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What next for the DDA?
Quantifying the role of negotiation modalities

Yvan Decreux and Lionel Fontagné

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European University Institute

Badia Fiesolana

I – 50014 San Domenico di Fiesole (FI)

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Abstract

Negotiators have reached a deal on a limited series of issues WTO Ministerial Conference in Bali (3–6 December 2013), one of these being trade facilitation. Based on a quantitative assessment taking into account the detail of the last proposals circulated, we argue however that due to the design of the negotiation, achievements of the DDA will eventually be limited. This is due to a lack of ambition making it difficult for negotiators to compensate their own concessions. Such feebleness is induced by the way negotiations were organized – in separate groups, without much consideration for, or understanding of, how the different elements added up to more than the sum of the parts. Our quantification of these issues is performed with a dynamic computable general equilibrium model of the world economy, while liberalisation of tariffs is taken into account at the product level in order to address exceptions, flexibilities as well as the non-linear design of the formulas. A reduction in domestic support and the phasing out of export subsidies in agriculture are taken into account, as well as trade facilitation. Our conclusion is that negotiators will have to re-bundle the bits of the negotiation and shift efforts towards the neglected issue of services to make progress towards the objectives agreed on in Bali.

Keywords

Doha Development Round, Computable General Equilibrium Models, Trade facilitation

JEL Classification: F13, F17

1. Introduction¹

The Round of multilateral trade negotiations that was launched in Doha in November 2001 has been revamped in Bali, December 2013, where Ministers gave officials a year to come up with a road map/work program that aims at finishing the DDA. This new rescheduling of the initial agenda comes after a long series of missed opportunities.² What do we learn from more than a decade of multilateral negotiations? How to move forward after Bali?

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). This attempt to break deadlock was followed by a Ministerial meeting in July 2008. This Ministerial was considered erroneously to come close to reaching agreement on modalities for non-agricultural market access (NAMA) and agriculture. In December the same year, Crawford Falconer circulated consolidated modalities for agriculture taking stock of progress made in July. Regarding non-agricultural products, progress as reported by Don Stephenson in August, Chair of the related Committee, were limited. However, here again new NAMA modalities were issued in December 2008.

The collapse in world trade induced renewed interest in re-visiting the Doha Development Agenda (DDA) deal. However, the political willingness to conclude negotiations proved to be absent, possibly due to the world financial crisis and a revival of the inclination towards protecting domestic economies. A lately addition to the agenda, pushed by the US administration and partially endorsed by the European Commission during the 2011 Spring, was the introduction of sectoral initiatives in the final package for chemical products, electronic products and machinery. Emerging economies showed reluctant to sign up to such initiatives that would have had sizeable impacts on certain sectors domestically. In mid-2011 the impossibility of combining the negotiation key patterns in a final deal was objectivized as the negotiating group on NAMA was confronted by the irresolvable problem of sectoral initiatives in NAMA. On 29 March 2011, the Director General of the WTO declared that “[it was] 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 that 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”. It however turned out that the 8th WTO Ministerial Conference in December 2011, welcoming the accession of Russia (as well as Samoa and Montenegro), did just have an “in-depth debate about the DDA” according to Director general own words.

Roberto Azevedo, the new WTO Director-General, managed to convince WTO Members to reach a trade deal on a limited series of issues during the WTO Ministerial Conference in Bali (3–6 December 2013), one of these being trade facilitation. This outcome has renewed interest for the sluggish multilateral negotiations, in a context where regionalism and megadeals (e.g. the TTIP) offer

¹ This is the profoundly revised version of paper circulated under the title: Economic Impact of Potential Outcome of the DDA. We thank Bernard Hoekman and participants to the conference “The Multilateral Trading System in the 21st Century”, Washington 18-19 April 2013, for inspiring comments on a former version.

² See e.g. Lacey (2013) for a more detailed description of the successive Ministerials of the Round.

unprecedented alternative opportunities for negotiating parties. The question is now how to move forward in such limited time span? How to unlock the negotiation process?

Indeed, the world economy has dramatically changed since the launch of the negotiations, with a series of emerging economies becoming major players. The crisis has penalised certain regions of the world to a greater extent, which required a revision to growth prospects. Such major change of the geopolitical context raises many issues concerning the fundamentals of the WTO which will hardly be amended within the 12-month period negotiators agreed on: e.g. eligibility – or graduation of – the Special and Differential Treatment (Aggarwal and Evenett, 2013; Bureau and Jean, 2013). Given such constraint, what can be done?

