

# **Is Northern agricultural liberalization beneficial to developing countries?**

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## **Abstract:**

Using an adapted version of the MIRAGE model, this paper aims at assessing the impact of a widespread liberalization in agriculture, concerning border protection as well as domestic support. The CGE model includes imperfect competition and increasing returns to scale in industry and services. It assumes land and labor mobility to be imperfect across sectors, and developing countries have a dual labor market.

Special emphasis is put on measuring properly protection and domestic support. Protection data, from the MAcMaps database, describes applied tariffs, taking preferential agreements exhaustively into account. Domestic support data is updated to 2001 for the EU and the US, and accounts for the Agenda 2000 reform and the New Farm Bill.

The results provide a contrasted picture of the benefits developing countries may draw from agricultural liberalization.

Key words: CGE model, Doha Round, agriculture, tariff preferences, domestic support.

J.E.L. Classification: F12, F13, D58, Q17.

## **Introduction**

The agricultural sector is one of the main bones of contentions in international trade negotiations, both in the multilateral and regional framework. The Uruguay Round lasted 7 years, mainly because of the difficulty in finding an agreement on agricultural issues. Article 20 of the URAA provides the basis for sectoral negotiations on agriculture. It called for beginning negotiations in the year 2000 on continuing the process of reforming the world's agricultural trading system. Although sectoral negotiations, called for by the 1994 WTO Uruguay Round Agreement on Agriculture (URAA), have been underway since March 2000, the Doha Ministerial Declaration incorporated them into a comprehensive round of multilateral trade negotiations and set an agreed negotiating mandate for agriculture.

After 7 meetings, 45 proposals and submissions from 127 countries in the first phase (March 2000 to March 2001), six major meetings in the second phase (March 2001 to March 2002), member countries were supposed to agree on numerical targets, formulas and other "modalities" for countries' commitments by 31 March 2003 and for countries to submit comprehensive draft commitments by the Fifth Ministerial Conference in 2003. This was not the case, and at the end of March 2003, the negotiating positions of the different countries were still very remote. Two successive attempts to synthesize the various positions into draft modalities for further commitments, the so-called "Harbinson proposals" failed to reach a consensus.

There are still major disagreements, on the three main issues surrounding agricultural negotiations, i.e. market access (in particular the proportion and methods for reducing tariffs and tariff peaks), domestic support, and, to a lesser extent, export subsidies and export credits. Some countries find the discipline suggested by the Harbinson proposal still too lenient, while others see it as unbalanced and imposing too many constraints on some countries that use particular instruments.

Nevertheless, if a consensus is to be found, it is unlikely that it will depart significantly from these proposals. The percentage reduction of high tariffs can differ from the proposals, the mandatory reduction of the "blue box" payments could be different, and the special and differential treatment for the developing countries could take other forms. However, the main aspects are likely to be adopted, unless one imagine a major failure of the WTO system, since the absence of an agreement is likely to trigger numerous trade conflicts at the end of the "due restraint" clause of the Uruguay Round. For that reason, in this paper, we still focus on the scenario proposed in the draft Modalities of February 2003 and try to quantify its macroeconomic and trade impact.

## **Recent assessments of the Doha Round impact**

The Doha Round has already been subject to various assessments, using either a partial equilibrium or a computable general equilibrium (CGE) model. Partial equilibrium models have the advantage of being less demanding in terms of data and of theoretical consistency, thus making it possible to work with greater sectoral breakdown, and with more ad-hoc specifications. In contrast to CGE models, however, partial equilibrium models generally focus on a given set of sectors, and ignore interactions between sectors (although the FAPRI modeling system accounts for interactions within some groups of sectors), that may notably be important through input-output relationships. They also ignore the constraints linked to the equilibrium of factor markets, and to the macro-economic equilibrium of the economy. The increasing opportunity cost of production factors for a given sector, the feedback effect through income,

the trade balance constraint are thus absent of a partial equilibrium analysis. This is an acceptable approximation for a shock of limited magnitude, in particular in terms of sectors concerned. It is much more problematic as soon as a widespread liberalization is considered. In this case, a CGE analysis is generally deemed to be necessary. And, by not taking into account the above mentioned constraints, partial equilibrium models are likely to overstate the extent of the induced impact on trade and output.

CGE assessments of the impact of agricultural liberalization in the Doha Round include Hertel, Anderson, Francois et Martin, 2000; Diao, Somwaru et Roe, 2001; Beghin J. C., Roland-Holst D. and van der Mensbrugge D., 2002; Elbehri et Leetmaa, 2002; van Meijl et van Tongeren, 2001; Rae et Strutt, 2002; Dimaranan, Hertel et Keeney, 2003; Francois, van Meijl and van Tongeren, 2003, and this list does not intend to be exhaustive. Although they all conclude that a liberalization of border protection and internal support would increase world prices and world trade, and would have a positive impact on global welfare, the results of the existing studies are rather contrasted. In particular, the outcome for developing countries is found to be uniformly positive in some studies, while some countries are found to suffer a loss in other assessments.

Carrying out a prospective assessment of the consequences of a widespread liberalization of agricultural trade usually requires using complex models, and large databases. Numerous differences thus arise across studies. The most relevant points are the following:

1. *Initial trade patterns.* For any country or region, the terms-of-trade impact of a given variation in world prices depends on its initial trade patterns. In particular, an increase in the world price of agricultural commodities is good news for countries that are (or are in a position to be) net exporters in such commodities. This is not difficult to measure, but the choice of regional aggregation can seriously blur the analysis. This is especially true for LDCs: they are net food importers, strongly in many instances (according to UNCTAD, 2002, the ratio of exports to imports for LDCs was only 20% in 2001), but this is concealed as soon as these countries are part of an aggregate including also large developing countries, such as South-Africa (as is often the case), not to speak about Brazil or Argentina. And very few studies consider separately LDCs or (African-) ACP countries (this region gathers the bulk of LDCs, with the notable exception of Bangladesh) in a CGE analysis. When this is done (as e.g. in Francois et al., 2003, or in Hertel et al., 2003), the outcome generally turns out to be negative for this region.
2. *Initial protection patterns.* To the best of our knowledge, no CGE modeling analysis dealing with multilateral liberalization in agriculture has so far taken into account preferential agreements in measuring protection.<sup>1</sup> Even partial equilibrium models do not account for preferences, with the only exception of Hoekman et al. (2002b). Now, preferences are a crucial device of the present protection patterns, for many countries (see Bouët et al., 2001). In addition, preferences are very contrasted across countries. The poorest countries benefit from preferential access to many countries through the LDCs-GSP, and in particular to the EU, thanks to the Cotonou agreement and the EBA initiative. In this context, any multilateral liberalization involves an erosion of the preference margin. As shown by Hoekman et al. (2002b), the stiffer competition this implies for LDCs exports might lead to reduced exports (toward the EU, at least), as a consequence of a multilateral liberalization of market access.

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<sup>1</sup> The GTAP database incorporate a handful of preferential agreements, such as the NAFTA or the EU. Data on agricultural protection stem from the AMAD database, of the ERS-USDA, year 1998. It also basically deals with MFN tariffs. Noticeably, Cotonou agreements (or, at that time, Lomé convention) are not accounted for.

3. *Protection pattern after liberalization.* The main scenarios considered in the present multilateral negotiations rely on non-linear reduction of tariffs, in order to even out their structure. This is important, since the impact of tariffs is non-linear, and tariff peaks are recognized to be widespread in agriculture. The existing literature provides very little insight about the consequence of such evening out. Rae (2002) applies a cocktail, non-linear formula, but directly at the GTAP classification level (12 agricultural commodities, 8 processed food products), where tariff peaks are generally mixed together with many other products: to a large extent, the evening out is already made in the sectoral aggregation. To our knowledge, the only instances of dealing with tariff peaks in a multilateral approach are Hoekman et al. (2002a, b) in a partial equilibrium model, and Fontagné et al. (2002), in a CGE analysis focusing mainly on industry.

A second problem is that negotiations concern bound (and possibly MFN) tariffs, not applied tariffs. In principle, the applied tariff will be lowered if it exceeds the lowered level of the bound tariff. This implies that the level of effective liberalization of market access may vary widely across countries, given that the level of "binding overhang" is very contrasted, and in general far higher in developing countries than in developed countries. Another consequence is that the preference margins will be more than proportionately eroded: the higher the initial preference margin, the lower the rate of reduction in the applied tariff. However, treating these issues correctly would require to combine information about bound tariffs, MFN tariffs, and preferential treatments. This has never been made so far, to our knowledge. Walkenhorst and Dihel (2002) and OECD (2003), however, show the effect on MFN tariffs of a given liberalization of bound tariffs. In doing so, they assume that the resulting MFN tariff is the lowest among the initial MFN tariff and the final (lowered) bound tariff. These insightful studies highlight how imperfect and heterogeneous the pass-through from bound tariffs to MFN tariffs is. Nevertheless, they let uninformed the question of how MFN liberalization is transmitted to applied tariffs.

4. *Domestic support level.* Measuring domestic support is obviously important in dealing with agricultural liberalization, but it is problematic for several reasons. The AMS data from the WTO (used e.g. in Hoekman et al., 2002a, or in the ATPSM model, Vanzetti and Sharma, 2002), for instance, are computed on the basis of 1986-88 prices, the economic relevance of which is far from clear in 2003. In addition, such data, by definition, only concerns supports belonging to the amber box. This means that the blue and green boxes are excluded from the analysis. Now, the decoupling of these supports is not complete: excluding them from the analysis is thus a source of understatement of the impact of domestic support. Although far from perfect, the OECD PSE data (by far the most widely used) seem to be a more reliable source, but they do not match WTO boxes, and they only cover OECD countries. Their product coverage is not complete either, and excludes for instance US cotton and tobacco.

