

THE POTENTIAL COST OF A FAILED DOHA ROUND

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ABSTRACT :

This study presents scenarios where countries decide to increase current tariff rates to protect domestic industries or raise revenues in order to finance domestic programs. It offers new conclusions on the economic cost of a failed Doha Round. In a scenario where applied tariffs of major economies would go up all the way to currently bound tariff rates, world trade would decrease by 7.7 percent. In a more modest scenario where countries would raise tariffs to maximum rates applied over the past 13 years, world trade would decrease by 3.2 percent. These increases in duties would reduce world welfare by USD353 billion under the first scenario, by USD134 billion under the more modest scenario. This study concludes there would be a potential loss of at least USD1,064 billion in world trade if world leaders were to fail to conclude the Doha Development Round of trade negotiations and were to implement subsequently protectionist policies such as observed at the end of the Uruguay Round. Another point of view is to consider the WTO agreement as an insurance scheme against potential trade wars. So we compare a resort to protectionism when the DDA is implemented with a resort to protectionism when the DDA is not implemented. The findings show that this trade agreement could prevent the potential loss of US\$ 809 bn of trade and, therefore, acts as an efficient multilateral insurance scheme against the adverse consequences of trade “beggar-thy-neighbour” policies.

KEYWORDS : *trade negotiations, CGE modeling, bound duties, domestic support*

JEL CLASSIFICATION : *F13, F15, F17*

1 INTRODUCTION

After seven years of negotiations, participants at the World Trade Organization (WTO) mini-ministerial meeting in Geneva on July 2008 could not reach a final agreement on the Doha Round liberalization modalities. Conflicts still exist on several issues regarding the commitments that both developed and developing countries should make. For instance, the United States (US) is still reluctant to tackle the issue of domestic support to the cotton sector, and India and other developing countries wish to avoid restrictions, such as the anti-concentration clause, on their ability to use flexibility in Non Agricultural Market Access (NAMA) negotiations.

Beyond these very specific elements of disagreement, it seems that the incentives to conclude the Doha Round are weak. Because large market access gains have already been achieved in the manufacturing sectors of developed country markets (Martin and Messerlin, 2007), the impetus that existed in previous multilateral negotiations has vanished. In addition, the remaining issues are not only more difficult to negotiate, but the political costs are high and the gains are more difficult to assess. For developed countries, liberalizing agricultural markets remains a very complex issue. At the same time, developing countries want to maintain protection in manufacturing and avoid making new commitments regarding services based on nascent industry considerations. Lastly, regional and bilateral liberalizations have reduced the market access gains expected by key players and have fostered resistance to multilateral liberalization that will erode existing preferences. Therefore, the longer the negotiations last, the weaker are the incentives to conclude a successful round.

In parallel, impact assessments using a computable general equilibrium (CGE) model have provided increasingly accurate quantitative information concerning the gains and losses associated with the Doha Development Agenda (DDA). Great improvements have been achieved since the Uruguay Round assessment, where a lack of information on tariffs led to an overestimation of potential gains. However, improved information has shown that the gains from the Doha Round are lower than expected (Bouet 2008), since the models now capture the fact that applied tariffs are in most cases lower than their Most Favored Nation (MFN) bound level, due to both binding overhang (the gap between MFN bound and applied rates) and preferences (the gap between MFN and bilateral applied rates). In addition, the implementation of trade scenarios has become more and more precise, adding details and including numerous flexibilities and exceptions that exist, limiting the scope of liberalization (Jean, Laborde and Martin, 2008).

The shrinking gains associated with the Doha Round have led both economists and policymakers to state that the real gains go far beyond tariff-reduction effects and can be found outside the standard model. For example, gains in productivity, the liberalization of services, and trade facilitation are still weakly represented in CGE exercises, but may account for a large share of the positive effects of a successful round. Moreover, even if applied tariffs are not cut, the simple fact that tariff lines are bound and that the existing binding overhang is reduced has a significant value because it provides a more stable trade environment.

The goal of this study is not to uncover additional benefits associated with the DDA, but to re-examine the value of an agreement by considering potential gains and losses in a moving landscape of trade policies.

Traditional impact studies have assessed the potential gains of the Doha negotiations by comparing the consequences of the negotiation modalities to the status quo baseline. Therefore, the cost of failed negotiations has been seen as just an opportunity cost representing the unrealized gains. This approach, however, may have underestimated the real losses associated with the failure of the DDA. Such a drastic event would make the business as usual scenario uncertain since the status quo is not a long-term perspective for trade policies. The current trend of multilateral trade liberalization may not survive this failure and the global public good provided by the WTO that helps to free trade in a stable and less-distorted environment may vanish. Therefore, this study compares the effects of a DDA scenario with other relevant alternatives.

Aside from the DDA scenario we study four protectionist scenarios which are characterized by different orders of magnitude and different approaches. Throughout the study we take into account the commitments enforced through the current trading system which limit WTO members' capacity to impede international trade, in particular through binding border protection. We develop a new database of historical world protection that prevailed from 1995 to 2006. This allows us to examine by how much have tariff barriers decreased since the creation of the WTO and to determine tariff maxima during this period of time which will be the basis of a protectionist scenario. We also use the MacMapHS6v2 database on applied and bound protection in 2004 to define another protectionist scenario characterized by the implementation of the highest protection authorized by the current multilateral system.

We implement these different tariff scenarios in the MIRAGE CGE model of the world economy in order to evaluate the economic consequences of these cooperative and non-cooperative outcomes. The difference between non cooperative and cooperative scenarios

represents a potential loss of US\$ 2,261 bn of trade (in constant terms) if we refer to bound tariffs, and US\$ 1,170 bn if we refer to maximum tariffs implemented between 1995 and 2006.

Another point of view is to consider the WTO agreement as an insurance scheme against potential trade wars. So we compare a resort to protectionism when the DDA is implemented with a resort to protectionism when the DDA is not implemented. The findings show that this trade agreement could prevent the potential loss of US\$ 809 bn of trade and, therefore, acts as an efficient multilateral insurance scheme against the adverse consequences of trade “beggar-thy-neighbour” policies. The reference scenario for this figure is a situation where countries adopt bound duties, whereas if we consider a situation where countries adopt the highest tariffs implemented between 1995 and 2006, the insurance scheme is worth US\$ 581bn in terms of world trade. These new findings clearly reappraise the potential cost of a failed Doha Round.

As stated by Pascal Lamy in his speech at the Lowy Institute in Sydney on March 2nd, 2009: “*the Doha Round is the most effective way to further constrain protectionist pressures by reducing the gap between bound commitments and applied policies.*”¹

The study is structured as follows. Section 2 details the motivation of this study. Section 3 describes the methodology. Section 4 presents the results of all scenarios, both in terms of level of border protection and in terms of economic impact. Section 5 concludes.

2 BACKGROUND

The purpose of this section is to provide a detailed background of this study. In sections 3 and 4 we undertake a new assessment of the Doha scenario, based on the last modalities. But, we also evaluate completely different trade scenarios that are aimed to estimate the potential cost of a worldwide resort to protectionism. Are these latter scenarios realistic? We really think that the response is positive and explain why in this section.

First, we consider the recent wave of protectionist and “beggar-thy-neighbor” policies adopted since early 2008 and conclude that there is no straightforward evidence that the threat of trade wars has recently increased. Then, we examine historical data on world protectionism and point out that trade policies offer a moving landscape, as well in the long-term as in the medium term. Finally, we proceed to a review of the economic literature in order to understand the rationale for these up-and-down variations in applied protection.

¹ See: http://www.wto.org/english/news_e/sppl_e/sppl117_e.htm.

2.1 Has protectionism recently increased?

It has been often stated that since September 2008, rising protectionism already occurs among WTO members, mixing increases in MFN duties, non – tariff barriers and the proliferation of anti-dumping duties (see Baldwin and Evenett, 2008 and 2009, for example). Border measures have been recently implemented like non-automatic licensing requirements by Argentina or tariffs on steel products by India. Numerous “bail-out” measures, apparently related to the banking and financial crisis, have also been adopted and contains protectionist measures like the “Buy American” provision included in the US stimulus package agreed on February 2009.

All these measures which in one way or another subsidize domestic firms are questionable in terms of their compatibility to the WTO law (Bhagwati and Panagarya, in Baldwin and Evenett, 2008), especially if they survive the crisis. The WTO authorizes domestic subsidies when aimed at restructuring businesses, promoting innovation and/or assisting displaced workers (Hufbauer and Schott, in Baldwin and Evenett, 2008).

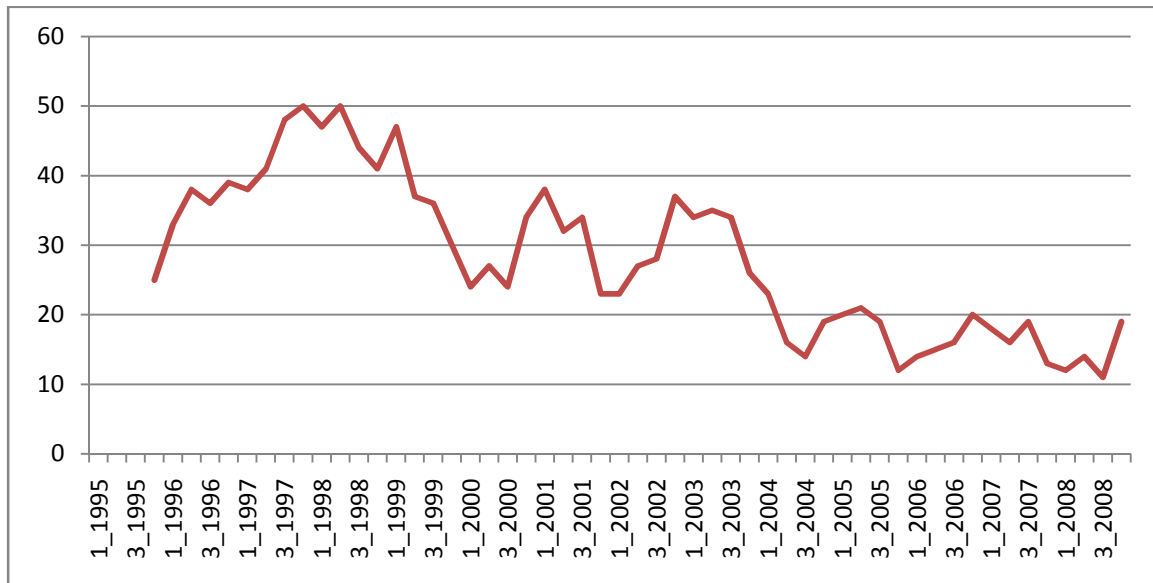
However, it is not always clear whether the use of these measures is linked to the financial crisis. All border measures are WTO-compatible. Some “bail-out” measures may be WTO-compatible, if temporary. The US “Buy American” provision violates the WTO Government Procurement Agreement under which Canada, the 27 European Union (EU) countries, Hong Kong, Iceland, Israel, Japan, Korea, Liechtenstein, Norway, Singapore, Switzerland, and the US have to open procurement to competition from firms based in the signatory countries (Hufbauer and Schott, 2008). This obligation is not extended to all WTO members; firms from Brazil, China, and India cannot complain about this provision.

