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## Economic Impact of Potential Outcome of the DDA

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## ECONOMIC IMPACT OF POTENTIAL OUTCOME OF THE DDA

## NON-TECHNICAL SUMMARY

The current Round of multilateral trade negotiations that was launched in Doha in November 2001 has reached a critical point. Following a Ministerial meeting in July 2008 that came close to reaching agreement on modalities for non-agricultural market access (NAMA) and agriculture, work has continued in Geneva, but the whole process looked to be at risk in mid-2011. In April 2011, the negotiations on NAMA encountered the stumbling block of sectoral initiatives. By June 2011, it was clear that completion of a comprehensive agreement on all topics was impossible by the end of this year, but it was hoped that agreement could be reached on an “LDC plus” including trade facilitation. Currently, this looks to be in doubt as well, and the 8th WTO Ministerial Conference in December 2011 is expected to discuss a more productive way forward in the negotiations.

In this paper, we tentatively address the economic impact of a deal integrating the most recent proposals circulated in the multilateral trade negotiations arena, especially sectorals in NAMA, in order to shed some light on the difficulties involved. We try to quantify the gains to be expected from an agreement on trade facilitation.

The sources used to assess the consequences of the negotiations are highly technical and complex, reflecting the difficulties involved for negotiators to find a politically acceptable deal (e.g. exceptions as well as compensatory import commitments, such as tariff rate quotas, are introduced). The consequences of an agreement, involving cuts that differ by country and by product, cannot be assessed without recourse to quantitative and detailed representation of the world economy. We measure border protection at the most detailed level possible (product, importer, exporter), and through computation of the liberalisation resulting from a tariff-cutting formula. Bound and applied duties (ad valorem, specific, mixed or compound) are measured at the Harmonised System 6-digit (HS-6) product level (the most disaggregated level for which we have harmonised information).

The data are from the Global Trade Analysis Project (GTAP) and Market Access Map (MAcMap), and describe the 2004 economy. We run a “pre-experiment” introducing the accumulated changes affecting the world economy in the period 2004 to 2010. In 2012 (and subsequent years depending on the timing of phasing out of the protection) the scenarios described below will be implemented. Phasing out is applied linearly over a five-year period for developed countries (10 years for developing countries). Recently acceded countries will be granted respectively longer periods, here we make the simplifying assumption that these countries will have 12 years for phasing out of protection. Finally, we compare situations for the world economy between 2013 and 2025, with and without liberalisation. The Least

Developed Countries (LDCs) will not be asked to reduce their tariffs, only to increase binding coverage.

The first scenario depicts the joint effect of modalities for agriculture and the NAMA. The three pillars of agriculture are introduced. NAMA data are based on the coefficients for the Swiss formula as contained in the 2008 draft modalities text. The second scenario adds a 3% reduction to protection for trade in services. The third scenario should be considered the core scenario in this exercise: it combines liberalisation of trade in goods and services with a rather ambitious trade facilitation scenario. The remaining four scenarios are systematically benchmarked against this central scenario. The fourth scenario adds improved port efficiency; the fifth scenario adds sectoral initiatives for chemicals, electronic products and machinery; the sixth adds a duty free initiative for environmental goods.

We observe a \$US70bn world Gross Domestic Product (GDP) long run gain when agriculture and industry are liberalised, a \$US85bn gain when a 3% reduction in protection for services is added to certain services sectors. Calculation of the gains associated with trade facilitation suggests roughly a doubling of the expected gains (\$US152bn); port efficiency adds another \$US35bn.

In total, the \$US187bn gains identified here in the scenario combining liberalisation in trade in goods and services with trade facilitation and port efficiency, would accumulate to world GDP every year in the medium term, compared to the situation without agreement. Recent proposals for sectoral initiatives would add a further \$US15bn on top of these gains.

#### ABSTRACT

Using a dynamic computable general equilibrium model of the world economy (MIRAGE), we simulate the impacts of the most recent drafts circulated in the multilateral trade negotiations arena, augmented by a modest outcome of the negotiation in services.

The liberalisation of tariffs is implemented at the product level in order to take into account exceptions, flexibilities as well as the non-linear design of the formulas. A reduction in domestic support and the phasing out of export subsidies are taken into account. We integrate dynamic gains up to 2025.

We observe a \$US70bn world Gross Domestic Product (GDP) long run gain when agriculture and industry are liberalised, a \$US85bn gain when a 3% reduction in protection for services is added to certain services sectors. Calculation of the gains associated with trade facilitation suggests roughly a doubling of the expected gains (\$US152bn); port efficiency adds another \$US35bn.

In total, the \$US187bn gains identified here in the scenario combining liberalisation in trade in goods and services with trade facilitation and port efficiency, would accumulate to world

GDP every year in the medium term, compared to the situation without agreement. Recent proposals for sectoral initiatives would add a further \$US15bn on top of these gains.

*JEL Classification:* F13, F17

*Keywords:* Doha Development Round, Computable General Equilibrium Models, Trade facilitation

## L'IMPACT ÉCONOMIQUE D'UNE ISSUE FAVORABLE DU CYCLE DE DOHA

## RÉSUMÉ NON TECHNIQUE

Les négociations multilatérales lancées à Doha en novembre 2001 ont atteint un point critique. A la suite de la Ministérielle de juillet 2008, proche d'un accord sur les modalités pour l'accès au marché pour les produits non agricoles (NAMA) et l'agriculture, le travail a continué à Genève mais l'ensemble du dispositif apparaissait en danger à la mi-2011. En avril 2011 les négociations sur le NAMA avaient buté sur la question des initiatives sectorielles. En juin il était clair qu'un bouclage du cycle était impossible d'ici la fin 2011, mais l'espoir subsistait d'obtenir un accord sur un paquet « PMA + » incluant la facilitation des échanges. Mais en septembre même cet objectif paraissait hors de portée et la 8ème Ministérielle de l'OMC de décembre 2011 devrait porter uniquement sur les méthodes pouvant être envisagées pour débloquer les négociations.

Afin de comprendre les raisons du blocage, nous examinons l'impact économique d'une conclusion du Cycle intégrant les propositions les plus récentes utilisées par les négociateurs, y compris les initiatives sectorielles dans le NAMA. Nous proposons également une quantification des gains à attendre d'un accord sur la facilitation des échanges.

Les documents utilisés ici pour évaluer les conséquences des négociations sont complexes et techniques. Ils soulignent l'imagination des négociateurs lorsqu'il s'agit d'atteindre un compromis politiquement acceptable (par exemple en introduisant des flexibilités, en même temps que des engagements compensatoires en termes d'importation, comme les contingents tarifaires). Au final, les conséquences d'un tel accord, qui amènera à des réductions tarifaires différentes pour chaque pays et chaque produit ne peuvent certainement pas être évaluées sans s'appuyer sur une représentation quantitative et détaillée de l'économie mondiale. Le présent article propose une telle évaluation d'impact en utilisant une mesure de la protection aux frontières au niveau le plus détaillé (produit, exportateur, importateur) et en utilisant les formules de coupe proposées dans les négociations. Les droits de douane consolidés et appliqués (qu'ils soient ad valorem, spécifiques, mixtes ou composés) sont mesurés au niveau de la nomenclature à 6 chiffres des échanges (la plus détaillée pour laquelle une information harmonisée est disponible).

Les données disponibles sont tirées des bases GTAP et MAcMap et décrivent l'économie mondiale en 2004. Nous commençons par une première simulation reproduisant la trajectoire de l'économie mondiale entre cette date et 2010. En 2012 (et les années suivantes en fonction des calendriers de réduction de la protection aux frontières), chaque scénario décrit plus bas est mis en œuvre. Le démantèlement tarifaire est étalé sur 5 ans pour les pays développés (10 ans pour les pays en développement). Les pays ayant récemment accédé à l'OMC se voient concéder des périodes plus longues, nous faisons l'hypothèse simplificatrice de 12 ans. Finalement, nous comparons la situation de l'économie mondiale à chaque date de 2013 à

2025 – avec et sans le choc d’ouverture commerciale. Les Pays les Moins Avancés ne réduisent pas leur protection douanière mais étendent la consolidation de leurs droits de douane.

Notre premier scénario s’intéresse à l’effet combiné de la baisse de la protection dans l’agriculture et l’industrie. Les trois piliers de la protection agricole sont concernés, tandis que les droits de douane sur les biens industriels sont abaissés en utilisant les formules suisses contenues dans le texte de 2008 sur les modalités. Notre deuxième scénario y ajoute une baisse, modeste, de 3% de la protection dans les services. Le troisième scénario est notre hypothèse centrale, ajoutant aux deux précédents un programme raisonnable de facilitation des échanges. Le quatrième scénario y ajoute un programme visant à une efficacité portuaire accrue. Le cinquième scénario ajoute au scénario central les initiatives sectorielles sur la chimie, l’électronique et les biens d’équipement. Le sixième scénario ajoute au scénario central l’initiative zéro droit de douane sur les biens environnementaux.

Nous identifions 70 milliards de dollars de gains en 2025, lorsque la libéralisation porte sur les biens agricoles et industriels. Une réduction de 3% de la protection dans les services porterait ces gains à 85 milliards. Un calcul des gains associés à la facilitation des échanges suggère environ un doublement des gains, tandis qu’un programme d’efficacité portuaire ajouterait encore 35 milliards.

Au final, les 187 milliards de gains identifiés ici dans un scénario associant réduction des barrières aux échanges de biens et de services avec des engagements en termes de facilitation des échanges et d’efficacité portuaire s’ajouteraient au PIB mondial chaque année, à moyen terme, relativement à la situation de référence. Les propositions récentes en termes d’initiatives sectorielles ajouteraient modestement 15 milliards de dollars à ces gains.

## RÉSUMÉ COURT

Les impacts attendus de la signature d’un accord dans le cadre du Cycle multilatéral de Doha à l’OMC sont simulés avec un modèle dynamique d’équilibre général calculable représentant l’économie mondiale (MIRAGE). On s’appuie sur les dernières propositions utilisées à la table des négociations, complétées d’une avancée modeste en termes de libéralisation des échanges de services.

La baisse des droits de douane est simulée au niveau fin de 5 113 groupes de produits afin de pouvoir prendre en compte les listes d’exceptions, les flexibilités ainsi que le caractère non linéaire des formules de coupes utilisées. Une baisse des soutiens internes et la suppression des subventions à l’exportation dans l’agriculture sont également simulées. Les gains dynamiques d’ouverture sont intégrés jusqu’à l’horizon de 2025.

Nous identifions 70 milliards de dollars de gains à cet horizon lorsque la libéralisation porte sur les biens agricoles et industriels. Une réduction de 3% de la protection dans les services

porterait ces gains à 85 milliards. Un calcul rapide des gains associés à la facilitation des échanges suggère un doublement des gains, tandis qu'un programme d'efficacité portuaire ajouterait encore 35 milliards.

Au final, les 187 milliards de gains identifiés ici dans un scénario associant réduction des barrières aux échanges de biens et de services avec des engagements en termes de facilitation des échanges et d'efficacité portuaire s'ajouteraient au PIB mondial chaque année, à moyen terme, relativement à la situation de référence. Les propositions récentes en termes d'initiatives sectorielles ajouteraient modestement 15 milliards de dollars à ces gains, au prix d'effets indésirables pour certains pays émergents.