In any case, these data are lagging far behind the reality of the negotiations: the latter deal with domestic support in 2005 and afterwards, while the data available in the above mentioned sources concern at best the year 2000 or 2001. Hence the need to incorporate recent (or future) important changes, such the Agenda 2000 reform of the CAP, the EU enlargement (and the associated CAP's extension), the US New Farm Bill. Such work is done in detail for the EU in studies devoted specifically to the Agenda 2000 reform or to the EU enlargement (see e.g. Bach and Frandsen, 1998, Jensen, Frandsen and Bach, 1998, Frandsen and Jensen, 2000, Gohin, Guyomard and Le Mouël, 2000, Brockmeier, Herok and Salamon, 2001); in existing CGE-based studies of multilateral liberalization, however, this

does not use to be done,<sup>2</sup> with the exception of Francois et al. (2002), who account for the Agenda 2000 reform and the EU enlargement. Specialised, agricultural partial equilibrium models, are also based on 1997 to 2000 data. Some of them, however, take into account in their baseline the above-mentioned planned changes in domestic support. This is in particular the case of the FAPRI modeling system (FAPRI Staff, 2002), the baseline of which incorporates a very detailed information on support policies and their planned evolution.

5. *Domestic support modeling.* Following Bach and Frandsen (1998), the literature about the impact of the EU enlargement and the Agenda 2000 reform has insisted on the importance to model properly the CAP tools, i.e. not to rely on their price-wedge equivalents, that are likely to be misleading in many instances. However, this is not used in existing studies about multilateral liberalization, except in the FAPRI modeling system. And, for instance, FAPRI (2002) shows that the impact of a removal domestic support on the world price of wheat is negligible, when taking into account the set-aside requirements in European wheat. Decoupling is never complete, and recent estimates suggest that the effect of decoupled payments on output is around 30% the effect of a coupled payment (see e.g. FAPRI, 2002, Gardner, 2002). This estimates are used here to consider, in the data, 30% of decoupled payments as output subsidies.

6. *Supply response.* The flexibility of supply response may strongly influence the assessed impact of a liberalization. The lesser this flexibility, the lower the impact of a given shock. And several limitations exist on supply response. A first one, not accounted for in partial equilibrium models, is that sectors compete for the use of production factors. In particular, the total output of agricultural sectors might be strongly constrained by the level of land supply, and an increased output in one sector raises, *ceteris paribus*, the opportunity cost of land for other agricultural sectors. This constraint all the more important, given that CGE models are used to assume that land supply is exogenous: this assumption is made in all the above-mentioned CGE assessments of the Doha Round, with the exception of Beghin et al. (2002). This is likely to significantly bias downward the assessed impact.

Another important determinants of supply response are the assumptions made about factors mobility. This mobility is generally assumed to be perfect for capital in the medium- or long-run. As far as land is concerned, the mobility is generally assumed to be imperfect, and modeled through a CET function. As to labor, its mobility is generally assumed to be perfect across sectors, but this not necessarily well-suited: agriculture requires specific skills, and the rural-urban mobility of labor force is limited. Ignoring this is likely to lead to overstate the impacts induced on agricultural output and labor force, and to understate the induced changes in farmer incomes.

Finally, an arguable assumption generally made in CGE models is that developing economies behave in a similar way as developed economies. This implies, for instance, that any raise in agricultural prices would lead to an increase in rural labor force, at the expense of the urban one. This is inconsistent with the fact that rural depopulation is in practice an irreversible evolution. The approach used a decade ago in the RUNS model (Burniaux and van der Mensbrugghe, 1990), based on a rural-urban migration function à la Harris-Todaro, is more consistent in this respect: it takes into account the underlying trend of rural depopulation, and it assumes an imperfect rural-urban mobility. However, we argue that the

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<sup>2</sup> All recent CGE-based assessments of multilateral liberalization use the GTAP database, in its version 5.0 for the most recent, where domestic support is described based on OECD's PSE support data, except for price market support, that is described through tariffs and export subsidies.

large asymmetry, in most developing countries, between the agricultural sector and the rest of the economy, would justify modeling them as dual economies, à la Lewis. This notably implies that the rural labor force is determined as a residual, once urban employment is determined.

7. *Demand response.* Agricultural goods are frequently considered by specialists as homogenous goods, and this is indeed by far the most usual assumption in agricultural, partial equilibrium models. In contrast, CGE models use to treat agricultural goods as strongly differentiated goods, with rather low elasticities of substitution. The GTAP model uses elasticities of substitution between domestic and foreign goods averaging 2.3 in agriculture, while elasticities between foreign goods reach twice this level. This level is surprisingly low, compared to the assumptions made in partial equilibrium models, but also compared to manufactured goods (for which this elasticity is higher, reaching 10.4 for domestic-foreign sourcing in motor vehicles, while these goods are generally recognized to be more differentiated), and to recent econometric estimates (see e.g. Hummels, 1999, Herkel-Rousse and Mirza, 2002, Romalis, 2002). The estimates by Romalis (2002) suggest a possible explanation for this: the measure of the price-elasticity of trade flows might be strongly blurred by the difficulty to measure adequately trade protection. He shows that measuring protection based on paid duties, instead of scheduled ones, strongly increases the value of the resulting estimated elasticities (they reach 10 to 12 in this cases, for industrial goods). Let us add that, as soon as agriculture is concerned, the widespread use of quantitative barriers<sup>3</sup> is also likely to blur the estimates of trade elasticities. This might explain why back-casting exercises (see e.g. Gehlhar, 1996, or Liu, Arndt and Hertel, 2003) are rather consistent<sup>4</sup> with the low values used for substitution elasticities: they are consistent with the measurement error in protection. Since we have made our best to reduce this measurement error in protection, it is consistent here to assume higher levels of substitution elasticities. However, for the sake of comparability, the values used here for the substitution between all suppliers are the same as the ones used in the GTAP model between foreign suppliers.

This paper aims at evaluating the impact of Harbinson 1 ½, with a methodology which takes into account three priorities:

- (i) measuring accurately policy variables, with firstly a complete integration of trade preferences and regional agreements. Our data are based on MAcMaps for 2001. Secondly, as far as domestic support is concerned, we have constructed an original dataset based on OECD's (Producer Subsidy Equivalent) PSE for 2001, which accounts for EU enlargement, the Agenda 2000, and the New US Farm Bill. Finally, we modelize land set-aside programs and an incomplete decoupling of subsidies.
- (ii) Modelling adequately economic responses; for the supply response we suppose an endogenous land supply (with the opposition of land-constrained and not land-constrained countries), an imperfect labour mobility between agriculture and other sectors and an imperfect land mobility. As far as demand response is concerned, we

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<sup>3</sup> Until the URAA, at least. However, the TRQs used since then are also frequently alike quantitative barriers, at least when the outside quota tariff rate is prohibitive.

<sup>4</sup> In fact, Gehlhar's study is consistent with elasticities approximately twice as high as those used in GTAP, but this level remains rather low.

- study the sensitivity of our results, by a value modification of elasticities of substitution between foreign suppliers.
- (iii) Finally we try to address developing countries' specific issues; we include a dual labour '*à la Lewis*' by opposing efficiency wages in industry and services, and competitive wages in agriculture. A fundamental issue is also to specify a consistent geographical breakdown of developing countries, which tackles the hierarchy of trade preferences and the distinction between net food importers and exporters. With respect to this last issue, we isolate the group of Cotonou - African countries.

### **Description of the model: main aspects**

The model used in this study stems from the MIRAGE model, described in Bhir et al. (2002a, b), with several modifications in order to tackle more properly agricultural issues.

MIRAGE is a multi-sector, multi-region computable general equilibrium (CGE) model, devoted to trade policy analysis. Agricultural sectors are perfectly competitive, but not industry and market services, where imperfect competition is described in an oligopolistic framework *à la Cournot*. It accounts for horizontal product differentiation linked to varieties, but also to geographical origin (nested Armington – Dixit-Stiglitz utility function). A new calibration procedure allows the available information on these aspects to be used efficiently. A notion of vertical product differentiation is introduced in industrial sectors, by distinguishing two quality ranges, according to the country of origin of the product. This is not the case, however, for agriculture goods and processed food.

Although MIRAGE is a dynamic, sequential model, it is used here, for the sake of simplicity, only for static comparative simulations. The modeling of capital is accordingly simplified, assuming capital stock to be perfectly mobile across sectors. FDI is not accounted for either, in contrast to the standard version of MIRAGE. In terms of macro-economic closure, investment is savings-driven, and the current balance is assumed to be exogenous.

The main other modifications introduced to the model are described below.

#### **Factor endowments and factor mobility**

Trade policy may modify the capital stock in the economy, through its impact on income or on the savings rate. This is not taken into account here, since we assume capital stock to be constant.

CGE models generally assume land endowment to be constant for each region. However, land in such models shall be understood as land used for culture or cattle. As such, its surface may evolve when there are incentives for it, and omitting this is likely to induce an understatement of the supply response. This is why land supply is assumed to be endogenous, behaving as an isoelastic function of the real return to land (as in the Linkage model, see van der Mensbrugge, 2001). Regions are accordingly classified either as land-constrained (supply elasticity is then equal to 0.25), or not (elasticity equal to 1).<sup>5</sup> This is intended to reflect the fact that the potential for agricultural output can vary widely across country, notably depending on their capacity to increase their surface of arable land.

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<sup>5</sup> These values are the same as in the Linkage model. We thank Dominique van der Mensbrugge for providing us information and advice on this point.

Developing countries are assumed to have dual economies. The modern sector (industry and services) pays an efficiency wage to unskilled workers, above their marginal productivity. It is thus faced with an infinitely elastic supply of unskilled labor. The primary sector (i.e., agriculture), in contrast, pays a competitive wage, and the supply of unskilled labor it is faced with is set as a residual, once the modern sector has set its unskilled labor employment level. Land mobility across agricultural sector is assumed to be imperfect, with a transformation elasticity equal to 0.5.

### **Protection and domestic support data**

The model uses GTAP 5.2 database (see Dimaranan and Mac Dougall, 2002), but specific data are used to describe tariff barriers as well as agricultural domestic support.