While “bail-out” and restructuring measures may be understood as an attempt to circumvent disastrous economic impact of the banking and financial crisis, the recently increasing adoption of “beggar-thy-neighbor” protectionist policies is not obvious. Most of the figures pointing out a multiplication of increased import tariffs or anti-dumping procedures do not make any temporal comparisons (like a recent report to the Trade Policy Review Body – TPRB –by the WTO staff) or compare it with 2007 as a year of reference. The “Recession and protectionism ‘within the rules’: Risks to the Multilateral trade system” – a monthly newsletter of the Institute for the Integration of Latin America and the Caribbean (INTAL) – states that “according to the information from the International Trade Centre (ITC) and the WTO, during the first half of 2008 the number of antidumping cases raised by 40 percent”. The newsletter, however, does not specify if the reference is the first half of 2007, and it neither provides medium term references. Gamberoni and Newfarmer (2009) affirm that “after a period of slowdown, the number of

antidumping cases (both investigations initiated and imposition of duties) surged in 2008, especially in the second half of 2008. Compared to 2007, antidumping initiations grew by 15 percent and findings with imposition of duties grew by 22 percent.” Again, we do not know if 2007 is the right comparison.

Figure 1 indicates trade disputes handled by WTO from 1995 to 2008; as seasonal variations are large, they are cumulated on four consecutive quarters. Of course, there is a lag between the time when a protectionist measure is implemented and the time when a complaint is filed. Therefore, the observed increase in the number of trade disputes during the last quarter of 2008 might reflect the increase of anti-dumping procedures noted in early 2008. In that case, this is not unique since the same phenomenon occurred in 2000 and 2002.

Figure 1. Trade disputes handled at the WTO Dispute Settlement Body – 1995-2008 by quarters - Cumulated on four consecutive quarters



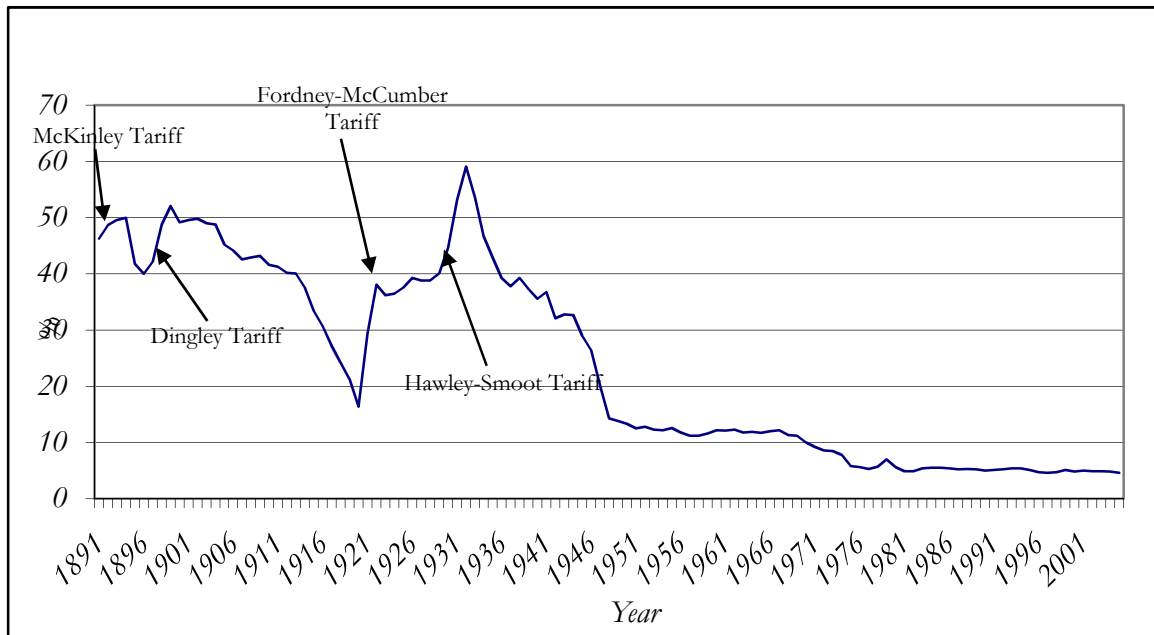
Source: WTO Secretariat

It should be noted, however, that reliable information is difficult to gather. For example, the WTO Staff makes references to protectionist measures but concedes that “*the information on changes in trade policies and trade-related policies contained in this report has been collected by the Secretariat from a variety of public and official sources. In some cases it has been possible to verify the information through formal channels, but in most cases it has not.*” (Para. 5)

2.2 The moving landscape of trade policies

It is often stated that pressure for protectionism is cyclical. Although this statement is rather difficult to support with concrete evidence, it can be easily demonstrated that protectionism has been cyclical in rich countries from the end of the eighteenth to mid-twentieth century. Figure 2 points out this “cyclicality” in the US from 1891 to 1940. Then the US tariff has followed a liberalizing path from 1940 until now. This trend can be found in France (see Messerlin, 1985) and other European countries (Bairoch, 1995, or Irwin, 1992 amongst others).

Figure 2. Amount of import duties divided by dutiable imports – US



Source : US International Trade Commission

Does this conclusion apply to all countries throughout the world? It is difficult to say since no historical database on applied protection exists at the world level. In addition, a decreasing national average can hide increases in tariffs at the product level. This is why we examine the frequency of tariff increases at the HS6 (Harmonized System – 6 digit) level from one year to the other in 164 countries between 1995 and 2006 using the TRAINS (TRade Analysis and INformation System) database. As the Ad Valorem Equivalent of specific tariffs may vary due to modification of unit values and as we focus on discretionary variations of import duties, we neutralize the effect of unit value variations.² Table 1 identifies 22 out of 164

² The 2004 year was the basis of calculation of AVE for every year from 1995 to 2006.

countries in the database for which the frequency of tariff increase has been greater than 10 percent in all sectors. It also shows the frequency calculated for agricultural and non-agricultural products by displaying figures at the world level as well as at the national level for the US, the EU, Japan, and China.

Table 1. Frequency of MFN tariff augmentation from 1995 until 2006 defined as the number of augmentations/(eleven years*number of HS6 products)

	NAMA	AMA	ALL
Sudan	32.6%	32.1%	32.6%
Qatar	24.8%	20.2%	24.2%
Kuwait	24.7%	20.1%	24.1%
Madagascar	21.4%	21.1%	21.4%
Switzerland	19.2%	26.0%	20.1%
Rwanda	19.5%	10.2%	18.3%
Uzbekistan	17.5%	20.4%	17.9%
Kyrgyzstan	17.4%	20.4%	17.8%
Argentina	17.3%	15.6%	17.1%
Nicaragua	15.3%	18.9%	15.7%
Sri lanka	14.3%	24.6%	15.7%
Paraguay	15.4%	10.8%	14.7%
Morocco	14.3%	17.1%	14.6%
Uruguay	15.4%	9.0%	14.5%
Bhutan	11.5%	24.0%	13.2%
Lebanon	12.7%	13.3%	12.8%
Congo	12.4%	14.4%	12.7%
Afghanistan	11.0%	16.9%	11.8%
India	11.2%	15.3%	11.8%
Czech republic	11.8%	3.4%	10.7%
Moldova rep.of	10.1%	13.3%	10.5%
Nigeria	10.7%	9.0%	10.4%
World	4.5%	6.1%	4.7%
USA	2.1%	13.3%	3.6%
EU	1.8%	14.6%	3.5%
Japan	0.7%	8.1%	1.7%
China	1.2%	1.8%	1.3%

Source: TRAINS and authors' calculations

At the world level, the frequency of tariff augmentation in all sectors is significant, even if not very large: close to 4.5 percent. While this frequency was higher than 20 percent in the case of five countries (Sudan, Qatar, Kuwait, Madagascar, and Switzerland), it was zero during this

period for eleven countries: Cyprus, Eritrea, Gambia, Guinea, Haiti, Hong Kong, Macau, Mayotte, Palau, Slovakia, and Syria. In general, tariff augmentations are more frequent in the agricultural sector,³ but this is in particular true in rich countries like the EU, the US, Japan, but also Norway, and in middle-income countries, like Poland and Ukraine. In Norway for example, from 1995 to 2006, while annual tariff augmentations occurred in only 0.2 percent of all non agricultural cases, they were noted in 22 percent of agricultural cases.

Table 2. Frequency of MFN tariff augmentation from 1995 until 2006 by groups of countries (WTO vs. non WTO; level of income: LDC/MIC/OECD)

WTO All sectors	4.66%	LDC All sectors	4.09%	MIC All sectors	5.18%	OECD All sectors	3.32%
non WTO All sectors	5.30%	non LDC All sectors	4.89%	non MIC All sectors	3.80%	non OECD All sectors	4.93%
WTO NAMA	4.46%	LDC NAMA	4.06%	MIC NAMA	5.01%	OECD NAMA	2.58%
non WTO NAMA	4.99%	non LDC NAMA	4.64%	non MIC NAMA	3.50%	non OECD NAMA	4.79%
WTO AMA	6.00%	LDC AMA	4.29%	MIC AMA	6.24%	OECD AMA	8.36%
non WTO AMA	6.97%	non LDC AMA	6.55%	non MIC AMA	5.81%	non OECD AMA	5.81%

Source: TRAINS and authors' calculations

LDC stands for Least Developed Countries; MIC stands for Middle Income Countries; OECD stands for Organization for Economic Cooperation and Development.

Does this behavior differ from one country to the other according to specific characteristics? In particular, does the WTO membership or the level of national income imply more or less MFN tariff augmentations? Table 2 provides some answers by displaying the frequency of MFN tariff augmentation from 1995 to 2006 for countries based on whether they are WTO members (WTO) or not (non WTO), whether they are classified as Least Developed Countries (LDC) or not (non LDC), Middle Income Countries (MIC) or not (non MIC), or OECD (OECD) or not (non OECD). Finally, these ratios are calculated for all sectors (ALL), and for agricultural sectors (AMA) or non agricultural sectors (NAMA).

The propensity to augment MFN tariffs is lower among WTO members than among non-WTO countries, as it is lower in industry than in agriculture. It appears that LDCs⁴ raise their MFN tariffs less frequently than the world average, while MICs do so more often. The propensity of OECD countries to augment their MFN tariffs is significantly low in industry, but is relatively high in agriculture – higher than in the case of MICs and LDCs.