*Classification JEL:* F13, F17

*Mots clés:* Cycle du Développement de Doha, Modèles d'Equilibre Général Calculable, Facilitation des échanges

## ECONOMIC IMPACT OF POTENTIAL OUTCOME OF THE DDA

Yvan Decreux\* &amp; Lionel Fontagné#

INTRODUCTION<sup>1</sup>

The current Round of multilateral trade negotiations that was launched in Doha in November 2001 has reached a critical point. On 19 May 2008, Crawford Falconer, Chairman of the agriculture negotiations, circulated revised draft modalities, and on the same day Don Stephenson released the revised draft negotiating text for Non-Agricultural Market Access (NAMA). Following a Ministerial meeting in July 2008 that came close to reaching agreement on modalities for non-agricultural market access (NAMA) and agriculture, work has continued in Geneva. The collapse in world trade induced renewed interest in re-visiting the Doha Development Agenda (DDA) deal. However, the political willingness to conclude negotiations seemed very uncertain, possibly due to the world financial crisis. In mid-2011 the whole process looked to be very much at risk as the negotiating group on NAMA was confronted by the seemingly irresolvable problem of sectoral initiatives in NAMA. On 29 March 2011, the Director General of the WTO declared that “[it is] time (...), to reflect on the consequences of failure” stating that “The absence of progress in NAMA sectorals constitutes today a major obstacle to progress on to the remaining market access issues”.

By June 2011, it was clear that completion of a comprehensive agreement on all topics was impossible by the end of this year, but it was hoped that agreement could be reached on an “LDC plus” including trade facilitation. On 22 June 2011 the Director General of the WTO suggested focusing on a “December [2011] Ministerial package on trade benefits for the poorest countries”. On 24th June he reiterated this suggestion in Brussels at the World Customs Organization, pointing to the gains to be achieved from facilitating trade for developing countries: “a trade facilitation deal in the Doha Round” would be a “tremendous value for our trading communities and in particular for many of our small and medium enterprises”. Currently, this looks to be in doubt as well, and the 8<sup>th</sup> WTO Ministerial Conference in December 2011 is expected to discuss a more productive way forward in the negotiations.

In order to understand the reasons for the impasse, we conduct an exercise to examine the economic impact of a deal integrating the most recent proposals circulated in the arena of the multilateral trade negotiations, including sectorals in NAMA. This is an important exercise both because the new proposals include even more precise prescriptions than in the 2008 draft

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and because the context has undergone radical changes. The crisis has penalised certain regions of the world to a greater extent, which has required a revision to growth prospects. New Free Trade Areas (FTAs) have also been established. Finally, the emerging economies are reluctant to sign up to the sectoral initiatives, which will have complex impacts when combined with the existing mechanisms to achieve flexibility. We try also to identify the extent of possible windows of opportunity in terms of the gains to be expected from an agreement on trade facilitation.

In this context of possible, perhaps not very plausible, completion of the negotiations, it is extremely important to quantify the potential gains associated with the completion of the Round and how these gains will be shared among countries.

Our exercise reveals impacts that cannot be compared directly with the orders of magnitude associated with *failure* of the Round. In the case of failure, a resurgence of protectionism, either within the strict boundaries of WTO rules (e.g. an increase in tariffs up to their bounds), at the fringes of it (generalising contingent protection), or outside of it (unilateral increases in protection) would have a cost corresponding to a multiple of the gains considered here. Bouët and Laborde (2009-a) measure what would be the consequence of a Doha Round failure, materialising in a worldwide increase in tariffs (up to the tariff bound, for instance). Results show that, were that the case, trade would be reduced by 10%, and welfare would be down by 0.5%.

The documents for assessing the consequences of the negotiations are highly technical and complex documentation, mirroring the degree of imagination among the negotiators to find a politically acceptable deal. A very simple modality, such as use of a non-linear tariff cut formula applied to every tariff line as opposed to negotiation product by product, is a very convenient design. If properly calibrated, such a measure can have an aggressive effect on tariff peaks and, accordingly, greatly reduce induced distortions. It simplifies negotiation over reciprocal concessions among the large number of participating countries. However, exceptions arise due to internal resistance among negotiating countries.<sup>2</sup> Minimum or maximum average cuts are added to the liberalisation scheme. Less strict treatment is proposed for small and vulnerable economies; membership of a customs union implies specific treatments for some members as well as a number of exceptions. Specific issues, such as tropical products or tariff escalation, are addressed by modification to the general pattern of modalities. All these details are taken into consideration in this report.

Ultimately, we have an intricate design: the consequences of such an agreement, leading to cuts that differ by country and by product, certainly cannot be assessed without resorting to a quantitative and detailed representation of the world economy. This report provides an assessment of the impact of these negotiating proposals on the world economy.

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<sup>2</sup> The designation of exceptions must still follow certain rules (e.g. non-concentration clauses).

Our paper adds to the previous literature assessing the economic impact of a successful Doha round.<sup>3</sup> Francois et al. (2005) model two scenarios: a 50% linear reduction in all the measures and a 1.5% reduction in trade costs in anticipation of future work on trade facilitation, and an OECD-based Trade Round where cuts apply only to OECD countries. They obtain a 5% to 11% increase in world trade and a 0.3% to 0.5% increase in world GDP. Compared to this seminal exercise, we provide with more details on actual proposals on the table and model tariff cuts as well as exceptions at the finest level of detail.

Bouët and Laborde (2009-b) conduct a totally different exercise. Instead of mimicking actual modalities discussed in the international negotiation arena, they estimate hypothetical outcomes of the Doha Round. They use a static version of the MIRAGE model and scan the results of 143 different trade shocks, which fall into five categories: import duty cuts, degree of harmonisation adopted in the tariff-reduction formula, provision of Special and Differential Treatment (SDT), global versus sectoral negotiation, and export subsidies. The scenario that maximises world output includes liberalisation in services, an ambitious Swiss formula without SDT, and a 75% reduction in export subsidies. In this scenario, world output grows by 0.4%, equivalent to a gain of \$US127bn.

Bouët and Laborde (2009-b) consider the 2008 proposals. Among the scenarios we simulated the one that is closest to this gives an increase of 1.3% in world exports, and an increase of 0.09% in world GDP. But compared to ours, their simulation does neither include services nor trade facilitation, and sectoral initiatives were not on the table at that time.

Bouët and Laborde (2010) examine five scenarios, namely the 2003 proposals from WTO chairs, the October 2005 G-20 proposal, the EU's contribution in October 2005, the US 2005 proposal and the December 2008 modalities. Compared to this paper, we use the most recent proposals, including sectorals. This is an important step to understand the current blockage of the negotiations. Not all the negotiating parties were prepared to endorse sectoral initiatives that may lead to a reduction of welfare gains for certain emerging economies. But more importantly, the impact of trade facilitation is central in our exercise, and helps alleviating the losses of countries confronted with the consequences of reduced preferential margins.

The rest of the paper is organized as follows. Section 2 presents the modelling assumptions. Overall results are presented in Section 3. Section 4 presents the impacts of our central scenario on 3 broad sectors. Detailed impacts on factor incomes are examined in Section 5. The additional impact of sectoral initiatives, compared to our central scenario, is examined in Section 6. Section 7 concludes.

## 1. SOURCES AND MODELLING ASSUMPTIONS

The intricate nature of the proposals discussed by negotiators, which include numerous exceptions to a series of rules applied at product level, imposes a specific modelling strategy.

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<sup>3</sup> One will find additional references in Piermartini and Teh (2005) for studies on the DDA from 2003 to 2005.

The state of the art is measurement of border protection at the most detailed level possible (product, importer, exporter), and computation of liberalisation resulting from a tariff-cutting formula. Bound and applied duties (whether ad valorem, specific, mixed or compound) need to be measured at the HS-6 product level (the most disaggregated level for which harmonised information is available).

### 1.1. Draft modalities

The “Fourth revision of draft modalities for Non-Agricultural Market Access” published December 2008, updated 21 April 2011, and including updated information on the actual percentage to be applied to different modalities (e.g. “20%” rather than “[5-30]”), and information collected on the option chosen by the main negotiating developing countries are the sources informing our scenarios for the negotiation on non-agricultural goods.<sup>4</sup> Sectoral initiatives concerning chemicals, machinery and electronic products and especially environmental products have increased as a result of pressure from the developed countries. We take these sectoral initiatives into account in additional simulations.

The sources of our data on agricultural goods include draft modalities and the report of the Chairman of the Trade Negotiations Committee dated 21<sup>st</sup> April 2011.<sup>5</sup> We rely on the HS6 tariffs. As exceptions are defined at the tariff line level, it allows more efficient use of flexibilities. This affects the proposals, which allow an additional 2% of HS6 products to be classed as sensitive for countries where protection is defined at the HS6 level. This is in line with previous estimations based on a list of selected products in the EU from the 2,200 Combined Nomenclature 8-digit (CN8) agricultural codes (out of 677 HS6 positions). We add this 2% to all countries that were conceded sensitive products in agriculture. First, each tariff reduction scenario is quantified at country, product and year level before being aggregated with the GTAP classification and introduced in a computable general equilibrium (CGE) model for the global economy. In the context of agriculture, tariff rate quotas (TRQs) are important. Reduced tariffs apply to many lines within quotas (inside tariff), with the outside tariff providing greater protection. This is related to the selection of exceptions. When agriculture tariff lines are classed as sensitive, an additional tariff quota must be opened.<sup>6</sup> Industrial countries have the possibility of limiting the tariff cut to two-thirds of what it would be based on the simple use of tiered formulas, and of compensating for this by a small quota. Alternatively, they can choose to halve the cut and open a larger quota or keep only one third of the cut and open a large quota. Modelling quotas should be done at the HS6-level, but this

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<sup>4</sup> WTO, Negotiating Group on Market Access, document # TN/MA/W/103/Rev.3. The update is published as “textual report by the chairman Ambassador Luzius Wasescha, on the state of play in the NAMA negotiations”,

<sup>5</sup> See WTO, Negotiating Group on Agriculture, documents, WTO, Negotiating Group on Agriculture, document # TN/AG/26.

<sup>6</sup> Since tariff rate quotas are not considered an optimal policy instrument, there have been requests for the opening of new TRQs to be limited. Several options were considered; we adopted the intermediate suggestion proposed at a special session of the Committee on Agriculture (6 December 2008, TN/AG/W/6) that the opening of new TRQs should be limited to a maximum of 1% of agricultural tariff lines.

is very demanding in terms of computing resources.<sup>7</sup> In order to avoid explicitly modelling quotas, we use the outside tariff under the assumption that the quota will quickly be filled as a result of growth in world demand. Given the time horizon considered in our exercise, for most sectors this will be the case. We assume also that countries choose the last option (a one-third cut). The likely impact of this modelling assumption is underestimation of the impact of the DDA on agriculture in the short run, in particular sectors with relatively high tariff protection, such as meat, ethanol, butter and sugar in the EU. For this reason, we do not discuss short run changes; we consider only the long term horizon where this assumption has very little effect.

## 1.2. The MIRAGE model

In the MIRAGE model the demand side is modelled for each region through a representative agent.<sup>8</sup> Domestic products are assumed to benefit from a specific status for consumers, making them less substitutable by foreign products than foreign products among each other. Also, manufactured products originating in developing and developed countries are assumed to belong to different (price or) quality ranges. Hence, the competition among different quality products is less tough than that between products of similar quality. To model the supply side, producers use five factors: capital, labour (skilled and unskilled), land, and natural resources. The structure of value-added is intended to take account of the well-documented skill-capital relative complementarity. The production function assumes perfect complementarity between value-added and intermediate consumption. The sectoral composition of the intermediate consumption aggregate stems from a nested Constant Elasticity of Substitution (CES) function. For each sector of origin, the sector bundle determining the origin of products has the same structure for final and intermediate consumption.

