68	-1,50	-4,62
AVEGET	-1,00	0,81	1,75	-2,08	-8,85
ANMX	-0,34	0,28	1,37	-0,58	-2,98
SYLV	-1,97	5,05	-5,68	-1,79	-11,19
PECHE	0,27	0,80	0,46	-0,29	-1,69
AGRO	0,48	1,68	0,71	-0,81	-4,68
ALC	-3,54	-6,47	-35,96	-1,48	-7,44
TEX	-10,44	12,35	14,14	-8,94	-23,67
HAB	-9,49	27,85	18,73	-11,12	-38,05
CUIR	-25,12	52,10	-1,23	-11,10	-56,11
BOIS	-3,64	14,45	-3,30	-3,10	-8,81
CHIM	-4,51	-1,32	4,01	-5,06	-12,65
MET	-2,37	3,44	15,73	-9,75	-37,32
FMP	-3,53	-8,86	-5,09	-3,23	3,10
MVH	0,40	-25,93	-12,06	-9,14	2,81
OTN	1,39	-20,85	-29,68	-6,79	-40,85
ELE	-1,06	12,90	2,83	-10,86	17,27
OME	-5,45	4,47	-13,90	-11,38	9,03
OMF	0,97	0,02	15,80	-5,72	-17,04
SERV	1,97	-3,03	-3,01	3,41	6,97
MIN	4,96	4,43	9,96	-3,32	-15,75

Domestic production (variation in percent): China proposal

	UE15	USA	RICH	NPI1	NPI2	CHIN
CER	2,86	1,35	3,69	-8,22	-3,25	-1,75
AVEGET	7,71	1,58	-3,45	-2,88	-2,41	-2,72
ANMX	7,57	0,79	-3,33	-0,74	-0,09	-1,45
SYLV	8,08	0,46	-4,14	-4,80	-9,43	-0,86
PECHE	1,62	1,57	-2,06	-3,22	-2,08	-1,29
AGRO	7,24	0,78	-3,27	1,39	-3,97	-4,55
ALC	22,23	2,26	-6,56	-13,43	-7,15	-6,48
TEX	23,43	-2,42	-7,52	-2,20	-8,85	-16,21
HAB	19,36	-3,32	-12,28	-5,50	-1,33	-9,69
CUIR	44,46	-14,10	-35,30	-23,61	-21,01	-28,62
BOIS	6,80	0,55	-4,65	-8,09	-9,72	-6,68
CHIM	14,47	-1,37	-6,22	-8,62	-7,80	-6,09
MET	31,33	-0,12	-7,30	-22,49	-15,95	-12,44
FMP	-1,56	1,20	-2,60	-5,68	-6,43	-4,04
MVH	9,96	3,51	-5,57	-4,89	-6,87	-5,27
OTN	74,71	-12,42	-6,10	-22,87	-7,66	3,65
ELE	5,93	7,00	2,08	-20,08	-10,33	-13,73
OME	10,26	0,49	-3,56	-9,89	-12,96	-0,10
OMF	10,36	-0,47	-4,36	-7,82	-3,62	-13,12
SERV	-4,43	-0,05	1,61	5,40	6,75	9,13
MIN	18,44	-0,60	-5,53	-22,26	-11,14	-11,33

	PECO	ASIE	MEDI	ALAT	ROW
CER	-1,37	3,36	3,38	-3,24	-2,39
AVEGET	-1,87	3,66	5,54	-3,60	-3,76
ANMX	-0,71	2,08	4,40	-1,29	-1,83
SYLV	-4,42	11,88	-10,22	-2,70	-3,63
PECHE	-1,02	2,75	0,81	-1,21	-1,19
AGRO	-1,01	5,20	2,31	-2,09	-2,53
ALC	-5,11	-6,43	-34,59	-2,93	-6,56
TEX	-11,26	57,37	37,35	-9,37	-11,83
HAB	-7,86	96,86	43,22	-10,27	-15,87
CUIR	-33,21	233,10	2,98	-13,37	-38,60
BOIS	-7,34	31,74	-3,46	-3,52	-6,06
CHIM	-6,67	11,60	8,93	-6,22	-7,62
MET	-9,90	2,48	24,65	-14,63	-15,85
FMP	-4,81	-10,14	-7,05	-2,62	0,63
MVH	-6,92	-40,36	-32,57	-13,93	-8,19
OTN	-0,31	-37,45	-27,98	-19,88	-21,24
ELE	3,45	68,75	12,85	-1,65	10,38
OME	-8,77	-1,04	-21,85	-7,88	5,21
OMF	1,26	4,44	46,41	-6,86	-12,72
SERV	3,51	-13,96	-6,02	4,44	3,48
MIN	1,41	9,92	13,41	-10,94	-4,17