³ Due to the volatility in agricultural prices, governments adjust trade policies more frequently. Let us notice that this fact is consistent with the political economy model used when we define trade policy scenarios: in Jean, Laborde and Martin (2008), lobbies have a domestic price targets.

⁴ These findings are consistent with previous works (Laborde, 2008) that emphasize the fact that LDCs have less sophisticated trade policies than more developed economies, in particular due to the lack of administrative capacity.

2.3 Economic crisis, trade wars, and retaliations

The current financial crisis ostensibly fosters demand for protectionism, and could lead to new trade barriers as occurred after the October 1929 crisis. A parallel can easily be drawn between the current situation and the one that existed then. In the early 1930s, unemployment was rising, fear of deflation was prevailing, and a lack of public resources (which was more pronounced in countries that paid war reparations) prevented governments from remedying the economic crisis. Moreover, today as in 1930, the context of decreasing prices can mechanically reinforce protection, as specific duties (defined as monetary amounts by physical units), which are numerous in agriculture, become more and more restrictive when world prices are down. In this type of economic context, protectionism is a tempting policy instrument for policymakers—it short-sightedly increases domestic prices and supports domestic activity, and it provides new public income. In the Republican platform of the 1928 presidential election, the tariff was presented as the “household remedy” (Isaacs, 1948), that is to say a policy that leads to higher domestic prices and increased economic activity.

But the role of the Smoot-Hawley Tariff Act and the subsequent tariff retaliations in the decline of trade after 1930 should not be overestimated: recent evaluations (Irwin, 1998; Madsen, 2001) show that discretionary increases in tariff rates only explain a minor part of the post-1929 contraction of trade. For example, Madsen (2001) estimates that real world trade declined from 1929 to 1932 by approximately 14 percent because of decreasing national incomes, 8 percent because of discretionary augmentations of tariffs, 5 percent because of deflation-induced tariff increases and 6 percent as a result of non-tariff barriers.

It is theoretically and empirically proven that trade openness is employment-creating and income-supporting in sectors in which an economy has a comparative advantage, but has a negative impact on employment and incomes in sectors where the economy has a comparative disadvantage. This implies that trade openness leads to a restructuring of an economy which can be costly, and trade openness is less unpopular in times of economic growth. During economic recession, the job market provides less opportunities and any threat on existing jobs is badly perceived. In time of stagnation, lobbying for protection will increase above usual levels in sectors without comparative advantage, especially when sectors are small and geographically/socially homogenous (Olson, 1965). This explains why demand for protection is so strong in the US sectors of automobile and textile and apparel, in the European sectors of agriculture and automobile, in the Japanese agricultural sector, and so on.

Governments do not correctly anticipate world retaliation and counter-retaliation, as was the case with the US in 1930 and also last year when in the middle of the food crisis, governments implemented export bans and export restrictions in successive rounds of retaliation and counter-retaliation. There exists an economic theory of retaliation and it concludes that:

- A trade war does not systematically eliminate all trade (Johnson, 1953);
- Policy instruments are not equivalent; in particular, quantitative restrictions are more damaging than tariff barriers (Tower, 1975);
- Big countries can benefit from a trade war while small countries always lose (Johnson, 1953); this point has been recently raised by Soesastro (in Baldwin and Evenett, 2009) when he states that the largest economies should today be more tempted by protectionism;
- Trade wars may be long and damaging when countries do not identify who is at the origin of the process and conversely, countries have to be “nice” in order to reestablish cooperation as quickly as possible (Axelrod, 1981.)

Finally, there is another reason that should contribute to rising protectionism. The failure of the DDA mainly comes from disagreements between rich and emerging countries: between India and the US on Safeguard Special Mechanism in agriculture; between the US and West Africa on cotton; between the EU and Brazil on tariff reduction in agriculture. This clearly defines a line of demarcation that could be the basis of future trade disputes.

In this section, we have seen that if there is no strong evidence of rising protectionism today, at least until April 2009, trade policies happen to be changed by policymakers as a reaction to economic situation. Current economic conditions could contribute to a complete change of mood in terms of trade policies implemented. In fact, even the post Second World War period, which is a remarkable period of history in terms of trade policies becoming freer and freer, trading partners, including WTO members, frequently augmented tariff protection when needed. This is in particular true for Middle Income Countries in all sectors and OECD countries in agriculture.

3 ALTERNATIVE SCENARIOS AND METHODOLOGY

With this background in mind, we intend to study what the gains of trade cooperation are when the alternative is noncooperation, but also how a negotiated DDA can protect the world trading system from a rise in protectionism.

With this objective, we implement different scenarios and compare the following:

- i) the implementation of the July 2008 package with different non-cooperative scenarios (implementation of bound duty levels; implementation of the highest MFN tariff applied during the 1995-2006 period for each importing country, and each product);
- ii) the implementation of these non-cooperative scenarios in a situation where the DDA is not implemented with a situation where it is implemented. This element will show us how a new trade negotiation will insure the world trading system against the risk of trade wars.

These assessments are carried out using the MIRAGE Computable General Equilibrium model of the world economy with protection data coming from the MAcMapHS6 database and a new historical database on MFN applied protection. The remaining of this section offers a methodological overview followed by a detailed description of each scenario.

3.1 Methodology

Tariff reform is implemented at the disaggregation level of the MacMapHS6v2.1 database (Laborde, 2008) with bound and applied tariff data for 2004 (including 5,113 products, 170 importing countries, and 208 exporting countries) at the HS6 product level.⁵ We add several updates to take into account all major changes that occurred up to 2008, including major regional trade agreements (RTA), new WTO members (such as Ukraine), but also the trade policy consequences of ongoing domestic reforms (as the EU Sugar trade reform). The TRAINS database was used to investigate tariff changes since 1995, and a special procedure was adopted to ensure comparability of MFN tariff rates between MacMapHS6 and TRAINS. For insuring inter-temporal comparison of nominal protection, all specific tariffs are converted using the reference group unit values from MAcMapHS6v2. But for the purpose of tariff reduction formula classification, the official guidelines to compute unit values are used. All trade policy scenarios are implemented on yearly basis following relevant timelines in each case.

The political economy model developed by Jean, Laborde, and Martin (2008) was used when sensitive products had to be selected for implementing tariff scenarios: both in the Doha scenarios and in all free trade agreements studied (scenarios and baseline). An extension of this

⁵ Slight modifications have been made on the MAcMapHS6v2.1 dataset: Malaysia's tariffs on tobacco products are updated (lowered), marginal protection on Chinese cereal TRQs are reduced and protection faced on sugar and banana by ACP countries in the EU market is modified to better capture preference erosion mechanisms.

model is used to define the binding strategy of developing countries in the DDA scenario. Indeed, for a particular scenario when we combine tariff increases with the DDA implementation, it is very important to have a theoretical based approach to define the new bound tariffs, in particular for countries (SVE –Small and Vulnerable Economies-, LDCs, and initially low binding countries) that benefit from wide flexibilities to achieve their new binding coverage goal. In such a case, we replace – in equation 6 of Jean, Laborde and Martin (2008) – the base year of applied tariff (here, 2004) by the highest tariff during the period 1995-2006 to compute the political cost of any new commitments. The DDA modalities (WTO, 2008 TN/MA/W/103/Rev.3) define in this case the overall constraints faced by each country. Finally, when WTO members liberalize under the DDA, the market access remains unchanged for non-WTO members.

Tariffs are aggregated from the HS6 level to the model aggregation (see below) using the reference group weighting scheme methodology (see Boumellassa, Laborde and Mitaritonna, 2009) and then implemented in the MIRAGE (Modeling International Relationships in Applied General Equilibrium) multi-country, multi-sector dynamic model, developed initially at the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) in Paris. We assume perfect competition across all sectors. A full description of the model is available in Decreux and Valin (2007). Based on standard and robust assumptions, it should be noted that the model may underestimate the positive effects of trade reform, particularly when such reform drives new investments, technology improvements, or important trade or production diversification.

In each country a representative consumer maximizes a CES-LES (Constant Elasticity of Substitution – Linear Expenditure System) utility function under a budget constraint to allocate his income across goods. The origin of goods is determined by a CES (Constant Elasticity of Substitution) nested structure following the Armington assumption. In addition, Northern countries are supposed to produce high-quality industrial goods, as compared to those supplied by Southern countries. On the production side, value added and intermediate goods are complements under a Leontief hypothesis. The value added is a CES function of unskilled labor and a composite of skilled labor and capital: it allows for including less substitutability between the last two production factors. In agriculture and mining, production also depends on land and natural resources. Investment is savings-driven and the current account is assumed to be constant in terms of world GDP (Gross Domestic Product). This last assumption is important in this study since tariff reductions (Doha scenario) and tariff increases (protectionist scenarios) will have positively correlated impacts on both imports and exports for every country.

Macroeconomic data (such as world trade flows, production, consumption, and intermediate use of commodities and services) come from the GTAP (Global Trade Analysis

Project) 7 database. Twenty-seven regions are identified in the model (eight high-income regions), which map the main trade blocks. The sectoral decomposition is highly detailed in terms of agriculture and agrifood business (twelve sectors), since most of the protection is concentrated in this sector. All other sectors are non-agricultural, including thirteen industrial sectors and two service sectors.⁶

A baseline is implemented from 2008 to 2025, which depicts the world without a new multilateral agreement. Concerning trade reform, the following agreements since 2004 have been included in the baseline:

- Full free trade agreements (FTA) for ASEAN (Association of South East Asian Nations), CEMAC (Communauté Economique et Monétaire de l'Afrique Centrale for Monetary and Economic Community of Central Africa), COMESA (Common Market for Eastern and Southern Africa), and SADC (Southern Africa Development Community).
- Economic Partnership Agreements (EPA) between ACP (Africa Caribbean Pacific) countries and the EU;
- Implementation of the EU-India, EU-ASEAN, US-Colombia, US-Oman, US-Bahrain, US-Morocco, US-Australia, Mercosur-Colombia, and China-Chile FTAs.
- All ongoing WTO accession commitments, including those of most recent members (Ukraine, Cape Verde, Viet Nam);
- Updated GSP (Generalized System of Preference) scheme of Japan in favor of LDC countries;
- Modified bound tariffs on EU poultry;
- EU enlargement to Romania and Bulgaria in 2007;
- The end of the EU EBA (Everything But Arms) transitory regime is implemented for protocol products (sugar, banana, and rice).

This baseline serves as a point of comparison with all the scenarios. The results are reported for the year 2025. The analysis does not account for the surge in world prices of energy and food products between 2004 and 2008.

3.2 Describing alternative scenarios

The five scenarios analyzed here include the Doha compromise of July 2008 and four protectionist alternatives. These are:

⁶ Sector and geographic decomposition are presented in Appendix 1 with correspondence to GTAP sectors.