In agricultural sectors, we assume constant returns to scale and perfect competition; in industry and service sectors firms are assumed to face increasing returns to scale and imperfect competition. In relation to market clearing and macroeconomic closure, capital goods are accumulated every year as a result of investments in the most profitable sectors, but capital cannot change its sector allocation once installed. Natural resources are considered to be perfectly immobile and not cumulative, both types of labour are assumed to be perfectly mobile across sectors, and imperfect land mobility is modelled by a constant elasticity of transformation function. Production factors are assumed to be fully employed; thus, negative shocks are absorbed by changes in prices (factor rewards) rather than in quantities. All production factors are immobile internationally. With respect to macroeconomic closure, the current balance is assumed to be exogenous (and equal to its initial value in proportion to world GDP), while real exchange rates are endogenous.

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<sup>7</sup> See Gouël et al. (2011) for an illustration.

<sup>8</sup> The MIRAGE model is described in Decreux and Valin (2007).

### 1.3. GTAP and protection data

MIRAGE relies on GTAP-8 data<sup>9</sup> for 2004. This version of the database is preferred to the 2007 pre-release: the latter contains GDP projections that are already present in the dynamic baseline of MIRAGE, while at the time of the present analysis, trade data had not been updated with actual data. For internal consistency we use our own projections and rely on the trade matrices generated by our model for the period 2004-2007. Tariff data on goods comes from Market Access Map (MAcMap), version HS6-V3, hence, the most granular level of international trade classification of products common to all countries refers to 2004.<sup>10</sup> Tariff equivalents of regulatory barriers to trade in services previously were mainly based on Park (2002). We use here recent estimates by Fontagné et al. (2011).

Protection in services can take two forms. In communication and transport, we assume that it consists of a barrier allowing the selected companies to increase their profit margins to their own benefit. It is modelled as an export tax, thus mostly benefiting the exporting country. In other services it is assumed to be cost-increasing, and is modelled as implying an additional iceberg trade cost. In other words, this cost implies an additional use of all inputs (intermediate consumption and factors) is needed to deliver the service to its final user.

### 1.4. Baseline and modelling of the shocks

The data available in GTAP and in MAcMap describe the 2004 economy. However, we know how the world economy has behaved over the period 2004-2010. The model can be constrained to comply with these macroeconomic observed developments. Accordingly, we run a “pre-experiment” introducing the changes accruing to the world economy between 2004 and 2010. In 2012 (and subsequent years, depending on the timing of phasing out of protection), each of the scenarios described below is implemented. We then compare the situation of the world economy in 2013, 2014...2025, with and without this liberalisation. The reference situation over the whole period is defined by the trajectory of the world economy up to 2013 forecast by the International Monetary Fund (IMF), and from 2013 onwards as forecast by CEPII using a three-factor (labour, capital, energy) growth model (Fouré et al., 2010). In this model, total population and labour force are from the usual sources (International Labour Organization – ILO and United Nations – UN), human capital formation is forecast on the basis of a catching up process, investment relies on savings, savings are derived from a life cycle assumption, and total factor productivity (TFP) and energy efficiency are also forecast.

Population and GDP are imposed on MIRAGE for every country or region and TFP is endogenously adjusting at country level in the pre-experiment, with no difference between sectors.

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<sup>9</sup> See <https://www.gtap.agecon.purdue.edu/> for more details.

<sup>10</sup> Further information on the construction of these data, especially ad valorem equivalents, is provided in Bouët et al. (2008).

Lastly, we perform simulations of the various shocks using these TFP changes as exogenous variables; the oil (and primary resources) price is endogenous in the model and 2004 resources are kept constant. Thus, the oil price is multiplied by 2.2 compared to world GDP price for 2004-2025 in the reference scenario.

Trade barriers are calculated on the 2004 picture of the world economy which takes account of the Indian reform, augmented by the EU-Korea trade agreement.<sup>11</sup>

For the NAMA as well as for agriculture, we model yearly tariff cuts at the product (HS6) and country levels, before aggregation into the regional and sectoral decompositions of the model (see Appendix 1).<sup>12</sup> This takes account of the difference between bound and applied tariffs. In addition, we model the reduction in internal support for agricultural products and the phasing out of export subsidies. Lastly, because we lack precise information on potential liberalisation in services and given the lack of ambition of negotiators in this field, we assume a 3% reduction in protection, limited to all industrialised, most Latin American countries, and Asia except Central Asia. We introduce flexibilities for special and sensitive products; we exempt the LDCs from tariff reductions, consolidate the unbound tariffs, and take account of all additional elements contained in the most recent Draft Modalities (see Appendix 3). Sectoral initiatives are modelled, starting with chemical products. The reference agreement is the Chemical Tariff Harmonisation Agreement (CTHA), which provides for a reduction in chemicals tariffs to 0%, 5.5% or 6.5% for HS Chapters 28 to 39. The products include inorganic and organic chemicals, fertilisers and plant protection chemicals, soaps and cosmetics, other chemicals and plastics. The 1995 agreement is plurilateral.<sup>13</sup> Next is machinery and then electronics. In these two sectors, the more ambitious option is to set the bound tariffs to zero. The EU position is more accommodating than the US and stresses that developing countries should be granted some flexibility even for sectorals.<sup>14</sup> We adopt the European approach. Also there is a published list of environmental goods for which tariffs could be set to zero; we propose a phasing out of the corresponding tariffs in one simulation, based on this list.

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<sup>11</sup> This reduces the gains for Korea from a conclusion of the Round, since most of the liberalisation already applies.

<sup>12</sup> In a global CGE model such as MIRAGE, it is necessary to rely on information at this degree of detail, and for every country in the world vis-à-vis each of their partners. Nevertheless, even this level of detail is an approximation of actual negotiations at the tariff line level. In our exercise, tariffs are averaged across tariff lines within HS6 positions. This inevitably leads to underestimation of the impact of any tariff cut at the tariff line level. Partial equilibrium approaches possibly rely on more detailed data, but they miss an explicit modelling of general equilibrium feed-backs.

<sup>13</sup> Armenia, Australia, Bulgaria, Canada, Chile, Ecuador, EU, Hong Kong, Iceland, Japan, Jordan, Kirgizstan, Republic of Korea, Mongolia, New Zealand, Norway, Oman, Panama, China, Qatar, Singapore, Switzerland, Taiwan, Turkey, United Arab Emirates and the United States.

<sup>14</sup> See EU statement at the TNC, 29 April 2011. This compromise would be threefold. Developed countries eliminate tariffs for all products; developing countries eliminate tariffs for some products and reduce the end-rates generated by the Swiss formula by a further fixed percentage point; in chemicals all developing countries reduce their tariffs to at least the levels of the CTHA-tariff if it is lower than the result of the former rule.

An important issue in the Round is trade facilitation. Although not at the forefront of negotiations, progress on trade facilitation is crucial for developing economies, as we show below. In order to measure the gains that would accrue from the implementation of a trade facilitation programme, we propose a modified MIRAGE model to incorporate trade costs that add up to the ordinary freight costs already present in the model. Data on trade costs are from Minor and Tsigas (2008), based on work for the United States Agency for International Development (USAID).<sup>15</sup> Their measure of trade costs is based on the time necessary to ship a good from a country to another, as provided by the World Bank *Doing Business* reports. Transaction time is divided between time to export and time to import. Within each of these categories, a distinction is made between inland transportation from/to the port, customs procedure time, and time at the port to process the good into/out of the ship. In the World Bank database, time does not depend on the good, but goods are differentiated because the cost of time depends on the product. Minor and Tsigas provide a measure of the daily cost of time as a percentage of the value of the good. The cost of time is evaluated based on the preference for air or sea transport. Data are computed at the detailed level and then aggregated to the GTAP aggregation level weighted by trade.

While we use the daily cost provided by Minor and Tsigas, we update the data on time using the latest available data from the *Doing Business* website. In our experiment, only time at the frontier (customs procedures and time at the port) is reduced. Transportation time to/from the port can vary widely due to the different country sizes, but no improvement has been assumed for this trade cost.

Our trade facilitation experiment consists of dividing by two the processing time exceeding the median level, for each category of trade costs (customs and port).<sup>16</sup> Only members of the WTO engage in the process. In a broader perspective, we consider another experiment where we add an improvement to port efficiency.

After computing the costs before and after trade facilitation at the GTAP level, this information is aggregated using trade as the weights, to match the aggregation level of the study.

In the simulation, we assume that trade facilitation can be achieved at no cost, although countries may incur some costs to implement it, for example, the need to purchase modern equipment to process goods at the ports and to cope with customs procedures. Trade facilitation can also generate a cost by diverting qualified people from other productive sectors. These costs are not incorporated in the model because of the absence of data. However, the gains implied by a rather moderate scenario are quite significant and, thus,

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<sup>15</sup> USAID 2007. "Calculating Tariff Equivalents for Time in Trade", March, downloadable from:  
[http://bizclir.com/cs/calculating\\_tariff\\_equivalents\\_for\\_time\\_in\\_trade](http://bizclir.com/cs/calculating_tariff_equivalents_for_time_in_trade)  
<http://www.nathaninc.com/?downloadid=208>

<sup>16</sup> Actually, performance may vary considerably across regions, so we group countries by continents to compute this median and chose the closest median, world or continent, in order to avoid simulating unrealistic improvements in Europe or Asia.

likely to outweigh any costs within a short period of time.<sup>17</sup> Since industrialised countries also benefit from trade facilitation, they may contribute to the upgrading of developing countries' infrastructures through the "aid for trade" scheme.

A recent addition to the agenda, pushed by the US administration and partially endorsed by the European Commission, is the introduction of sectoral initiatives in the final package for chemical products, electronic products and machinery. There are two possible approaches. One could be to define sectors where sensitive products cannot be chosen, but the liberalisation in these sectors is not necessarily reinforced. The other could be to push forward the liberalisation in certain pre-defined sectors, for example with a zero tariff initiative. In both approaches, products concerned by sectorals cannot be selected as sensitive, so that sensitive products will accrue to other industries. As a consequence, even though sectorals increase overall liberalisation, they cannot be strictly speaking considered as only additional cuts in some sectors: tariffs in other sectors will be cut slightly less. This has to be kept in mind when analysing detailed results as compared to the benchmark simulation. We took account of this element of complexity in our tariff simulation. Sectors of interests are defined based on the lists circulated by the chair on April 21, 2011. We adopt the following strategy for the three sectors.

Chemical products are defined as NAMA products in chapters 28 to 39. Tariffs are set to 0 in 5 years in developed countries. Developing members can bind 4% of national chemical tariff lines at 4%, provided that they do not exceed 4% of the total value of the Member's chemical products imports; this result is to be achieved in 10 years.

For machinery defined as agricultural equipment, construction equipment, power generating machinery and equipment and pumps, valves, compressors and filtration equipment tariffs are set to 0 in 4 years in developed countries. Developing countries can bind up to 4% of national industrial tariff lines at 5%, provided that they do not exceed 4% of the total value of the Member's industrial machinery imports; liberalisation is to be achieved in 7 years.

For electronics tariffs are reduced to 0 in 3 years by developed countries, while developing members can bind up to 5% of national electronics tariff lines at 5%, provided that they do not exceed 5% of the total value of the Member's electronics imports and should reduce their tariffs in 5 years.