Trade barriers are described by the *MAcMaps* database (see Bouët, Fontagné, Mimouni and Pichot, 2001, 2002), that provides with a measure of ad-valorem tariffs, and of the ad-valorem equivalent of specific tariffs, tariff quotas, prohibitions and anti-dumping duties, at the bilateral level, for 137 countries with 220 partners. Preferential agreements are taken into account in a quasi-exhaustive way. This information is available at the HS6 or tariff line level, according to the country (i.e. at least for 5 000 products).<sup>6</sup> This description of trade barriers, besides its precision, preserves the bilateral dimension of the information, contrarily to what is commonly done in applied modeling. This information refers to applied protection in 2001, and it replaces the information given in the GTAP database. It takes into account the effect of a full implementation of the Uruguay Round Agreements.

The GTAP database includes data on agricultural support for OECD countries in 1997. This information is most valuable but, as outlined before, it lags far behind the reality of negotiations. This is why we have built an original dataset on agricultural domestic support in the EU and in the US, mainly based on OECD PSE estimates, for the year 2001. In addition, we take into account the effect of the EU enlargement, of a full implementation of the Agenda 2000 reform in the EU, and of the 2002 Farm Bill in the US (see Appendix for more details).

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This information about agricultural support is considered through a pre-experiment simulation: from the GTAP dataset, with *MAcMaps* protection, a new equilibrium is computed, assuming that domestic support is shifted to its new level. The resulting equilibrium corresponds to a notional world economy, based on 1997 data, but incorporating (in addition to 2001 data on market access) the above mentioned changes in agricultural policies.

Subsidies are directly introduced in the model as price wedge, either on output, on variables inputs, on land or on capital. In addition, market price support is modeled through the combination of tariffs and of export subsidies.

Set aside is taken into account in the US and the EU, and modeled as a negative shock on the productivity of land (see Bach and Frandsen, 1998).

*Explicit modeling of the link between intervention price, export subsidy, and ceilings on the latter will be done in a future version.*

### **Geographical and sectoral breakdown**

From the geographical point of view, priority is given to estimating impact of liberalising agricultural policies in the two highly interventionist zones (USA and EU) which have huge

<sup>6</sup> In a future draft, scenarios of border protection liberalization will be computed at the HS6 level.

trade preferences, on differentiated groups of developing countries. We concentrate attention to the impact on ACP countries on one hand, and the Cairns group on the other hand.

As a matter of fact, the world is divided in 9 regions:

1 - the European Union, enlarged to 15 countries;

2 - the United States of America (with American Samoa, Guam and Northern Mariana Islands);

3 - the ACP countries;

4 - the Cairns group (with 19 countries: Brazil, Argentina... but also Australia, Canada and New Zealand);

5 - China (Hong Kong included);

6 - the former Soviet Union (called FSU);

7 - Developed Asia, called DA, (including Japan and South Korea);

8 - the European periphery, called Periph, with the EFTA, Romania, Bulgaria, Croatia, Turkey and the Maghreb countries.

9 - the Rest of the World.

From the sectoral point of view, economic activity is shared between 32 sectors with a pre-eminence of agricultural and agri - food sectors (23 - see Table 1).

**Table 1: Sectoral breakdown**

Sector	Abbrev.	Perfect/imperfect competition
Paddy rice	PadRice	Perfect comp.
Wheat	Wheat	Perfect comp.
Other cereals	Cereals	Perfect comp.
Vegetable and fruits	VegFruits	Perfect comp.
Oil seeds	OilSeeds	Perfect comp.
Sugar (Cane & Beet)	SugarCB	Perfect comp.
Fibers	Fibers	Perfect comp.
Crops	Crops	Perfect comp.
Live animals	LivAnimals	Perfect comp.
Animal products	AnimProd	Perfect comp.
Raw milk	RawMilk	Perfect comp.
Wool	Wool	Perfect comp.
Forestry	Forestry	Perfect comp.
Fishing	Fishing	Perfect comp.
Other primary products	Primary	Perfect comp.
Meat	Meat	Perfect comp.
Meat products	MeatProd	Perfect comp.
Fats	Fats	Perfect comp.
Dairy products	Dairy	Perfect comp.
Processed rice	ProcRice	Perfect comp.
Sugar (processed)	Sugar	Perfect comp.
Other food products	Food	Perfect comp.
Beverage & Tobacco	BevTobacco	Perfect comp.
Trade and transport service	TrT	Perfect comp.
Textile	Textile	Imperfect comp.

Clothing	Clothing	Imperfect comp.
Leather	Leather	Imperfect comp.
Wood products	WoodProd	Imperfect comp.
Other industrial products	AutreIndus	Imperfect comp.
Chemical products	Chemicals	Imperfect comp.
Equipment goods	Equipment	Imperfect comp.
Other services	AutreSer	Imperfect comp.

## Main results

We study the impact of Harbinson proposal, as it has been defined in 2003 March (it is 'Harbinson 1 ½, which means a revision of the draft he proposed in 2003 February).

Several instruments are used in Northern countries' agricultural sector in order to support domestic activity, border protection and domestic support. In the current negotiations one central issue is to know which instrument is more distorsive and should be cut under priority. As a matter of fact, we firstly consider a border liberalization, secondly a reduction in domestic support.

### **Border protection**

Harbinson proposed a differentiated reduction in border protection, taking into account Special and Differentiated Treatment. For industrial countries, the reduction is very progressive:

- if tariffs are greater than 90%, a reduction of 60%;
- if tariffs are equal to or less than 90% and greater than 15%, a reduction of 50%;
- if tariffs are equal to or less than 15%, a reduction of 40%.

The reduction is much less severe for developing countries (the definition of developing countries is the one adopted by WTO – see Annex B):

- if tariffs are greater than 120%, a reduction of 40%;
- if tariffs are equal to or less than 120% and greater than 60%, a reduction of 35%;
- if tariffs are equal to or less than 60% and greater than 20%, a reduction of 30%;
- if tariffs are equal to or less than 20%, a reduction of 25%.

Market access in enlarged European Union and in USA is presented in tables 2 and 3. Tables 4 and 5 illustrate the impact of Harbinson 1 ½ on this market access: these figures are variation in rates of protection such that it means for example that while ACP dairy products are taxed by a 32.1% duty before the Round, Harbinson 1 ½ reduces this duty to 30.1%. As Harbinson 1 ½ concerns only agriculture, industrial sectors are removed from tables 4 and 5. In the last row and column, simple averages are indicated.

In the two richest trading zones, protection is concentrated in dairy products, wheat sugar, meat, cereals and live animals. In these sectors, protection is very high in Europe. Its trade policy has conceded extensive preferences to ACP countries: the simple average of protection rates granted to ACP countries is 5.0%, against 31% against the Cairns group and 30% against USA. Of course, these figures are very high due to the number of agricultural sectors.

**Table 2: market access in European Union (25) before the Doha Round**

<i>code</i> <i>gap</i>	ACP	CAIRNS	China	Ex_URSS	Periph	RoW	RPI	US	EU aver.
<i>Dairy</i>	32.1%	68.4%	37.7%	36.2%	72.6%	31.4%	74.5%	77.7%	<b>53.8%</b>
<i>Wheat</i>	5.1%	95.9%	85.0%	86.3%	139.4%	131.7%	84.0%	92.8%	<b>90.0%</b>
<i>Sugar</i>	31.2%	77.2%	141.2%	26.5%	18.7%	45.6%	172.3%	32.2%	<b>68.1%</b>
<i>Meat</i>	8.3%	95.4%	86.0%	79.5%	78.7%	96.8%	25.1%	112.0%	<b>72.7%</b>
<i>ProcRice</i>	6.5%	24.3%	20.8%	18.5%	8.9%	18.0%	21.9%	26.4%	<b>18.2%</b>
<i>Cereals</i>	0.0%	121.8%	127.3%	98.8%	110.6%	126.5%	121.1%	176.9%	<b>110.4%</b>
<i>PadRice</i>	23.8%	27.7%	24.0%	17.8%	23.3%	25.2%	25.6%	28.8%	<b>24.5%</b>
<i>MeatProd</i>	10.0%	53.4%	38.5%	29.0%	13.0%	64.1%	74.8%	60.5%	<b>42.9%</b>
<i>BevTobac</i>	12.7%	8.6%	9.7%	3.7%	15.9%	5.6%	12.4%	23.3%	<b>11.5%</b>
<i>LivAnima</i>	0.0%	136.6%	177.1%	9.0%	105.6%	150.6%	1.2%	52.8%	<b>79.1%</b>
<i>VegFruit</i>	12.8%	85.5%	30.7%	5.9%	9.2%	55.3%	48.4%	74.5%	<b>40.3%</b>
<i>Clothing</i>	0.0%	10.5%	11.2%	10.3%	0.0%	6.3%	11.1%	10.9%	<b>7.6%</b>
<i>Food</i>	1.4%	45.2%	19.1%	6.7%	12.3%	16.4%	21.8%	58.7%	<b>22.7%</b>
<i>Fats</i>	0.0%	3.3%	4.2%	1.5%	11.5%	1.6%	8.3%	4.3%	<b>4.4%</b>
<i>Leather</i>	0.0%	5.2%	4.7%	3.5%	0.1%	4.8%	7.2%	5.3%	<b>3.8%</b>
<i>SugarCB</i>	5.4%	29.9%	61.4%	220.9%	58.8%	25.4%	20.2%	19.1%	<b>55.1%</b>
<i>OilSeeds</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.0%</b>
<i>Crops</i>	0.7%	3.0%	2.7%	1.0%	6.4%	1.1%	3.2%	4.3%	<b>2.8%</b>
<i>Textile</i>	0.0%	8.0%	9.7%	7.4%	0.5%	6.6%	8.7%	7.8%	<b>6.1%</b>
<i>Fibers</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.0%</b>
<i>WoodProd</i>	0.0%	0.7%	0.6%	0.4%	0.2%	0.1%	0.8%	1.2%	<b>0.5%</b>
<i>AnimProd</i>	0.0%	6.8%	2.8%	0.1%	1.5%	2.3%	0.8%	2.8%	<b>2.2%</b>
<i>Fishing</i>	0.1%	9.6%	6.3%	4.7%	25.6%	9.3%	8.4%	9.1%	<b>9.1%</b>
<i>Wool</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.0%</b>
<i>AutreInd</i>	0.1%	4.0%	2.9%	1.1%	0.4%	1.3%	4.5%	2.8%	<b>2.1%</b>
<i>Chemical</i>	0.0%	3.9%	3.9%	4.7%	0.7%	1.8%	4.4%	3.8%	<b>2.9%</b>
<i>Equipmen</i>	0.0%	1.4%	1.1%	0.4%	0.1%	0.2%	2.1%	1.6%	<b>0.9%</b>
<i>Primary</i>	0.0%	0.8%	2.1%	1.2%	0.3%	0.1%	2.4%	2.4%	<b>1.2%</b>
<i>Forestry</i>	0.0%	0.2%	0.4%	0.0%	0.0%	0.3%	0.2%	0.2%	<b>0.2%</b>
<i>AutreSer</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.0%</b>
<i>Total</i>	5.0%	30.9%	30.4%	22.5%	23.8%	27.6%	25.5%	29.7%	<b>24.4%</b>