- (i) **DDA:** July 2008 modalities
- (ii) **Up to Bound:** Non FTA applied tariffs increased to existing bound levels.
- (iii) **Bound&DDA:** Implementation of July 2008 modalities plus non FTA applied tariffs increased to new, post DDA, bound level.
- (iv) **Up to Max:** Non FTA applied tariffs increased to their last 10 years maximum level, capped by existing bound tariffs.
- (v) **Max&DDA:** Implementation of July 2008 modalities plus non FTA applied tariffs increased to their last 10 years maximum level, capped by new, post DDA, bound tariffs.

3.2.1 *The DDA scenario*

The first scenario represents a successful Doha outcome based on July 2008 modalities. After seven years of trade talks, market access modalities have reached a high level of sophistication. Even if the general philosophy is simple, with progressive tariff-cut formulas for both agricultural and nonagricultural goods, many flexibilities have been introduced with different degrees of special and differential treatment for different groups of developing countries. Following our previous work (Laborde, Martin, and van der Mensbrugge 2008, and Berisha, Bouet, Laborde, and Mevel 2008), this scenario implements all the details of these modalities⁷ in terms of market access including tariff cutting formulas, country and product flexibilities (sensitive and special products) as well as special provisions for tariff escalation, tropical products and long standing preferences. The scenario does not account for any changes on the sectoral initiative due to the lack of agreement on this issue.

For the duty-free-quota-free market access initiative for least developed countries (LDCs) and OECD countries (excluding South Korea but including Mexico and Turkey), we assume a 3-percent exemption clause in terms of products.⁸ Export subsidies are phased out by 2013 for developed countries.

Concerning domestic support, this scenario includes the overall constraint on Overall Trade Distorting Support (OTDS) for the US and the EU (EU). In contrast to most traditional exercises where domestic supports commitments are translated in *ad valorem* or specific subsidy caps for current applied policies, we explicitly introduce the OTDS as an overall limit for domestic support spending for each year. In the dynamic context and due to the growth of

⁷ A full description of the modalities implemented in this study is provided in Laborde, Martin, and van der Mensbrugge (2008). This scenario is based on the May 2008 Modalities (WTO documents TN/AG/W/4/Rev.2, TN/MA/W/103/Rev.1).

⁸ This scenario mimics Scenario F in Berisha, Bouet, Laborde, and Mevel (2008).

production in the baseline, the initial agricultural subsidy rates, based on 2004 prices, may lead to a violation of the new commitments. In our simulation, it appears that only the US⁹ will face a real constraint forcing it to modify its production distortive programs. With the reduction scheme of the OTDS on one hand, and the increasing production on the other, we estimate that subsidy rates of production and on some primary factors should start to decrease by 2011 and will have to be halved by 2025 to the final US\$ 16.4bn limit. Any domestic support reduction will impact all sectors in a uniform way. Since this paper focuses on tariffs and tariff changes across scenarios, we have introduced neither a program-specific modeling of domestic support policies, nor a political economy model aimed to explain how domestic support reduction across commodities will be handled. Our goal here is just to show that the new OTDS commitments, even if they do not drive domestic support reduction today, have a real value on the medium run. The consequences of this treatment are discussed in Appendix II.

Due to the complexity of integrating other elements of the DDA agenda in the simulations, other sources of potential gains are omitted, such as liberalization in services, WTO rules, trade facilitation and intellectual property rights.

3.2.2 *Up to Bound Scenario*

Two protectionist scenarios are analyzed in order to offer a contrasting picture with the DDA. The first option, the *Up to Bound* scenario, examines the possibility for WTO countries to increase their tariffs up to their Uruguay Round (UR) bound level in a five-year period (2009-2014). It assumes that the entire binding overhang will be eliminated. For unbound lines, the existing average binding overhang is applied to compute new tariff targets.¹⁰ This scenario represents a strong increase in protection by eliminating all unilateral liberalization, but does not represent an open trade war between WTO members. Existing commitments are still respected.¹¹

On one hand, this scenario may appear extreme since many developing countries bound their tariffs during the Uruguay Round using a ceiling option to levels that they have never and will never apply. Countries also apply zero tariffs on a large selection of raw materials and imported input even if the existing bound tariffs are strictly positive.

⁹ The recent CAP reform allows the EU to largely reallocate domestic program to the green box.

¹⁰ Technically, we estimate the following relation for each country: $\text{Bound_Rate} = a \text{ MFN_rate} + b$ on bound lines, where Bound_Rate is a MFN bound duty and MFN_rate a MFN applied duty. Then we apply parameters a and b on applied MFN rate to build a theoretical bound tariffs for the unbound lines.

¹¹ Even while adhering to their commitments, we may imagine that countries will use additional tools to increase their protection above bound level by using contingent protection, and by initiating litigations cases that would allow them to retaliate.

On the other hand, *Up to Bound* is not the worst scenario that can be anticipated. Many countries have not bound their import tariffs yet and are not constrained today by any upward limitation. In our scenario, applying bound duties can underestimate in some cases the desire for high protection on some specific products. Moreover, anti-dumping duties and safeguard mechanisms can be activated and can restrict trade even in rich countries where binding overhang is inexistent or limited.

In this scenario, only MFN applied rates and non-reciprocal, preferential rates are modified. The only non-reciprocal program that is maintained is the EU “Everything but Arms” initiative due to the way this program has been implemented and renewed in the EU legislation.

3.2.3 Bound&DDA scenario

Two scenarios intend to measure the extent to which the implementation of the July 2008 package could reduce the cost of a new trade war by lowering bound duties. Scenario Bound&DDA combines the DDA scenario and the Up to Bound scenario, but the bound duties that are used here are those derived from the July 2008 package. Therefore, the difference between this scenario and the Up to Bound one represents the extent to which a new trade agreement under Doha could reduce the capacity of WTO members to augment MFN tariffs. The treatment of bound tariffs is very different in this scenario from the treatment in the *Up to Bound* case. Contrarily to the previous case where an average binding margin was applied in an uniform way based on existing binding overhang, in this scenario we apply the new DDA constraints in terms of binding rules based on the Jean, Laborde and Martin (2008) political economy approach combined to past trade policy behavior (see discussion in section 3.1).

As previously, only MFN applied rates and non-reciprocal preferential rates are modified.

3.2.4 Up to Max Scenario

To adopt a more realistic protectionist scenario, historical data were used to determine the highest applied protection rate implemented by every country during 1995–2006. Then, the minimum between the historical maximum level and the existing bound tariffs was selected. This *Up to Max* scenario corresponds to a case whereby governments apply the most adverse trade policies of the past 10 years, but still respect their UR commitments. On an historical basis, tariffs evolve as a response to changes in world prices, domestic production structure, and political pressures. In that sense this scenario is politically realistic. It is important to note that in all scenarios with increasing tariffs, the preferential tariffs protected by bilateral or regional agreements are unchanged.

3.2.5 *Max&DDA Scenario*

In this scenario, the same combination (DDA plus a protectionist option) is adopted but the DDA scenario is combined with the Up to Max scenario. As new bound duties have been defined in the July 2008 package and as the tariff applied is the minimum between the highest duty applied during the 1995-2006 period and the newly defined bound duty, this scenario differs from the *Up to Max* scenario. The difference between them can also represent the benefit from the DDA as an insurance scheme against trade wars.

As previously, only MFN applied rates and non-reciprocal preferential rates are modified.

4 RESULTS

4.1 Impact on protection and market access

Figure 3 displays the consequences of these five scenarios on average world tariffs (the baseline is also represented.)

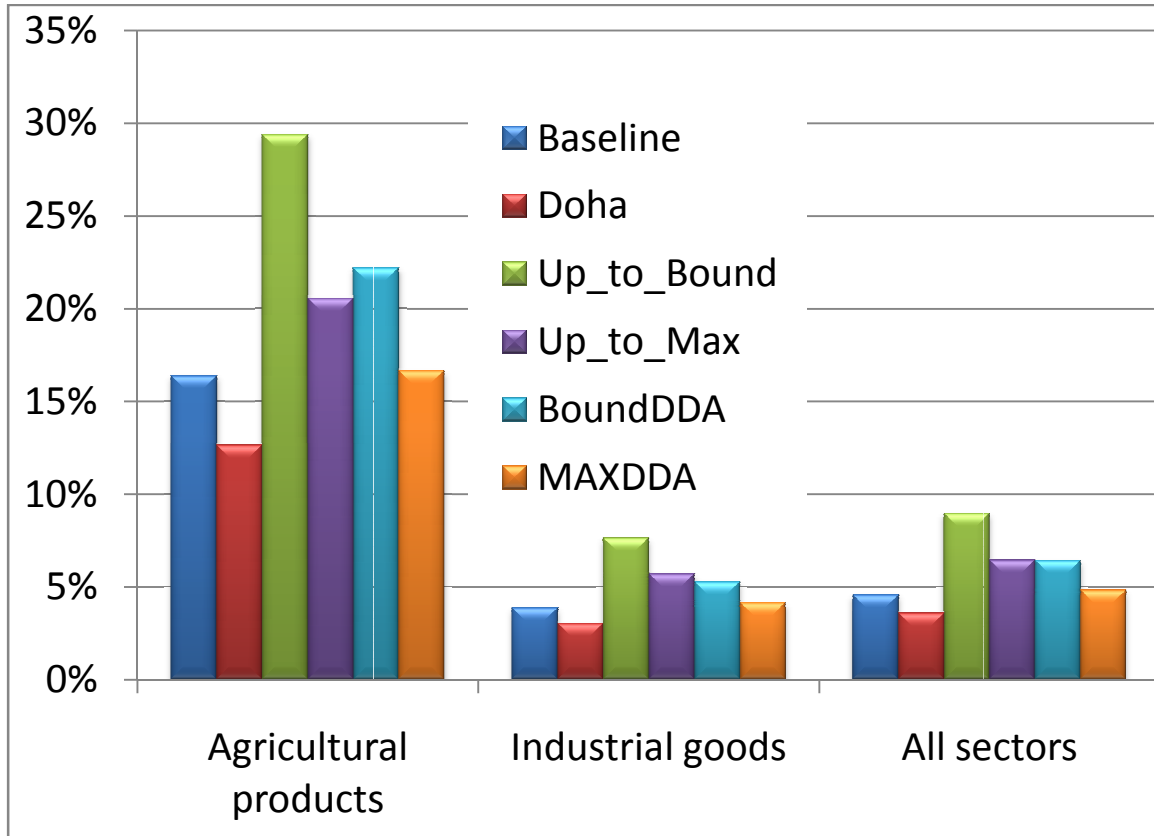
The Doha scenario will reduce world protection by 22 percent, from 4.6 percent to 3.6 percent. Moving to bound tariffs (*Up to Bound* scenario) will nearly double the level of protection on average. The elimination of unilateral tariff reductions enacted during the past 10 years (*Up to Max* scenario) has a more limited impact but still represents an increase of 41 percent in world tariffs compared to the baseline (from 4.6 percent to 6.4 percent).