This tariff cut concerns all developed countries (including Korea) and the following developing: Argentina, Brazil, Chile, Colombia, Peru, Paraguay, Uruguay, Mexico, China, India, Indonesia, Malaysia, Philippines, Taiwan, Thailand. As for environmental goods, we use the official list of corresponding products and implement a zero tariff initiative.

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<sup>17</sup> See the recent and extensive work by OECD discussed above.

### 1.5. The different scenarios

The scenarios proposed here are defined in terms of product categories and initiatives. There are two product categories: agricultural and non-agricultural. Services are treated separately (they do not belong to the GATT). Agricultural (raw agricultural and food) products correspond to 677 HS6 products in the HS classification of 1996 used in the tariff database MAcMap. Fisheries are part of NAMA. Japan, Switzerland, Tunisia and Turkey apply a slightly different list.

Table 1 summarises the different shocks introduced in the exercise. Phasing out is linearly applied over a 5 years period for developed countries (10 years for developing countries). Recently acceded members are conceded longer periods; we make the simplifying assumption of 12 years. This tariff cut concerns all developed countries (including Korea) and the following developing countries: Argentina, Brazil, Chile, Colombia, Peru, Paraguay, Uruguay, Mexico, China, India, Indonesia, Malaysia, Philippines, Taiwan, Thailand. Least Developed Countries are not asked to reduce their tariffs; they just increase the binding coverage. They also benefit from the 97% initiative according to which 97% of their tariff lines will be open to export by developed countries, with 0 tariffs and no quota. Note that this initiative has no impact in the EU case, due to the Everything but Arms initiative.

The first scenario concerns the effects of the modalities for agriculture and the NAMA. The three pillars for agriculture are introduced while NAMA uses the coefficients for the Swiss formula as contained in the 2008 draft modalities text. The second scenario adds a 3% reduction in protection on trade in services. The third scenario should be considered the central scenario in this exercise: it combines liberalisation of trade in goods and services with a rather ambitious scenario in terms of trade facilitation. The next three scenarios are benchmarked systematically against this central scenario. The fourth scenario adds improvements to port efficiency. The fifth scenario adds the sectoral initiatives on chemicals, electronic products and machinery. The sixth scenario adds an initiative on environmental goods.<sup>18</sup>

**Table 1: Description of the scenarios**

	Agric. +NAMA	+ Services	+ Trade facil <sup>o</sup>	Port efficiency	Chemicals electronics machinery	Envt.
<b>S1 Goods</b>	x					
<b>S2 Goods &amp; serv.</b>	x	x				
<b>S3 Central</b>	x	x	x			
<b>S4 Port</b>	x	x	x	x		
<b>S5 Sectoral</b>	x	x	x		x	
<b>S6 Environment</b>	x	x	x			x

<sup>18</sup> We use the WTO list of environmental products. See Committee on Trade and Environment Special Session, 21 April 2011.

## 2. OVERALL RESULTS OF THE CENTRAL SCENARIO

Table 2 shows the overall impact of the main simulation scenarios. The long run effect of the envisaged trade liberalisation in goods (only) amounts to 0.09% of world GDP annually (\$US70bn in 2025).<sup>19</sup> There is an overall increase in world exports of goods of 1.25%, or \$US230bn, as a result of the series of flexibilities introduced. Below, we consider the impact of sectoral initiatives, separate from the central and more plausible completion of the Round scenario. Given the very conservative assumption of a 3% liberalisation in certain services, limited to certain importers, we add \$US15bn gains in world GDP. In trade terms, changes are more important: we obtain an additional \$US34bn world trade. When we add the gains from trade facilitation (more efficient customs procedures only), we can expect a further \$US68bn annual increase in world GDP from 2025 onwards. This is a very important issue, in particular because a large part of the additional gains would accrue to developing economies.

**Table 2: World GDP and exports long run changes from the baseline**

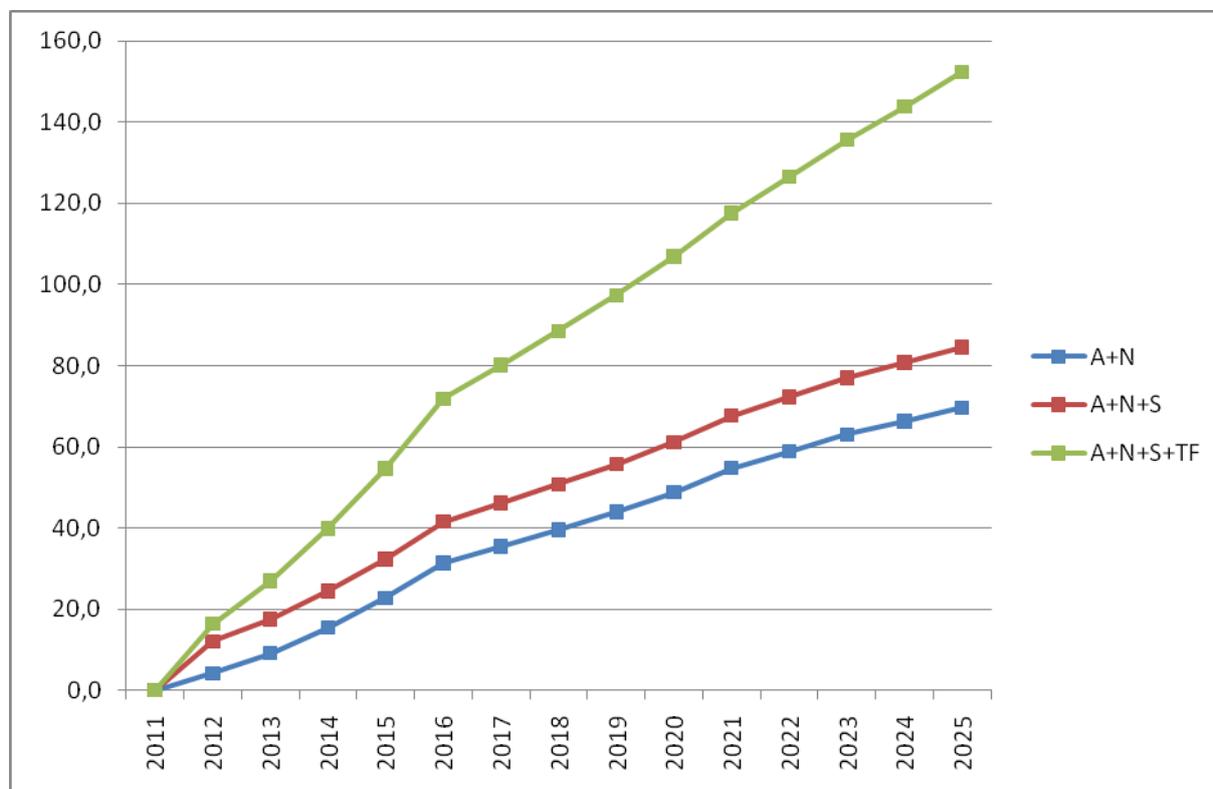
	Agric + NAMA	+ Services	+ Trade Facilitation
World exports %	1.25	1.44	1.95
USD bn	230	264	359
World GDP %	0.09	0.11	0.20
USD bn	70	85	152

*Note:* Long run is 2025. Gains are in constant (2004) dollars, relative to 2025 economic values.

*Source:* Author's calculation using MIRAGE

Figure 1 shows the evolution of annual GDP gains during the implementation of the DDA. In dynamic terms, the gains are equally distributed over the period, especially in the case of goods and services liberalisation. However, the inclusion of trade facilitation results in other important gains. There is a jump in the first year, which accounts for a third of the total expected gains. Also, the slopes of the curves are steeper than in the case of liberalisation in goods and services only. The inclusion of trade facilitation allows large gains, which accumulate more quickly over the years.

<sup>19</sup> In this paper, "long run" implies year 2025 even though dynamic welfare/GDP gains will continue for longer, leading to slightly larger actual long term gains (see Figure 1). Percentage deviations are translated into \$US on the basis of current year value (for GDP, exports, etc.) at constant 2004 prices. Hence, the long run gain in \$US is the annual deviation from the baseline in 2025, at constant prices.

**Figure 1: Yearly USD bn gains in GDP, 2011-2025**

Note concerning the scenarios:

A+N: Agriculture and NAMA (scenario 1).

A+N+S: Agriculture, NAMA and Services (scenario 2).

A+N+S+TF: Agriculture, NAMA, Services and Trade facilitation (scenario 3: central).

All values correspond to changes in current GDP at constant (2004) prices.

Source: Author's calculation using MIRAGE

Table 3 presents these long term GDP gains at regional or country level (see country aggregation in Appendix A1). In dollar terms, the EU and China reap each 22% of world gains from a goods-and-services scenario. US gains are less spectacular (7% of world gains) compared to its relative size in the world economy. Three regions suffer small losses: the Caribbean, Mexico and the Sub-Saharan countries. However, in two of these regions (Caribbean and Sub-Saharan Africa – SSA) trade facilitation makes it possible to reap gains from this Round. Introducing port efficiency does not change the results qualitatively, but adds another \$US34bn to world GDP. All countries gain, and the main beneficiaries of liberalisation are China and the EU.

The United States and the Association of Southeast Nations (ASEAN) also benefit (but to a lesser extent) from the scenario combining liberalisation in agriculture and industry, with 8%

and 9% of World gains respectively. Japan draws most of its benefit from the liberalisation of trade in goods, reaping 15% of World gains in this scenario.<sup>20</sup> The EU benefits most from liberalisation in services. SSA gains \$US6.4bn of GDP from trade facilitation.

**Table 3: Long run deviation from the baseline, GDP, USD mn**

	Goods	+ Services	+ Trade Facilitation
<b>Argentina</b>	694	730	890
<b>ASEAN</b>	6,492	7,319	12,973
<b>Australia &amp; New Zealand</b>	1,401	1,545	1,714
<b>Brazil</b>	366	456	2,044
<b>Canada</b>	859	1,197	1,302
<b>Caribbean</b>	-718	-696	131
<b>China</b>	15,981	18,443	36,465
<b>EFTA</b>	7,289	7,669	7,669
<b>European Union</b>	11,847	18,571	30,731
<b>India</b>	3,821	4,328	6,932
<b>Japan</b>	10,194	10,703	13,772
<b>Korea</b>	635	887	4,512
<b>Mexico</b>	-473	-353	-296
<b>North Africa</b>	1,062	1,150	1,279
<b>Rest of Africa (except South Africa)</b>	-549	-394	6,024
<b>Rest of Mercosur</b>	438	480	889
<b>Rest of South America</b>	977	1,057	2,533
<b>Rest of South Asia</b>	454	582	1,412
<b>Rest of World</b>	1,001	1,809	7,390
<b>Taiwan</b>	2,498	2,622	4,524
<b>USA</b>	5,344	6,450	9,480
<b>World</b>	<b>69,615</b>	<b>84,552</b>	<b>152,370</b>

*Note:* Long run is 2025. Gains are in constant (2004) dollars, relative to 2025 economic values.

*Source:* Author's calculation using MIRAGE

In addition to changes in the amounts of GDP, individual countries may be affected by terms of trade changes and by efficiency gains or losses. This can be examined using the decomposition of welfare changes in Table 4. Taiwan, Japan, the ASEAN and the North

<sup>20</sup> Detailed analysis reveals a very significant increase of Japanese car production as a result of Doha.