(Source: MacMaps 2001 and authors' calculations)

**Table 3: market access in United States before the Doha Round**

<i>code</i> gtap	ACP	CAIRNS	China	Ex_URSS	Periph	RoW	RPI	UE_25	US average
<i>Dairy</i>	56.6%	46.1%	15.9%	22.4%	51.6%	22.0%	50.5%	47.9%	<b>39.1%</b>
<i>Wheat</i>	0.6%	0.7%	2.3%	2.6%	4.9%	0.9%	1.7%	2.2%	<b>2.0%</b>
<i>Sugar</i>	8.5%	68.6%	85.8%	1.3%	10.1%	11.7%	84.3%	74.3%	<b>43.1%</b>
<i>Meat</i>	5.1%	22.2%	17.8%	3.6%	5.0%	8.0%	7.1%	22.7%	<b>11.4%</b>
<i>ProcRice</i>	0.0%	1.8%	6.3%	6.4%	2.6%	2.0%	6.5%	5.5%	<b>3.9%</b>
<i>Cereals</i>	2.1%	0.7%	0.6%	1.9%	0.1%	0.4%	1.0%	0.8%	<b>1.0%</b>
<i>PadRice</i>	0.0%	2.1%	3.0%	2.9%	2.1%	1.6%	2.6%	2.8%	<b>2.1%</b>
<i>MeatProd</i>	0.8%	0.8%	4.5%	1.8%	2.3%	0.0%	0.9%	1.1%	<b>1.5%</b>
<i>BevTobac</i>	4.0%	3.2%	8.9%	0.3%	7.4%	3.6%	7.7%	5.7%	<b>5.1%</b>
<i>LivAnima</i>	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%	<b>0.0%</b>
<i>VegFruit</i>	0.5%	0.9%	10.5%	10.2%	2.7%	0.5%	3.7%	3.0%	<b>4.0%</b>
<i>Clothing</i>	11.8%	12.0%	12.0%	14.3%	12.3%	9.6%	14.1%	12.3%	<b>12.3%</b>
<i>Food</i>	0.8%	9.6%	10.6%	0.3%	6.3%	2.8%	10.5%	18.0%	<b>7.4%</b>
<i>Fats</i>	0.8%	1.9%	3.7%	2.0%	1.1%	0.7%	4.2%	4.7%	<b>2.4%</b>
<i>Leather</i>	1.2%	9.4%	14.8%	4.0%	8.2%	10.0%	10.1%	8.7%	<b>8.3%</b>
<i>SugarCB</i>	0.1%	0.8%	1.6%	0.2%	0.2%	0.2%	0.4%	0.1%	<b>0.5%</b>
<i>OilSeeds</i>	0.7%	8.7%	84.2%	0.2%	8.1%	20.7%	6.4%	4.5%	<b>16.7%</b>
<i>Crops</i>	7.8%	9.6%	5.9%	1.4%	29.1%	3.1%	4.4%	8.9%	<b>8.8%</b>
<i>Textile</i>	12.6%	8.0%	10.3%	9.1%	11.5%	8.6%	10.8%	9.6%	<b>10.1%</b>
<i>Fibers</i>	7.4%	25.7%	26.6%	29.0%	28.9%	25.2%	23.5%	25.6%	<b>24.0%</b>
<i>WoodProd</i>	0.1%	0.2%	0.9%	0.2%	0.4%	0.1%	0.5%	0.4%	<b>0.3%</b>
<i>AnimProd</i>	0.0%	0.3%	0.3%	0.0%	0.5%	0.3%	0.2%	0.2%	<b>0.2%</b>
<i>Fishing</i>	0.2%	0.1%	0.4%	0.0%	0.1%	0.3%	0.1%	0.4%	<b>0.2%</b>
<i>Wool</i>	0.0%	0.0%	0.9%	0.4%	0.1%	4.4%	0.6%	0.5%	<b>0.9%</b>
<i>AutreInd</i>	0.1%	0.4%	2.1%	0.3%	1.3%	0.2%	1.7%	2.3%	<b>1.1%</b>
<i>Chemical</i>	0.2%	1.0%	4.6%	0.3%	2.5%	1.7%	3.4%	3.2%	<b>2.1%</b>
<i>Equipmen</i>	0.9%	0.6%	2.4%	0.4%	1.4%	0.1%	2.0%	1.4%	<b>1.2%</b>
<i>Primary</i>	0.0%	0.3%	2.8%	0.4%	0.4%	0.1%	3.1%	1.5%	<b>1.1%</b>
<i>Forestry</i>	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.5%	0.1%	<b>0.2%</b>
<i>AutreSer</i>	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<b>0.0%</b>
<i>Total</i>	<b>4.1%</b>	<b>7.9%</b>	<b>11.3%</b>	<b>3.9%</b>	<b>6.7%</b>	<b>4.6%</b>	<b>8.8%</b>	<b>9.0%</b>	<b>7.0%</b>

(Source: MacMaps 2001 and authors' calculations)

In United States, agricultural protection is much lower than in Europe, but the industrial protection is slightly higher (see textile, clothing and leather), as confirmed by other studies. The essential result of Harbinson 1 ½ is an erosion of trade preferences for ACP countries. Their market access in Europe improves by only 1 point (1 point also in USA) while duties decrease by 13 points for the Cairns group, China and USA. The erosion of ACP preferences in USA is much lower. Market access in USA improves by 3 points for the Cairns group, 4 points for European Union and Other Industrialized Countries, 5 points for China. Obviously, it is related to higher initial trade preferences in European Union.

**Table 4: impact of Harbinson 1 ½ on European market access – % points**

<i>Codegtap</i>	<b>ACP</b>	<b>CAIRNS</b>	<b>China</b>	<b>Ex_URSS</b>	<b>Periph</b>	<b>RoW</b>	<b>RPI</b>	<b>US</b>	<b>EU aver.</b>
<i>Dairy</i>	-2%	-32%	-17%	-17%	-37%	-13%	-39%	-39%	<b>-24%</b>
<i>Wheat</i>	-3%	-53%	-48%	-48%	-77%	-68%	-48%	-51%	<b>-49%</b>
<i>Sugar</i>	-7%	-8%	-59%	-11%	-8%	-5%	-87%	-15%	<b>-25%</b>
<i>Meat</i>	0%	-39%	-29%	-27%	-36%	-37%	-10%	-52%	<b>-29%</b>
<i>ProcRice</i>	0%	-2%	-2%	-1%	-1%	-1%	-2%	-2%	<b>-1%</b>
<i>Cereals</i>	0%	-66%	-59%	-53%	-61%	-71%	-66%	-99%	<b>-59%</b>
<i>PadRice</i>	0%	0%	0%	0%	0%	0%	0%	0%	<b>0%</b>
<i>MeatProd</i>	-3%	-29%	-20%	-14%	-5%	-36%	-43%	-34%	<b>-23%</b>
<i>BevTobac</i>	-7%	-3%	-2%	-1%	-2%	-2%	-2%	-1%	<b>-3%</b>
<i>LivAnima</i>	0%	-78%	-105%	-3%	-60%	-87%	0%	-31%	<b>-45%</b>
<i>VegFruit</i>	-7%	-49%	-17%	-2%	-5%	-30%	-27%	-43%	<b>-22%</b>
<i>Food</i>	0%	-19%	-5%	0%	-2%	-6%	-4%	-11%	<b>-6%</b>
<i>Fats</i>	0%	-1%	-1%	0%	-5%	0%	-3%	-2%	<b>-2%</b>
<i>SugarCB</i>	0%	-16%	-33%	-88%	-1%	-13%	-6%	-9%	<b>-21%</b>
<i>OilSeeds</i>	0%	0%	0%	0%	0%	0%	0%	0%	<b>0%</b>
<i>Crops</i>	0%	0%	0%	0%	0%	0%	-1%	0%	<b>0%</b>
<i>AnimProd</i>	0%	-3%	-1%	0%	-1%	-1%	0%	-2%	<b>-1%</b>
<i>Fishing</i>	0%	0%	0%	0%	0%	0%	0%	0%	<b>0%</b>
<i>Total</i>	-1%	-13%	-13%	-9%	-10%	-12%	-11%	-13%	<b>-10%</b>

(Source: MacMaps 2001 and authors' calculations)

**Table 5: impact of Harbinson 1 ½ on USA market access – % points**

<i>codegtap</i>	<b>ACP</b>	<b>CAIRNS</b>	<b>China</b>	<b>Ex_URSS</b>	<b>Periph</b>	<b>RoW</b>	<b>RPI</b>	<b>UE_25</b>	
<i>Dairy</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Wheat</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Sugar</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Meat</i>	0%	-1%	-3%	0%	-3%	-1%	-4%	-1%	-2%
<i>ProcRice</i>	-1%	0%	0%	-1%	0%	0%	0%	0%	-1%
<i>Cereals</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>PadRice</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>MeatProd</i>	0%	0%	0%	0%	0%	0%	-1%	-1%	0%
<i>BevTobac</i>	-33%	-27%	-9%	-13%	-31%	-13%	-30%	-29%	-23%
<i>LivAnima</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>VegFruit</i>	0%	0%	-1%	-1%	0%	0%	-2%	-2%	-1%
<i>Food</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Fats</i>	0%	-5%	-4%	0%	-3%	-1%	-5%	-7%	-3%
<i>SugarCB</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>OilSeeds</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Crops</i>	0%	-13%	-11%	-2%	-3%	-3%	-4%	-14%	-6%
<i>AnimProd</i>	0%	0%	0%	0%	0%	0%	0%	0%	0%
<i>Total</i>	-1%	-3%	-5%	-1%	-2%	-1%	-4%	-4%	-3%