The implementation of the July 2008 package has a significant impact on potential future trade wars. If the DDA is not implemented, current protection can be doubled when countries resort to bound levels, while it increases by only 41 percent in case the DDA is implemented. Under the *Max&DDA* scenario world protection increases by only 5 percent while it increased by 41 percent under the *Up to Max* scenario. These comparisons show the extent to which the implementation of the July 2008 package could avoid costly protectionism.

As clearly highlighted in Figure 3, the variations in protection are more contrasting when focusing on agriculture. World agricultural protection decreases by 23 percent if the July 2008 package is implemented while it becomes 1.8 times higher if bound duties are applied. Comparison of world agricultural protection under a DDA (12.6 percent) and under a global resort to bound duties (29.4 percent) provides a scale of 1 to 2.33. When the reference is maximum duties applied in the 1995-2006 period it is 1 to 1.63. If we compare world bound

protection in agriculture under a DDA with a situation where the DDA is not implemented, the scale is 1.32.

Figure 3. World Average Tariffs by scenario (2025 level)



Source: MAcMapHS6v2.1, TRAINS and authors' calculations (reference group weighting scheme).

Table 3 (respectively Table 4) displays the results in terms of protection applied on imports (respectively faced by exports) by group of countries. The *DDA* scenario will cut the applied protection by one-third for HICs and one-tenth for MICs, a significant achievement when compared to previous GATT rounds. It will also lock existing market access due to unilateral liberalization on a MFN or nonreciprocal preferences basis. Indeed, under the *Up to Bound* scenario, protection could increase by 48 percent in HICs, 132 percent in MICs, and 270 percent in LDCs compared to the current levels. Under the *Up to the Max* scenario, protection in the same three groups of countries will increase by 23 percent, 56 percent, and 67 percent, respectively.

Table 3. Protection applied by category of countries

	<i>Baseline</i>	<i>DDA</i>	<i>Up to Bound</i>	<i>Bound & DDA</i>	<i>Up to Max</i>	<i>Max & DDA</i>
HIC						
Agricultural products	15.6	10.3	22.9	15.6	18.5	13.6
Industrial goods	2.2	1.4	3.3	2.1	2.8	1.6
<i>All sectors</i>	<i>3.0</i>	<i>1.9</i>	<i>4.4</i>	<i>3.1</i>	<i>3.7</i>	<i>2.3</i>
MIC						
Agricultural products	18.3	17.6	40.8	33.4	24.9	23.0
Industrial goods	7.9	7.0	17.9	12.2	12.9	10.2
<i>All sectors</i>	<i>8.6</i>	<i>7.8</i>	<i>19.8</i>	<i>14.0</i>	<i>13.3</i>	<i>10.9</i>
LDC						
Agricultural products	11.6	11.6	65.3	65.5	20.0	20.0
Industrial goods	9.2	9.2	31.4	34.2	16.5	14.3
<i>All sectors</i>	<i>9.8</i>	<i>9.8</i>	<i>36.1</i>	<i>38.6</i>	<i>16.3</i>	<i>14.6</i>
World						
Agricultural products	16.4	12.6	29.4	22.2	20.6	16.7
Industrial goods	3.9	3.0	7.6	5.3	5.7	4.2
All sectors	4.6	3.6	9.0	6.4	6.4	4.8

Source: MacMapHS6v2.1, TRAINS, and authors' calculations (reference group weighting scheme).

Note: HICs stands for High Income Countries, MICs for Middle Income Countries, and LDCs for Least Developed Countries.

Implementation of the July 2008 package gives a better access to HICs markets (from 3.0 percent down to 1.9 percent in all sectors, but from 15.6 percent to 10.3 percent in agriculture) while variation in protection applied by MICs is small (from 8.5 percent down to 7.8 percent in all sectors) and nonexistent as far as LDCs are concerned. At the same time, the July 2008 package gives world exporters an insurance against potential rise in applied protection by MICs and LDCs: in the case of MICs while protection can be augmented from 8.6 percent up to 14.0 percent (bound level) in case of implemented DDA, it can be augmented up to 19.8 percent today. As far as LDCs are concerned if we compare the case *Up to the Bound* and *Bound&DDA* scenarios, we can see that tariffs will increase more in the latter case. Indeed, the flexibilities granted by the DDA modalities to bind tariffs will provide more freedom to increase tariffs than the homogenous binding overhang rate applied to build the *Up to the Bound* scenario. By using the political economy model in binding tariffs combined with the new rules, governments can achieve higher level of protection than using a homogenous rate of binding overhang computed on existing bound tariff lines. This is consistent with the idea that the most sensitive products are the unbound ones.

Table 4. Protection faced by category of countries

	<i>Baseline</i>	<i>DDA</i>	<i>Up to Bound</i>	<i>Bound & DDA</i>	<i>Up to Max</i>	<i>Max & DDA</i>
HIC						
Agricultural products	16.1	11.9	28.5	21.1	20.3	16.1
Industrial goods	3.8	3.0	7.7	5.4	5.6	4.2
<i>All sectors</i>	4.6	3.6	9.0	6.4	6.5	5.0
MIC						
Agricultural products	17.1	13.8	30.6	23.7	21.2	17.7
Industrial goods	4.0	3.0	7.5	5.0	5.9	4.0
<i>All sectors</i>	4.6	3.6	8.9	6.4	6.3	4.6
LDC						
Agricultural products	9.9	8.2	30.2	24.0	14.6	12.6
Industrial goods	3.9	2.7	9.4	6.2	9.0	4.5
<i>All sectors</i>	4.0	3.2	11.7	8.5	7.3	4.7
World						
Agricultural products	16.4	12.6	29.4	22.2	20.6	16.7
Industrial goods	3.9	3.0	7.6	5.3	5.7	4.2
<i>All sectors</i>	4.6	3.6	9.0	6.4	6.4	4.8

Source: MacMapHS6v2.1, TRAINS, and authors' calculations (reference group weighting scheme).

Note: HICs stands for High Income Countries, MICs for Middle Income Countries, and LDCs for Least Developed Countries.

It is worthwhile to examine which group of countries is most severely impacted by these scenarios in terms of access to foreign markets (Table 4). In relative terms, the *Doha* scenario manages to deliver homogeneous market access gains with an average decrease of about 20 percent of the tariffs faced by three groups of countries: from 4.6 percent to 3.6 percent for both HIC and MIC countries, and from 4.0 to 3.2 percent for LDCs. The other scenarios, however, have significantly different results. Though the two protectionist scenarios have similar effects for HICs and MICs (90 percent or exactly 97 and 93 percent, respectively under the *Up to Bound* scenario, and 40 percent or exactly 42 and 37 percent, respectively under the *Up to Max* scenario), the LDCs are more severely affected due to losses of nonreciprocal preferences,¹² in particular, in the US and Japan: protection faced by LDCs is nearly tripled. Consequently, the implementation of a DDA is of great interest for LDCs not only because it improves access to foreign markets even if it is at the price of an erosion of preferences, but also as it locks unilateral schemes and in particular the most recent initiatives. It will forbid potential rise of protection faced by their exports: based on the maximum protection faced during the 1995-2006 period, then

¹² Except on the EU market where the EBA program is maintained.

protection faced by LDCs' exports can raise from 4.0 percent to 7.3 percent if DDA is not implemented while it can increase up to only 4.7 percent if DDA is applied.

4.2 Economic impacts

The MIRAGE CGE model is used to assess the economic impacts of these different tariff and domestic support scenarios up to 2025.

4.2.1 Economic impacts at the global level

Table 5 indicates the global results of all scenarios for the world economy in 2025, compared to baseline. Under the *Doha* scenario considered here, and focusing only on a part of the DDA agenda (the tariff liberalization and domestic support discipline), world trade is augmented by a mere 1.9 percent (US\$ 363bn) and world real income by US\$ 59bn in 2025. This confirms the findings of other studies (see Decreux and Fontagné 2006, or Bouet, Mevel, and Orden 2006), except that here the gains are slightly lower mainly because the baseline includes numerous RTA that already reduce applied tariffs before the DDA implementation. However, these numbers are driven by the assumption that no major political shock will take place if the DDA is not signed. Such an assumption should be considered carefully.

In case of the *Up to Bound* scenario, world trade would contract by 9.9 percent (US\$ 1,899bn) and world real income by US\$ 353bn. In the case of the less damaging *Up to Max* scenario, world trade would decline less, by 4.2 percent (US\$ 808bn). While the latter increase in duties would especially impact agricultural exports (-9.4 percent), particularly harming developing countries' agricultural exports (-11.5 percent), the exports of industrial goods could also face a substantial reduction of 4.4 percent.

In case of an implementation of the July 2008 package and a subsequent augmentation of protection up to bound levels, the decrease of world exports would be only US\$ 1,090bn while it would be US\$ 1,899bn if the DDA is not applied. In other words, according to this assessment, the DDA implementation can prevent a potential loss of US\$ 809bn of trade. If the rise in protectionism is the maximum protection applied during the 1996-2006 period, the DDA as an insurance scheme is worth US\$ 581bn of trade.

Table 5. Global results led by tariffs and domestic support changes – Change compared to the baseline in 2025

		<i>DDA</i>	<i>Up_to_Bound</i>	<i>Bound & DDA</i>	<i>Up_to_MAX</i>	<i>Max & DDA</i>
World exports in goods and services (volume)^(a)		1.90	-9.93	-5.70	-4.23	-1.19
<i>of which</i>	<i>Agro-food</i>	5.47	-20.26	-13.42	-9.36	-4.52
	<i>Industry</i>	1.96	-9.77	-5.07	-4.36	-0.95
World Welfare		0.09	-0.51	-0.25	-0.19	-0.04
<i>of which</i>	<i>North</i>	0.07	-0.32	-0.20	-0.14	-0.08
	<i>South</i>	0.13	-1.00	-0.35	-0.32	0.06
World exports in goods and services (volume)^(a)		363	-1899	-1090	-808	-227
<i>of which</i>	<i>Agro-food</i>	73	-269	-178	-124	-60
	<i>Industry</i>	279	-1389	-721	-621	-135
World Welfare		59	-353	-169	-134	-26
<i>of which</i>	<i>North</i>	33	-156	-100	-70	-37
	<i>South</i>	26	-197	-69	-64	11

Source: Authors' calculations. MIRAGE simulations.

Note: Welfare changes are computed as the equivalent variation. Export volumes are defined using a Fisher index.

^(a) Intra-EU trade flows are excluded.

4.2.2 Economic impact at the country level

In this subsection we focus on the impact of various scenarios on countries' macroeconomic variables. In order to simplify the presentation, we focus on seventeen countries/zones instead of twenty-seven.