African countries benefit from sizeable gains in allocative efficiency due to specialisation in activities in which they have advantages. This contributes to the GDP gains observed earlier. However, for the North African countries these gains are reduced due to terms of trade losses, yielding an overall negative welfare gain.<sup>21</sup>

Terms of trade are also adversely affected in Mexico and Canada, two countries that currently generally benefit from the North-American Free Trade Agreement (NAFTA). However, only Mexico experiences a welfare loss (-0.15% for Mexico, compared to 0.02% for Canada). Korea experiences only a small improvement in welfare since most trade liberalisation applies in the reference scenario which integrates the recent EU-Korea agreement.

The case of Sub-Saharan Africa is important for the Round and deserves additional comment. It should be remembered that this region does not liberalise overall (or only to a very small extent), due to the combined presence of LDCs, Paragraph 6 Annex b countries and other flexibilities conceded to developing countries. In simple bilateral liberalisation schemes, it is usually assumed that a country which opens less benefits from terms of trade gains, to the detriment of its partner. In a multilateral framework however, things are not so simple. In particular, improved market access is usually more limited for SSA countries, which already benefit from preferential schemes in some important markets. The improved market access granted to SSA countries' competitors actually works to decrease some of the SSA countries' export prices, leading to terms of trade losses even in the absence of liberalisation. This could result in reduced domestic production in several industries, increased average costs and less variety for local and foreign consumers. However, the introduction of trade facilitation yields very large welfare gains for the SSA region (up to 0.5% of GDP). Nevertheless, these results are very conservative compared to Minor and Tsigas's (2008) estimates, which show GDP gains of 1.1% to 4.2%.

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<sup>21</sup> Due to the computation of GDP at constant prices, short-term GDP evolutions are not affected by terms of trade. However, terms of trade affect a country's capacity to invest, so they will translate into dynamic GDP gains or losses in the long run.

**Table 4: Decomposition of long run welfare gains (agric. + NAMA + services), percent**

	Welfare	<i>Of which</i>					
		Allocation efficiency	Capital accumulation	Land supply	Terms of trade	Variety	Other
Argentina	0.23	0.09	0.09	0.04	0.05	-0.03	-0.00
ASEAN	0.56	0.11	0.21	0.01	0.15	0.01	0.09
Australia & New Zealand	0.15	0.05	0.04	0.03	0.06	-0.02	-0.00
Brazil	0.03	0.07	0.01	0.02	0.02	-0.06	-0.04
Canada	0.02	0.06	-0.00	0.01	-0.03	-0.02	0.01
Caribbean	-0.11	0.01	-0.02	0.01	0.04	-0.05	-0.11
China	0.19	0.04	0.10	0.00	0.06	0.01	-0.01
EFTA	0.84	0.66	0.09	-0.02	0.04	0.03	0.04
European Union	0.06	0.08	-0.00	-0.00	-0.06	0.00	0.05
India	0.15	0.06	0.04	0.00	0.01	0.01	0.02
Japan	0.32	0.09	0.03	-0.00	0.07	0.02	0.10
Korea	0.07	0.08	0.02	-0.00	-0.00	-0.07	0.04
Mexico	-0.15	0.07	-0.03	0.01	-0.10	-0.03	-0.07
North Africa	-0.13	0.19	-0.01	0.01	-0.18	-0.08	-0.07
Rest of Africa (except South Africa)	-0.10	0.00	-0.02	0.00	-0.05	-0.02	-0.02
Rest of Mercosur	0.16	0.05	0.06	0.01	0.10	-0.00	-0.06
Rest of South America	0.21	0.02	0.08	0.04	0.07	-0.01	0.01
Rest of South Asia	0.14	0.02	0.05	0.01	0.06	0.01	-0.01
Rest of World	-0.00	0.01	0.00	0.00	-0.03	0.00	0.00
Taiwan	0.44	0.24	0.10	0.00	0.01	0.03	0.07
USA	0.03	0.02	0.00	-0.01	-0.04	0.00	0.04

Source: Author's calculation using MIRAGE

While a reduction in tariff barriers generally deteriorates terms of trade for the opening economy, the converse is true when a country facilitates imports. Trade facilitation data and our scenario assumption suggest that a trade facilitation programme in the SSA countries would mostly reduce the time to import goods, making imported goods cheaper for importers compared to exported goods. Hence, terms of trade gains improve (+0.1%) if trade facilitation is added, as shown in Table 5. In the absence of trade facilitation, terms of trade are deteriorating for this region. Also, capital accumulation is encouraged and contributes to half of the recorded welfare gains for SSA.

**Table 5: Decomposition of long run welfare gains (agric. + NAMA + services + TF), percent**

	Welfare	Allocation efficiency	Capital accumulation	<i>Of which:</i>			
				Land supply	ToT	Variety	Trade-cost (exporter)
<b>Argentina</b>	0.24	0.08	0.09	0.04	0.03	-0.03	0.04
<b>ASEAN</b>	0.84	0.13	0.31	0.01	0.13	0.03	0.15
<b>Austr. New Z</b>	0.13	0.05	0.04	0.03	0.03	-0.03	0.01
<b>Brazil</b>	0.10	0.08	0.04	0.03	-0.01	-0.06	0.05
<b>Caribbean</b>	0.04	0.02	0.01	0.01	0.05	-0.04	0.04
<b>China</b>	0.40	0.05	0.20	0.00	0.14	0.04	0.03
<b>EFTA</b>	0.78	0.66	0.08	-0.02	-0.00	0.03	0.03
<b>EU</b>	0.12	0.08	0.01	-0.00	-0.07	0.00	0.05
<b>India</b>	0.24	0.07	0.06	0.00	0.02	0.01	0.03
<b>Japan</b>	0.35	0.10	0.04	-0.00	0.05	0.02	0.05
<b>Korea</b>	0.27	0.10	0.06	-0.00	-0.12	-0.05	0.17
<b>Mexico</b>	-0.16	0.07	-0.03	0.02	-0.11	-0.03	0.01
<b>North Africa</b>	-0.17	0.20	-0.01	0.01	-0.21	-0.08	0.02
<b>Canada</b>	-0.00	0.06	-0.01	0.01	-0.06	-0.02	0.02
<b>Rest of Africa</b>	0.45	0.07	0.22	0.01	0.07	0.03	0.04
<b>R.o Mercosur</b>	0.22	0.06	0.08	0.01	0.11	-0.00	0.05
<b>R.o South Am.</b>	0.41	0.03	0.15	0.05	0.07	-0.00	0.09
<b>R.o South Asia</b>	0.28	0.03	0.09	0.01	0.08	0.01	0.05
<b>R.o World</b>	0.05	0.03	0.03	0.00	-0.05	0.00	0.04
<b>Taiwan</b>	0.64	0.26	0.13	0.00	-0.14	0.07	0.23
<b>USA</b>	0.05	0.02	0.00	-0.01	-0.03	0.01	0.01

Note: ToT: Terms of Trade

Source: Author's calculation using MIRAGE

The inclusion of port efficiency in our scenario adds to the expected outcomes. The results (not reported here) show that welfare would increase by more than 0.8% in SSA, driven mainly by allocation efficiency and capital accumulation gains.

### 3. SECTORAL IMPACT OF THE CENTRAL SCENARIO

We should also discuss some sectoral and regional results of a central scenario combining liberalisation in agriculture and services as defined above, with the NAMA and trade facilitation.

Table 6 shows percent changes in the value of exports for the different regions in the three broad sectors of interest: agriculture, industry and services.

In agriculture, the two main beneficiaries of the DDA in terms of exports are Australia and New Zealand (+13.7%) and North Africa (+15.8%). Brazil also gains in agriculture in this Round (+8.7%) but less than China in percentage terms given the initial levels. The second largest gains in industrial exports behind Asia (in the range of +3 to +4% for China, ASEAN, Korea and Japan) are in the EU and in the US (+3.4% for each region). Industrial exports in Argentina and Canada retrench due to the agricultural specialisation of the two countries. Interestingly, North Africa increases strongly its export of services, but from low levels.

**Table 6: Long run change in the value of exports (agric. + NAMA + Services + TF), percent**

	Agriculture	Industry	Services
<b>Argentina</b>	4.86	-0.47	1.11
<b>ASEAN</b>	4.43	3.64	-2.62
<b>Australia &amp; New Zealand</b>	13.75	0.83	0.67
<b>Brazil</b>	8.75	0.72	1.15
<b>Canada</b>	7.62	-0.59	2.52
<b>Caribbean</b>	6.26	1.21	-0.17
<b>China</b>	9.63	3.03	-0.28
<b>EFTA</b>	6.35	1.16	2.56
<b>European Union</b>	6.42	3.47	2.17
<b>India</b>	4.63	2.09	0.42
<b>Japan</b>	7.99	4.73	-2.93
<b>Korea</b>	7.37	4.19	-0.88
<b>Mexico</b>	6.36	0.77	3.20
<b>North Africa</b>	15.80	2.42	6.88
<b>Rest of Africa (except South Africa)</b>	3.81	1.88	2.63
<b>Rest of Mercosur</b>	9.63	1.37	3.47
<b>Rest of South America</b>	6.19	0.77	-0.33
<b>Rest of South Asia</b>	4.46	2.11	-0.99
<b>Rest of World</b>	2.90	0.36	2.49
<b>Taiwan</b>	3.69	2.75	-1.54
<b>USA</b>	-1.29	3.42	1.90

Source: Author's calculation using MIRAGE

Appendix 4 shows the combined impacts of changes in exports, imports and demand, for every detailed sector. Changes in production are deduced from these three components.

Internal demand is less sensitive than trade to price changes, and generally represents a large proportion of total demand. Consequently, changes in production are cushioned compared to trade variations.

In terms of overall agricultural production, Australia and New Zealand benefit the most from increased exports because they are more open to international trade (Table 7). Brazil, Argentina and Canada come next. EU production reduces by 1.2%. Japan experiences a 4% decrease in agricultural production. Due to their very strong initial protection, the EFTA countries face the strongest reduction for agriculture production and reorient their resources toward the other sectors. China and India are hardly affected.

**Table 7: Long run change in the volume of production (agric. + NAMA + Services + TF), percent**

	Agriculture	Industry	Services
<b>Argentina</b>	2.91	-1.31	0.13
<b>ASEAN</b>	0.41	1.15	0.03
<b>Australia &amp; New Zealand</b>	6.50	-1.76	-0.05
<b>Brazil</b>	3.48	-1.18	-0.03
<b>Canada</b>	2.55	-0.71	-0.00
<b>Caribbean</b>	0.78	-0.26	-0.04
<b>China</b>	0.07	0.41	0.18
<b>EFTA</b>	-18.42	0.90	0.49
<b>European Union</b>	-1.16	-0.05	0.09
<b>India</b>	0.10	0.20	0.09
<b>Japan</b>	-4.09	1.34	-0.01
<b>Korea</b>	-0.27	0.32	-0.06
<b>Mexico</b>	0.56	-0.38	-0.06
<b>North Africa</b>	1.10	-1.17	0.17
<b>Rest of Africa (except South Africa)</b>	0.29	-0.02	0.48
<b>Rest of Mercosur</b>	0.79	-0.41	0.22
<b>Rest of South America</b>	1.71	-0.59	0.15
<b>Rest of South Asia</b>	0.26	0.39	0.05
<b>Rest of World</b>	0.13	-0.12	0.10
<b>Taiwan</b>	-0.10	0.78	0.14
<b>USA</b>	-0.76	0.05	0.02

Source: Author's calculation using MIRAGE

In aggregate industry, all variations of regional level production are below 2% (in absolute terms), the main winners being ASEAN, Japan and Korea. Australia, New-Zealand and Brazil show value added losses in this sector, compensating for their gains in agriculture. Canada, the Caribbean countries and Mexico are also negatively affected by losing their initially favourable access to the US market for industrial goods. Asia is the largest gainer from these changes. The US and European industries show a negligible impact on industrial production.