Two routes can be envisaged. According to a first analysis, the problem is that negotiators have been constrained by a too small negotiating set (Evenett, 2013). If the conclusion is that the landing zone is indeed too small, then the implication is new issues need to be added. Alternatively, the problem may be more of an artefact of the way negotiations were organized (and analysed). In that case the problem is to rebundle the topics. Such shift would be justified by a new pattern of the world economy: the great unbundling of production (Baldwin, 2011) and the porosity of the frontier between goods and services. In presence of Global Value Chains there is shared interest of exporters and importers in securing market access and facilitating trade, which reinforces the need to make progress on the fronts of trade facilitation and services.³

Our argument is that beyond the lack of political commitment to conclude the round, possibly tactical errors, or the deleterious climate created by the global crisis, most of the **difficulties that negotiators will have to face over the 12-months window open by the Bali Ministerial are intrinsic to the design of the negotiations. Negotiating in separate groups, without much understanding of how the different elements added up to more than the sum of the parts, has been an incentive for introducing several exceptions and sensitive issues making it difficult to ultimately deliver. Moving forward now imposes “re-bundling” major topics: agriculture, NAMA, services and trade facilitation.** While, negotiation effort had been devoted initially in designing formulae general and aggressive enough, exceptions shielding from the political economy consequences of such systematic cuts in protection were eventually envisaged due to the lack of consideration of overall gains of concluding the Round. General formulas not only impose exceptions, they also impose country-specific provisions: certain countries ask for additional flexibilities; (very) recently acceded members need to receive differential treatment as they have already committed to phase out a significant part of their protection; the poorest countries are conceded exemption from tariff reduction, and provisions are also present for small and vulnerable economies or countries with low levels of binding; but as general tariff reduction is the source of preference erosion, specific solutions have to be envisaged for the affected countries, which in turn might well harm countries that did not benefit from such preferential access. All in all, the text combining all these elements is not only intricate; it does not lead to an improvement in market access worth the negotiation efforts in many cases, if one sticks to a strategy of separately negotiating on the different topics.

Bagwell and Staiger (2011) see here a “latecomer problem”: given initial starting points in terms of protection and the principle of SDT applied to all developing countries, there is no way of reaching a balanced deal on goods only. With such narrow negotiating agenda in mind, negotiators from major developed countries raised requests for deeper tariff reduction (on a voluntary basis) and other “zero tariff initiatives” at the very last step of the negotiation. The purpose was to hopefully restore some “reciprocity” in the concessions. But such “rebalancing” would have imposed a lately and sharp redistribution of the gains and concessions among the players: there was ultimately no landing zone for the negotiations without considering a broader agenda including services and trade facilitation.

³ Karmakar (2013) acknowledges the importance of negotiating with GVCs in mind, but suggests to close the Round as soon as possible in order to launch a specific Round on that issue.

Hence, this strategy for fixing the problem was misplaced. As we will show here, this is the combination of progress in the NAMA and in agriculture with progress on the front of services and trade facilitation that deliver. By spending most of their efforts on goods, with limited consideration of services and with trade facilitation envisaged only from a development point of view, negotiators have missed the new reality of the world economy: global value chains tightly linking developed, emerging and developing economies in goods and services trade. Empirical relevance of this nexus is illustrated by the (non)-proliferation of protectionist measures after the trade collapse of 2008-9. This is not only WTO disciplines, but also the interconnection of countries within global chains, that prevented from a resurgence of protectionism Gawande et al. (2014).⁴

Our view is certainly shared by many commenters and experts. More originally, we aim in this paper at putting numbers on the impasse and the way forward. We conduct an exercise to quantify the economic impact of a deal. To proceed, we integrated the most recent proposals circulated in the arena of the multilateral trade negotiations, and importantly also put figures on the possible gains to be reaped on the front of services and trade facilitation.

Our exercise reveals gains that cannot be compared directly with the orders of magnitude associated with the possible consequences of a *failure* of the Round. In the case of failure (which can be considered as more pessimistic compared to a non-completion), 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 (2010-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%. A non-completion would not necessarily lead to such scary outcomes, if the whole process of negotiating at the WTO is re-engineered.