Table 6 illustrates how various scenarios affect countries' exports in value. The impact of the Doha agreement does not provide any surprising effect as compared to previous assessments. A look at the protectionist scenarios, without the DDA implemented, reveals how some countries could be greatly affected by a global resort to protectionism. Brazil, for example, is highly specialized in agriculture which is particularly affected by an augmentation of protection: let us recall that the *Up to Bound* scenario implies an increase in world agricultural protection by 13 percentage points, while only 3.7 percentage points in industry (see Table 3). This is the reason why Brazil's exports are especially reduced (-25.6 percent) under the *Up to Bound* scenario. Could the DDA serve as an insurance scheme against potential rise of protectionism for Brazil? According to the findings here, if the DDA is implemented, Brazil's exports would be reduced by only 7.4 percent if bound duties were adopted after this agreement. The same mechanism is in play under the *Up to Max* and *Max&DDA* scenarios, but the magnitude is smaller.

Traditionally, assessments of the Doha agreement conclude on a small effect for the EU and the US. Our study leads to the same conclusion (for example the increase in EU exports in

2025 is only 2.9 percent) but here we also assess the benefit of the DDA by comparing the cooperative scenario (*DDA*) with the non-cooperative one (the *Up to Bound*, for example, results in a 10.4 percent decline of EU exports and 2.9 percent decline of US exports), or by comparing how the trade agreement prevents from loss of exports related to increased protection (the difference between *Up to Bound* and the *Bound&DDA* scenarios: 5 percent for the EU, 2.4 percent for the US). Table 6 illustrates that this new evaluation amplifies the importance of the DDA for these large economies.

Table 6. Variations in exports (value – intra-trade excluded) by countries led by tariffs and domestic support changes – Percentage changes compared to the baseline in 2025

	<i>DDA</i>	<i>Up to Bound</i>	<i>Bound & DDA</i>	<i>Up to MAX</i>	<i>Max & DDA</i>
ASEAN LIC	2.1	-18.7	-30.8	-10.7	-5.3
ASEAN MIC	2.2	-16.3	-8.0	-8.1	-3.8
ANZCERTA	3.3	-9.4	-1.0	-3.0	1.4
Bangladesh	5.8	-51.8	-52.5	-9.6	-10.8
Brazil	4.0	-25.6	-7.4	-5.9	-0.7
Canada	0.5	-1.9	-1.7	-0.8	0.1
Central Africa	0.1	-28.9	-26.9	-7.1	-7.1
China – HK	4.7	-3.3	-1.2	-1.5	3.9
EU	2.9	-10.4	-5.4	-8.6	-4.6
India	1.8	-38.9	-12.7	-12.7	-3.1
Japan	3.2	-3.0	1.1	-1.7	2.1
Mexico	0.6	-13.2	-5.2	-3.6	-2.0
MENA	4.4	-11.8	-1.4	-5.1	-0.2
Pakistan	2.1	-42.0	-35.3	-27.6	-20.9
Turkey	0.6	-12.4	-7.8	-5.7	-4.7
USA	1.9	-2.9	-0.5	-1.0	1.0

Source: Authors' calculations. MIRAGE simulations.

Note: ASEAN LIC stands for ASEAN Low Income countries, ASEAN MIC stands for ASEAN Middle Income countries, ANZCERTA (Australia New Zealand Closer Economic Relations Trade Agreement) stands for the Australia and New Zealand group, MENA stands for Middle East and North African countries.

Variation in exports is also explained by the macroeconomic closure of the model which supposes that each current account has to remain constant. Under the *Up to Bound* and *Up to Max* scenarios, each country augments applied protection such that its imports decrease. This can imply an appreciation of the real exchange rate in order to keep the current account constant.

Table 7 points out the welfare impacts of various scenarios. The Doha scenario implies gains for all regions except Mexico.¹³ This loss can be explained by an erosion of preferences towards the US and Canada in case of an agreed multilateral liberalization. In general under the DDA scenario welfare gains are small; they are significant only for Brazil, Bangladesh and the ASEAN MIC zone.

Table 7. Variations in welfare by countries led by tariffs and domestic support changes – Percentage change compared to the baseline in 2025

	<i>DDA</i>	<i>Up_to_Bound</i>	<i>Bound & DDA</i>	<i>Up to MAX</i>	<i>Max & DDA</i>
ASEAN LIC	0.4	-1.7	-1.3	-1.2	-0.1
ASEAN MIC	0.6	-1.3	-0.2	-0.4	-0.1
ANZCERTA	0.1	-0.2	-0.1	-0.1	0.0
Bangladesh	0.7	-2.0	-2.0	-0.6	-0.6
Brazil	0.3	-0.4	0.1	-0.1	0.2
Canada	0.0	0.0	0.1	0.1	0.1
Central Africa	0.0	-0.0	0.2	0.8	0.8
China – HK	0.1	-0.5	0.2	-0.2	0.1
EU	0.1	-0.5	-0.4	-0.3	-0.2
India	0.0	-1.8	-0.8	-0.4	-0.1
Japan	0.2	-0.3	0.0	-0.1	0.1
Mexico	-0.1	-1.7	-0.6	-0.2	-0.1
MENA	0.1	-0.6	-0.2	-0.2	-0.0
Pakistan	0.2	-2.1	-2.2	-2.0	-1.7
Turkey	0.1	-0.6	-0.3	-0.4	-0.3
USA	0.0	-0.2	-0.1	-0.1	-0.0

Source: Authors' calculations. MIRAGE simulations.

Note: ASEAN LIC stands for ASEAN Low Income countries, ASEAN MIC stands for ASEAN Middle Income countries, ANZCERTA (Australia New Zealand Closer Economic Relations Trade Agreement) stands for the Australia and New Zealand group, MENA stands for Middle East and North African countries.

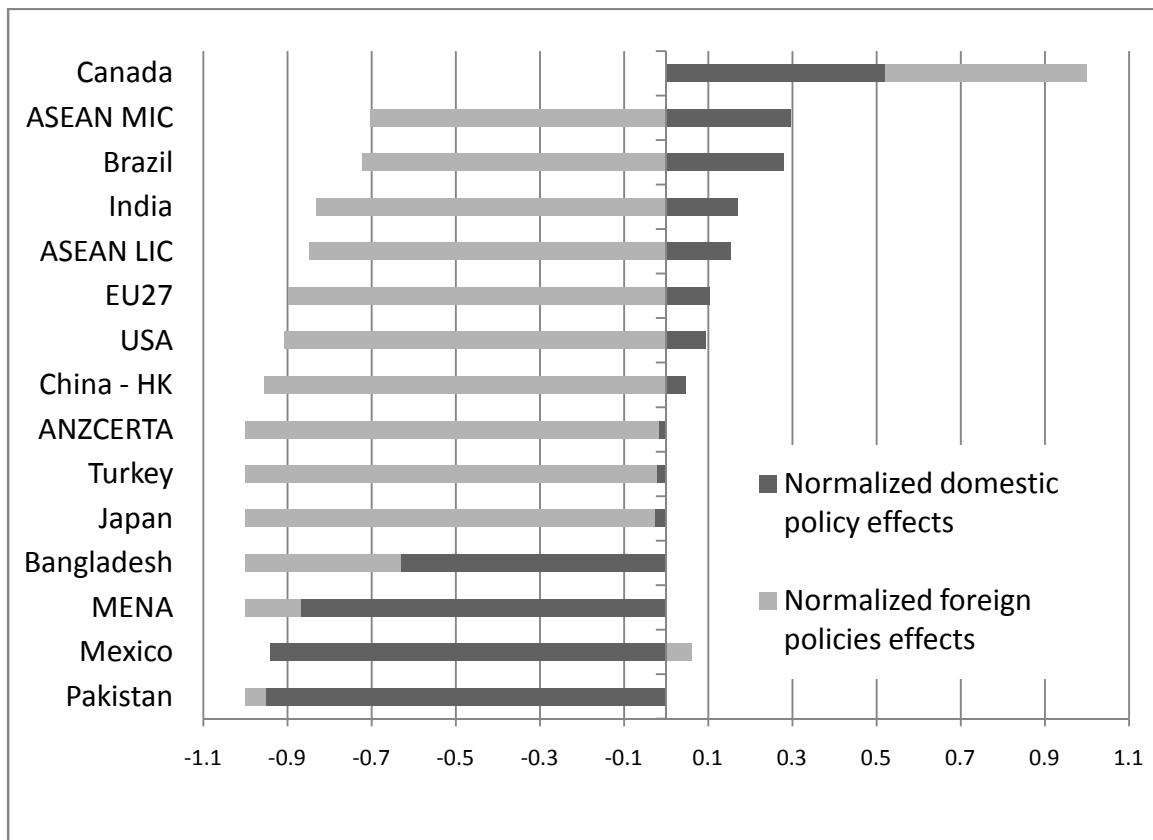
A rise of protectionism would mainly hurt MICs and LDCs. As pointed out, in case of the *Up to Bound* scenario the relative loss of welfare is three times larger for developing countries than for developed countries (see Table 5). Asian developing countries are particularly affected (see the case of Bangladesh, India and Pakistan on Table 7). The implementation of the DDA is important for these countries as an insurance against the risk of trade wars, in particular as far as India is concerned. We can also notice a few cases where increasing protectionism is beneficial. For instance, Canada takes advantage of increased preferential margins into the NAFTA markets

¹³ Nigeria and the Rest of Eastern Africa are also affected by a slight decrease in welfare.

while limited increases of its own tariff improve its terms of trade (optimal tariff argument), and imply small domestic distortions.

As illustrated by the Canadian case, tariff changes, either implied by own policy reform or by other countries' one, may have different, even opposite effects on welfare. Decomposing the mechanisms that affect welfare is crucial to understand the results. In particular, assessing the strength of the “*what I do is what I get*” argument is important. Indeed, in a context of global trade policy changes, a country will be affected by both changes in its own tariffs (domestic policy effect) and in its partner tariffs (foreign policy effect). Due to intra-country reallocation of resources, imported inputs and model closure (fixed current account), it is difficult to distinguish “import-led effects” from “export-led effects”. Both domestic and foreign policy effects have negative and positive outcomes. As previously stated, we have:

Figure 4. Relative impacts of foreign and domestic policies on welfare results – Up to Max scenario



Source: Authors' calculations. MIRAGE simulations.

Note: ASEAN LIC stands for ASEAN Low Income countries, ASEAN MIC stands for ASEAN Middle Income countries, ANZCERTA (Australia New Zealand Closer Economic Relations Trade Agreement) stands for the Australia and New Zealand group, MENA stands for Middle East and North African countries.

a. for domestic tariff increase:

- i. a positive effect on welfare related to the “optimal tariff” argumentation;
 - ii. a negative effect on welfare led by increasing distortions in domestic economy;
- b. for foreign tariff increase:
- i. a positive effect for exporters benefiting from preferences on increasingly protected markets;
 - ii. a negative effect for exporters facing increased barriers.

