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ECONOMIC IMPLICATIONS OF TRADE LIBERALIZATION UNDER THE DOHA ROUND

SUMMARY

In this paper we explore the likely economic effects of the 'Doha Development Agenda' both for Europe and for major developing regions. We extend the recent literature by the World Bank, the IMF, and the OECD by including market structure and investment effects in the modeling exercise, and by stressing a policy benchmark including China's accession to the WTO, the Agenda 2000 reforms to the CAP, enlargement of the EU, and recent EU FTAs. We cover the areas of agricultural liberalization, liberalization in industrial tariffs, liberalization in services trade, and trade facilitation measures.

With the implementation of Uruguay Round commitments, average *ad valorem* tariffs in the industrial countries generally are around 3 percent for non-agricultural products. However, there are important exceptions. This includes textiles and clothing, where the average rate is roughly three times this average. For the developing countries, average industrial tariffs range from a low of 3 to 4 percent to a high of more than 20 percent. In general, for the latter countries, the difference between bound and applied tariffs is large enough that reductions in tariff bindings in the range of 50% are necessary to force any substantive reductions in average applied rates. For many countries, even this will have little or no effect, as tariffs are largely unbound.

One key difference from industrial products is that essentially all agricultural tariffs are bound. Viewed in conjunction with industrial protection, the basic pattern is that the industrial countries protect agriculture and processed food, while protection in developing countries is more balanced. Another difference is that, in agriculture, Uruguay Round agreements have allowed scope for great policy discretion and uncertainty. One of the more striking features of the regime that has actually emerged is the prominent role that quantity measures have taken in the new architecture.

For services, "market access" is a problematic concept. We use estimates of "tariff equivalents" for services trade, based on a simple gravity model estimated for services trade in 1997. It appears that barriers to services trade are often much higher in developing countries than in the OECD.

With the reduction in traditional trade barriers, interest has shifted to trade facilitation measures. These are meant to target less transparent trade barriers, such as customs procedures, product standards and conformance certifications, licensing requirements, and related administrative sources of trading costs. Conceptually, these costs are a pure global deadweight loss. Reducing such barriers is the very last source of potential gains we assess.

The core of our analysis is structured around a set of scenarios meant to illustrate the implications of alternative approaches to market access liberalization. They are stylized rather than exact representations. This is because we are working with an aggregate model and the

actual market access modalities remain to be worked out. Our scenarios are themselves decomposed into different components, related to specific sets of countries and specific sectors and instruments. This offers the advantage of allowing the construction of rough representations of hybrid liberalization experiments later, since individual components can be taken from different scenarios and combined.

We define three sets of scenarios.

- In the "Linear 50%" all trade instruments are reduced by 50%: agricultural and industrial tariffs and export subsidies, OECD domestic support for agriculture, services barriers, and trading costs.

- The second partial liberalization experiment is called the "Swiss formula" experiment. In this experiment the reduction in import tariffs in agriculture and manufacture is based on a straight Swiss formula where the maximum tariff is reduced to 25%.

- The third scenario simply involves full elimination of all trade barriers.

Finally, for each of the experiments our global computable general equilibrium framework includes short-run (capital stocks are fixed), versus long-run (capital stocks adjust) effects. We also alternatively employ perfect competition and imperfect competition in the manufacturing and services sectors.

On net, agricultural liberalization is a mixed-bag. The benefits of liberalization of domestic support in the OECD agriculture are largely limited to the OECD, while the cross-country effects of the elimination of border measures are mixed. The pattern for manufacturing liberalization is more consistent and positive, both in the initial static results, and over the long-term. At the extreme, we identify between an initial (static) effect of between $35 and $55 billion. Another important source of gains is services, which yields static income gains potentially, up to over $50 billion globally. In the relatively open economies in the Asia-Pacific region, trade facilitation yields a dramatic short-run effect as well as a long-run impact driven by investment effects. Hence, for the developing countries in this region, the single most important issue is trade facilitation, particularly by other developing countries.

ABSTRACT

We explore the impact of multilateral liberalization, with emphasis on the EU and developing countries. We first develop a realistic "baseline" that takes into account events such as the entry of China into the WTO and the enlargement of the EU, allowing us to focus on those effects that are specifically attributable to further trade liberalization in the Doha Round. We then employ a global applied general equilibrium model, featuring capital accumulation and imperfect competition. Our Doha scenarios include agriculture, manufactures, and services liberalization, and trade facilitation. With agglomeration, OECD agricultural liberalization is not uniformly positive for LDCs.

JEL classification: F13, F4, F12

Keywords: WTO; Doha Round; trade liberalization; services trade, trade facilitation, CGE modeling

CONSÉQUENCES ÉCONOMIQUES DE LA LIBÉRALISATION COMMERCIALE ASSOCIÉE AU CYCLE DE DOHA

RÉSUMÉ

Nous analysons dans cet article les effets économiques attendus de l'Agenda du Développement de Doha à la fois pour l'Europe et pour les principales régions en développement. Nous améliorons les approches récentes de la Banque mondiale, du FMI et de l'OCDE en prenant en considération dans l'exercice de modélisation les structures de marché et les effets de l'investissement. Nous considérons également une situation de référence incluant l'accession de la Chine à l'OMC, l'Agenda 2000 de réforme de la PAC, l'élargissement de l'Union et les accords de libre échange récemment signés pas l'Union européenne. Nous couvrons les effets de la libéralisation agricole, manufacturière, des services, et les mesures de facilitation des échanges.

A la suite de la mise en place des accords du Cycle d'Uruguay, les droits de douane *ad valorem* moyens appliqués par les pays industrialisés aux produits industriels sont de l'ordre de 3%. Il y a toutefois d'importantes exceptions, au premier rang desquelles le secteur du textile habillement, où le taux est au moins trois fois plus élevé que la moyenne. Dans les pays en développement, les droits de douane moyens s'étagent de 3-4% à 20%. Et en général, pour ces derniers pays, la différence entre droits consolidés et appliqués est telle que des engagements de réduction des tarifs consolidés de 50% sont nécessaires pour affecter de façon significative les droits appliqués. Et pour de nombreux pays, même une telle réduction aurait un impact limité ou nul, dans la mesure où les droits sont largement non consolidés.

Au contraire, les produits agricoles ont des tarifs consolidés. Par comparaison avec les produits industriels, la situation est celle d'une forte protection des produits agricoles transformés ou non dans les pays industrialisés, alors que la protection est plus homogène dans les pays en développement. Une autre différence tient à ce que dans l'agriculture, les accords du cycle d' Uruguay ont donné beaucoup plus libre court à l'arbitraire et à l'incertitude. Une des caractéristiques principales de la situation actuelle est l'importance prise par les restrictions quantitatives.

En ce qui concerne les services, le concept d'"accès au marché" est problématique. Nous nous appuyons ici sur les "équivalents tarifaires" des barrières aux échanges de services, à partir d'estimations gravitaires pour les échanges de services en 1997. Il apparaît que les barrières aux échanges de services sont souvent beaucoup plus élevées dans les pays en développement qu'au sein de l'OCDE.

Avec le recul des barrières traditionnelles aux échanges l'intérêt s'est déplacé vers les mesures de facilitation des échanges. Ces dernières sont ciblées sur les barrières les moins transparentes, comme les formalités douanières, les normes et certifications, les licences, et les coûts administratifs qui y sont associés. D'un point de vue analytique, il s'agit de pures pertes sociales sèches. Réduire ces barrières est ainsi la dernière source de gains potentiels du Cycle dont nous proposons une évaluation.

L'essentiel de notre analyse est organisé autour d'un ensemble de scénarios s'intéressant aux implications des différentes approches de libéralisation. Ces scénarios sont nécessairement stylisés, dans la mesure où l'on travaille avec un modèle agrégé dans la mesure où les modalités exactes de libéralisation sont encore en négociation. Nos scénarios peuvent eux-mêmes être décomposés, par ensembles de pays, de secteurs ou d'instruments. Cette solution offre l'intérêt de permettre la construction de scénarios hybrides grossiers, par combinaison d'éléments individuels.