A5. Equations of the Basic Trade Model

Notations :

There are $i, j=1, \dots, 42$ sectors,

- Perfectly (imperfectly) competitive sectors : icp (incp)
- Agricultural (non agricultural) sectors : inman (iag)
- Sectors with (without) specific sectors : ifs (infs),

r and rs subscripts indicates countries, For exports, when double subscripts appear, the first one denote the sector of origin and the second one the sector of destination,

1. Production:

$$(1) XD(incp, r) = n(incp, r) * xdf(incp, r)$$

$$(2) XD(i, r) * v_0(i, r) = VA(i, r)$$

$$(3) CI(i, r) = i_0(i, r) * XD(i, r)$$

$$(4) CI(i, j, r) = a(i, j, r) * CI(j, r)$$

$$(5) mob(ifs, r) = VA(ifs, r) * \left(xmv(ifs, r) * \frac{pva(ifs, r)}{wm(ifs, r)} \right)^{sv(ifs, r)}$$

$$(6) mob(inf s, r) = VA(inf s, r) \quad (6)$$

$$(7) fsp0(ifs, r) = VA(ifs, r) * \left(xsv(ifs, r) * \frac{pva(ifs, r)}{ws(ifs, r)} \right)^{sf(i, r)}$$

2. Factor markets:

$$(8) com(i, r) = mob(i, r) * \left(xwc(i, r) * \frac{wm(i, r)}{wmc(i, r)} \right)^{sf(i, r)}$$

$$(9) fd(i, "ln q", r) = mob(i, r) * \left(xwnqf(i, r) * \frac{wm(i, r)}{w("ln q", r)} \right)^{sf(i, r)}$$

$$(10) fd(i, "lq", r) = com(i, r) * \left(xwqf(i, r) * \frac{wm(i, r)}{w("lq", r)} \right)^{sc(i, r)}$$

$$(11) fd(i, "capital", r) = com(i, r) * \left(xwrf(i, r) * \frac{wmc(i, r)}{w("capital", r)} \right)^{sc(i, r)}$$

3. Intermediate goods demands :

$$(12) \ zd(i, j, r) = cij(i, j, r) * \left(xdi(i, j, r) * \frac{pci(i, j, r)}{pd(i, r)} \right)^{sz(i, j, r)}$$

$$(13) \ zm(i, j, r) = cij(i, j, r) * \left(xmi(i, j, r) * \frac{pci(i, j, r)}{p \min dex(i, r)} \right)^{sz(i, j, r)}$$

$$(14) \ z(i, j, r, rs) = zm(i, j, r) * \left(xmi(i, j, r) * \frac{p \min dex(i, j, r)}{pm(i, r, rs)} \right)^{simp(i, j, r, rs)}$$

4. Output allocation for tradables :

$$(15) \ XXD(i, r) = XD(i, r) * \left(xxx(i, r) * \frac{pp(i, r)}{pe(i, r)} \right)^{-st(i, r, rs)}$$

$$(16) \ EX(i, r) = XD(i, r) * \left(xex(i, r) * \frac{pp(i, r)}{pe(i, r)} \right)^{-st(i, r, rs)}$$

$$(17) \ E(i, r, rs) = Ex(i, r) * \left(xzz(i, r, rs) * \frac{pe(i, r)}{pex(i, r, rs)} \right)^{-svz(i, r, rs)}$$