(Source: MacMaps 2001 and authors' calculations)

Let us examine firstly results from the border liberalization scenario: they are illustrated on tables 6 to 8. Table 6 gives the evolution of macroeconomic variables (welfare, GDP, termes of trade, global and agricultural exports and imports...). The most striking result concerns the evolution of trade flows: the reduction in tariffs causes an increase of world agricultural exports by 27.4%. ACP agricultural exports increase by only 1.0% while

**Table 6: Evolution of macroeconomic variables in case of tariff reduction scenario**

	EU_25	US	OIC	ACP	RoW	China	CAIRNS	Periph	FSU
Welfare	0.32	0.02	0.46	0.33	0.47	0.44	1.01	2.23	0.09
GDP (volume)	0.21	0.02	0.32	0.10	0.16	0.16	0.34	1.54	0.07
Terms of trade	0.14	0.15	-0.43	-0.51	-0.11	0.14	0.53	-0.83	-0.17
Real effective exchange rate	0.10	0.14	-0.57	-0.39	0.06	0.19	0.65	-1.11	-0.14
Unskilled real wages	-0.76	0.74	-0.79	-0.16	0.26	0.26	1.64	-0.54	-0.20
Agricultural real wages	-2.31	1.94	-2.65	-0.72	1.12	1.06	7.07	-3.98	-0.58
Non agricultural unskilled real wages	0.18	-0.01	0.33	0.00	0.00	0.00	0.00	1.57	0.03
Skilled real wages	0.28	-0.09	0.51	0.36	0.22	0.17	0.15	2.97	0.07
Real return to capital	0.34	0.02	0.31	0.16	0.14	0.15	0.23	1.86	0.08
Real return to natural resources	0.24	-0.39	-2.09	0.72	0.15	-0.09	-0.48	3.32	0.26
Real return to land	-1.02	1.00	-5.59	0.26	-0.12	-0.45	0.28	0.06	0.11
Exports (volume)	2.48	1.30	1.78	1.19	1.73	1.09	2.94	4.62	1.00
Imports (volume)	2.86	1.14	2.19	1.09	1.69	1.07	2.92	4.77	1.37
Agricultural exports (volume)	41.96	23.68	30.30	1.04	14.98	20.78	29.50	32.39	6.41
Agricultural imports (volume)	34.81	13.31	27.81	18.74	17.82	8.76	44.27	65.25	9.95
Tariff revenue (points of GDP)	0.02	-0.01	-0.09	-0.08	-0.03	-0.02	0.05	0.04	-0.08
World welfare	0.25								
World exports	2.11								
World agricultural exports	27.43								

Note: Unless otherwise specified, all changes are expressed in %.

**Table 7: World import price changes (in %)**

World prices	variation
Paddy rice	3.48
Wheat	6.67
Cereal grains nec	1.84
Vegetables, fruit, nuts	0.68
Oil seeds	1.00
Sugar cane, sugar beet	0.17
Plant-based fibers	-0.04
Crops nec	0.06
Cattle, sheep, goats, horses	0.91
Animal products nec	-0.27

Raw milk	-1.60
Wool, silk-worm cocoons	1.89
Forestry	0.07
Fishing	0.05
Meat: cattle, sheep, goats, horse	0.81
Meat products nec	-0.24
Vegetable oils and fats	0.29
Dairy products	6.29
Processed rice	1.03
Sugar	2.17
Food products nec	-0.58
Beverages and tobacco products	-0.19
Primary products	0.05
Textiles	-0.07
Wearing apparel	-0.07
Leather products	-0.02
Wood products	0.19
Chemical, rubber, plastic products	0.01
Machinery and equipment nec	0.02
Other Industries' products	0.03
Transportation and Trade	0.02
Other Services	0.06

**Table 8: Evolution of exports in the tariff reduction scenario (changes in %)**

Exports by sector (volume)	EU_25		US		ACP		China		CAIRNS		Periph	
	Initial	Var.%	Initial	Var.%	Initial	Var.%	Initial	Var.%	Initial	Var.%	Initial	Var.%
Paddy rice	0.00	-5.3	0.10	47.6	0.00	62.1	0.01	15.0	0.01	87.3	0.00	103.2
Wheat	0.09	72.4	0.42	57.1	0.00	0.5	0.00	122.9	0.55	54.9	0.01	226.1
Cereal grains nec	0.04	59.8	0.64	37.1	0.00	-3.3	0.09	-5.1	0.25	47.9	0.01	127.6
Vegetables, fruit, nuts	0.22	82.2	0.50	42.0	0.09	3.6	0.11	41.9	0.59	65.9	0.23	4.2
Oil seeds	0.01	14.8	1.12	5.0	0.02	7.5	0.03	75.1	0.43	-1.1	0.01	18.0
Sugar cane, sugar beet	0.00	5.5	0.00	26.1	0.00	-9.8	0.00	-25.5	0.00	-27.6	0.00	2.6
Plant-based fibers	0.09	0.4	0.62	0.7	0.10	3.0	0.00	0.5	0.05	-3.7	0.01	7.3
Crops nec	0.24	49.3	0.29	-3.0	0.53	-1.4	0.11	-3.5	0.87	-5.5	0.09	22.0
Cattle, sheep, goats, horses	0.09	50.0	0.05	56.4	0.00	7.4	0.00	369.7	0.14	16.1	0.01	310.0
Animal products nec	0.22	55.5	0.23	-0.1	0.01	-2.0	0.08	8.8	0.26	-5.7	0.03	27.6
Raw milk	0.00	122.5	0.00	147.5	0.00	97.6	0.00	80.4	0.00	45.0	0.01	103.6
Wool, silk-worm cocoons	0.00	2.0	0.00	3.4	0.00	5.3	0.00	-0.9	0.22	-4.4	0.00	11.0
Forestry	0.04	0.2	0.21	-0.1	0.15	1.7	0.01	0.8	0.22	-1.4	0.03	2.5
Fishing	0.04	-2.8	0.06	-2.1	0.01	2.2	0.05	-5.8	0.22	-4.1	0.12	1.4
Meat: cattle, sheep, goats, horse	0.11	54.5	0.37	47.0	0.01	-6.5	0.01	17.1	0.60	65.3	0.01	129.0
Meat products nec	0.50	57.7	0.42	31.8	0.00	13.7	0.09	68.2	0.35	48.0	0.03	48.3
Vegetable oils and fats	0.41	14.9	0.38	6.7	0.02	3.0	0.02	3.7	1.05	5.9	0.06	32.7
Dairy products	0.46	81.4	0.06	166.5	0.00	219.0	0.00	167.6	0.33	97.4	0.06	233.8
Processed rice	0.01	36.5	0.06	97.5	0.00	180.2	0.03	62.3	0.12	34.3	0.00	62.1
Sugar	0.08	22.5	0.01	79.5	0.06	21.0	0.01	52.8	0.35	60.9	0.01	55.1
Food products nec	1.78	35.9	1.12	35.4	0.21	-4.4	0.41	14.0	1.89	31.2	0.72	23.3
Beverages and tobacco products	2.31	36.2	0.61	5.0	0.00	36.7	0.09	18.7	0.26	18.9	0.07	30.0

Primary products	4.29	0.4	2.72	0.0	2.69	0.8	1.02	0.1	10.98	-0.8	5.70	1.0
Textiles	2.17	-0.5	1.12	-1.2	0.07	2.1	2.22	0.2	1.24	-1.6	0.84	9.2
Wearing apparel	1.32	-3.4	0.65	-1.7	0.04	4.6	5.30	0.2	0.85	-3.1	1.06	13.1
Leather products	1.26	-2.0	0.22	-4.8	0.03	8.4	2.00	0.5	0.99	-3.7	0.21	7.7
Wood products	1.39	-0.8	0.95	-0.2	0.09	3.3	0.39	1.1	3.19	-0.7	0.28	4.6
Chemical, rubber, plastic products	10.70	-0.5	8.53	-0.4	0.07	1.9	1.58	0.5	3.99	-0.8	2.96	3.4
Machinery and equipment nec	18.19	-0.3	16.80	-0.9	0.03	3.4	3.27	0.5	5.24	-1.2	3.94	3.4
Other Industries' products	24.66	-0.4	28.38	-0.8	0.51	2.7	7.49	0.6	20.06	-1.2	3.77	3.1
Transportation and Trade	11.46	-0.0	8.12	-0.5	0.41	1.5	3.78	0.0	5.45	-0.7	2.61	1.9
Other Services	17.25	0.1	12.65	-0.3	0.43	1.6	0.71	0.4	5.56	-0.5	3.33	1.7

### Domestic support

According to Harbinson 1 ½, the green box would be maintained without any reduction commitment. With regard to the amber box, developed countries have to reduce the aggregate measurement of support (AMS) by 60%, 40% for developing countries. For the blue box, reduction commitments are 50% for developed countries, 33% for developing countries.

As far as export subsidies are concerned, Harbinson 1 ½ proposed a complete suppression for all countries in 9 years for developed countries and 12 years for developing countries.