Production of services is less affected, with variations of less than 1% (in absolute terms) as a result of the Round's limited ambitions for services.

#### 4. DETAILED IMPACTS ON FACTOR INCOMES OF THE CENTRAL SCENARIO

The changes in specialisation and related changes in value added induce displacement of workers across sectors, and a progressive reorientation of the capital stock towards the most competitive activities. Since not all activities displace or attract skilled and unskilled workers in equal proportions, there will be excess demand (or supply) in a given type of labour which will translate into an increase (decrease) in related wages. This mechanism is based on the assumption of a flexible labour market and no unemployment. Note that substitutions will occur not only between skills, but also between factors (e.g. capital substituted by labour). These substitutions cushion the changes in factor returns, with factors in less demand becoming relatively cheaper and more intensively used.

Ultimately, changes in factor incomes will occur as the result of the different factor proportions in the different activities. Table 8 reports changes in the returns to skilled and unskilled labour in the different regions, over the long run, for the different components of our central scenario.

Unskilled wages are penalised by reduced production in Mexico in each scenario. Again, this can be explained by loss of preferences. Large gains are expected in the ASEAN countries (+1.2%) and SSA countries (+1.9%), based on the introduction of Trade Facilitation measures. Substantial gains are expected also in Taiwan (+0.9%). In the US, the effect is negligible (+0.1%), and rather small for the EU (+0.2%), Canada (+0.1%), Brazil (+0.1%) and Argentina (+0.3%).

The wages for skilled workers increase almost everywhere (with the exception of Mexico) when the effects of liberalisation in agriculture, industry, services and trade facilitation are combined. The gains are small in Korea 0.6%, in the US, Australia and New-Zealand 0.2% and in the EU 0.4%. Trade facilitation benefits the SSA and ASEAN countries the most, with gains of 2.3% and 1.3% respectively.<sup>22</sup>

<sup>22</sup> In unreported results we observe that countries specialised in agriculture, such as Australia, New Zealand and Canada, and also in South America, the returns to land increase by at least 2% in the long run (up to 3% in Brazil and

**Table 8: Long run percent change in real wages**

	Skilled			Unskilled		
	(1) agric. + NAMA	(2) + Services	(3) + Trade Facilitation	(1) agric. + NAMA	(2) + Services	(3) + Trade Facilitation
Argentina	0.17	0.19	0.17	0.30	0.32	0.29
ASEAN	0.56	0.64	1.33	0.87	0.91	1.20
Australia & New Zealand	0.09	0.11	0.19	0.37	0.40	0.46
Brazil	-0.11	-0.11	0.02	0.01	0.02	0.13
Canada	0.01	0.04	0.13	0.03	0.05	0.14
Caribbean	-0.18	-0.17	0.09	0.11	0.11	0.25
China	0.40	0.43	0.87	0.44	0.46	0.71
EFTA	1.30	1.37	1.42	0.68	0.74	0.78
European Union	0.13	0.18	0.38	0.06	0.10	0.22
India	0.24	0.26	0.30	0.23	0.25	0.24
Japan	0.57	0.59	0.68	0.35	0.36	0.43
Korea	0.27	0.32	0.59	0.39	0.42	0.59
Mexico	-0.24	-0.24	-0.23	-0.09	-0.07	-0.07
North Africa	-0.11	-0.10	0.63	-0.14	-0.13	0.62
Rest of Africa (except South Africa)	-0.18	-0.16	2.28	0.01	0.01	1.85
Rest of Mercosur	0.02	0.05	0.10	-0.08	-0.06	-0.05
Rest of South Am.	0.13	0.15	0.43	0.26	0.29	0.48
Rest of South Asia	0.09	0.13	0.32	0.12	0.16	0.29
Rest of World	-0.01	-0.00	1.20	-0.01	-0.01	1.19
Taiwan	0.64	0.64	0.95	0.68	0.68	0.91
USA	0.11	0.12	0.20	0.01	0.03	0.08

Source: Author's calculation using MIRAGE

## 5. SECTORAL INITIATIVES

In three broad sectors (chemicals, machinery, electronics) several WTO members are keen to open global markets further (excluding LDCs) through sectoral initiatives. There is also a separate initiative for environmental goods. In our analysis, we make the assumption that these initiatives will be endorsed by all developed countries (including Korea) and also (we assume optimistically) a number of developing countries, such as Argentina, Brazil, Chile,

3.6% in Canada). This contrasts with the decrease in the returns to land for the US, EU and Japan (-7% on average), and the huge 39% decrease for EFTA. Real returns to land in Asia and India are barely affected in any of the scenarios: changes never exceed 1% in absolute terms. Changes in the returns to capital are limited throughout these regions, and never reach 1%.

Colombia, Peru, Paraguay, Uruguay, Mexico, China, India, Indonesia, Malaysia, Philippines, Taiwan and Thailand.<sup>23</sup>

The first four columns of Table 9 report the long run change in the volume of trade (in bn USD), associated with the scenarios discussed above. Column (1) presents the long run changes in world trade of agricultural and industrial goods and services compared to the baseline, associated with the three pillars of the negotiation in agriculture and the NAMA. The \$US2.6bn increase in trade in services is a pure general equilibrium effect. Table 9, column (2) includes limited liberalisation in services. Again, we observe small general equilibrium effects on trade in goods. Column 3 shows the central scenario. The impact of trade facilitation is shared among agricultural and industrial goods, and general equilibrium effects on trade in services are visible again. Columns 4, 5 and 6 must be compared to Column (3). Column (4) reports the results for port efficiency.

The last two columns of Table 9 report the long run change in the volume of trade for the two sectoral initiatives. They must be compared with Column (3). Table 9 Column (5) shows the \$US145.6bn increase in trade in industrial goods, when the first sectoral initiative (chemicals, machinery, electronics) is added. The general equilibrium effects on agriculture are still visible, though limited, and there is no effect on trade in services. In Column 6, the first version of the sectoral initiative on environmental goods is added to the central scenario. Its impact on trade is negligible overall (\$US23.6bn or an additional 8%), compared to the central scenario. Gains are in line with the limited product coverage of this proposal (168 HS6 lines compared with machinery 430, electronics 440 and chemicals 910 lines).

**Table 9: Long run change in the volume of trade (bn USD)**

	(1)	(2)	(3)	(4)	(5)	(6)
	Agric+NAMA	+ Services	+ Trade facilitation	Port efficiency	Mach- Chem- Electn.	Envt. zero
<b>Agriculture</b>	32.28	32.51	36.70	38.83	37.83	36.86
<b>Industry</b>	194.94	195.95	285.41	330.30	430.96	308.96
<b>Services</b>	2.61	35.23	36.42	37.28	36.41	36.27

*Note:* (1) agriculture + NAMA; (2) agriculture + NAMA + services; (3) agriculture + NAMA + services + trade facilitation; (4) agriculture + NAMA + services + trade facilitation + port efficiency; (5) agriculture + NAMA + services + trade facilitation + sectorals except environmental goods; (6) agriculture + NAMA + services + trade facilitation + zero tariffs initiative on environmental goods

*Source:* Author's calculation using MIRAGE

<sup>23</sup> Recall that in the WTO arena, Korea is considered a developed country for industrial goods, but not for agricultural goods.

Table 10 examines how the sectoral initiatives translate into changes in welfare changes for the regions. First we consider the effects of the sectoral initiative on chemicals, machinery and electronics. The additional effects of this sectoral initiative are limited to Japan, Korea, EFTA and the Caribbean. Indian welfare gains are largely reduced due to terms of trade deterioration. Australia and New Zealand, and the Rest of Latin America gain slightly less than in our central scenario. For the remaining countries, this scenario does not add to welfare gains, despite the large increase in world trade. The second sectoral initiative is about environmental goods. It hardly changes the previous results due to the limited coverage of products.

**Table 10: Long run change in welfare (percent deviation from baseline)**

	(1)	(2)	(3)	(4)	(5)	(6)
	Agric+N AMA	+ Services	+ Trade facilitation	Port efficiency	Mach Chem Electr	Envt
<b>Argentina</b>	0.22	0.23	0.24	0.24	0.23	0.23
<b>ASEAN</b>	0.52	0.56	0.84	1.09	0.84	0.84
<b>Australia &amp; New Zealand</b>	0.12	0.15	0.13	0.14	0.07	0.07
<b>Brazil</b>	0.00	0.03	0.10	0.11	0.09	0.09
<b>Canada</b>	-0.00	0.02	-0.00	-0.01	-0.01	-0.01
<b>Caribbean</b>	-0.09	-0.11	0.04	0.06	0.06	0.06
<b>China</b>	0.17	0.19	0.40	0.42	0.39	0.39
<b>EFTA</b>	0.79	0.84	0.78	0.75	0.83	0.83
<b>European Union</b>	0.03	0.06	0.12	0.13	0.12	0.12
<b>India</b>	0.12	0.15	0.24	0.30	0.04	0.04
<b>Japan</b>	0.30	0.32	0.35	0.36	0.46	0.47
<b>Korea</b>	0.04	0.07	0.27	0.30	0.30	0.29
<b>Mexico</b>	-0.16	-0.15	-0.16	-0.17	-0.25	-0.26
<b>North Africa</b>	-0.13	-0.13	-0.17	-0.21	-0.17	-0.19
<b>Rest of Africa (except South Africa)</b>	-0.11	-0.10	0.45	0.81	0.46	0.46
<b>Rest of Mercosur</b>	0.13	0.16	0.22	0.81	0.25	0.26
<b>Rest of South America</b>	0.18	0.21	0.41	0.75	0.36	0.35
<b>Rest of South Asia</b>	0.09	0.14	0.28	0.39	0.26	0.26
<b>Rest of World</b>	-0.01	-0.00	0.05	0.20	0.06	0.06
<b>Taiwan</b>	0.45	0.44	0.64	0.67	0.52	0.54
<b>USA</b>	0.01	0.03	0.05	0.06	0.05	0.05

*Note:* (1) agriculture + NAMA; (2) agriculture + NAMA + services; (3) agriculture + NAMA + services + trade facilitation; (4) agriculture + NAMA + services + trade facilitation + port efficiency; (5) agriculture + NAMA + services + trade facilitation + sectorals except environmental goods; (6) agriculture + NAMA + services + trade facilitation + zero tariffs initiative on environmental goods

*Source:* Author's calculation using MIRAGE

## CONCLUSION

The simulations in this paper are based on an updated version of the negotiated DDA draft modalities. They propose a representation of the impact of liberalised market access and reduction in farm support, taking account of the various formulas, exceptions and flexibilities. In the absence of more detailed information on the possible outcome of negotiations on these issues, we add a reduction in trade barriers in services. Trade facilitation, port efficiency and sectoral initiatives are considered. These shocks to the world economy are introduced in MIRAGE, a dynamic CGE model, and we compare the trajectory of the world economy to 2025, to a dynamic baseline in the absence of final agreement in the Round. We provide results for 21 regions and 26 sectors of the world economy.