Our paper adds to the previous literature assessing the economic impact of a successful Doha round.⁵ 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 (2010-c) 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 (2010-b) 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. Among the scenarios we simulated the one that is closest to this gives an increase of 2.1% 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

⁴ Using trade and protection data for a series of large emerging countries, Gawande et al. (2014) show that participation in global value chains has been a powerful economic factor determining their trade policy responses to the trade collapse.

⁵ One will find additional references in Piermartini and Teh (2005) for studies on the DDA from 2003 to 2005.

the table at that time. Compared to this paper, we use the most recent proposals, including sectorals. This is an important addition 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.

Laborde (2011) tackles the role of sectoral as identified in the Appendix 6 of the December 2008 modalities. A large set of initiatives (even the ones initiated by one country only like hand tools for Taiwan (China), or related to raw materials) is combined and simulated. Larger gains are identified, compared to a central scenario with flexibilities absent of any services liberalisation or trade facilitation.

In contrast, Hoekman and Nicita (2010) compare the impact of the completion of the Round with the effects of policies aiming at reducing transaction costs. They show that small reduction in trade costs would have an effect much larger than the Round.

Hoekman, Martin and Mattoo (2010) insist on the greater security for market access provided by the Round and dismiss the idea of a dramatic trade liberalization associated with the completion of this Round. Regarding sectorals, they push the argument that they could bring support from the concerned industries (in advanced economies) to the completion of multilateral trade negotiations. However, they could not provide with a fully-fledged evaluation of the global impact of these sectorals as details of the proposals were not yet disclosed or even negotiated.

Finally Hufbauer and Schott (2012 and 2013) propose a “recovery package” based on optional plurilateral agreements. Using rather crude estimates, they tentatively quantify the impact of seven broad areas of negotiation, namely trade facilitation, international services, international digital economy, duty-free quota-free market access for LDCs, agricultural subsidies, food export controls, environmental goods and services. These topics as a whole would deliver a two-trillion dollar increase in world exports. However they do not claim that such elements should be part of a global deal and they do not embed the various impacts into a sound and theory-based general assessment of the Round.

The rest of the paper is organized as follows. Section 2 presents the quantifying assumptions. Overall results are presented in Section 3. Section 4 concludes.

2. Sources and quantifying 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. The state of the art is measurement of border protection for goods 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). In contrast, detailed information on trade facilitation is sparse and one must rely on cruder estimates. This is also the case for the other potential big chunk of the gains to be expected, namely trade in services. In the latter case, information on the exact impact of regulatory measures is much less disaggregated than for goods, and subject to caution as strong assumptions must be made to extract quantified measures from the existing qualitative evidence on regulations. We finally examine the impact of the scenarios by taking into account interactions between sectors, countries and markets, which is done with MIRAGE

(Decreux and Valin, 2007), a dynamic CGE model of the world economy fitting imperfect competition.⁶

Draft modalities for goods

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.⁷ 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. Flexibilities have to follow some rules to ensure that some tariffs are reduced in all HS chapters. All these details are taken into consideration in this paper.

Firstly, as regards the NAMA, 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.⁸

Sectoral initiatives concerning chemicals, machinery and electronic products are taken into account in two scenarios. For chemical products tariffs are set to 0 in 5 years in developed countries. There is still a SDT⁹ as developing member countries can bind 4% of national chemical tariff lines at 4% and are conceded a 10 years period for phasing out their tariffs. For machinery products, 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% and are conceded 7 years to phase out tariffs. For electronic products tariffs are reduced to 0 in 3 years by developed countries, developing members can bind up to 5% of national electronics tariff lines at 5%, and must phase out their tariffs within 5 years. For environmental goods, the published list of goods for which tariffs could be set to zero is used.

Secondly, regarding agricultural products the sources of our data include draft modalities and the report of the Chairman of the Trade Negotiations Committee dated 21st April 2011.¹⁰ 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

⁶ MIRAGE relies here on GTAP-8 data 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. Also the formulas are designed using the 2004 tariff database. The 2004 picture of the world protection takes account of the Indian reform, augmented by the EU-Korea trade agreement.

⁷ The designation of exceptions must still follow certain rules (e.g. non-concentration clauses).

⁸ 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”.

⁹ This tariff cut concerns all developed countries (including Korea) but only a sub-sample of developing/emerging countries: Argentina, Brazil, Chile, Colombia, Peru, Paraguay, Uruguay, Mexico, China, India, Indonesia, Malaysia, Philippines, Taiwan, Thailand.