**Table 5: Evolution of macroeconomic variables in case of RBP scenario**

	EU_25	US	DA	ACP	RoW	China	CAIRNS	Periph	FSU	World
Welfare	0.23	-0.02	0.39	-0.13	0.02	0.08	0.22	-0.23	-0.13	0.15
GDP (volume)	0.14	-0.01	0.27	-0.03	0.01	0.03	0.08	-0.15	-0.09	
Terms of trade	-0.19	-0.02	-0.46	0.10	0.23	0.34	0.55	0.12	-0.14	
Real effective exchange rate	-0.42	-0.01	-0.62	0.37	0.42	0.42	0.67	0.29	0.23	
Unskilled real wages	-0.62	0.22	-1.10	0.12	0.27	0.24	0.77	-0.01	0.17	
Agricultural real wages	-1.98	0.63	-3.41	0.53	1.25	1.05	3.43	0.35	0.58	
Non agricultural unskilled real wages	0.23	-0.04	0.29	0.00	0.00	0.00	0.00	-0.23	-0.08	
Skilled real wages	0.51	-0.10	0.49	-0.10	-0.06	-0.04	-0.14	-0.56	-0.15	
Real return to capital	0.25	0.03	0.25	-0.06	-0.06	-0.05	0.04	-0.08	-0.10	
Real return to natural resources	-0.70	-0.06	-0.73	-0.53	-0.46	-0.09	-0.77	1.13	-0.22	
Real return to land	-1.60	0.90	-5.23	-0.12	0.04	0.09	0.11	-0.02	0.22	
Exports (volume)	1.27	0.85	1.53	0.23	0.59	0.74	1.16	0.29	0.03	1.02
Imports (volume)	1.41	0.68	1.77	0.21	0.55	0.75	1.08	0.37	0.15	
Agricultural exports (volume)	5.74	15.23	18.89	2.14	9.75	15.11	15.94	25.43	7.53	12.54

Agricultural imports (volume)	31.93	8.14	23.36	-2.20	0.24	1.57	3.04	-1.12	-2.21
Tariff revenue (points of GDP)	0.01	-0.01	-0.03	0.00	0.02	0.01	0.01	-0.02	-0.00

Note: Unless otherwise specified, all changes are expressed in %.

Real remuneration of agricultural workers and landowners are negatively affected in Europe and Developed Asia, while they increase in the Cairns group, China and the Former Soviet Union.

**Table 6: Evolution of exports in the RBP scenario (changes in volume, in %)**

	EU_25	US	DA	ACP	RoW	China	CAIR NS	Periph	FSU
Paddy rice	24.7	38.9	37.7	94.7	44.9	28.1	123.0	57.0	18.0
Wheat	3.3	12.3	44.5	4.4	35.1	75.1	10.5	107.0	74.5
Cereal grains nec	6.2	16.9	48.5	-7.2	26.8	-12.0	12.7	29.3	34.3
Vegetables, fruit, nuts	5.4	7.0	17.9	15.1	14.7	21.0	14.7	0.2	1.7
Oil seeds	6.3	-2.1	27.3	6.0	3.0	134.7	-6.5	-2.6	-1.8
Sugar cane, sugar beet	81.6	12.0	0.0	-36.7	-28.7	-30.0	-28.0	-15.0	0.5
Plant-based fibers	2.2	1.4	5.7	0.3	-0.6	1.8	-1.1	1.5	0.5
Crops nec	7.8	1.8	11.8	-3.1	-3.1	8.3	3.0	23.8	-1.5
Cattle, sheep, goats, horses	16.2	12.7	22.1	2.0	28.2	38.5	-1.0	44.9	-0.0
Animal products nec	1.7	-3.3	18.5	-2.1	-2.5	-2.5	-4.2	0.1	-2.8
Raw milk	25.7	-20.3	-6.9	-18.5	-20.2	-19.9	-23.8	-19.3	-19.0
Wool, silk-worm cocoons	1.5	2.5	11.4	-0.6	-0.0	-0.5	-2.4	1.1	3.0
Forestry	1.8	0.4	2.5	-1.2	-0.3	1.4	-1.2	-1.4	-0.5
Fishing	16.9	3.9	8.8	-9.4	5.3	6.3	1.8	77.5	11.6
Meat: cattle, sheep, goats, horse	-6.5	33.2	23.8	26.1	30.3	13.4	68.2	72.6	28.6
Meat products nec	13.5	17.3	21.2	26.9	17.5	-0.6	29.1	17.4	11.7
Vegetable oils and fats	1.7	2.5	24.5	-2.2	-2.1	-0.1	-0.5	13.0	1.4
Dairy products	3.6	36.5	35.3	30.5	38.3	38.1	43.4	94.2	102.8
Processed rice	32.0	53.6	83.4	118.7	18.7	47.9	124.4	18.7	78.8
Sugar	3.8	15.0	40.3	14.5	48.3	15.8	39.2	18.6	14.5
Food products nec	-5.9	19.7	18.8	10.3	8.5	16.7	15.2	21.8	6.4
Beverages and tobacco products	14.5	69.5	13.6	30.3	8.5	28.6	13.9	31.5	7.0
Primary products	1.0	0.2	1.5	-0.4	-0.5	-0.4	-1.1	0.1	-0.1
Textiles	0.8	-0.4	1.6	-0.1	-0.4	0.1	-1.0	-2.7	-1.0
Wearing apparel	2.2	-0.1	2.9	-0.6	-0.8	-0.1	-2.1	-3.4	-1.4
Leather products	-0.0	-2.8	8.6	-0.8	-0.2	0.2	-2.4	-1.8	-4.2
Wood products	1.4	-0.1	1.5	-0.3	0.3	0.4	-0.9	-1.7	-1.2
Chemical, rubber, plastic products	0.7	-0.2	1.2	0.1	0.1	0.1	-0.8	-1.3	-0.6
Machinery and equipment nec	1.2	-0.9	1.5	-0.4	-0.1	0.2	-1.4	-2.0	-1.1
Other Industries' products	1.3	-0.8	1.6	-0.4	0.0	0.1	-1.4	-1.5	-1.2
Transportation and Trade	0.5	-0.5	1.0	-0.2	-0.3	0.1	-0.9	-0.6	-0.6
Other Services	0.8	-0.4	0.8	-0.1	-0.1	0.1	-0.7	-0.5	-0.5

### **Domestic support:**

In this scenario (called DS), domestic support is reduced by 50% in the US, the EU and Developed Asia. This reduction is applied to each subsidy rate (tax rates are not modified when they are positive) in agriculture. This reduction is also applied to the rate of land set-aside.

- The lowering of price supports involves a strong increase of world prices in some sectors (+4 to +10% in cereals, plant-based fibers, or cattle). It mainly reflects the increase of the cost of production in the liberalizing countries.
- World agricultural exports are unchanged, but European and US exports are negatively affected. Agricultural world market share are gained by ACP countries, the Cairns group and the Former Soviet Union.
- The reduction of domestic support benefits to almost all countries, except the EU's periphery and Asian developed countries. In the liberalizing countries it is due primarily to a better allocation of resources. Asian developed countries are an exception mainly because domestic support is not the main supporting tool in favor of agriculture. As they are net importers of agricultural products, the better allocation of resources is therefore not sufficient to compensate for the significant deterioration of their terms of trade.
- Agricultural wages are reduced in the EU as well as in the US, but they rise in the rest of the world, particularly in the developing countries (Rest of World, Cairns, China and ACP Africa). Skilled wages also increase in developing countries, with the exception of ACP Africa where they stay stable.
- The main effect on exports is in the US, because of high level of initial domestic support.

**Table 7: Evolution of macroeconomic variables in case of DS scenario**

	EU_25	US	DA	ACP	RoW	China	CAIR	Periph	FSU	World
	NS									
Welfare	0.10	0.08	-0.04	0.33	0.70	0.66	0.42	-0.19	0.02	0.09
GDP (volume)	0.06	0.05	-0.02	0.13	0.23	0.22	0.14	-0.13	0.01	
Terms of trade	-0.07	0.16	-0.21	0.18	0.01	0.07	0.17	-0.11	-0.06	
Real effective exchange rate	-0.11	-0.15	-0.07	0.37	0.19	0.10	0.22	0.04	0.10	
Unskilled real wages	-0.41	-1.59	0.09	0.47	0.94	0.59	0.89	0.19	0.33	
Agricultural real wages	-1.26	-4.25	0.27	2.10	4.28	2.63	3.98	0.67	0.81	
Non agricultural unskilled real wages	0.11	0.11	-0.02	0.00	0.00	0.00	0.00	-0.09	0.04	
Skilled real wages	0.30	0.28	-0.04	-0.01	0.21	0.23	0.08	-0.34	0.02	
Real return to capital	0.02	0.01	-0.04	-0.03	0.21	0.24	0.16	-0.12	-0.00	
Real return to natural resources	0.66	1.13	0.17	-0.53	-0.37	0.20	-0.25	-0.32	-0.13	
Real return to land	-9.28	-6.80	-0.10	-0.31	-0.33	-0.35	-0.06	0.32	0.55	
Exports (volume)	0.11	-0.36	-0.04	0.47	-0.13	0.06	0.28	-0.24	0.24	-0.02
Imports (volume)	0.08	-0.23	-0.08	0.43	-0.12	0.08	0.25	-0.26	0.21	
Agricultural exports (volume)	-2.95	-10.20	0.86	4.17	3.08	3.82	4.80	2.72	10.25	-0.83
Agricultural imports (volume)	4.08	3.52	-0.41	-0.96	-7.11	-4.50	-4.73	-4.75	-1.46	
Tariff revenue (points of GDP)	0.00	0.00	-0.00	0.02	-0.01	-0.03	0.00	-0.06	0.00	

Note: Unless otherwise specified, all changes are expressed in %.