Given the political economy of the negotiations, various exceptions and flexibilities limit the impact of the Swiss formula on manufacturing, and of the tiered formula on agriculture. Also, several countries are exempt from liberalisation. However, the final mix of rules and exemptions submitted by the chair persons would lead to a non-negligible impact on the world economy and also to a positive outcome in terms of GDP for all regions, if not a systematic welfare gain.<sup>24</sup> Our simulations point to a \$US70bn world GDP gain if agriculture and industry were to be liberalised. Moderate liberalisation in services would add another \$US15bn to world GDP over the long run. These gains would be added to world GDP every year over the long run compared to the situation without agreement. In addition, trade facilitation would result in some \$US67bn gains each year to world GDP over the long term, and port efficiency would add a further \$US35bn. However, we modelled gains, not the costs of the facilitation programme: its success will be conditional on the finalisation of a costly Aid for Trade package. Sectoral initiatives do not add much to world gains and reduce the gains to be expected by India.

The above figures are tiny percentages of the world GDP or commerce: overall, the limited gains to be expected from the completion of the Round, even when dynamic gains are present as in this exercise, help understanding the difficulties to conclude.

There are three caveats to our exercise, despite the attention paid to the details of the negotiations. Firstly, the final outcome of the negotiation may include additional items not modelled here. This is the case for modes 3 and 4 of the General Agreement on Trade in Services (GATS), an increase in business security and transparency due to additional commitments and lower bindings, an improvement in the rules managing world trade. Secondly, the cost of *not* signing a final agreement is not just reversal of the gains computed here; an agreement around current proposals would significantly lower bound tariffs and would extend the consolidation coverage (Bouët and Laborde, 2008). Also, a move towards regionalism and bilateralism would be unavoidable in the case of failure of the Round, with associated trade diversion effects. Thirdly, the credibility of the regulatory architecture developed under the umbrella of the WTO would be put at risk were negotiations to fail.

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<sup>24</sup> Mexico gains in terms of GDP when sectoral initiatives are considered. Other regions systematically gain when trade facilitation is included.

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## APPENDIX 1: REGIONAL AGGREGATION

<b>Region</b>	<b>Composition</b>
1 EU27	
2 USA	
3 Canada	
4 Japan	
5 EFTA	EU27 Switzerland Norway Iceland Liechtenstein
6 Australia & New Zealand	
7 Korea	
8 Taiwan	
9 China	
10 India	
11 Rest of South Asia	Bangladesh Pakistan Sri Lanka Afghanistan Bhutan Maldives Nepal
12 ASEAN	
13 Mexico	
14 Brazil	
15 Argentina	
16 Rest of Mercosur	Paraguay Uruguay
17 Rest of South America	Peru Bolivia Equator Colombia Venezuela Guyana Suriname
18 Caribbean	
19 North Africa	Morocco Algeria Tunisia Libya Egypt
20 Rest of Africa	except South Africa
21 Rest of (incl. South Africa)	World Rest of Europe Former Soviet Union Middle East Rest of Oceania

## APPENDIX 2: SECTORAL AGGREGATION

<b>Aggregation Code</b>	<b>Label</b>
s01 Cereals	Paddy rice Wheat Cereal grains nec Processed rice
s02 Vegetable & Fruits	Vegetables. fruit. nuts
s03 Oils and Fats	Oil seeds Vegetable oils and fats
s04 Sugar	Sugar cane. sugar beet Sugar
s05 Fibers and Other crops	Plant-based fibers Crops nec Wool. silk-worm cocoons
s06 Meat	Cattle.sheep.goats.horses Animal products nec Meat: cattle.sheep.goats.horse Meat products nec
s07 Dairy	Raw milk Dairy products
s08 Forestry Wood Paper Publishing	Forestry Wood products Paper products. publishing
s09 Fishing	Fishing
s10 Primary & Petroleum products	Coal Oil Gas Minerals nec Petroleum. coal products
s11 Food & Tobacco	Food products nec Beverages and tobacco products
s12 Textile Leather & Clothing	Textiles Wearing apparel Leather products
s13 Chemicals	Chemical.rubber.plastic prods
s14 Other Manufactured products	Mineral products nec Metal products Manufactures nec
s15 Metals	Ferrous metals Metals nec
s16 Cars & Trucks	Motor vehicles and parts
s17 Planes Ships Bikes Trains	Transport equipment nec
s18 Electronic equipment	Electronic equipment
s19 Machinery	Machinery and equipment nec
s20 Other services	Electricity Gas manufacture. distribution Water Recreation and other services PubAdmin/Defence/Health/Educat Dwellings
s21 Construction	Construction
s22 Trade	Trade
s23 Transport	Transport nec

## APPENDIX 3: DESCRIPTION OF THE SCENARIOS CONCERNING TRADE IN GOODS

**1- Modalities for agricultural tariffs:**

The three pillars for agricultural products are protection at the border (tariffs), internal support and export subsidies. Export subsidies must be phased out by 2013, but the evolution in world prices has reduced the impact of this commitment. In relation to internal support, the green box is not affected by reductions; they apply to measures in the orange box, but the difficulty is that caps are defined in nominal terms. Accordingly, inflation (and economic growth) will make these commitments tighter and this must be taken into account. With 2% inflation, and according to our baseline economic growth, the rate of support will have to be reduced by 40% in Europe by 2025 to respect the current commitments regarding domestic support. We apply this target to Europe (including the European Free trade Agreement - EFTA countries) and the USA.

Tariffs will be reduced in bands, using two different schemes depending on the development level of importers (Table A-1). The higher the initial bound tariff, the larger will be the cut. Importantly, since agricultural tariffs are often specific (in dollars per unit, not percentage of the value), AVEs are defined and cut. We cut the AVEs present in MAcMap.

**Table A-1: Reduction rates for agricultural tariffs in our central scenario**

<b>Developed countries</b>		<b>Developing countries</b>	
Initial bound tariff	Reduction rate	Initial bound tariff	Reduction rate
AVE ≤ 20 %	50 %	AVE ≤ 30 %	$\frac{2}{3} \times 50 \%$
20 % < AVE ≤ 50 %	57 %	30 % < AVE ≤ 80 %	$\frac{2}{3} \times 57 \%$
50 % < AVE ≤ 75 %	64 %	80 % < AVE ≤ 130 %	$\frac{2}{3} \times 64 \%$
AVE > 75 %	70 %	AVE > 130 %	$\frac{2}{3} \times 70 \%$

There are exceptions and flexibilities, however. The first exception concerns **tariffs on tropical products**: they are reduced more severely in developed importing countries. Second, **maximum tariffs** are defined. No bound tariff can be above 100% after implementation of the formula, with the exception of the sensitive tariffs defined below.

**Tariff escalation** is a situation where tariffs increase down the value added chain, that is, when transformed products are afforded more protection than raw materials. This tariff escalation must be reduced. In practice, for transformed products, the tariff cut must refer to the band that is immediately above (e.g. 64% if a 57% cut is normally due) if there is a difference in the bound tariffs between the raw and the transformed product larger than 5 percentage points. In the higher band, a 6 pp additional reduction is applied. However, after this additional reduction, the tariff on the transformed product has a lower bound which is the

tariff of the raw product. For computing convenience, we make the assumption that these mechanisms are applied before the choice of sensitive products (the draft modalities for agriculture stipulate that tariff escalation treatment shall not apply to any product that is declared as sensitive). The cuts in the model for the few processed product lines classed as sensitive may be larger than negotiators can agree about. This leads to a slight overestimation of the impact of the DDA on EU agriculture.

**Sensitive products** are a fundamental element of flexibility. Countries can choose tariff lines that will be less subject to liberalisation provided that multilateral tariff quotas at a limited tariff rate are open (the size of the quota increase is an increasing function of the degree of flexibility). The tariff reduction can be reduced by one-third, one half or two-thirds. As already noted, we do not model quotas explicitly due to numerical constraints. We make the assumption that countries choose the highest level of flexibility and reduce their tariffs by one-third of the “normal” reduction for sensitive products. Developed countries are conceded 4% of sensitive products. Since this mechanism is more favourable to countries defining their sensitive products at the tariff line level (they can target products better), countries that define them at the HS6 level are conceded 2% more sensitive products. Because we work at the HS6 level, we adopt this assumption and select 6% sensitive HS6 lines for developed countries. This means that the number of tariff lines to be declared sensitive is smaller in reality than in the model: the actual DDA impact will likely be slightly higher for those countries (such as the EU) that choose their lines at a more disaggregated level of the product classification.

The more protected countries (defined as countries where more than 30% of tariffs are in the upper bound) are conceded 2% additional sensitive lines. We apply this rule (Table A-2). In our database, only EFTA is affected (Iceland, Switzerland and Norway). Canada and Japan asked for more lines in exchange of more generous tariff quotas. We consider that the Canadian proposal is accepted in full, and that half of the Japanese request is accepted. We select the sensitive products using the method proposed by Jean, Laborde and Martin (2008): we chose the lines where the product of the value of imports and the difference between the AVE after normal and sensitive treatment is largest.

A **minimal cut** is imposed on tariffs: each country must have a simple average cut of 54%. In practice this threshold is not binding for developed countries when the other rules are enforced. A **maximal cut** is also considered: each developing country has an upper cap on its liberalisation in agriculture: the average cut cannot be larger than 36% (30% for Venezuela) after implementation of the special products (see below). If the tariff cut is too large, it is reduced proportionally to approach the objective.

**Special products:** this flexibility is open to developing countries only. They do not open quotas in compensation. Accordingly, we make the assumption that developing countries do not rely on sensitive products.

**Small and vulnerable economies:** the tariff cut can be moderated by 10 percentage points. Congo, Cote d’Ivoire and Nigeria are not on the official list of affected countries, but we adopt the consensus view that they will benefit from this provision.

**Recently acceded members:** these countries have already reduced their tariffs to comply with accession conditions. This applies particularly to China. Therefore, the effort for them is reduced. They can moderate their cuts by 10 percentage points. Also, tariff lines bound below 10% are exempt from tariff reduction. These two provisions are cumulative. **Very recently acceded members**, small size recently acceded members and countries in transition will not reduce their agricultural tariffs. Georgia becomes part of this list for agricultural products only (it is a recently acceded member for the NAMA).

**Special products:** developing countries can have 5% of their tariff lines excluded from any tariff cut and 7% of tariff lines (8% for recently acceded members) can have a reduced cut. We model this at the HS6 level thus adding 2% of lines to apply the principle referred to above. On average, the tariff rate reduction for special products must be 11% (10% for newly acceded members): for reasons of simplification we apply this rate to every special product except the 7% of HS6 positions with a zero tariff rate.

**Maximal cut for small and vulnerable economies:** after application of special products, the average tariff cut cannot be larger than 24%. We reduce all tariff cuts proportionally if one economy does not respect this cap.

**Surinam:** This member of the Caribbean Community (CARICOM) has a more open tariff structure than its partners in the agreement. In order to not destabilise this agreement, it is exempted from tariff reductions.

**Turkey:** there is no special treatment for Turkey in principle. However, we have to consider that tariffs applied by Turkey will adjust to EU tariffs for manufactured agro-food products, through application of the customs union.

**Least Developed Countries:** These countries may be asked to bind, but not to reduce their tariffs. As we work with bound tariffs, this has no implications for our exercise.

**Table A-2: Percentage of sensitive products for developed countries in agriculture in our central scenario**

Developed countries	Number of sensitive products (HS6 positions)
EU, USA, Australia, New-Zealand	6 % = 41 HS6 products
EFTA, Canada	8 % = 54 HS6 products
Japan	9 % = 61 HS6 products

## 2- Modalities for the NAMA

All NAMA products are affected by reductions of **bound tariffs**. Unbound tariff lines must be bound using the applied tariff and adding 25 percentage points. Countries with a very small proportion of bound tariffs will be conceded special treatment.