¹⁰ See WTO, Negotiating Group on Agriculture, documents, WTO, Negotiating Group on Agriculture, document # TN/AG/26.

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.¹¹ 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 the expansion of quotas should be done at the HS6-level, but this is very demanding in terms of computing resources.¹² In order to avoid explicitly modelling quotas, we use the outside tariff under the assumption that the expanded 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.¹³

Protection in services

For services, three problems have to be tackled. First, negotiators have devoted limited effort to that broad topic so far, meaning that we lack information on what could be the outcome of a successful deal. Thus, we are obliged to rely on partial information and to assume what could be the ultimate achievements. Second, we do not have for services the kind of information that we can rely on for barriers to trade in goods. We deal with regulatory obstacles, of which tariff equivalents must be computed as a first step. Tariff equivalents of regulatory barriers to trade in services previously were mainly based on Park (2002). We use here estimates by Fontagné et al. (2011). Finally, a third issue is about the proper modelling of the effects of regulatory barriers, the big question mark here is whether regulatory barriers are rent-creating or cost-enhancing. 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.

Bali outcomes

The agreement reached in Bali comprises an agricultural part, a development part, and trade facilitation.

¹¹ 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.

¹² See Gouët et al. (2011) for an illustration.

¹³ Tariff data on goods comes from Market Access Map (MAcMap), version HS6-V3, hence, the most detailed level of international trade classification of products common to all countries refers to 2004. Further information on the construction of these data, especially ad valorem equivalents, is provided in Bouët et al. (2008).

Food security (shielding public stockholdings programmes devoted to food security for an interim period) is waived for developing economies. The impact of this measure is uncertain because we cannot envisage how much countries like India will rely on this support measure.

The distribution of unfilled tariff quotas (due to restrictive quota administration by the importer) will in contrast favour trade. In our exercise, when quotas are unfilled, we rely on the inside tariff both in the baseline scenario and in simulated scenarios, so that such impact of redistributing quotas is not tailored in our simulation.

Improved market access for cotton from LDCs is not an important issue as the key problem is about production subsidies, which are not affected.

Simplified preferential rules of origin cannot be taken into account as we do not have this level of detail in our database and model.

A services waiver authorising importers to grant preferential access in services to LDCs is potentially an import issue, but the agreement “authorises” and does not impose such preferential treatment. To the best of our knowledge, it has no practical implication (no developed country embarked in such scheme so far).

Progress on trade facilitation is really the crucial point for achieving substantial gains in the DDA, as we show below. The decision in Bali to embark in an ambitious programme of trade facilitation is accordingly therefore no surprise. The purpose is to simplify customs procedures and to improve speed and efficiency. This should reduce trade costs. Importantly, transparency of procedures, reduction of corruption and red-tape are objectives member countries agreed on. The deal will be backed by technical (and financial) assistance to developing countries.¹⁴

However, the outreach of such agreement on trade facilitation is difficult to assess. 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).¹⁵ 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.¹⁶

¹⁴ The agreement has many facets. First, transparency and non-discrimination via e.g. publication of information on procedures, fees, classifications, restrictions, opportunity to comment on notified procedures, or right of administrative appeal of a customs’ administrative decision. Second, procedures of release and clearance of goods: e.g. pre-arrival clearance of goods, electronic payment, fast track for authorized operators, faster procedures for perishable goods. Third, facilitation of transit and customs cooperation (e.g. exchange of information).

¹⁵ USAID 2007. “Calculating Tariff Equivalents for Time in Trade”, March, downloadable from:
http://bizclir.com/cs/calculating_tariff_equivalents_for_time_in_trade
<http://www.nathaninc.com/?downloadid=208>

¹⁶ 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. After computing the costs before and after trade facilitation at the sector and country level, this information is aggregated using trade as the weights, to match the aggregation level of the study.

Modelling of the modalities

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.

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.

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).¹⁷ 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.

We also introduce trade facilitation in our simulation, which is worth doing with reference to the Bali package. 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).¹⁸ Only members of the WTO engage in the process. 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.¹⁹ 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, likely to outweigh any costs within a short period of time.²⁰ Since industrialised countries also benefit from trade facilitation, they committed to contribute to the upgrading of developing countries' infrastructures through the "aid for trade" scheme, which will alleviate the cost of improving on trade facilitation.

As referred to above, trade in services is also an important topic of the ongoing multilateral negotiations in particular in light of the presence of Global Value Chains. We adopt here a realistic and very cautious assumption on what can be reaped for the 12-months of negotiation granted by the Bali declaration. 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.