Table 8. Variations in factor remunerations by countries led by tariffs and domestic support changes – Percentage change compared to the baseline in 2025

	Real return to capital			Real return to land			Skilled real wages			Unskilled real wages in agriculture			Unskilled real wages in non-agriculture		
	<i>DDA</i>	<i>Bound</i>	<i>Bound & DDA</i>	<i>DDA</i>	<i>Bound</i>	<i>Bound & DDA</i>	<i>DDA</i>	<i>Bound</i>	<i>Bound & DDA</i>	<i>DDA</i>	<i>Bound</i>	<i>Bound & DDA</i>	<i>DDA</i>	<i>Bound</i>	<i>Bound & DDA</i>
ASEAN LIC	-0.2	-4.3	-8.8	0.9	-7.2	-8.8	0.4	-4.1	-7.6	0.8	-6.6	-8.9	0.4	-5.5	-9.4
ASEAN MIC	0.3	-5.4	-3.2	1.9	-6.7	-5.4	1.0	-6.1	-2.1	1.6	-7.5	-5.4	0.8	-7.4	-3.4
ANZCERTA	0.2	-0.4	0.1	3.3	-5.4	-1.6	0.2	-0.8	-0.2	3.3	-4.3	-0.8	0.1	-0.8	-0.2
Bangladesh	-0.5	-4.7	-4.8	6.8	10.8	10.8	-0.5	-6.0	-6.2	4.7	6.0	6.0	-0.9	-6.2	-6.3
Brazil	0.3	-2.0	-1.0	4.8	-10.3	-1.6	0.1	-0.5	0.2	4.2	-8.5	-1.8	-0.1	-2.0	-0.8
Canada	0.3	-0.2	-0.1	3.0	-3.8	-1.6	0.1	-0.2	0.1	1.9	-2.0	-0.2	0.1	-0.2	-0.1
Central Africa	0.0	-8.3	-8.1	-0.1	-4.5	-4.1	-0.0	1.4	1.8	0.0	-5.7	-5.1	-0.0	-2.6	-2.4
China - HK	0.1	-0.1	-0.6	0.7	-0.1	0.0	0.5	-0.9	-0.2	0.6	-0.2	-0.0	0.5	-0.6	-0.2
EU	0.2	-0.3	-0.1	-1.8	-0.1	-1.1	0.2	-0.8	-0.5	-1.9	-0.6	-1.3	0.2	-0.4	-0.2
India	-0.1	-2.9	-2.2	0.3	2.8	3.7	0.0	-5.3	-2.0	0.2	0.1	1.6	0.0	-4.4	-2.0
Japan	0.3	-0.0	0.0	-6.5	1.0	-2.4	0.5	-0.4	0.0	-5.2	0.8	-2.6	0.4	-0.3	0.0
Mexico	0.2	0.4	0.3	1.9	-1.1	-0.1	-0.1	-3.4	-1.2	1.3	-1.5	-0.3	-0.1	-2.6	-1.0
MENA	0.3	-1.6	-0.4	2.5	1.5	1.7	0.3	-2.4	-0.5	2.0	0.6	1.2	0.2	-2.0	-0.4
Pakistan	-0.2	-3.1	-1.9	0.7	0.8	1.1	0.1	-6.6	-7.6	0.6	-1.5	-1.2	0.1	-6.8	-6.7
Turkey	0.0	-2.9	-2.0	0.4	-0.0	-0.7	0.1	-1.4	-0.5	0.4	-0.6	-0.8	0.1	-2.0	-1.2
USA	-0.2	0.0	0.2	-5.8	-1.4	-0.6	0.1	-0.3	-0.2	-2.7	-0.7	-0.2	0.1	-0.2	-0.1

Source: Authors' calculations. MIRAGE simulations.

Note: ASEAN LIC stands for ASEAN Low Income countries, ASEAN MIC stands for ASEAN Middle Income countries, ANZCERTA (Australia New Zealand Closer Economic Relations Trade Agreement) stands for the Australia and New Zealand group, MENA stands for Middle East and North African countries.

Real returns to factor are computed as the nominal return deflated by the representative household price index.

Keeping in mind that the CGE effects are not additive and that any decomposition is path dependent, we used a methodology aimed to reduce this issue (Laborde, 2009) and we compute normalized relative effects of “domestic” and “foreign” reform. As it is clear from Figure 4, in the

case of *Up to Max* scenario, we see that different countries respond differently to these conflicting effects. Several large countries (Canada, ASEAN, Brazil, India, EU27, etc.) can benefit from their own tariff increases as opposed to small countries for which a resort to high tariffs will be negative.

For most exporters, tariff increases on destination markets will have drastic negative effects and will dominate the welfare changes. This is particularly true for Asian countries (China and Japan for instance) that have no preferential access. But for a few countries benefiting from large preferential access (Canada and Mexico), the overall rise in protection at the global level still delivers positive effects: the increased value of existing preferences outweighs the loss of market access in third countries.

Finally, we examine how factors' real remuneration is modified under three scenarios: Doha, *Up to Bound* and the *Bound&DDA* scenario (see Table 8). The objective is only to illustrate how some productive factors are affected differently by a further liberalization of a country's economy or a global resort to protectionism, and if the insurance scheme discussed in this paper, plays also at the level of these factors.

In agricultural countries like Australia/New Zealand or Brazil productive factors related to agriculture (land, agricultural unskilled labor) should be clearly supportive of a Doha agreement and opposed to a global augmentation of protection up to bound levels. In Brazil for example, the real remunerations of land and agricultural unskilled labor increase by 4.8 percent and 4.2 percent if a Doha agreement is signed while they decline by 10.3 percent and 8.5 percent if the *Up to Bound* scenario is implemented. The DDA agreement also plays the role of insurance for land and unskilled agricultural labor in these countries since under the *Bound&DDA* scenario their remuneration declines but to a lesser extent (1.6 percent and 1.8 percent in the case of Brazil). The same mechanism works in Asian MICs and Central Africa. In these poor countries, the WTO Doha agreement is also an insurance scheme for poor people.

On the other side, in rich countries like Japan, Korea, and the European Free Trade Area (EFTA) countries, land and agricultural unskilled labor should be supportive of increased protectionism while opposed to further liberalization¹⁴. In the case of the EU and the US, any reform leads to a decline of the real remuneration of these factors. Indeed, for the agricultural sector in both regions, the Doha round will have adverse effects (reduction in subsidies or protective tariffs), but a global resort to protectionism will also hurt their agricultural interests. In case of the *Up to Bound* and the *Bound&DDA*, the negative effects are smaller.

¹⁴ EFTA and Korea are not included on Table 8. These results can be requested to the authors.

It is noteworthy that in rich countries (Australia/New Zealand, Canada, EU, Japan, and US), skilled labor and capital should generally support increased multilateral trade openness as it increases their real remuneration and oppose increased protectionism as it reduces their real remuneration. The variations of real remuneration implied by these trade policies are less than those concerning land and agricultural unskilled labor: this is explained by differences in the degree of inter-sectoral mobility. These results are consistent with the traditional Heckscher-Ohlin-Samuelson framework.

4.2.3 What is really at stake?

These figures allow for a clear reassessment of what is really at stake. A disagreement among WTO countries over the DDA would signal international non-cooperation. If countries subsequently implement protectionist policies, the loss could be much greater. This exercise clearly gives an insight of what could be lost as a result of the failure of the DDA. A simple comparison reveals a potential loss of US\$ 1,171bn in world trade. The failure of the DDA would not only prevent an increase of US\$ 363bn in world trade coming from new commitments on tariffs and domestic support, but a worldwide move toward protectionism would contract world trade by US\$ 808bn if we consider that the implementation of the highest duties applied during the 1995-2006 is the realistic scenario to which countries would resort. If an implementation of bound duties is the relevant reference point, the potential cost of a failed Doha Development Agenda reaches US\$ 2,262bn in volume of annual trade by 2025.

Moreover, the DDA will not only increase trade, but it will also reinforce binding commitments and reduce existing bound duties. In so doing, it will play its international public good role by making the trade environment more secure and decreasing the costs associated with potential trade wars. We concretized this idea by comparing the application of bound duties based on their current levels to the same policy based on the level of bound duties implied by the DDA: in that case the DDA is worth US\$ 809bn in terms of trade volume and US\$ 184bn in terms of real income.¹⁵

Strikingly, these conclusions are especially true for poor countries: in terms of real income, if we consider that the real value of DDA is measured by the insurance role that it plays, from a global value of US\$ 184bn, \$ 128bn (about two thirds) represent the benefits to

¹⁵ 184 = - 169 - (-353) and 809 = -1090 - (-1899)

developing countries (see Table 5). This explains why the DDA should be finally considered as a Development Round.

5 CONCLUSION

Recent studies assessing the potential impact of the DDA have concluded that there would be modest augmentation in world trade and world real income. This study, which is limited to tariffs and domestic support, does not invalidate such conclusions, but it examines the situation from a different perspective. The failure of a WTO agreement would be a clear sign of international noncooperation; it would launch trade conflicts and litigations (especially between High Income and Developing Countries), and would be the first unsuccessful Round despite the fact that it is the first Round to focus on development and the first Round launched by the WTO. In a period of economic stagnation, the risk is high that this failure would give WTO members the incentive to pursue non-cooperative strategies via the adoption of protectionist policies. In that case, the loss would be much greater than a mere US\$ 59bn– the opportunity cost of not concluding the DDA. This study concludes that there would be a potential loss of at least US\$ 1,171bn in world trade if world leaders were to fail to reach an agreement for the Round of trade negotiations in the next few weeks and if subsequently countries were to implement protectionist policies. Therefore, stakes in Geneva are very high and the July 2008 package appears to be the closest and most promising step toward a global development agenda for a world in turmoil.