Nous distinguons trois séries de scénarios:

- Dans le scénario "Linéaire 50%", tous les instruments de protection sont réduits de 50%: droits industriels et agricoles, subventions aux exportations, soutien interne à l'agriculture au sein de l'OCDE, barrières aux échanges de services, coûts de transaction.

- Le second scénario de libéralisation partielle s'appuie sur une "formule suisse " ramenant le droit de douane maximal à 25%.

- Le dernier scénario est une libéralisation totale.

Enfin , chacun de nos exercices de simulation en équilibre général prend en considération alternativement les effets de court-terme (où les stocks de capital sont fixes) et de long terme (respectivement s'ajustent); nous examinons également l'impact de la prise en compte de la concurrence imparfaite dans les domaines manufacturier et des services.

Au total, la libéralisation agricole a des effets ambigus ; la libéralisation du soutien interne de l'agriculture au sein de l'OCDE a en général des résultats positifs limités essentiellement à l'OCDE, alors que la réduction des barrières aux frontières a des plus différenciés selon les pays. Les gains de la libéralisation pour les produits manufacturés sont plus systématiques, à la fois en statique et sur le long terme. Nous identifions des gains statiques pouvant atteindre de 35 à 55 milliards de dollars. Une autre source importante de gains est la libéralisation des services, qui procure des gains de revenu pouvant atteindre globalement plus de 50 milliards. Enfin, dans les économies relativement ouvertes de la région Asie-Pacifique, la facilitation des échanges a des effets très importants, d'un point de vue statique, et d'un point de vue dynamique en raison de son impact sur l'investissement. C'est pourquoi cet item de l'agenda est le plus important pour les économies concernées, en particulier s'agissant de la libéralisation par les autres économies en développement.

RÉSUMÉ COURT

Nous analysons dans cet article les effets économiques de la libéralisation commerciale multilatérale, en nous intéressant plus particulièrement à l'Europe et aux principaux pays en développement. Nous considérons une situation de référence prenant en compte les événements récents comme l'accession de la Chine à l'OMC ou l'élargissement de l'Union européenne, afin de bin identifier les effets attribuables spécifiquement à la libéralisation commerciale associée au Cycle de Doha. Nous utilisons alors une modélisation en équilibre général calculable, intégrant l'accumulation du capital et l'imperfection de la concurrence. Nos scénarios couvrent les effets de la libéralisation agricole, manufacturière, des services, et les mesures de facilitation des échanges. En présence d'effets d'agglomération, la libéralisation agricole dans l'OCDE n'a pas systématiquement des effets positifs sur les pays les moins avancés.

Classification JEL: F13, F4, F12

Mots clés : OMC, cycle de Doha, libéralisation commerciale, échanges de services, facilitation des échanges, modélisation en équilibre général calculable.

ECONOMIC IMPLICATIONS OF TRADE LIBERALIZATION UNDER THE DOHA ROUND[1]

Joseph Francois[*], *Hans van Meijl*[**], *Frank van Tongeren***

1. INTRODUCTION

After the failed attempts in Seattle in late 1999, the Ministerial Meeting of the World Trade Organization (WTO) in Doha, in November 2001 launched the agenda for a new comprehensive round of multilateral trade negotiations. At the behest of the EU, the ministerial declaration emphasized that the Doha Round should provide a major opportunity for developing countries. Consequently the agenda for new WTO round has been coined the 'Doha Development Agenda'. In this paper we explore the likely economic effects of the new WTO Doha round for Europe, and for major developing regions. Our methodology is comparable to that used in recent studies of these issues by the World Bank, the IMF, and the OECD. However, we extend this literature by including market structure and investment effects in the modeling exercise, and by stressing a policy benchmark including China's accession to the WTO, the Agenda 2000 reforms to the CAP, enlargement of the EU, and recent EU FTAs. We cover the areas of agricultural liberalization, liberalization in industrial tariffs, liberalization in services trade, and trade facilitation measures. Our services scenarios build on gravity-equation based estimates of services barriers.

The paper is organized as follows: Section 2 develops the liberalization scenarios for the subsequent quantitative analysis. Chapter four describes briefly the modeling framework used. Chapter five discusses the results of our liberalization scenarios. It starts with a section on global results, proceeding with the results for the EU and finally discussing the estimated impact on the Netherlands.

2. THE POLICY LANDSCAPE AND TRADE LIBERALIZATION SCENARIOS

The core of our analysis is structured around a set of scenarios. These scenarios are based on alternative liberalization approaches for agriculture, manufactured goods, and services trade. They are meant to illustrate the implications of alternative approaches to market access liberalization. They are stylized rather than exact representations. In part, this is because we are working with an aggregate model (i.e. we do not model trade at the 6-digit HS level), and as such detailed treatment of all product-specific proposals is simply

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impossible. In addition, the actual market access modalities remain to be worked out. In agriculture, domestic support may or may not be affected, developing countries may or may not have to liberalize, and certain politically sensitive sectors may yet again escape from meaningful liberalization. Our scenarios are themselves decomposed into different components, related to specific sets of countries and specific sectors and instruments. This offers the advantage of allowing us (or the reader) to construct rough representations of hybrid liberalization experiments later, since individual components can be taken from different scenarios and combined.[2]

2.1 The Policy Landscape

Tariff negotiations in the GATT/WTO have generally been based on tariff bindings, or schedules of concessions tabled under GATT rules, and the coverage and level of these bindings is an important element of the initial conditions for the negotiations. provides information on the share of industrial-product tariffs (on a trade-weighted basis) that remains either unbound or bound above applied rates. While tariffs in the OECD (and Latin America) are generally bound, many Asian and African economy tariffs remain unbound despite more than a four-fold increase in the coverage of developing-country tariff bindings in the Uruguay Round (Abreu 1996). For almost all developing countries, existing bindings are, on average, well above applied rates, reflecting a combination of relatively high initial bindings, and the subsequent wave of reductions in applied rates. (See Blackhurst *et al* 1996, Francois 2001).

In addition to general Uruguay Round commitments, there have also been efforts for sector-based commitments to implement zero tariffs (called "zero-for-zero"). This is reflected in the next-to-last column of Table 2-1. As a result of zero-for-zero efforts, OECD economies have between roughly 10% and 30% of tariff lines bound at zero percent. Most developing countries have opted out of this process. Zero-for-zero increased developed country duty-free imports to 43% of total imports (Laird 1998). The process itself ground to a halt after the initial Information Technology Agreement (ITA). This seems to have been for two reasons: (i) the sectors in which OECD economies could easily reach agreement had already been included, and (ii) those sectors remaining involve North-South issues not susceptible to this approach. In other words, the cherries have been picked, leaving us with the hard nuts.

With the implementation of Uruguay Round commitments, average *ad valorem* tariffs in the industrial countries generally are around 3 percent. This is reflected in the first columns of Table 2-2. However, there are important exceptions. One of these is textiles and clothing, where the average rate is roughly three times this average. This is reflected in the standard deviation and maximum tariff columns. With full implementation of current commitments, the estimatd simple average industrial tariff in the United States is 3.2

[2] Technically, decomposition of general equilibrium-related effects of policy scenarios exhibits path dependence, meaning that the decomposition can be sensitive to the ordering of the elements of the experiment set. The impact of a particular instrument is also sensitive to the other members of the set. We employ a linear decomposition method in this paper that does not exhibit path dependence (Harrison et al 2000). As such, individual experiment elements are roughly additive.

percent, with a standard deviation of 4.3, and a maximum tariff of 37.5 percent. The European Union has a higher average, but less dispersion. (The EU has an average of 3.7 percent, a standard deviation of 3.6 percent, and a maximum tariff of 17 percent.) For the developing countries in Table 2-1, average industrial tariffs range from a low of 3 to 4 percent to a high of more than 20 percent. presents detailed data for three developing countries: Brazil, India, and Thailand. These countries span the spectrum of developing country bindings as reflected in Table 2-1. Brazil's tariffs are all bound, though the average rate for industrial products is 14.9 percentage points above the current applied rate. This gap is called a *"binding overhang*." (See Francois and Martin 2003). India and Thailand's tariffs are partially covered by bindings, again with significant binding overhang. In general, for developing countries, binding overhang is large enough that reductions in the range of 50% are necessary to force reductions in average applied rates for countries like Brazil. For many countries, even this will have little or no effect, as tariffs are largely unbound. Of course, this limits severely the negotiating leverage of developing countries in the WTO. This is also why the debate of using bound, applied, or "historic" rates as a starting point is important.