¹⁷ 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.

¹⁸ 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.

¹⁹ Trade facilitation can also generate a cost by diverting qualified people from other productive sectors.

²⁰ See the recent and extensive work by OECD discussed above.

Such limited reduction may appear as too conservative. It however reflects the status of the negotiation, to the best of our knowledge, even if more ambition on this front would have facilitated negotiations on other topics. Again, what is important if one aims to move forward is to re-bundle negotiations on goods, services and trade facilitation.²¹

We finally take care of describing precisely the intricate series of flexibilities cushioning the impact of the formulas. We introduce flexibilities for special and sensitive products; we exempt the LDCs from tariff reductions, consolidate the unbound tariffs, we take account of all additional elements contained in the most recent Draft Modalities (see Appendix 3) and we address the specific role of sectoral initiatives (see Appendix 5) .

The 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.²²

Table 1 summarises the different shocks introduced in the exercise. In all scenarios (else otherwise specified), 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. The 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. This scenario is basically the one negotiators kept in mind most of the time when speaking of reciprocity or balance of concessions.

The next two scenarios show what re-bundling after Bali could mean. Services and trade facilitation are addressed. The second scenario adds a 3% reduction in the equivalent tariff of protection on trade in services. The third scenario is about trade facilitation. We introduce a specific modelling of this programme in order to take into account the associated potential gains for developing countries. We address here only customs efficiency: the implementation cost of this programme is much lower than what would be required to develop port infrastructures for instance.

The last two scenarios add sectorals to this central scenario and illustrate how tentatively rebalancing without considering the whole set of topics is counter-productive. The fourth scenario adds the sectoral initiatives on chemicals, electronic products and machinery. The last scenario considers on the top of scenario 4 an initiative on environmental goods.²³

²¹ Most of the action might take place in terms of binding, which has a value per se though not captured by the usual modelling strategies. See Gootiiz and Mattoo (2009) for more details on services in the DDA.

²² Japan, Switzerland, Tunisia and Turkey apply a slightly different list.

²³ We use the WTO list of environmental products. See Committee on Trade and Environment Special Session, 21 April 2011.

Table 1: Description of the scenarios

		Agric. +NAMA	Services	Trade facil ^o	Chemicals electronics machinery	Envt.
S1	Goods	x				
S2	Goods & serv.	x	x			
S3	Benchmark	x	x	x		
S4	Sectoral	x	x	x	x	
S5	Environment	x	x	x	x	x

3. Results

From the current period until 2025, each scenario is implemented with a yearly step, following the liberalisation schedule. Results below are presented as deviations from the baseline for each scenario.

Overall results of the benchmark 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 a limited 0.09% of world GDP annually (\$US70bn in 2025).²⁴ There is an overall increase in world exports of goods of 1.25%, or \$US230bn annually. Both results are unexpectedly low for a non-specialist, but it has been repeatedly documented in the literature that introducing flexibilities is reducing the overall impact of any deal (Jean et al., 2010). To put it differently, the problem here is how to find a balance of pains and gains within a subset of the negotiation topics. As previous Rounds eroded seriously the mean tariffs for goods, the late-comer problem for the DDA is to necessarily tackle remaining tariff peaks. It imposes an aggressive non-linear formula that clashes with the political economy of the domestic acceptability of a deal.

Given the very conservative assumption of a 3% liberalisation of trade in certain services, limited to certain importers, this adds \$US15bn gains in world GDP. In trade terms, changes are more important: we obtain an additional \$US34bn world trade. But the reader can guess what would be the outcome of increased ambition of negotiators in that field, as a first approximation (neglecting general equilibrium effects), by simple extrapolation.²⁵

The benefits of re-bundling the negotiations item are evident, when we add the gains from trade facilitation (more efficient customs procedures only). In that case, we can expect a further \$US68bn annual increase in world GDP from 2025 onwards. Indeed, a large part of the additional gains would accrue to developing economies where progress margins in terms of custom efficiency and trade costs are the highest.

²⁴ 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.

²⁵ Recall that effects, for limited changes in variables, are linear.