5. Tarification Strategy of the firm

$$(18) \ cma(incp, r) = \frac{ctv(incp, r)}{xdf(incp, r)}$$

$$(19) \ cmo(incp, r) = cma(incp, r) + cfu(incp, r)$$

$$(20) \ cfu(incp, r) = \frac{ctf(incp, r)}{xdf(incp, r)}$$

$$(21) \ ctv(incp, r) = sum(j, pci(j, incp, r) * aij(incp, j, r) * i0(incp, r) * xdf(incp, r) + wm(incp, r) * v0(incp, r) * xdf(incp, r))$$

$$(22) \ cfu(incp, r) = \frac{pp(incp, r)}{pp0(incp, r)} * ctf0(incp, r)$$

6. Capital goods demands

$$(23) \ PCK(i, r) * IT(i, r) = kip(i, r) * invest(r)$$

$$(24) \ sum(i, pcf(i, r) * dt(i, r)) = (1 - pmep(r)) * Rnat(r)$$

$$(25) id(i, r) = it(i, r) * \left(xdk(i, r) * \frac{pck(i, r)}{pd(i, r)} \right)^{sk(i, r)}$$

$$(26) im(i, r) = it(i, r) * \left(xmk(i, r) * \frac{pck(i, r)}{pi \min dex(i, r)} \right)^{sk(i, r)}$$

$$(27) iv(i, r, rs) = im(i, r) * \left(xiv(i, r, rs) * \frac{pi \min dex(i, r)}{pm(i, r, rs)} \right)^{siv(i, r, rs)}$$

7. Consumer goods demands

$$(28) dd(i, r) = dt(i, r) * \left(xdd(i, r) * \frac{pcf(i, r)}{pd(i, r)} \right)^{sd(i, r)}$$

$$(29) dm(i, r) = dt(i, r) * \left(xmd(i, r) * \frac{pcf(i, r)}{pddindex(i, r)} \right)^{sd(i, r)}$$

$$(30) d(i, r, rs) = dm(i, r) * \left(xdde(i, r, rs) * \frac{pddindex(i, r)}{p \min dex(i, r)} \right)^{sdde(i, r, rs)}$$

$$(31) cpag(r) = ct(r) * \left(xagn(r) * \frac{pindex(r)}{pindexag(r)} \right)^{sg(r)}$$

$$(32) dt(inag, r) = ct(r) * \left(xnagn(inag, r) * \frac{pindex(r)}{pcf(i, r)} \right)^{sg(r)}$$

$$(33) dt(iag, r) = cpag(r) * \left(xig(iag, r) * \frac{pindexag(r)}{pcf(iag, r)} \right)^{sg(r)}$$

$$(34) ddv(incp, r) * bv(incp, r) = dd(incp, r) * n(incp, r) * *(sigmas(incp, r)/(1 - sigmas(incp, r)))$$

$$(35) idv(incp, r) * bv(incp, r) = id(incp, r) * n(incp, r) * *(sigmas(incp, r)/(1 - sigmas(incp, r)))$$

$$(36) zdv(incp, j, r) * bv(incp, r) = zd(incp, j, r) * n(incp, r) * *(sigmas(incp, r)/(1 - sigmas(incp, r)))$$

7, Foreign Trade

- Imports :

$$(37) m(i, r, rs) = sum(j, z(i, j, r, rs)) + iv(i, r, rs) + d(i, r, rs)$$

- **Bilateral Flows :**

$$(38) m(i, r, rs) = e(i, rs, r)$$

- **Definition of prices of traded goods**

$$(39) PM(i, r, rs) = PW(i, r, rs) * (1 + tm(i, r, rs)) * \overline{ER}$$

$$(40) PEX(i, r, rs)^* = PW(i, r, rs) * (1 + se(i, r, rs)) * \overline{ER}$$

$$(41) PE(i, r) * EX(i, r) = \text{sum}(rs, PEX(i, r, rs) * E(i, r, rs))$$

8. Value and Output Prices :

$$(42) PP(icp, r) * XD(icp, r) = PD(icp, r) * XXD(icp, r) + PE(icp, r) * EX(icp, r)$$