As in the case of industrial tariffs, the stage for any future agriculture negotiations was also set by the Uruguay Round outcome -- this time by the Uruguay Round Agreement on Agriculture (URAA). One key difference from industrial products is that essentially all agricultural tariffs are bound. However, in both industrial and developing countries, there is a large degree of binding overhang resulting from "dirty tariffication" or the use of "ceiling bindings" (Hathaway and Ingco 1996). The next round of agricultural negotiations was scheduled in the URAA, while the negotiating parameters (tariffs, tariff-rate-quota levels, subsidy commitments, etc.) must also be viewed in the context of the schedules of URAA commitments. The system that has emerged is complex and similar to arrangements in the textile and clothing sectors, featuring a mix of bilaterally allocated tariff-rate-quotas (with associated quota rents) and tariffs. Viewed in conjunction with industrial protection, the basic pattern is that the industrial countries protect agriculture and processed food, while protection in developing countries is more balanced (though also higher overall) in its focus on food and non-food manufactured goods.

The URAA had a stated goal of no backsliding and modest liberalization. However, negotiating parties (generally the relevant agriculture ministries) gave considerable leeway to themselves with regard to selection of the appropriate reference period from which to measure export subsidy reductions. In addition, the move to a price-based system for protection has, in many cases, been subsumed into an effective adoption of explicit quotas. The disciplines on domestic subsidies have also been weakened by a relatively soft definition of the AMS vis-à-vis individual subsidies and the scope for reallocation of expenditures within the AMS. (See Tangermann 1998 for discussion.) Commitments not to erode current market access were meant to limit the scope for increased protection through dirty tariffication. As the name implies, dirty tariffication involved violations of the spirit, if not the letter, of the URAA text. It involved setting tariff bindings at rates far above then current effective protection rates. The practice of setting high bindings complicated the problem of measuring the impact of further commitments to reduce bindings. Basically, in agriculture, we are in a world that allows scope for great policy discretion and uncertainty as a result of the loose nature of the commitments

made. In addition, the setting of high bound rates made possible the conversion of NTBs into even more restrictive import tariffs. This in turn made quantity disciplines necessary to avoid backsliding. Despite the goals of subsidy reductions and a shift toward price-based border measures, one of the more striking features of the regime that has actually emerged is the prominent role that quantity measures have taken in the new architecture. Basically, the agricultural trading system is complicated and still evolving. Policy measurement in this area has converged on the use of price-based measurements that emphasize the tax/subsidy equivalent of policy. (As this approach reflects available data, this is the approach we employ in this paper as well.)

For services, "market access" is a problematic concept. From the outset, service negotiations have been "qualitative." They have not targeted numeric measures, but rather commitments in the cross-border movement of consumers and providers and the establishment of foreign providers. In fact, for academics, the GATS seems to confuse FDI and migration with international trade. As a result, efforts to quantify market access in service sectors (a basic requirement if we want to then quantify liberalization) have been problematic at best. The standard approach (an example is Hoekman 1995) has been to produce inventory measures. As an alternative perspective, we follow Francois (2001) and have produced estimates of "tariff equivalents" for services trade. These are based on a simple gravity model, estimated from detailed global trade data for services trade in 1997. The basic approach is described in the annex to this paper (available upon request). The resulting estimates are summarized in Table 2-3. The estimates are admittedly crude. The pattern that emerges is consistent with that for industrial tariffs. It appears that barriers to services trade are higher (often much higher) in developing countries than in the OECD. Hence, as in the case of industrial tariffs, the effects of further GATS negotiations will hinge critically on developing country participation or non-participation, and the extent to which they commit to actual liberalization rather than stand-stills (the qualitative equivalent of ceiling bindings).

2.2 Trading costs

With the reduction in traditional trade barriers, attention in the regional and multilateral trade arenas has not only shifted to quantity restrictions, but also to trade facilitation measures. These are meant to target less transparent trade barriers, such as customs procedures, product standards and conformance certifications, licensing requirements, and related administrative sources of trading costs. Studies of regional integration initiatives (Baldwin and Francois 1997, Smith and Venables 1988) have emphasized the potential for liberalization initiatives to substantially reduce such barriers. Conceptually, these costs are different from the price and quantity measures used for manufactures and agriculture. They are a pure global deadweight loss.

The estimates of trading costs are very rough (at best). Nonetheless, they provide some sense of the magnitudes involved. An overview of estimates is provided in Table 2-4. In the context of the EC single market program, elimination of internal customs procedures and related administrative streamlining were projected to reduced trading costs by up to 2 percent of the value of trade (EC 1988). Globally, UNCTAD (1994) has noted that trading

costs represent 7 to 10 percent of the cost of delivered goods. Like the EC, UNCTAD also estimates that simple trade facilitation measures could reduce these costs by 2 percent of the value of trade. The Australian Industry Commission (1995) has estimated potentially higher savings in the context of APEC, ranging from 5 to 10 percent of the value of trade. Under more modest facilitation initiatives, the Japanese Economic Planning Agency (1997) has estimated savings at 2 percent in an APEC context, while Francois (2001) has employed a similar range of estimates.

2.3 Policy scenarios

To bring these elements together, we define three sets of scenarios (See Table 2-5). The first two are partial liberalization scenarios. In the "Linear 50%" all trade instruments are reduced by 50%. This involves a 50% reduction in agricultural and industrial tariffs and export subsidies, a 50% reduction in OECD domestic support for agriculture, a 50% reduction in the tariff-equivalent of services barriers, and a partial reduction in trading costs, related to trade facilitation measures. Services liberalization involves a 50% or a full reduction in the barriers shown in Table 2-3. The second partial liberalization experiment is called the "Swiss formula" experiment. In this experiment the reduction in import tariffs in agriculture and manufacture is based on a straight Swiss formula with a coefficient of 0.25, meaning the maximum tariff is reduced to 25%. (See Francois and Martin 2003). The third scenario simply involves full elimination of all trade barriers. Trade facilitation, based on the range of available estimates, is assumed to range between 1.5 percent of the value of trade (partial liberalization) and 3 percent (full liberalization).

Each experiment is decomposed, both in terms of sectors and instruments, and also in terms of country grouping. An example is given in Table 2-6 were the world welfare effect (equivalent variation) is decomposed across sectoral instruments and regions. Because of the decomposition method used, this means that the reader can roughly pick and choose, combining the results of hybrid experiments involving elements from different experiments, for a rough sense of possible effects. For example, if in the next WTO round, the outcome will be only 50% liberalization in manufactures in all regions and trade facilitation only in OECD countries, the estimated world welfare effect is approximately $80 billion ($34 billion due to liberalization in manufacturing and $46 billion due to trade facilitation in the OECD).