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

	S1	S2	S3
	Agric + NAMA	+ Services	+ Trade Facilitation
Exports %	1.25	1.44	1.95
Exports USD bn	230	264	359
GDP %	0.09	0.11	0.2
GDP 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

Table 3 presents these long term GDP gains at regional or country level (see country aggregation in Appendix A1).²⁶

In dollar terms, China, the EU and Japan²⁷ reap respectively 23%, 17% and 15% of world gains from a goods scenario. US gains are less spectacular (8% 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 due to erosion of preferences.²⁸

These gains are however of a limited magnitude relative to the size of the countries, which justifies the sentiment of too limited outreach of the deal to justify a support. A modest progress on the front of services would change the outcome for certain major players. EU and US gains would increase by 57% and 21% respectively. Canada and Korea would also benefit much.

Lastly, re-bundling trade in goods and services with trade facilitation, as tentatively done in Bali, should ease the negotiations. Indeed the most spectacular outcome is the shift of Sub-Saharan Africa from a limited loss (goods only) to a sizeable \$US6.4bn gain of GDP with trade facilitation. Brazilian gains of GDP (compared to goods only) are multiplied by 5.6, Chinese gains by 2.3, Indian gains by 1.8. But developed countries will also reap benefits from trade facilitation, which rebalances the deal: Korean gains would be multiplied by 7.1, EU and US gains by 1.8, though from a low initial level in the US case,

²⁶ Introducing port efficiency on the top of our modelling of trade facilitation would not change the results qualitatively, but would add another \$US34bn to world GDP. Results are not presented here for sake of simplicity. All countries would gain, and the main beneficiaries of liberalisation are China and the EU.

²⁷ Detailed analysis reveals a very significant increase of Japanese car production as a result of Doha.

²⁸ However, in two of these regions (Caribbean and Sub-Saharan Africa – SSA) trade facilitation makes it possible to reap gains from this Round as discussed below.

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

	S1	S2	S3
	Goods	+ Services	+ Trade Facilitation
Argentina	694	730	890
ASEAN	6,492	7,319	12,973
Australia & New Zealand	1,401	1,545	1,714
Brazil	366	456	2,044
Canada	859	1,197	1,302
Caribbean	-718	-696	131
China	15,981	18,443	36,465
EFTA	7,289	7,669	7,669
European Union	11,847	18,571	30,731
India	3,821	4,328	6,932
Japan	10,194	10,703	13,772
Korea	635	887	4,512
Mexico	-473	-353	-296
North Africa	1,062	1,150	1,279
Rest of Africa (except South Africa)	-549	-394	6,024
Rest of Mercosur	438	480	889
Rest of South America	977	1,057	2,533
Rest of South Asia	454	582	1,412
Rest of World	1,001	1,809	7,390
Taiwan	2,498	2,622	4,524
USA	5,344	6,450	9,480
World	69,615	84,552	152,370

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

Source: Author's calculation using MIRAGE

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%.

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. In the absence of trade facilitation, terms of trade would be deteriorating for this region. Also, capital accumulation is encouraged and contributes to half of the recorded welfare gains for SSA.

Sectoral impact of the benchmark scenario

We should also discuss some sectoral and regional results of a central scenario combining liberalisation in agriculture and manufactures as defined above, with the services and trade facilitation. Table 4 shows percent changes in the value of exports for the different regions in the three broad sectors of interest –agriculture, industry and services – for a post-Bali type of scenario consolidating advances on goods and rebalancing with services and trade facilitation.

In agriculture, the two main beneficiaries of such scenario in terms of exports are Australia and New Zealand (+13.7%) and North Africa (+15.8%). Brazil also gains in agriculture (+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.

Appendix 4 shows the combined impacts of changes in exports, imports and demand, for every detailed sector, induced by this post-Bali scenario. 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 5). Brazil, Argentina and Canada come next. EU production reduces by 1.2% only. 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 (with large efficiency gains showing up in their GDP gains). China and India are hardly affected.

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.

Table 4: Long run change in the value of exports (S3), percent

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

Source: Author's calculation using MIRAGE

Table 5: Long run change in the volume of production (S3), percent

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

Source: Author's calculation using MIRAGE

The wrong way after Bali

Contrasting with a possible rebalancing of the negotiations with services and trade facilitation, in three broad sectors (chemicals, machinery, electronics) several WTO members were keen to open global markets further (excluding LDCs) through sectoral initiatives. There is also a separate initiative for environmental goods. This strategy will lead to a dead end if endorsed, as the precedent of 2011 shows. Our results quantify the underlying mechanisms.