(43)

$$PP(incp, r) * XD(incp, r) = PD(incp, r) * XXD(incp, r) + PE(incp, r) * EX(incp, r) + n(incp, r) * \text{ctf}(incp, r)$$

$$(44) pp(incp, r) = \text{cmo}(incp, r)$$

$$(45) PVA(i, r) * VA(i, r) = PP(i, r) * XD(i, r) - PCNTER(i, r) * CI(i, r)$$

$$(46) PCNTER(i, r) * CI(I, R) = \text{sum}(j, PCI(j, i, r) * CI(j, i, r))$$

$$(47) PVA(ifs, r) * VA(ifs, r) = WS(ifs, r) * FSP0(ifs, r) + WM(ifs, r) * MOB(ifs, r)$$

$$(48) PVA(\text{inf } s, r) = WM(\text{inf } s, r)$$

$$(49) WM(i, r) * MOB(i, r) = WS(ifs, r) * FSP0(ifs, r) + W(" \ln q", r) * FD(i " \ln q", r)$$

$$(50) WC(i, r) * COM(i, r) = W(" capital", r) * FD(i, " capital", r) + W(" Lq", r) * FD(i, " Lq", r)$$

9. Value of domestic purchases

$$(51) PCI(i, j, r) * CI(i, r) = PD(i, r) * ZD(i, j, r) + PMINDEX(i, j, r) * ZM(i, j, r)$$

$$(52) pp(incp, r) = \text{cmo}(incp, r)$$

$$(53) PINDEX(r) * CT(r) = PINDEXAG(r) * CPAG(r) + \text{sum}(inag, PCF(inag, r) * DT(inag, r))$$

$$(54) \text{ PINDEXAG}(r) * \text{CPAG}(r) = \text{sum}(iag, \text{PCF}(iag, r) * \text{DT}(iag, r))$$

$$(55) \text{PCF}(i, r) * \text{DT}(i, r) = \text{PD}(i, r) * \text{DD}(i, r) + \text{PDDINDEX}(i, r) * \text{DM}(i, r)$$

$$(56) \text{PCK}(i, r) * \text{IT}(i, r) = \text{PD}(i, r) * \text{ID}(i, r) + \text{PIMINDEX}(i, r) * \text{IM}(i, r)$$

$$(57) \text{PMINDEX}(i, j, r) * \text{ZM}(i, j, r) = \text{sum}(rs, \text{pm}(i, r, rs) * z(i, j, r, rs))$$

$$(58) \text{PIMINDEX}(i, r) * \text{IM}(i, r) = \text{sum}(rs, \text{PM}(i, r, rs) * \text{IV}(i, r, rs))$$

$$(59) \text{pdv}(incp, r) = \frac{\text{sigmas}(incp, r)}{\text{sigmas}(incp, r) - 1} * \text{cma}(incp, r)$$

$$(60) \text{pd}(incp, r) * \text{bv}(incp, r) = n^{\frac{1}{1-\text{sigmas}(incp, r)}} * \text{pdv}(incp, r)$$

10. Aggregate taxes and subsidies

$$(61) \text{TARIFF}(r) = \text{sum}(i, \text{sum}(rs, \text{PW}(i, r, rs) * \text{tm}(i, r, rs) * \text{M}(i, r, rs) * \overline{\text{ER}}))$$

$$(62) \text{SUBEX}(i, r) = \text{sum}(rs, \text{se}(i, r, rs) * e(i, r, rs) * \text{pex}(i, r, rs))$$

11. Income definition

$$(63) \text{yfsp}(ifs, r) = \text{ws}(ifs, r) * \text{fsp0}(ifs, r)$$

$$(64) \text{RNAT}(r) = \text{sum}(i, \text{PVA}(i, r) * \text{VA}(i, r)) + \text{TAXIM}(R) - \text{sum}(i, \text{SUBEX}(i, r))$$

$$(65) \text{EPAG}(r) = \text{pmep}(r) * \text{Rnat}(r)$$

12. Definition of local supply

$$(66) \text{xxd}(i, r) = \text{sum}(j, \text{zd}(i, j, r)) + \text{id}(i, r) + \text{dd}(i, r)$$

$$(67) \text{sum}(i, \text{fd}(i, f, r)) = \text{fm0}(f, r)$$

13. Accounting balance

(68)

$$\begin{aligned} & \text{sum}(i, \text{sum}(rs, \text{pw}(i, r, rs) * q0 * m0(i, r, rs)) - \text{sum}(i, \text{sum}(rs, \text{pw}(i, r, rs) * q0 * e(i, r, rs))) \\ & = \text{epag}(r) - \text{invest}(r) + \text{leon}(r) \end{aligned}$$

14. Closure of the model :

$$\text{pd}(\text{"svces"}, \text{rdm}) \text{ fixed,}$$