Finally, for each of the experiments employ alternative model features (these model features are discussed in more detail in section 3.2). First, we include short-run versus long-run effects. In the short-run capital stocks are fixed and in the long-run capital stocks adjust (See Francois et al 1996). Second, we alternatively employ perfect competition and imperfect competition in the manufacturing and services sectors. With perfect competition we assume constant returns to scale and with imperfect competition we assume monopolistic competition with increasing returns to scale, firm-level product differentiation, and average cost pricing. The model therefore includes the basic features of "economic geography" models, including intermediate linkages, monopolistic competition, and returns from specialization. (See Francois and Nelson 2002). For the agricultural sectors (except for the food processing industry) we maintain constant returns to scale in all

cases. In this study we use the constant returns to scale scenario mainly as a benchmark scenario to assess the impact of the increasing returns to scale features and it facilitates comparison with other studies that mainly use constant returns to scale in all sectors.

3. THE MODEL AND DATA

This section provides a brief overview of the global computable general equilibrium (CGE) model used in this study. The model is characterized by an input-output structure (based on regional and national input-output tables) that explicitly links industries in a value added chain from primary goods, over continuously higher stages of intermediate processing, to the final assembling of goods and services for consumption. Inter-sectoral linkages are direct, like the input of steel in the production of transport equipment, and indirect, via intermediate use in other sectors. The model captures these linkages by modeling firms' use of factors and intermediate inputs. The most important aspects of the model can be summarized as follows: (i) it covers all world trade and production; (ii) it allows for scale economies and imperfect competition; (iii) it includes intermediate linkages between sectors; (iv) and it allows for trade to affect capital stocks through investment effects. The last point means we model medium to long-run investment effects. The inclusion of scale economies and imperfect competition implies agglomeration effects like those emphasized in the recent economic geography literature.

3.1 Model Data and the Benchmark

Our data come from a number of sources. Data on production and trade are based on national social accounting data linked through trade flows (see Reinert and Roland-Holst 1997). These social accounting data are drawn directly from the most recent version of the Global Trade Analysis Project (GTAP) dataset, version 5.2. (Dimaranan and McDougall, 2002). The GTAP version 5 dataset is benchmarked to 1997, and includes detailed national input-output, trade, and final demand structures. The basic social accounting and trade data are supplemented with trade policy data, including additional data on tariffs and non-tariff barriers.

The data on tariffs are taken from the WTO's integrated database, with supplemental information from the World Bank's recent assessment of detailed pre- and post-Uruguay Round tariff schedules and from the UNCTAD/World Bank WITS dataset. All of this tariff information has been concorded to GTAP model sectors. Services trade barriers are based on the estimates described in chapter three and the technical annex. We also work with the schedule of China accession commitments (Francois and Spinanger 2001).

Table 2-1: Industrial tariff rates and bindings -- post UR and ITA

	Percent of MFN imports that are subject to:				Tariff lines	
	Bound tariffs	unbound tariffs	tariffs bound above applied rates	Tariffs unbound or bound above applied rates	Share of bound duty free tariff lines to total tar. lines	Total tariff lines
Argentina	100.0	0.0	99.9	99.9	0.0	10530
Australia	96.9	3.1	31.7	34.8	17.7	5520
Brazil	100.0	0.0	91.0	91.0	0.5	10860
Canada	99.8	0.2	45.7	45.9	34.5	6261
Chile	100.0	0.0	99.7	99.7	0.0	5055
Colombia	100.0	0.0	97.7	97.7	0.0	6145
El Salvador	97.1	2.9	96.0	98.9	0.0	4922
European Union	100.0	0.0	17.7	17.7	26.9	7635
Hungary	93.6	6.4	3.3	9.7	10.4	5896
India	69.3	30.7	14.8	45.5	0.0	4354
Indonesia	92.3	7.7	86.6	94.3	0.0	7735
Japan	95.9	4.1	0.1	4.2	47.4	7339
Korea	89.8	10.2	3.4	13.6	11.6	8882
Malaysia	79.3	20.7	31.0	51.7	1.6	10832
México	100.0	0.0	98.4	98.4	0.0	11255
New Zealand	100.0	0.0	46.5	46.5	39.5	5894
Norway	100.0	0.0	36.5	36.5	46.6	5326
Peru	100.0	0.0	98.5	98.5	0.0	4545
Phillipines	67.4	32.6	15.5	48.1	0.0	5387
Poland	92.8	7.2	44.6	51.8	2.2	4354
Singapore	36.5	63.5	11.7	75.2	15.2	4963
Sri Lanka	9.2	90.8	1.4	92.2	0.1	5933
Thailand	67.4	32.6	8.9	41.5	0.0	5244
Tunisia	67.9	32.1	41.5	73.6	0.0	5087
Turkey	49.3	50.7	0.0	50.7	1.4	15479
United States	100.0	0.0	14.0	14.0	39.4	7872
Uruguay	100.0	0.0	96.3	96.3	0.0	10530
Venezuela	100.0	0.0	90.3	90.3	0.0	5974
Zimbabwe	13.6	86.4	3.9	90.3	3.0	1929

Source: Francois (2001), based on WTO and World Bank data on Uruguay Round and post-Information Technology Agreement schedules.

Table 2-2: Summary of Effects of Basic Swiss Formula Reductions: Applied tariffs before and after a 50% cut in average tariff bindings

Agriculture

	Post-UR and ITA tariffs				Effect of basic Swiss-formula application on tariffs				
	Simple average	standard deviation	maximum tariff	binding overhang	simple average	Standard deviation	maximum tariff	binding overhang	% reduction in average
European Union	5.9	7.5	74.9	0.3	3.0	2.9	10.9	0.1	-48.6
Japan	6.2	8.1	43.3	1.2	3.5	3.7	13.9	0.2	-43.0
United States	3.5	7.4	90.0	0.5	1.9	2.4	11.5	0.1	-46.6
Brazil	12.9	5.1	27.0	22.6	12.4	4.6	22.3	5.3	-3.7
India	31.0	20.8	150.0	90.7	29.5	14.9	70.8	31.3	-4.8
Thailand	26.5	14.4	65.0	7.1	15.1	6.3	30.1	1.7	-43.0

Non-agriculture

	Post-UR and ITA tariffs				Effect of basic Swiss-formula application on tariffs				
	Simple average	standard deviation	maximum tariff	binding overhang	simple average	Standard deviation	maximum tariff	binding overhang	% reduction in average
European Union	3.7	3.6	17.0	0.4	1.9	1.4	5.0	0.1	-47.7
Japan	2.3	3.4	30.9	0.1	1.2	1.4	5.6	0.0	-48.5
United States	3.2	4.3	37.5	0.2	1.7	1.6	6.1	0.0	-48.3
Brazil	15.9	6.0	35.0	14.9	13.5	4.2	16.7	1.9	-15.4
India	19.2	16.5	40.0	3.9	11.3	9.2	30.5	0.3	-41.3
Thailand	10.5	10.8	80.0	7.8	7.2	6.1	20.7	2.0	-31.6

Source: Francois and Martin (2003).

Table 2-3: Estimated Services Trade Barriers (percent trade cost equivalents)

Label	Region	Trade	Trans-port and logistics	Business services	Other services
NLD	Netherlands	0.0	0.0	0.0	0.0
FRA	France	12.3	12.1	18.3	19.2
DEU	Germany	0.0	13.7	9.5	0.0
REU15	Rest of EU	12.3	0.0	0.0	0.0
CEEC	CEECs	1.6	0.0	0.0	0.0
MED	Mediterannean and Middle East	2.3	0.0	0.0	0.0
NAM	North America	0.0	22.6	1.2	16.0
SAM	South America	13.8	10.4	8.6	5.9
CHINA	China	0.0	14.5	37.4	3.7
INDIA	India	61.3	63.9	32.1	62.2
HINCAS	High income asia	0.0	0.0	6.3	0.0
OASPAC	Other Asia-Pacific	0.0	0.0	0.0	0.0
AUSNZ	Australia and New Zealand	0.0	2.3	9.5	15.2
SAF	South Africa	28.3	17.5	32.8	22.6
SSA	Sub-Saharan Africa	0.0	0.0	0.0	0.0
ROW	Rest of World	7.2	0.0	0.0	0.0

Based on gravity equation estimates.