In our analysis, we make the assumption that these initiatives would be endorsed by all developed countries (including Korea) and also (we assume optimistically) a number of developing countries, such as Argentina, Brazil, Chile, Colombia, Peru, Paraguay, Uruguay, Mexico, China, India, Indonesia, Malaysia, Philippines, Taiwan and Thailand.²⁹

The first three columns of Table 6 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 of this goods-only agreement.

²⁹ Recall that in the WTO arena, Korea is considered a developed country for industrial goods, but not for agricultural goods.

Table 6, column (2) includes limited liberalisation in services. Again, we observe small general equilibrium effects on trade in goods. The 35 billion increase in exchange of services is an important achievement that matches additional trade in agricultural goods.

Table 6, Column (3) shows our central post-Bali scenario. The impact of trade facilitation is shared among agricultural and industrial goods, and general equilibrium effects on trade in services are visible again. Agricultural exports increase by another 12% and manufactured exports by another 46%. This contradicts the view that customs red tape, additional costs and extra time is not firstly penalising agricultural – and potentially perishable – good.

The last two columns of Table 6 report the long run change in the volume of trade for the two sectoral initiatives. They must be compared with Column 3. Table 6 Column 4 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 5, the first version of the sectoral initiative on environmental goods is added to the previous column. Its impact on trade is negligible overall, as 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 6: Long run change in the volume of trade (bn USD)

	S1	S2	S3	S4	S5
	Agric+NAMA	Services	Trade facilitation	Mach- Chem- Electn.	Env. zero
Agriculture	32.28	32.51	36.70	37.83	37.89
Industry	194.94	195.95	285.41	430.96	438.40
Services	2.61	35.23	36.42	36.41	36.29

Note: S1: agriculture + NAMA; S2: agriculture + NAMA + services; S3: agriculture + NAMA + services + trade facilitation; S4: agriculture + NAMA + services + trade facilitation + sectorals except environmental goods; S5: agriculture + NAMA + services + trade facilitation + sectorals including zero tariffs initiative on environmental goods

Source: Author’s calculation using MIRAGE

So, (plurilateral) sectorals do the job, from a mercantilist point of view, and this is why negotiators might be tempted to push such kind of agenda again, with such design or any similar one. However, the political economy of the sectoral initiative is not favourable: big players like India or China, would be confronted with large surge in imports in key sectors, were the sectoral adopted.³⁰ This mechanism is exemplified for selected emerging countries and selected sectors in Table 7. China would record a 33% increase in imports of Chemicals by 2025, instead of 13% only in our central scenario including trade facilitation. The corresponding figures are 24% and 8% for Chinese imports of Machinery respectively. The magnitude of imports response is even larger for India, with 47% and 62% for Chemicals and Machinery respectively.

³⁰ The interested reader will find in Appendix 6 how the sectoral initiatives translate into changes in GDP for the regions. With the sectoral initiative on chemicals, machinery and electronics and environment as a whole, Indian GDP gains are largely reduced. Limited losses are also observed in Brazil. China, which has offensive interests in certain sectors concerned by the initiatives, would gain in terms of GDP overall. But this gain would have to be put in perspective of the large increase in imports concentrated in certain sectors.

Table 7: Long run change in the volume of imports (percent): selected market and sectors

		S1	S2	S3	S4	S5
China	Chemicals	8.61	8.62	13.41	33.25	33.22
	Electronic equipment	1.69	1.68	2.23	5.42	5.38
	Machinery	6.55	6.58	8.46	23.83	24.13
India	Chemicals	1.94	1.93	5.67	47.65	47.63
	Electronic equipment	-1.03	-1.09	1.11	2.34	2.30
	Machinery	8.30	8.17	11.03	61.91	62.80
Mexico	Chemicals	0.14	0.13	0.09	6.69	6.57
	Electronic equipment	-0.10	-0.10	-0.02	4.07	4.00
	Machinery	1.32	1.30	1.24	15.01	15.18
Brazil	Chemicals	5.36	5.31	7.03	7.86	7.86
	Electronic equipment	1.15	1.11	1.99	2.95	2.93
	Machinery	5.39	5.30	6.70	7.78	7.78

Source: Author's calculation using MIRAGE

Conclusion

The quantification proposed here is based on an updated version of the negotiated DDA draft modalities taking into account trade facilitation agreed in Bali, and considering an additional element of rebalancing, namely a modest progress on the front of services. Taking into account the various formulae, exceptions and flexibilities for goods, we examine the potential impact of a deal on 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.