Developed countries apply the **Swiss formula** with a coefficient of 8%; **developing countries** also apply the Swiss formula, but there is some room for manoeuvre. Developing countries are conceded sensitive products for a certain percentage of the lines, for which the tariff cut may be halved or zero. According to paragraphs 7(a), 7(b) or 7(c), developing countries can choose between 20%, 22% or 25% for their Swiss formula.

Within the 20% Swiss option, there are two possibilities:

- Paragraph 7(a1) authorises lower than formula cuts for up to 14% of tariff lines provided that “the cuts are no less than half the formula cuts and that these tariff lines do not exceed 16 percent of the total value of a Member's non-agricultural imports”. For countries choosing this possibility (Argentina, Brazil, Columbia, Mexico, South-Africa) we apply half the cut.
- Paragraph 7(a2) allows for not applying formula cuts for up to 6.5% of NAMA tariff lines provided they do not exceed 7.5% of the total value of imports. We apply full exemption of the tariff cut, within the mentioned limits (6.5% and 7.5%), for countries choosing this possibility (China, Egypt, Indonesian, Morocco, Malaysia, Philippines, Thailand).

Within the 22% Swiss option, there are two possibilities:

- Paragraph 7(b1) authorises lower than formula cuts for up to 10% of tariff lines provided that “that the cuts are no less than half the formula cuts and that these tariff lines do not exceed 10% of the total value of a Member's non-agricultural imports”. To the best of our knowledge, there are no countries to which this option applies.
- Paragraph 7(b2) allows for not applying formula cuts for up to 5% of NAMA tariff lines provided they do not exceed 5% of the total value of imports. We apply full exemption of the tariff cut, within the mentioned limits (5% and 5%), for India only.

The 25% Swiss option comprises no flexibilities and should not be chosen by developing countries.

**South-Africa** receives special treatment. This member of the South-African Customs Union (SACU) has a more open tariff structure than its partners in the regional agreement. In order not to destabilise this agreement, South-Africa is conceded a 25% coefficient in the tariff formula. The rest is unchanged.

Sensitive products have to be selected. Compared to agricultural products we chose a different method to define **sensitive products for the NAMA**. Weighting the difference in tariffs by imports would lead to saturation in the upper cap in terms of trade affected (10%), without using the full range of tariff lines. Hence, we do not weight these differences.

An **anti-concentration clause** must be introduced. Developing countries must apply the general formula to at least 9% of the tariff lines and 20% of their imports in each of the HS2 chapters.

Members of the Mercado Comun del Sur (**MERCOSUR**) regional agreement will all apply the same tariff cuts, even though Uruguay and Paraguay could be considered Small and Vulnerable Economies. For simplicity, we select sensitive products on the basis of Brazilian tariffs (tariff structures do not differ widely in the region) and apply them to each national tariff structure separately.

A recently acceded member, **Oman**, is conceded the possibility of not reducing its tariffs below 5%. In exchange, Oman must apply the Swiss formula with a coefficient of 22%, with 10% of sensitive products limited to products with a tariff of 5%.

**Small and vulnerable economies** are not committed to applying the Swiss formula. They must simply cap the average of their bound tariffs below a cap depending on the initial average of their bound tariffs. If the initial average is below 20%, these countries reduce the tariff on 95% of their tariff lines, by 5%, or apply an average 4.75% reduction to their bound tariffs. In practice, this means that Georgia is the only country that has to reduce its tariffs, and it is below the 20% threshold. However, Georgia country has a very small proportion of bound tariffs and must apply the previously mentioned clause (applied plus 25 percentage points). For simplicity, we reduce all bound tariffs for this country by 5%, and keep 5% of sensitive lines.

There is no special treatment for **Turkey** in principle. However, we have to consider that tariffs applied by Turkey will adjust to the EU ones on all manufactured goods except steel, through application of the customs union.

**APPENDIX 4: LONG RUN IMPACT OF CENTRAL SCENARIO ON REGIONAL PRODUCTION BY SECTOR**

**Table A-3 Long run impact on primary and food products production, percent**

	Cereals	Vegetable & Fruits	Oils and Fats	Sugar	Fibers and Other crops	Meat	Dairy	Forestry Wood Paper Publishing	Fishing	Primary & Petroleum products
European Union	-2.2	-1.5	-4.4	-12.6	-1.0	-2.1	-2.3	0.3	-0.2	0.1
USA	-8.0	-0.9	-2.6	-0.1	-5.6	0.0	-0.6	0.3	0.2	0.1
Canada	7.1	2.9	2.9	-0.1	4.7	6.2	-5.2	0.6	0.2	0.0
Japan	-7.3	-1.1	-4.6	-18.6	-1.9	-12.7	-6.4	-0.8	-0.4	0.0
EFTA	-19.5	-20.7	-12.8	-25.8	-26.9	-41.7	-22.5	0.3	-0.1	0.1
Australia & New Zealand	4.9	2.4	2.4	2.1	3.9	5.4	22.3	-0.3	0.1	0.0
Korea	0.7	-0.8	-0.4	1.7	0.2	-0.4	2.9	-0.1	-0.4	0.5
Taiwan	2.9	0.0	-1.6	-0.1	4.0	0.5	-1.4	-0.3	-0.1	0.3
China	0.5	0.1	-1.6	0.3	3.1	-0.2	0.6	-0.4	0.0	-0.1
India	0.1	0.0	0.2	0.1	0.0	-0.1	0.2	-0.1	0.0	-0.1
Rest of South Asia	0.3	0.0	0.2	0.9	0.4	0.1	-0.1	0.1	0.0	-0.1
ASEAN	-0.1	0.4	0.3	1.6	0.3	-0.2	2.6	-1.5	0.1	0.0
Mexico	2.8	1.0	2.5	0.4	1.7	1.6	0.3	-0.1	0.0	0.0
Brazil	2.5	0.8	2.1	2.5	5.6	6.9	1.7	0.3	0.3	-0.1
Argentina	2.6	0.8	2.9	0.9	2.1	5.7	0.4	-0.3	0.3	0.0
Rest of Mercosur	2.0	0.3	1.1	0.4	0.6	0.9	0.6	-0.3	0.1	0.2
Rest of South America	2.0	4.1	1.0	3.2	1.8	1.6	2.8	-0.3	0.0	0.0
Caribbean	1.6	1.2	0.3	3.7	0.7	1.0	2.0	-0.4	0.0	0.0
North Africa	3.7	0.1	19.2	1.9	0.0	-1.4	3.8	-1.4	0.0	0.2
Rest of Africa (except South Africa)	0.9	0.0	0.5	5.0	0.2	0.2	2.6	0.0	0.0	0.0
Rest of World	1.0	-0.1	0.9	0.7	0.9	-0.2	0.0	0.2	0.1	0.1

*Source:* MIRAGE – Authors' calculations

*Note:* Central scenario including agriculture, NAMA, services and trade facilitation

**Table A-4 Long run impact on manufactured products production, percent**

	Food & Tobacco	Textile Leather & Clothing	Chemicals	Other Manuf. products	Metals	Cars & Trucks	Planes Ships Bikes Trains	Electronic equipment	Machinery
European Union	0.4	-2.2	0.1	0.1	-0.3	-2.2	1.1	1.5	0.8
USA	0.5	-11.5	0.5	0.1	0.7	-0.3	0.7	2.6	1.0
Canada	-0.2	-17.0	-0.4	-0.6	0.7	-3.7	2.3	2.3	1.4
Japan	-1.5	-5.7	0.5	-0.1	0.2	11.6	-2.6	-0.5	-2.6
EFTA	-5.7	4.1	1.6	0.8	2.3	-0.9	0.5	1.5	2.4
Australia & New Zealand	1.6	-21.0	-1.0	-1.2	-2.7	-10.1	-0.9	0.3	-3.3
Korea	-1.0	9.3	-1.9	-1.2	-0.5	-1.0	-2.3	2.6	0.8
Taiwan	-1.6	28.4	9.8	0.1	4.3	-11.8	4.8	-2.3	1.2
China	0.2	5.5	0.1	0.7	0.0	-0.8	0.6	0.0	0.2
India	0.2	-0.5	0.0	0.2	0.8	1.0	-0.5	0.3	0.2
Rest of South Asia	0.5	1.6	0.5	0.1	-1.6	-1.4	-3.3	-1.2	-1.5
ASEAN	0.9	6.7	0.9	-0.9	-3.7	-0.4	-2.3	-0.5	-3.2
Mexico	-0.2	-8.7	0.0	-0.4	0.5	0.1	0.2	1.1	0.6
Brazil	1.2	-1.5	-2.2	-1.3	-1.5	-3.7	-3.2	-2.1	-2.5
Argentina	1.6	-3.4	-3.4	-1.5	-3.4	-4.1	0.4	-0.7	-6.7
Rest of Mercosur	0.7	-3.6	-0.6	-1.0	0.9	-0.7	1.7	1.3	-2.6
Rest of South America	0.2	-3.9	-0.4	-0.6	-2.7	-0.9	-0.8	4.3	-3.6
Caribbean	-0.8	8.0	-0.7	-1.0	-1.7	-2.0	-2.5	-2.1	-1.2
North Africa	-0.1	-7.0	-5.5	-2.2	2.5	-3.5	3.2	1.3	1.6
Rest of Africa (except South Africa)	-0.4	-3.7	1.0	0.4	3.1	-1.1	1.0	-1.9	-2.7
Rest of World	0.0	-2.1	-0.8	-0.2	-0.4	0.2	1.6	1.6	-0.1

Source: MIRAGE – Authors' calculations

Note: Central scenario including agriculture, NAMA, services and trade facilitation

**Table A-5 Long run impact on services production, percent**

	Other services	Construct <sup>o</sup>	Trade	Transport	Communic <sup>o</sup>	Financial services	Business services
European Union	0.0	0.0	0.2	0.3	0.1	0.1	0.1
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Japan	0.2	0.1	0.0	-0.3	-0.1	-0.3	-0.2
EFTA	0.6	0.3	0.5	0.9	0.3	0.6	0.4
Australia & New Zealand	0.0	0.0	0.0	0.1	-0.2	-0.1	-0.3
Korea	0.0	0.2	-0.1	-0.3	-0.2	-0.2	-0.3
Taiwan	0.3	0.6	0.0	-0.1	-0.2	-0.2	-0.5
China	0.0	0.6	0.1	0.3	0.1	-0.1	0.0
India	0.1	0.2	0.1	0.2	0.0	-0.1	-0.8
Rest of South Asia	0.1	0.3	0.0	0.1	-0.1	0.0	-0.7
ASEAN	0.1	0.8	0.1	0.3	-0.5	-0.6	-1.8
Mexico	-0.1	0.0	-0.1	-0.1	-0.1	0.1	-0.5
Brazil	0.0	0.0	0.0	0.1	-0.2	-0.1	0.0
Argentina	0.1	0.4	0.2	0.2	0.1	0.0	0.2
Rest of Mercosur	0.2	0.3	0.2	0.1	0.3	0.2	0.1
Rest of South America	0.1	0.5	0.2	0.1	0.2	0.0	-0.3
Caribbean	-0.1	0.0	0.1	0.0	-0.1	-0.1	-0.2
North Africa	0.0	-0.2	-0.2	1.3	0.6	0.3	1.6
Rest of Africa (except South Africa)	0.3	0.7	0.4	1.2	0.2	0.2	0.7
Rest of World	0.0	0.1	0.1	0.3	0.1	0.1	0.3

Source: MIRAGE – Authors' calculations

Note: Central scenario including agriculture, NAMA, services and trade facilitation

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