**Table 9: Evolution of exports in the DS scenario (changes in volume, in%)**

	EU_25	US	DA	ACP	RoW	China	CAIRN	Periph	FSU
Paddy rice	-0.2	-50.5	-0.6	8.3	14.1	9.9	10.4	2.9	13.5
Wheat	-5.7	-20.2	-2.6	2.3	6.0	16.6	7.0	14.4	9.8
Cereal grains nec	-5.7	-11.2	4.5	11.5	9.0	16.7	13.4	9.9	12.1
Vegetables, fruit, nuts	2.0	-1.5	2.3	-6.6	-1.7	-2.9	-3.3	-3.7	-2.9
Oil seeds	-1.0	-18.8	4.6	13.5	15.7	15.0	13.2	12.3	10.7
Sugar cane, sugar beet	0.8	-19.0	0.0	0.1	6.6	1.4	9.5	1.0	2.1
Plant-based fibers	-39.3	-32.4	9.1	32.0	30.1	52.3	34.8	46.3	48.1
Crops nec	-7.3	-0.1	5.3	3.1	5.2	1.6	3.6	4.5	5.3
Cattle, sheep, goats, horses	-44.9	4.1	54.9	21.6	39.2	41.6	17.4	56.9	32.2
Animal products nec	-13.8	-3.4	2.3	4.5	11.6	10.4	6.5	16.7	12.6
Raw milk	16.2	-36.1	-2.7	1.9	7.6	5.9	3.5	6.2	6.0
Wool, silk-worm cocoons	1.7	-5.6	0.4	-0.8	-2.4	2.7	-0.6	0.5	1.7
Forestry	0.6	0.8	0.9	-0.9	-0.8	-0.2	-0.5	-0.3	-0.2
Fishing	1.1	0.7	0.8	-1.5	-0.7	-0.2	-0.7	-0.4	-0.6
Meat: cattle, sheep, goats, horse	-15.3	-5.1	3.8	19.9	5.1	2.8	9.3	11.1	7.8
Meat products nec	-4.1	-2.2	1.0	3.7	2.9	3.2	2.9	3.9	3.3
Vegetable oils and fats	-12.3	-10.9	-3.6	28.5	11.7	10.1	11.6	21.0	16.8
Dairy products	2.9	-10.4	-0.4	0.1	5.1	0.6	1.4	1.9	2.5
Processed rice	-2.7	-9.4	3.3	0.7	1.7	1.1	3.3	-0.9	5.1
Sugar	0.7	-5.8	0.4	-0.6	1.7	1.8	1.3	0.5	1.4
Food products nec	0.0	-1.8	0.3	-0.2	1.2	2.4	1.6	1.2	1.5
Beverages and tobacco products	-0.2	0.6	0.8	-1.6	-1.1	1.2	-1.1	0.4	0.0
Primary products	0.5	0.8	0.5	-0.5	-0.6	-0.3	-0.5	0.1	-0.2
Textiles	0.5	-0.8	1.4	0.2	1.1	-0.8	1.0	-0.4	0.7
Wearing apparel	1.1	0.5	1.1	-0.9	0.2	-1.2	0.3	-1.1	-0.5
Leather products	-0.3	-0.3	1.2	-3.0	-0.2	0.6	-0.3	1.2	-0.9
Wood products	0.4	0.8	-0.2	-0.9	-0.7	-0.0	-0.5	-0.8	-0.8
Chemical, rubber, plastic products	0.3	0.5	0.3	-0.1	-0.2	0.2	-0.4	-0.3	-0.8
Machinery and equipment nec	0.4	0.8	-0.3	-1.0	-0.9	0.1	-0.7	-1.0	-1.0
Other Industries' products	0.5	0.9	-0.2	-0.8	-0.7	-0.0	-0.6	-0.8	-0.9
Transportation and Trade	0.2	0.5	-0.1	-0.5	-0.4	0.1	-0.3	-0.3	-0.5
Other Services	0.3	0.5	-0.1	-0.4	-0.4	0.1	-0.3	-0.4	-0.5

## Conclusion

Using an adapted version of the MIRAGE model, this paper aimed at assessing the impact of a widespread liberalization in agriculture, concerning border protection as well as domestic support. The CGE model includes imperfect competition and increasing returns to scale in industry and services. It assumes land and labor mobility to be imperfect across sectors, and developing countries have a dual labor market.

Special emphasis has been put on measuring on measuring properly protection and domestic support. Protection data, from the MAcMaps database, describes applied tariffs, taking preferential agreements exhaustively into account. Domestic support data is updated to 2001 for the EU and the US, and accounts for the Agenda 2000 reform and the New Farm Bill.

The results show that, far from being uniform, the impact of agricultural liberalization on developing countries is strongly contrasted. This has been blurred, in many previous analyses, by geographical aggregation, or by not taking tariff preferences into account.

This draft is preliminary. In future development, we plan to model more explicitly agricultural policy instruments, to refine the dataset on domestic support, and to build scenarios of market access liberalization directly at the HS6 level, to stick as close as possible to the existing proposals.

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## Appendix : Agricultural data and policy assumptions for the baseline

**The data.** We distinguish 22 agricultural and food sectors. The core of the dataset relies on the GTAP 5.2. data, except for tariffs and agricultural policy instruments. Tariffs come from the MAcMaps dataset, and include bilateral applied tariffs. Data for farm support include various policy instruments, that are converted into different types of taxes and subsidies for modeling purposes. We distinguish market price support, output subsidies, capital subsidies, variable input subsidies, land subsidies, and decoupled subsidies to a particular agricultural sector.

For OECD countries, a detailed dataset that rely on primary information from the OECD on the PSEs was constructed so as to model the farm policies. For non PSE commodities data from national sources have been used (e.g. budget data for subsidies to cotton, tobacco, olive oil in the EU; data provided by the Economic Research Service of the USDA for US programs). In the case of the EU and the United States, the data on farm support was amended so as to reflect the full implementation of major ongoing reforms, i.e. the 2002 farm bill in the US and the 1999 Agenda 2000 in the EU. For non-OECD countries such as China and the former Soviet Union, the data that has been used for domestic agricultural policies is the have been limited to the instruments available in the standard 5.2 version of the GTAP dataset.

Farm support is treated as various types of price wedge, either on output, on variables inputs, on land or on capital. In addition, market price support is modeled through the combination of tariffs and of export subsidies. Output subsidies include all subsidies (limited and unlimited) that are a function of the volume of output. Capital subsidies include support for on farm investment (e.g. national subsidies on interest charges given by some EU member states), and payments per head of cattle (e.g. beef premia in the EU) . Variable input subsidies include tax deductions (fuel in some countries), subsidies to particular inputs (e.g. cotton seeds in the EU). Direct payments per hectare that are based on reference yields (e.g. arable crops payments in the EU) are treated as land subsidies. Decoupled payments (payments to self-employed labor) include all payments that are conditional to input constraints, agri-environmental payments, and payments that are based on reference levels and not tied to land, input use or output.

With these assumptions, it is noteworthy that most of the EU support to the beef sector is treated as a capital subsidy; most of the support to cereals in the EU is treated as land subsidy; most of the support to the dairy sector is treated as market price support in both the EU and the US; most of the support to cereals and oilseed is treated as decoupled in the US (with the exception of marketing loans, treated as output subsidies).

**The baseline.** Figures on farm support for OECD countries refer to the year 2001. They are then expressed in a percentage of the sectoral output in 2001, and included in the original dataset. Because of the medium-run nature of the MIRAGE simulations, it has been assumed that the two major policy reforms already under way, i.e. the US Farm Security and Rural Investment (FSRI) Act of 2002 and the EU Agenda 2000, were fully implemented. That is, we amended the data on domestic policies collected for the year 2001 so as to include developments in the level of support, in the EU and the US that will be implemented over the 2002-2005 period. Nevertheless, we did not explicitly constructed a baseline for the year 2005 in the sense that we left other parameters and data at their 2001 level. That is, we chose not to use forecasts of demand, supply and prices in establishing this baseline. Forecasts on changes in central and Eastern European countries, or in China, are indeed hard to predict. Using predicted world

prices for 2005 would have led to introduce in the baseline some results drawn from other models, which would have made the assumptions underlying the simulations less transparent.

Land set aside that prevailed in the EU in 2001 is modeled as a negative shock on the productivity of land (see Jensen et al., 1998). It is then amended so as to take into account changes in the Agenda 2000 and the FSRI. The increase in the acreage under conservation programs caused by the FSRI is only partially taken into account (as an extra negative productivity shock on land for wheat). We consider that only a share of the increased acreage eligible will be used for conservation (Westcott et al., 2002), and that the overall effect on output will be limited, because of several arguments put forward by Gardner (2002) and Sumner (2003). In order to account for exemption of small producers and other forms of slippage, the 10% set aside on arable crops in the EU was taken into account as a 7% negative productivity shock on land.

Relatively to the 2001 figure, the effects of the implementation of the FSRI were taken into account by an increase in the output subsidy for wheat (6%) and other cereals (3%), and a decrease in the case of soybean (4%). An output subsidy on dairy (3% of the value of production) was introduced. It has been shown that, because they affect risk and resource allocation, the flexibility contract payments in the FAIR Act were not completely decoupled (Adams et al., 2001; Gardner 2002). In addition, the possibility to update the base for the FSRI countercyclical payments has led to a degree of "recoupling" of these payments. In order to take into account the indirect effect of these subsidies on output we considered that 35% of the amount of these payments are in fact output subsidy on the range of commodities covered by the program.

In the European Union, the implementation of the Agenda 2000 was taken into account in the data on intervention prices and support for 2001, except in the case of oilseeds (where a further 13% decrease in subsidies based on acreage was introduced) and in the case of beef (a 32% decrease of the intervention prices was applied in order to account for the July 2002 decrease in intervention price). In order to account for the final (i.e. 2002) increase in beef premia, the overall support per head of cattle (introduced in the model as a capital subsidy in the live bovines sector), the 2001 support was increased by 13%. Finally, the first step of a reform in the milk sector (supposed to take place in 2005) was introduced as a 20% decrease in intervention price for fluid milk and 976 million euros subsidy to capital in the fluid milk sector.

**Border protection** : Figures on border protection are coming from the Mac Maps database for 2001. Slight modifications have been introduced.

**Tariff quotas**: in Mac Maps, tariff quotas are integrated as multilateral instruments. It means that an Ad Valorem Equivalent (AVE) is estimated in each (importing country \* product) case and applied to all exporters. Observation of the way tariff quotas are administrated reveals that large countries, having adopted preferential agreements, concede Inside Quota Tariff Rate (IQTR) to exporters which have been granted traditional preferences; other countries' exported products are taxed by the Outside Quota Tariff Rate (OQTR).