Table 2-4: Estimated cost savings from trade facilitation

European Commission (1992)	In the context of the Single Market program, savings may amount to 1.6 percent to 1.7 percent of the value of trade due to savings on administrative costs of transactions represent 7 to 10% of the value of trade.
UNCTAD (1994)	Trade facilitation could reduce this to 5% to 8%.
Australian Industry Commission (1995)	Trade facilitation may save 5% to 10% of the total value of trade, through reduced transaction costs, in the APEC context.
Japan EPA (1997)	A "modest" APEC initiative may lead to 2% savings (as a share of the value of trade) due to reduced transaction costs.

Table 2-5: Scenario definitions

Instruments	Linear 50%	Swiss formula	Full liberalisation
Import tariffs in agriculture and manufacturing	50% reduction	Swiss formula reduction (with a max 25% tariff)	100% reduction
Estimated border measures in services	50% reduction	50% reduction	100% reduction
Export subsidies	50% reduction	50% reduction	100% reduction
Domestic agricultural support in OECD countries	50% reduction	50% reduction	100% reduction
Trade facilitation	1.5% of value of trade	1.5% of value of trade	3% of value of trade

Table 2-6: Total welfare gains of linear 50% experiment decomposed by sectoral instruments and regions

	OECD	LDCs	Inter-action Effects	Total
Agricultural liberalization (border measures)	24482	32446		56928
Agricultural liberalization (domestic support)	8744			8744
Manufactures (border measures)	12057	22230		34287
Services liberalization	17225	6907		24132
Trade facilitation	46159	26152		72311
Interaction effects				15974
Total	**108667**	**87735**	**15974**	**212376**

Source model simulations

While the basic GTAP dataset is benchmarked to 1997, and reflects applied tariffs actually in place in 1997, we of course want to work with a representation of a post-Uruguay Round world. We also want to include the accession of China, the enlargement of the EU, and Adenda 2000 reforms as part of the baseline. To accomplish this, before conducting any policy experiments we first run a "pre-experiment" in which we do the following:

- Implement the rest of the Uruguay Round tariff commitments,
- Implement the ATC (textile and clothing quotas) phaseout,
- Implement China's accession to the WTO,
- Implement Agenda 2000,
- And Implement the EU enlargement.

As such, the dataset we work with for actual experiments is a representation of a notional world economy (with values in 1997 dollars) wherein we have realized many of the trade policy reforms already programmed for the next few years.

The social accounting data have been aggregated to 17 sectors and 16 regions. The sectors and regions for the 17x16 aggregation of the data are given in Table 3.1 (a more detailed mapping between the aggregated sectors and regions and the original GTAP regions and sectors is given in a technical annex available on request).

3.2 Theoretical structure

We turn next to the basic theoretical features of the model. More discussion is provided in a separate technical annex, available upon request. In all regions there is a single representative, composite household in each region, with expenditures allocated over personal consumption and savings (future consumption). The composite household owns endowments of the factors of production and receives income by selling them to firms. It also receives income from tariff revenue and rents accruing from import/export quota licenses (when applicable). Part of the income is distributed as subsidy payments to some sectors, primarily in agriculture.

On the production side, in all sectors, firms employ domestic production factors (capital, labor and land) and intermediate inputs from domestic and foreign sources to produce outputs in the most cost-efficient way that technology allow. Perfect competition is assumed in the agricultural sectors as indicated in Table 3.1 (notice that the processed food products sector is characterized by increasing returns to scale). In these sectors, products from different regions are assumed to be imperfect substitutes in accordance with the so-called "Armington" assumption. Production under imperfect competition is discussed below.

Table 3.1: Sectors and regions

NLD	Netherlands	CERE*	Cerals
FRA	France	HORT*	Horticulture & other crops
DEU	Germany	SUGA*	Sugar, plants and processed
REU15	Rest of EU	INTLIV*	Intensive livestock &products
CEEC	CEECs	CATLE*	Cattle & beef products
MED	Mediterannean and Middle East	DAIRY*	Milk & dairy
NAM	North America	OAGR*	Other agriculture
SAM	South America	PROCF	Processed food products
CHINA	China	TEXT	Textiles, leather & clothing
INDIA	India	EXTR	Extraction industries
HINCAS	High income asia	CHEM	Petro & chemicals
OASPAC	Other Asia-Pacific	MELE	Metal and electotechnical ind
AUSNZ	Australia and New Zealand	OIND	Other industries
SAF	South Africs	TRAD	Trade services
SSA	Sub-Saharan Africa	TRAN	Transport services
ROW	Rest of World	BSVC	Business, financial & communnications services
		OSVC	Other private and public services

* denotes a competitive sector in all applications.

Prices on goods and factors adjust until all markets are simultaneously in (general) equilibrium. This means that we solve for equilibria in which all markets clear. While we model changes in gross trade flows, we do not model changes in net international capital flows. Rather our capital market closure involves fixed net capital inflows and outflows. (This does not preclude changes in gross capital flows). To summarize, factor markets are competitive, and labor and capital are mobile between sectors but not between regions.

We model manufacturing and services as involving imperfect competition. The approach followed involves monopolistic competition. Monopolistic competition involves scale economies that are *internal* to each firm, depending on its own production level. In particular, based on estimates of price-cost markups, we model the sector as being characterized by Chamberlinian large-group monopolistic competition. (For more on this approach, see Francois and Roland-Holst 1997.) An important property of the monopolistic competition model is that increased specialization at intermediate stages of production yields returns due to specialization, where the sector as a whole becomes more productive the broader the range of specialized inputs. These gains spill over through two-way trade in specialized intermediate goods. With these spillovers, trade liberalization can lead to global scale effects related to specialization. With international scale economies, regional welfare effects depend on a mix of efficiency effects, global scale effects, and terms-of-

trade effects. (Again see Francois and Roland-Holst 1997). Similar gains follow from consumer good specialization.

Another important feature involves a dynamic link, whereby the static or direct income effects of trade liberalization induce shifts in the regional pattern of savings and investment. These effects have been explored extensively in the trade literature, and relate to classical models of capital accumulation and growth, rather than to endogenous growth mechanisms. Research in this area includes Baldwin and Francois (1999), Smith (1976, 1977), and Srinivasan and Bhagwati (1980). Several studies of the Uruguay Round (see for example Francois, McDonald and Nordstrom 1993, 1994) also incorporated variations on this mechanism, along with variations in market structure. Such effects compound initial output welfare effects over the medium-run, and can magnify income gains or losses. How much these "accumulation effects" will supplement static effects depends on a number of factors, including the marginal product of capital and underlying savings behavior. It also hinges along interactions with market structure. In the present application, we work with a classical savings-investment mechanism (discussed briefly in the appendix, and also in Francois, McDonald and Nordstrom 1997). This means we model long-run linkages between changes in income, savings, and investment. The results reported here therefore include changes in the capital stock, and the medium- to long-run implications of such changes.

4 RESULTS

4.1 Global effects

We now turn to the results of the experiments outlines in chapter two. Tables 4-1 to 4-4 present a summary of results at the global level. The tables present a breakdown of the national income effects (technically measured as equivalent variation) resulting from the various policy experiments along the lines of major sector components. Table 4-1 is focused on agriculture, Table 4-2 is focused on manufactures, Tables 4-3 is focused on services liberalization, and Table 4-4 focuses on trade facilitation. The Tables also give a breakdown of the effects of scale economies, through a comparison of a perfect competition version of the model to the one with scale economies and imperfect competition. We consider the increasing returns case to be the most relevant, and unless indicated otherwise, the discussion of results pertains to this version of the model.