Consequently limited gains must be expected on the front of trade in goods, on which most of the negotiators and policy makers were focussing. This helps understanding the difficulties to conclude. The overall design of the deal finally considered is particularly unattractive to certain big players

How to move forward is clearly shown in our exercise: one must “re-bundle” the topics of the negotiation: introducing services in the final deal, and taking account of trade facilitation benefits, reshapes the whole pattern of gains and interests of participating countries or regions. We show that even a modest achievement in services combined with trade facilitation as agreed in Bali should lead to an acceptable deal.

This is contrasting with attempts of rebalancing the Round without re-bundling it: plurilateral initiatives such as sectorals would open markets but would clash with political economy constraints.

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,

2010-a). Also, a move towards regionalism and bilateralism would be unavoidable in the case of failure of the Round, with associated trade diversion effects, as suggested by current negotiations on mega deals. 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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Appendix 1: regional aggregation

Region	Composition
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 World (incl. South Africa)	Rest of Europe Former Soviet Union Middle East Rest of Oceania

Appendix 2: sectoral aggregation

Aggregation Code	Label
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

Developed countries		Developing countries	
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. Developing countries are conceded one third more sensitive products (see special products below regarding our assumption).

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.

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. Such concession to China would probably no longer be accepted would a final Round of the negotiations take place. And to some extent, sectoral initiatives were designed to circumvent this issue as illustrated below by our results. However, this was still considered as acceptable in 2008 when modalities were amended. The effort for recently acceded members 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: 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. 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.

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°	Trade	Transport	Communic°	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

Appendix 5: Modelling of the sectorals

There were two possible approaches. One would have been to define sectors where sensitive products cannot be chosen, but the liberalisation in these sectors is not necessarily reinforced. The other would have been 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. The EU position was more accommodating than the US and stresses that developing countries should be granted some flexibility even for sectorals.³¹ We adopt this approach in order to get a conservative assessment of the effect of these clauses. 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 categories of products concerned by the sectorals.

Chemical products are defined as NAMA products in HS chapters 28 to 39. 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 these two Chapters. The products include inorganic and organic chemicals, fertilisers and plant protection chemicals, soaps and cosmetics, other chemicals and plastics.³² 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.

Next is machinery and then electronics. In these two sectors, the more ambitious option is to set the bound tariffs to zero. 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 countries: Argentina, Brazil, Chile, Colombia, Peru, Paraguay, Uruguay, Mexico, China, India, Indonesia, Malaysia, Philippines, Taiwan, Thailand.

The simulation on environmental goods assumes a further liberalisation of environmental goods by a group of countries including developed and developing countries except small and vulnerable economies (but including Uruguay and Paraguay) and least developed countries. There is a published list of environmental goods for which tariffs could be set to zero; we assume a phasing out of the corresponding tariffs in one simulation, based on this list.

³¹ See EU statement at the TNC, 29 April 2011. This compromise would have been 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.

³² The 1995 agreement is plurilateral: 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.

Appendix 6: Long run change in the volume of GDP (percent) with sectorals

**Table: Long run change in the volume of GDP (percent):
sectorals and difference with central scenario, USD mn**

	S5	S5-S3
Argentina	890	1
ASEAN	15,730	2,754
Australia & New Zealand	1,870	154
Brazil	1,960	-86
Canada	1,270	-35
Caribbean	270	135
China	42,740	6,273
EFTA	7,820	151
European Union	33,980	3,245
India	4,610	-2,321
Japan	15,680	1,912
Korea	5,410	896
Mexico	1,640	1,935
North Africa	1,260	-20
Rest of Africa (except South Afr.)	6,040	20
Rest of Mercosur	930	45
Rest of South America	2,930	398
Rest of South Asia	1,370	-38
Rest of World	7,430	44
Taiwan	6,040	1,513
USA	11,110	1,626
World	170,970	18,600

Note: First column shows changes in the volume of GDP under scenario 5. Second column shows the difference with our central scenario.

Source: Author's calculation using MIRAGE

Author contacts:

Yvan Decreux

International Trade Center, Geneva

Email: y.decreux@gmail.com

Lionel Fontagné (corresponding author)

Paris School of Economics (University Paris 1) and CEPII

Maison des Sciences Economiques (Office #106)

106-112 Bd de l'Hôpital

F-75647 Paris Cedex 13

Email: lionel.fontagne@univ-paris1.fr