In this study, we have tried to integrate the bilateral dimension of tariff quotas. It means that an AVE is estimated for the major part of (importing country \* exporting country \* product) cases. A precise description of the allocation of IQTR and OQTR by importing country is not available. Thus we suppose the following allocation: in the case of European Union, LDC and Euromed countries are granted each time the IQTR; in the case of USA, LDC and Caribbean countries are favoured; in the case of Japan, New Zealand, Canada, Poland, Switzerland and Australia, IQTR are conceded to LDC countries. In all other cases, as it is traditional in Mac

Maps, an AVE is estimated for each (importing country \* product) case and applied to all exportes.

In our border protection figures, exporting countries or zones are supporting different access on the same market and for the same product, due to:

- the application of regional or preferential agreements by the importer and/or;
- the application of bilateral protective instruments (anti-dumping duties, tariff quotas) by the importer and /or;
- different specialization schemes of exporting countries or zones (see the aggregation procedure below).

*MFN duties:* in Mac Maps, Most Favoured Nation (MFN) duties are not available. Our study needs MFN duties as they are the basis of a multilateral agreement, negotiated under WTO. In such a way, we estimate MFN duties in the following way: for each importer, we are considering two countries which are not granted any preferential or regional treatment. In a vast majority of cases, it is either USA, or Japan, or European Union. MFN duties are estimated by the simple average of the two bilateral duties (given by Mac Maps) which the importer is applying to products coming from these two countries.

A bias could come from the application of specific duties. As in Mac Maps, an Ad Valorem Equivalent of specific duties is estimated by dividing the duty by the unit value of bilateral trade flows, different bilateral unit values may result in countries taxed by a higher duty (or more precisely by a higher AVE of the same duty). It means that when considering a bilateral AVE of a MFN specific duty, as the MFN duty which is reduced by multilateral negotiation, it could result in applying a too high reduction rate for exporters which were very taxed in the initial situation. This rate of reduction in protection could even be greater than 60% while it is the maximum rate of reduction, in the Harbinson proposal.

This is the reason why we correct the new applied rate in order to ensuring that the maximum rate in reduction is 60%. This procedure is likely to underestimate liberalization, as it is demonstrated in table A1.

Imagine that an importing zone is applying an MFN duty of 1000\$ by ton on exports coming from three zones (A, B, C), but has conceded a preference to country D, of which exports are taxed by a duty of 100\$ by ton. As the four countries' exports have different unit values, it results in different initial rates of protection (given in table A1 by the first AVE). If the liberalization means a 60% reduction in MFN duties, the new MFN duty is 400\$/ton while preferential duty has not been changed.

This information is not available in our version of Mac Maps (levels of specific duties and the nature of the bilateral tariff – conceded under MFN treatment or preferential regime – are not available too; available information are in italics on table A1), in such a way that we have to estimate the MFN duty by an AVE. Suppose that B represents the country on which the MFN estimation is based. In our simulation, we consider that 666.7% is the initial MFN duty on which we apply the 60 reduction: the new MFN duty is 226.7%. As it is lower than initial bilateral tariffs for countries A, B and C, it is the new bilateral tariff for these three countries. But for country A, it represents a 73.3% reduction; we correct the bilateral tariff to obtain a 60% reduction. This procedure is correct in the case of preferential tariffs and exporters which are initially more taxed than the MFN-reference country. For the others, liberalization is underestimated.

Table A1: case study.

<b>Initial situation</b>							
	Applied duties	Unit	Country	Bil. Unit value (\$/ton)	AVE		
MFN	1000	\$/ton	A	100	1000.0%		
			B	150	666.7%		
			C	155	645.2%		
Preference	100	\$/ton	D	100	100.0%		
<b>Real shock</b>							
	New applied duties	Unit	Country	Bil. Unit value (\$/ton)	AVE	Reduction rate	
MFN	400	\$/ton	A	100	400.0%	60.0%	
			B	150	266.7%	60.0%	
			C	155	258.1%	60.0%	
Preference	100	\$/ton	D	100	100.0%	0.0%	
<b>Simulation</b>							
	New MFN		<b>B is the MFN reference</b>				
	266.7%	%	Country	Bil. Unit value (\$/ton)	AVE	Reduction rate	AVE after corr.
			A	100	266.7%	73.3%	400.0%
			B	150	266.7%	60.0%	266.7%
			C	155	266.7%	58.7%	266.7%
			D	100	100.0%	0.0%	100.0%

*Europe*: we consider an enlarged European Union, that is to say after the entrance of the ten countries from Eastern Europe, planned for 2004. We suppose that these ten countries have already adopted the European duties for each product and for each exporting zone.

*Aggregation*: from the HS6 version of Macmaps for 2001, in order to obtaining the border protection for our case study, we adopt the aggregation procedure, defined in Bouët et alii (2001). Noticeably, we weight tariffs by the imports from a reference group, and not national imports for an endogeneity bias reason.

**Annex B:**

Developed countries		Developing countries	
reporter	country	reporter	country
20	Andorra	4	Afghanistan
36	Australia	8	Albania
58	Belgium and Luxembourg	12	Algeria
70	Bosnia and Herzegovina	16	American Samoa
124	Canada	24	Angola
136	Cayman Islands	28	Antigua and Barbuda
162	Christmas Island	31	Azerbaijan
184	Cook Islands	32	Argentina
191	Croatia	40	Austria
208	Denmark	44	Bahamas
234	Faroe Islands	48	Bahrain
238	Falkland Islands	50	Bangladesh
246	Finland	51	Armenia
251	France	52	Barbados
254	French Guiana	60	Bermuda
258	French Polynesia	64	Bhutan
260	French Southern Antarctic te	68	Bolivia
276	Germany	72	Botswana
292	Gibraltar	76	Brazil
300	Greece	84	Belize
304	Greenland	90	Solomon Islands
312	Guadeloupe	100	Bulgaria
352	Iceland	104	Myanmar
372	Ireland	108	Burundi
381	Italy	112	Belarus
392	Japan	116	Cambodia
462	Maldives	120	Cameroon
474	Martinique	132	Cape Verde
488	Midway Islands	140	Central African Republic
492	European Union Nes	144	Sri Lanka
498	Moldova, Rep.of	148	Chad
528	Netherlands	152	Chile
530	Netherland Antilles	156	China
536	Neutral Zone	170	Colombia
540	New Caledonia	174	Comoros
554	New Zealand	178	Congo
574	Norfolk Island	180	Democratic Republic of the
579	Norway	188	Costa Rica
580	Northern Mariana Islands	192	Cuba
582	Pacific Islands	196	Cyprus
584	Marshall Islands	203	Czech Republic
612	Pitcairn	204	Benin
620	Portugal	212	Dominica
638	Reunion	214	Dominican Republic
666	St. Pierre and Miquelon	218	Ecuador
674	San Marino	222	El Salvador
690	Seychelles	226	Equatorial Guinea

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724	Spain	231	Ethiopia
752	Sweden	232	Eritrea
757	Switzerland	233	Estonia
807	The former Yugoslav Rep. of	242	Fiji
810	Union of Soviet Socialist R	262	Djibouti
826	United Kingdom	266	Gabon
842	United States of America	268	Georgia
849	United States Minor Outlyin	270	Gambia
		288	Ghana
		296	Kiribati
		308	Grenada
		316	Guam
		320	Guatemala
		324	Guinea
		328	Guyana
		332	Haiti
		340	Honduras
		344	Hong Kong
		348	Hungary
		360	Indonesia
		364	Iran
		368	Iraq
		376	Israel
		384	Côte d'Ivoire
		388	Jamaica
		398	Kazakstan
		400	Jordan
		404	Kenya
		410	Korea
		414	Kuwait
		417	Kyrgyzstan
		418	Lao People's Democratic Rep
		422	Lebanon
		426	Lesotho
		428	Latvia
		430	Liberia
		434	Libyan Arab Jamahiriya
		440	Lithuania
		442	Luxembourg
		446	Macau
		450	Madagascar
		454	Malawi
		458	Malaysia
		466	Mali
		470	Malta
		478	Mauritania
		480	Mauritius
		484	Mexico
		490	Taiwan
		496	Mongolia

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500 Montserrat  
504 Morocco  
508 Mozambique  
512 Oman  
516 Namibia  
520 Nauru  
524 Nepal  
533 Aruba  
548 Vanuatu  
558 Nicaragua  
562 Niger  
566 Nigeria  
570 Niue  
583 Micronesia (Federated State)  
585 Palau  
586 Pakistan  
591 Panama  
598 Papua New Guinea  
600 Paraguay  
604 Peru  
608 Philippines  
616 Poland  
624 Guinea-Bissau  
626 East Timor  
630 Puerto Rico  
634 Qatar  
642 Romania  
643 Russian Federation  
646 Rwanda  
654 Saint Helena  
659 Saint Kitts and Nevis  
660 Anguilla  
662 Saint Lucia  
670 Saint Vincent and the Grenadines  
678 Sao Tome and Principe  
682 Saudi Arabia  
686 Senegal  
694 Sierra Leone  
699 India  
702 Singapore  
703 Slovakia  
704 Viet Nam  
705 Slovenia  
706 Somalia  
711 South Africa  
716 Zimbabwe  
732 Western Sahara  
736 Sudan  
740 Suriname  
748 Swaziland

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760 Syrian Arab Republic  
762 Tajikistan  
764 Thailand  
768 Togo  
772 Tokelau  
776 Tonga  
780 Trinidad and Tobago  
784 United Arab Emirates  
788 Tunisia  
792 Turkey  
795 Turkmenistan  
796 Turks and Caicos Islands  
798 Tuvalu  
800 Uganda  
804 Ukraine  
818 Egypt  
834 Tanzania, United Rep. of  
850 Virgin Islands (U.S.)  
854 Burkina Faso  
858 Uruguay  
860 Uzbekistan  
862 Venezuela  
872 Wake Island  
876 Wallis and Futuna  
882 Samoa  
887 Yemen  
891 Yugoslavia  
894 Zambia

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