From the initial set of income effect tables, we can see that agricultural liberalization offers a mixed set of results. Liberalization of domestic support in the OECD, on the other hand, is generally positive for the OECD, though with negative consequences for sub-Saharan Africa. We find that significant, though limited, liberalization yields positive results globally, and regionally for Europe, Africa, and most of Asia. However, on net agricultural liberalization is a mixed-bag, with gains in most areas from elimination of domestic support, but with more mixed results from the elimination of border measures. Static results are consistently positive if constant returns to scale (CRS) are assumed, but induced changes in investment, combined with the imperfect competition features of the model, point to negative effects over the longer-run.

Specifically, we find unexpected welfare effects from agricultural liberalisation in the following cases:

- Australia and New Zealand, who are both net agricultural exporters, and are generally favouring agricultural liberalization. Those countries are usually expected to gain from improved market access in other countries.
- Mediterranean countries who are close to the EU and are usually expected to gain from liberalization in the heavily protected EU agricultural markets.
- Other non-OECD countries (India, China, South Africa, SSA) who do not liberalize themselves and loose when their access to OECD markets is improved.
- Gains for South America are very limited. As a big agricultural exporter, they are generally expected to gain more from liberalization.

In order to understand these unexpected results it is important to distinguish the standard perfect competition and CRS case, which most other Doha studies use from our modeling of industrial sectors as exhibiting imperfect competition and IRS. For almost all regions the explanation of the negative welfare results under imperfect competition is straightforward: Due to trade liberalization in agriculture their agricultural sectors expand, because they gain by getting better access to OECD markets. However, the agricultural sectors are all perfectly competitive sectors with constant returns to scale. The expanding agricultural sectors draw resources from industrial sectors. As a consequence, the industrial sectors have to contract, which has negative implications for welfare because they cannot achieve cost effective scales of production. Therefore, the unexpected negative welfare effects are due in part to the presence of scale economies in some parts of the economy. This is a general point: If liberalization leads to specialization and expansion of CRS sectors, this is often inferior compared to a policy-induced expansion in IRS sectors. In the latter case, the traditional gains from liberalization are magnified by additional opportunities to utilize economies of scale.

Our results highlight the importance of taking a long-term structural view. CAIRNS group countries should perhaps be cautious about expecting long-term economy-wide gains if, as a result of liberalization, the agricultural sector draws more resources away from other productive uses. Developing countries also need to think carefully about the risks of reinforcing an emphasis on primary exports.

The pattern for manufacturing liberalization is more consistent and positive, both in the initial static results, and over the long-term. From Table 4-2, the most important area for manufacturing tariff liberalization is the developing countries. Recall from the discussion in chapter three that OECD tariffs are, on average, below 3 percent for manufacturing. As a result, the impact of a Swiss-formula (which targets high tariffs) yields only limited effects on the OECD, while directly proportional cuts have a more dramatic effect. At the extreme, we identify between an initial (static) effect of between $35 and $55 billion. The one region consistently, and significantly, hurt by significant manufacturing liberalization is China. This follows from an erosion of its terms of trade, driven by its growth in textile exports, combined with increased competition from other low wage countries (see the

export effects in the annex tables). Natural competitors, such as India, currently limit their participation on world markets through a mix of import and export barriers. Rationalization in this area by developing countries leads to heightened competition against China in a number of sectors, with the result being income losses for China driven almost entirely by manufacturing and agricultural liberalization in the developing world.

Another important source of gains is services, which yields static income gains on a par with remaining manufacturing tariffs, ranging, potentially, to over $50 billion globally. One obvious winner from services liberalization is the United States, which is projected to pick up a substantial share of total gains. Another big winner in services, however, is somewhat less obvious. India, which has moved in recent years to become a major exporter in services (including software and back office services) is projected to be a bigger potential winner from services liberalization than North America. In fact, as a share of GDP, services is a more important source of gains for India than agriculture and manufacturing liberalization combined. The other important source of gains for India (and for much of the world) is trade facilitation. In the Asia-Pacific region, where exports alone are often 50 percent of GDP, trade facilitation yields a dramatic short-run effects as well as a long-run impact driven by investment effects (Table 4-4). For the Asia-Pacific developing countries, the single most important issue is trade facilitation, particularly by other developing countries.

Further detail on labor market and trade effects is provided in the annex tables. In general, both unskilled and skilled workers gain from the partial and full liberalization scenarios in most regions, except for some cases in the CEEC economies and China. In China, the results are linked to the trade and income effects following from competition with other low-wag exporters, as discussed above. The general pattern of wage effects is summarized in Figure 4.1, which shows percent changes in wages for unskilled workers in all regions, under all three scenarios. While this figure is somewhat difficult to read in detail, the basic pattern is clear – positive wage effects everywhere, under all scenarios, except for China in all cases and the CEECs in some cases.

The general pattern of export effects, reported in detail in the annex tables (available upon request), is summarized in Figure 4.2. Like the Figure 4.1, the emphasis here is not on individual values, but the general pattern of results. Export growth, under all scenarios, is greatest in the developing countries, especially in Asia and the Pacific (including India and China), but also in the Mediterranean, African, and Latin American economies. The CEECs suffer from trade-erosion with respect to market access to the EU15 economies.

4.2 Results for the (enlarged) European Union

The European Union is a customs union, with a common external tariff against supplies from third countries, and practically zero tariffs within the union. Lower external trade barriers affect producers and consumers in member states in two related ways. First there is the direct boost to competition on home markets through improved market access for suppliers from outside the European Union. Second, the relative position of suppliers within the EU might change. The formation of the EU customs union leads, by definition, to trade preferences amongst the members of the free trade area. As a consequence the

share of trade that is within the EU (intra-EU trade) is typically biased upward, and trade within the EU is larger than might be expected on the basis of geographic proximity and other trade promoting factors alone. With the recent eastward enlargement the preferences are extended from the current 15 EU members to the new member states.[3] Recall that the enlargement process has been incorporated in our baseline scenario.

The lowering of external trade barriers by the EU will inevitably lead to the erosion of the intra-EU trade preferences. Suppliers with lower cost will be able to enter the EU markets once the tariff barriers have come down that currently shield domestic producers from foreign competition. Consequently, we can expect the current bias towards intra-EU trade to be reduced. Table 4-5 nicely illustrates this effect by breaking down the simulated change in EU27 import values for one of the more modest liberalisation scenarios.

[3] Our simulations include all 12 accession candidates newcomers, i.e. we also include Bulgaria and Romania, although these two countries will not enter the EU with the first wave of new member countries.

Table 4-1: Agricultural Liberalization Static National Income Effects, millions of dollars (based on equivalent variation)

	Constant returns to scale			Increasing returns to scale							
	50% liberalisation of border measures			50% liberalization of border measures			Full liberalization or border measures			OECD Domestic Support	
	Total	OECD	LDCs	Total	OECD	LDCs	Total	OECD	LDCs	Partial	Full
Netherlands	139	-227	366	768	319	449	1,436	112	1,324	-16	119
France	657	193	464	1,661	1,524	136	3,312	2,543	769	2,746	4,320
Germany	809	441	368	2,307	2,122	184	4,855	4,181	674	1,110	1,534
Rest of EU 15	2815	1723	1092	5,042	4,914	128	8,651	7,647	1,004	4,576	7,069
CEECs	263	575	-312	1,702	1,143	559	4,348	2,023	2,325	-2	-202
Mediterranean	4293	269	4024	15,008	-794	15,802	22,232	-2,112	24,344	-600	-1,369
North America	3098	1358	1740	2,678	1,501	1,177	4,356	1,128	3,228	2,173	3,881
South America	2848	2052	796	2,054	162	1,892	4,366	392	3,973	-152	-289
China	1439	755	684	2,993	-374	3,367	3,549	555	2,993	-252	-577
India	165	69	96	756	-76	832	1,196	-205	1,401	-6	-35
High Income Asia	7737	7125	612	16,127	14,163	1,964	26,998	21,930	5,068	-504	-977
Other Asia-Pacific	1035	768	267	3,673	1,007	2,667	6,550	2,526	4,024	-85	-173
Australia-NZ	1261	969	292	-350	-419	70	-499	-721	222	70	185
South Africa	418	90	328	1,257	-84	1,341	2,057	-207	2,264	-38	-115
Sub-Saharan Africa	649	457	192	1,394	-194	1,588	3,162	-455	3,617	-92	-248
Rest of World	275	201	74	-141	-432	291	174	-527	700	-184	-755
Total	27901	16818	11083	56,928	24,482	32,446	96,743	38,811	57,932	8,744	12,368