REFERENCES

- Axelrod, R., 1981, The Evolution of Cooperation, *Science*, Vol 211, Issue 4489, 1390-1396.
- Bairoch, P., 1995, *Economics and World History: Myths and Paradoxes*, University of Chicago Press
- Baldwin R.E., and S. Evenett, eds., 2008, *What world leaders must do to halt the spread of protectionism?*, London, Center for Economic Policy Research, VoxEU.org.
- Baldwin R.E., and S. Evenett, eds., 2009, *Murky protectionism and the Crisis*, London, Center for Economic Policy Research, VoxEU.org. ,
http://www.voxeu.org/reports/Murky_Protectionism.pdf

- Berisha V., Bouet A., Laborde D. and S. Mevel, 2008 The Development Promise: Can the Doha Development Agenda Deliver for Least Developed Countries?, IFPRI Briefing Note, July, IFPRI.
- Bouet A., 2008, *The Expected Benefits from Trade Liberalization - Opening the Black box of Global Trade Modeling*, Washington DC, IFPRI Food Policy Review 8.
- Bouet A., S. Mevel and D. Orden, 2006 More or less Ambition in the Doha Round: Winners and Losers from Trade Liberalization with a Development Perspective, *The World Economy* 30(8): 1253-1280.
- Boumellassa H., D. Laborde, and C. Mitaritonna, 2009, "A consistent picture of the protection across the world in 2004: MAcMapHS6 version 2". AgFoodTrade Working paper and IFPRI Discussion paper.
- Decreux Y. and H. Valin, 2007, MIRAGE, Updated Version of the Model for Trade Policy Analysis: Focus on Agriculture and Dynamics, CEPII Working Paper, 15, October.
- Decreux Y., and L. Fontagné, 2006, A Quantitative assessment of the Outcome of the Doha Development Agenda, CEPII Working Paper, 10, May.
- Gamberoni, E and Newfarmer R., 2009, Trade protection: Incipient but worrisome trends. <http://www.voxeu.org/index.php?q=node/3183>
- Hufbauer G.C., and J.J. Schott, 2009, Buy American: Bad for Jobs, Worse for Reputation, PIIE Policy Brief N. PB09-2, February, Washington DC, Peterson Institute for International Economics.
- INTAL, 2009, Recession and protectionism 'within the rules': Risks to the Multilateral trade system, INTAL Monthly Newsletter No150, January 2009.
- Irwin D.A., 1992, Multilateral and Bilateral Trade Policies in the World Trading System: an Historical Perspective in de J. de Melo and A. Panagarya, eds, *New Dimension of Regional Integration*, Center for Economic Policy Research.
- Irwin D.A., 1998, The Smoot-Hawley Tariff: A Quantitative Assessment, *Review of Economic and Statistics*, 80: 326-34.
- Isaacs A., 1948, *International trade -Tariffs and Commercial Policy*, Richard Irwin, Chicago.
- Jean S., Laborde D. and Martin W. , 2006. Consequences of Alternative Formulas for Agricultural Tariff Cuts, in K. Anderson and W. Martin, eds. *Agricultural Trade Reform and the Doha Development Agenda*, The World Bank and Palgrave MacMillan, 81-116.
- Jean S., Laborde D. and Martin W., 2008, Choosing Sensitive Agricultural Products in Trade Negotiations, IFPRI Discussion Paper No. 788.

- Johnson H.G., 1953, Optimum Tariff and Retaliation, *The Review of Economic Studies*, vol. 21: 142-153.
- Laborde, D., 2008, *Mesures et détermination endogène des droits de douane*, PhD thesis, Université de Pau et des Pays de l'Adour.
- Laborde, D., 2009, Decomposition of Multilateral Trade Policy shocks in a CGE, *Mimeo*.
- Laborde, D., Martin, W. and D. van der Mensbrugge, 2008, Implications of the 2008 Doha Draft Modalities for Developing Countries, *GTAP conference paper*.
- Madsen, J.B., 2001, Trade Barriers and the Collapse of World Trade During the Great Depression, *Southern Economic Journal*, 67(4), 848-868.
- Martin W., and P. Messerlin, 2007, Why is it so difficult? Trade liberalization under the Doha Agenda, *Oxford Review of Economic Policy*, 23(3):347-366.
- Messerlin P., 1985, Les Politiques Commerciales et leurs Effets en Longue Periode, in B. Lassuderie-Duchene and J.-L. Reiffers, eds, *Le Protectionnisme*, Paris, Economica.
- Olson, M., 1965. *The Logic of Collective Action*, Cambridge: Harvard University Press.
- Tower E., 1975. The optimum Quota and Retaliation, *The Review of Economic Studies*.
- WTO, 2008a, Fourth REVISION OF DRAFT Modalities for Non-Agricultural Market Access, TN/MA/W/103/Rev.2, WTO Secretariat, Geneva.
- WTO, 2008b, Revised Draft Modalities for Agriculture, TN/AG/W/4/Rev.3, WTO Secretariat, Geneva.
- WTO, 2009, Report to the TPRB from the Director-General on the Financial and Economic Crisis and Trade-Related Developments, January, JOB(09)/2

Table 9. Appendix 1 – Sector and geographic decomposition

Table 10. Regional Aggregation

<i>Region</i>	<i>GTAP7 code</i>
Australia / New Zealand	nzl, aus
Bangladesh	bgd
Brazil	bra
Canada	can
Central Africa	xac, xcf
China and Hong Kong	hkg, chn
EU	roa, bgr, gbr, swe, esp, svn, svk, prt, pol, nld, mlt, lux, ltu, lva, ita, irl, hun, grc, deu, fra, fin, est, dnk, cze, cyp, bel, aut
ASEAN MIC (Middle Income countries)	tha, phl, mys
India	ind
Indonesia	idn
Japan	jpn
Korea	kor
ASEAN LIC(Low income countries)	xse, vnm, mmr, lao, khm, xea
Mexico	mex
MENA - Middle East and North African countries	xnf, tun, mar, egypt
Nigeria	nga
Pakistan	pak
Rest of Eastern Africa	xec, uga, eth
Rest of Latin America	xcb, xca, pan, nic, gtm, cri, xsm, ven, ury, per, pry, ecu, col, chl, bol, arg
Rest of OECD	xef, nor, che
Rest of the world	xws, irn, geo, aze, arm, xsu, kgz, kaz, xer, xee, ukr, rus, hrv, blr, alb, xna, xoc
Rest of South Asia	xsa, lka
Rest of SADC	zwe, zmb, tza, moz, mus, mdg
Rest of ECOWAS	xwf, sen
South African Custom Unions	xsc, zaf, bwa, mwi
Chinese Taipei and Singapore	sgp, twn
Turkey	tur
US	usa

Table 11. Sectoral Aggregation

<i>Sectors</i>	<i>GTAP7 code</i>
Paddy and processed rice	pcr, pdr
Beverage and Tobacco	b_t
Cereals	gro
Food products	frs
Cattle	ome
Meat products	ofd
Milk and dairy products	nmm
Other agricultural products	rmk
Plant-based fibers	wtr, gdt, ely
Sugar	osg, ros, obs, isr, ofi, cmn, cns, wtr, gdt, ely
Vegetables and fruit	coa
Wheat	oil, coa
Chemical products	cmt, oap
Electronic	omt, cmt, oap
Forestry and fishery	i_s, nmm
Leather	mp, nfm, i_s, nmm
Machinery	omt, cmt, oap
Mineral and metal products	osd
Motor vehicles and transport equipment	omf
Petroleum and coal products	coa
Primary products	pdr
Textile	tex
Wearing and Apparel	atp, wtp, otp, trd
Wood and paper	wap
Other manufacture products	ros, obs, isr, ofi, cmn, cns, wtr, gdt, ely
Other services	c_b
Transport and trade	lum

Table 12. Appendix 2 – Modeling the OTDS constraint in a dynamic setting

As discussed in section 3.2.1, we introduce the OTDS capping in the dynamic model. Compared to standard approach where domestic support are computed from base year level and converted in *ad valorem* equivalent,¹⁶ it appears that taking into account the growth of production value in the agricultural sector will lead to a reduction in subsidy rate to respect the new WTO commitments. 0 illustrates the consequences of our specific treatment in the results. Focusing on agricultural production and exports, we see that:

- The EU is nearly not affected by subsidy reduction thanks to the recent CAP reform and the large share of green box payments in the overall EU domestic support. At the opposite, the OTDS limits applied to the US farmers will benefit to the EU producers and exporters. In the overall, the EU production is less reduced with the DDA tariff reduction combined to the OTDS treatment than without (-1.17 percent versus -1.27 percent);
- The situation of Brazil is magnified compared to the EU one. In this case, the Brazilian production increases more with the OTDS treatment (+4.03 percent to +3.78 percent);
- US production is directly affected by domestic support reduction (-1.5 percent in agricultural and agri-business production instead of +0.1 percent). We can even see that for some sectors, the gaps are reverted: from an expansion of the Sugar (+1 percent) and Wheat (+1.4 percent) sectors, we have a decline in production (respectively -4 percent and -5.5 percent).

¹⁶ Since the current US domestic support is below new OTDS limits, it does not lead to reduction of current policies.

Agricultural export and production variations under the Doha scenario with and without dynamic OTDS constraints

	<i>Brazil</i>		<i>EU</i>		<i>US</i>	
	Doha with constraint on OTDS	Doha without constraint on OTDS	Doha with constraint on OTDS	Doha without constraint on OTDS	Doha with constraint on OTDS	Doha without constraint on OTDS
<i>Exports – Volume – 2025 - percent deviation from the baseline</i>						
<i>Agriculture and Agro-food</i>	2.69	2.65	0.69	0.69	1.73	1.96
Beverage and Tobacco	3.90	4.05	1.58	1.57	5.69	5.74
Cereals	-1.76	-3.93	-0.19	-0.87	-8.80	1.91
Food products	4.35	4.30	1.34	1.19	6.90	7.40
Cattle	-4.38	-5.97	2.50	1.67	-16.06	-0.32
Meat products	31.35	31.41	-1.75	-2.05	11.62	13.25
Milk and dairy products	69.66	68.54	-2.59	-3.06	-21.57	-15.70
Other agricultural products	1.46	0.09	4.18	2.99	-5.52	4.27
Paddy and processed rice	17.10	14.90	-7.38	-7.69	-6.21	2.96
Sugar	3.70	3.80	-25.58	-25.72	15.53	12.48
Vegetables and fruit	-1.28	-3.11	-0.29	-0.74	-6.27	2.74
Wheat	-5.80	-7.30	6.42	4.63	-6.84	1.23
<i>Production – Volume – 2025 - percent deviation from the baseline</i>						
<i>Agriculture and Agro-food</i>	4.03	3.78	-1.17	-1.27	-1.50	0.10
Beverage and Tobacco	-1.85	-1.69	0.02	0.03	0.17	-0.05
Cereals	0.43	0.45	0.28	0.28	-0.07	-0.04
Food products	3.88	3.30	-0.63	-0.86	-6.59	0.26
Cattle	0.98	0.92	-0.15	-0.18	0.17	0.41
Meat	12.07	12.07	-0.96	-1.11	-1.98	1.07
Milk and dairy products	14.40	14.43	-5.38	-5.49	1.00	1.26
Other agricultural products	1.94	1.90	-1.82	-1.89	-3.62	-2.57
Paddy and processed rice	0.79	0.15	-0.13	-0.56	-5.67	0.03
Sugar	0.30	0.21	-9.66	-9.99	-4.09	1.07
Vegetables and fruit	-0.14	-0.14	-0.00	-0.01	0.11	-0.04
Wheat	0.17	-1.79	1.59	1.12	-5.47	1.35

Source: Authors calculations based on MIRAGE simulation