Table 4-2: Manufacturing Tariff Reductions, Static National Income Effects, millions of dollars (based on equivalent variation)

	Constant returns to scale			Increasing returns to scale					
	50% liberalisation of border measures			50% liberalization of border measures			Full liberalization or border measures		
	Total	OECD	LDCs	Total	OECD	LDCs	Total	OECD	LDCs
Netherlands	303	-178	481	947	-18	965	1,586	-315	1,901
France	981	-134	1115	2,189	386	1,803	4,649	431	4,218
Germany	1910	-125	2035	3,397	322	3,075	6,002	-719	6,721
Rest of EU 15	2689	-964	3653	7,367	534	6,833	12,018	-2,016	14,033
CEECs	-3418	-2159	-1259	4,102	2,118	1,984	12,755	6,715	6,040
Mediterranean	189	1362	-1173	-1,133	1,310	-2,443	-3,206	2,186	-5,392
North America	543	-3917	4460	13,226	2,590	10,636	22,104	548	21,556
South America	203	1088	-885	-2,450	839	-3,289	-7,286	1,765	-9,051
China	1477	4175	-2698	-23,717	-9,444	-14,273	-37,826	-10,398	-27,428
India	357	548	-191	-499	427	-926	-3,991	778	-4,769
High Income Asia	9642	2088	7554	22,859	8,473	14,386	37,669	11,327	26,343
Other Asia-Pacific	1601	3140	-1539	3,244	2,320	924	1,701	3,932	-2,231
Australia-NZ	-169	-198	29	787	130	657	704	-471	1,174
South Africa	240	94	146	621	248	373	1,013	446	567
Sub-Saharan Africa	-128	75	-203	-156	242	-398	-574	452	-1,026
Rest of World	1214	727	487	3,503	1,579	1,924	6,928	2,705	4,222
Total	17634	5622	12012	34,287	12,057	22,230	54,247	17,367	36,880

Table 4-3: Services Liberalization, Static National Income Effects, millions of dollars (based on equivalent variation)

	Constant returns to scale			Increasing returns to scale					
	50% liberalisation of border measures			50% liberalization of border measures			Full liberalization or border measures		
	Total	OECD	LDCs	Total	OECD	LDCs	Total	OECD	LDCs
Netherlands	98	67	31	814	637	178	1,130	892	238
France	2281	2212	69	4,825	4,576	249	2,802	2,262	540
Germany	2296	2220	76	4,451	4,431	20	4,412	4,092	320
Rest of EU 15	798	587	211	2,830	3,034	-205	4,342	3,390	953
CEECs	172	193	-21	3,327	2,623	704	970	623	347
Mediterranean	636	558	78	2,863	2,290	573	2,525	2,146	379
North America	8742	8461	281	11,872	14,856	-2,985	16,260	14,805	1,456
South America	2026	315	1711	5,556	1,288	4,268	4,109	1,258	2,852
China	793	279	514	4,647	-1,596	6,243	1,524	-93	1,617
India	1957	44	1913	21,601	-199	21,800	4,657	132	4,525
High Income Asia	1722	1577	145	1,444	2,670	-1,225	4,257	3,960	297
Other Asia-Pacific	325	329	-4	197	-1,300	1,497	1,522	1,252	270
Australia-NZ	670	654	16	1,541	1,612	-71	1,569	1,523	46
South Africa	555	36	519	971	117	854	1,086	196	890
Sub-Saharan Africa	102	73	29	490	341	149	394	332	62
Rest of World	354	313	41	688	730	-42	1,493	1,277	216
Total	23527	17918	5609	68,116	36,109	32,007	53,053	38,046	15,007

Table 4-4: Trade facilitation, Static National Income Effects, millions of dollars (based on equivalent variation)

	Constant returns to scale			Increasing returns to scale					
	50% liberalisation of border measures			50% liberalization of border measures			Full liberalization or border measures		
	Total	OECD	LDCs	Total	OECD	LDCs	Total	OECD	LDCs
Netherlands	1058	944	114	1,436	1,123	313	2,910	2,314	596
France	1858	1670	188	2,183	1,858	325	4,615	3,922	693
Germany	2607	2366	241	3,475	2,709	766	7,161	5,683	1,478
Rest of EU 15	6654	6050	604	8,188	6,431	1,757	16,462	13,201	3,261
CEECs	-13	84	-97	1,804	1,253	551	4,576	3,108	1,469
Mediterranean	3974	205	3769	4,305	681	3,624	8,621	1,248	7,373
North America	10952	9938	1014	14,150	10,857	3,293	27,519	21,626	5,893
South America	4863	946	3917	4,440	884	3,556	9,365	1,800	7,565
China	6046	1399	4647	-1,675	-775	-900	3,097	682	2,415
India	1197	288	909	1,189	320	869	2,424	649	1,775
High Income Asia	14556	13622	934	19,755	15,419	4,336	37,790	30,686	7,104
Other Asia-Pacific	5451	1146	4305	7,545	2,246	5,299	15,320	4,516	10,804
Australia-NZ	1343	1271	72	1,348	1,077	271	2,589	2,134	455
South Africa	638	135	503	799	198	601	1,625	401	1,223
Sub-Saharan Africa	868	90	778	1,052	178	874	2,342	395	1,947
Rest of World	1105	1050	55	2,315	1,698	617	4,454	3,324	1,130
Total	63157	41204	21953	72,311	46,159	26,152	150,870	95,690	55,179

Figure 4-1

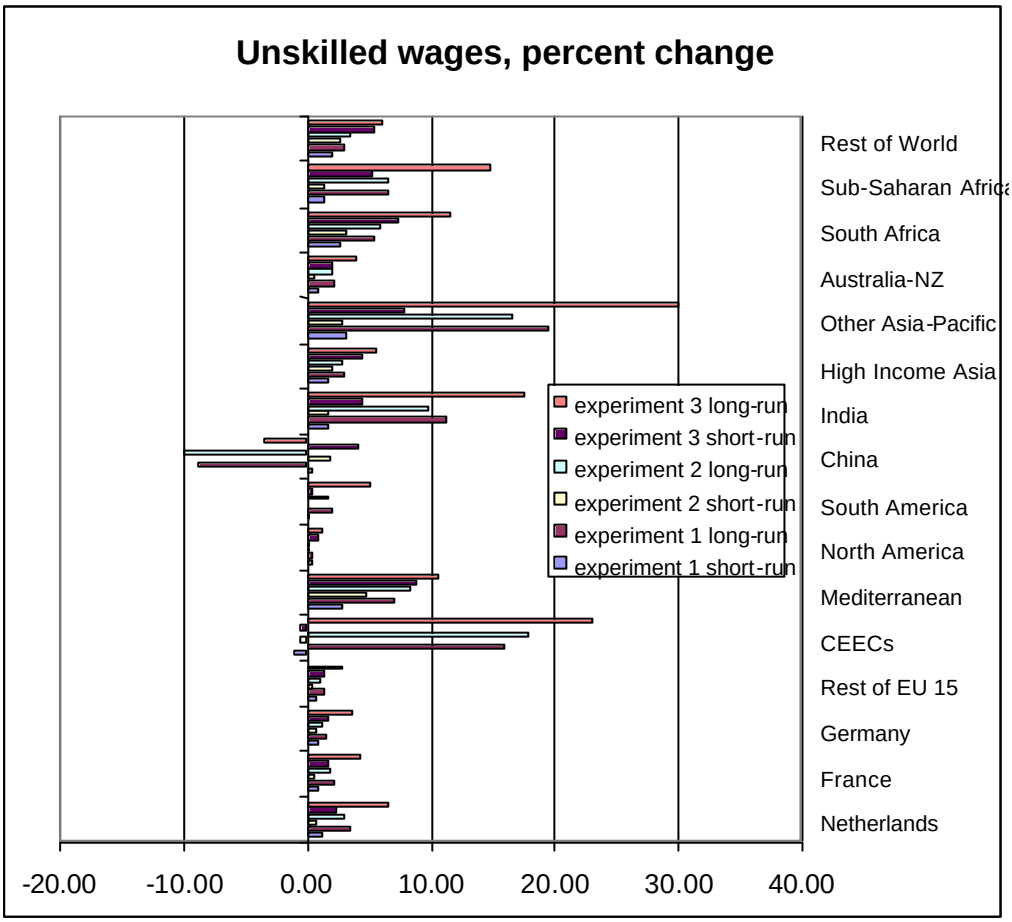

Unskilled wages, percent change
Rest of World
Sub-Saharan Africa
South Africa
Australia-NZ
Other Asia-Pacific
High Income Asia
India
China
South America
North America
Mediterranean
CEECs
Rest of EU 15
Germany
France
Netherlands
experiment 3 long-run
experiment 3 short-run
experiment 2 long-run
experiment 2 short-run
experiment 1 long-run
experiment 1 short-run
-20.00
-10.00
0.00
10.00
20.00
30.00
40.00

Figure 4-2

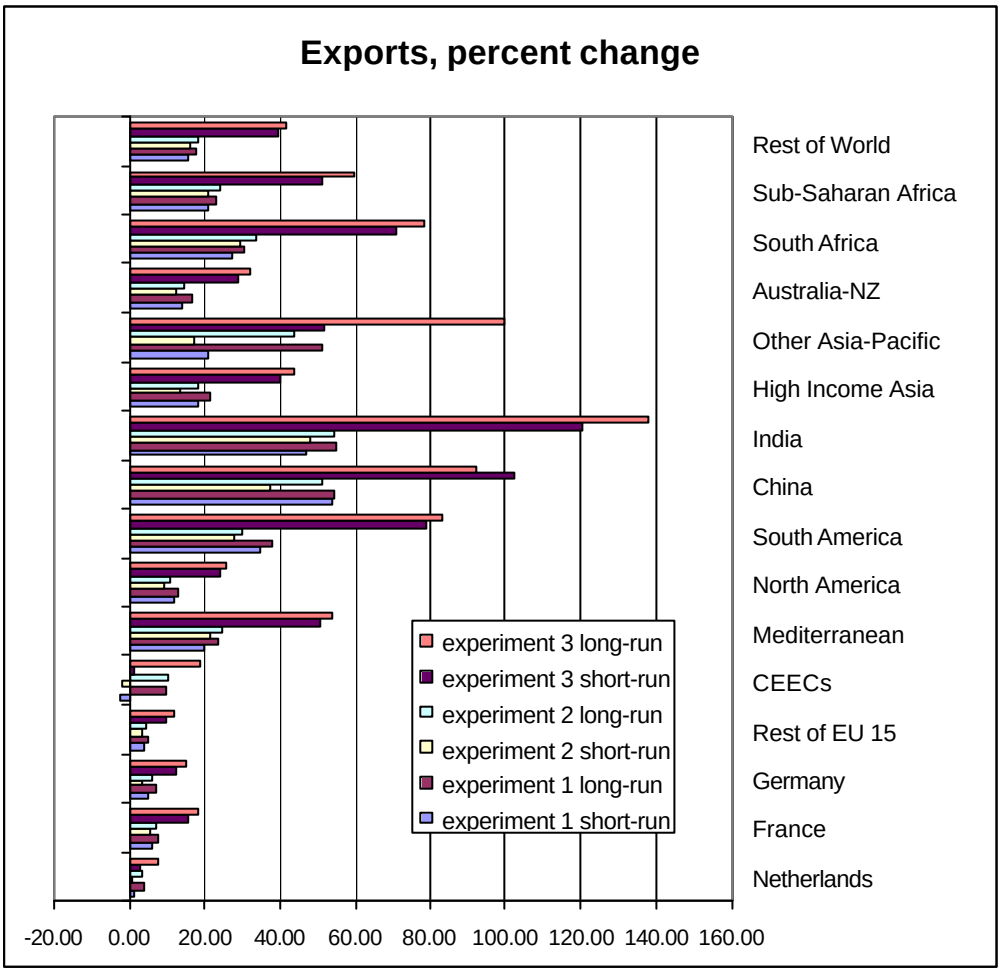

Exports, percent change
Rest of World
Sub-Saharan Africa
South Africa
Australia-NZ
Other Asia-Pacific
High Income Asia
India
China
South America
North America
Mediterranean
CEECs
Rest of EU 15
Germany
France
Netherlands
experiment 3 long-run
experiment 3 short-run
experiment 2 long-run
experiment 2 short-run
experiment 1 long-run
experiment 1 short-run
-20.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00

Table 4-5: Percent change in value of bilateral exports (f.o.b.), linear 50% cuts (*)

↓ from → to	**EU27**	**LDCs**	**Other**	**Total exports**
EU27	-6	21	13	2 (4)
LDCs	30	39	25	30 (38)
Other	12	26	8	14 (15)
Total imports	3 (5)	28 (35)	14 (15)	12 (15)

Source: Model simulations.

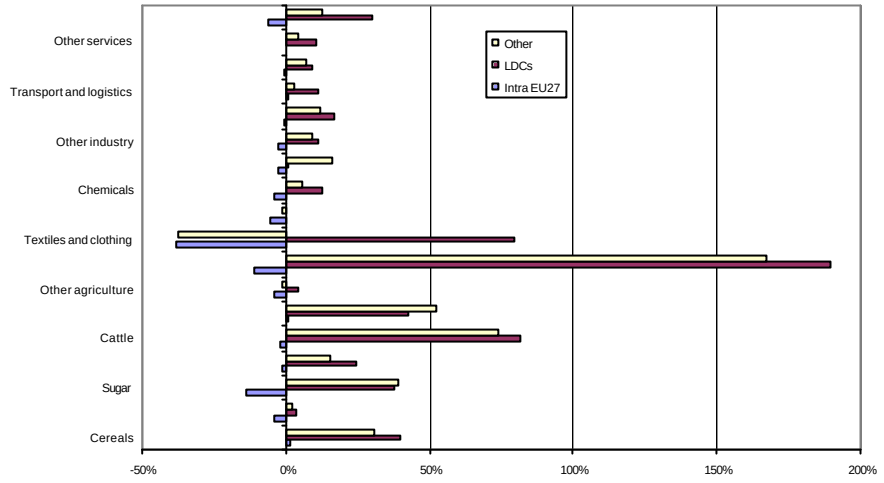
Note: (*) Short run results with scale economies. Long run results in brackets.

The 2% growth in EU27 exports is small compared to the 12% growth in world trade. A first driver of this result is that EU countries mostly trade amongst themselves. The benefits from removing the intra-EU barriers have already been realised in the past and there are no additional gains for intra-EU trade in a new WTO round. A second driver of this result is the increased competition from non-EU countries on EU markets. Simulated intra-EU27 trade shrinks by -6% as other suppliers enter the EU markets.

The most impressive growth in markets share is realized by suppliers from LDCs, who are simulated to expand their exports to the EU by 30%, compared to the 12% increase of imports from other developed countries.

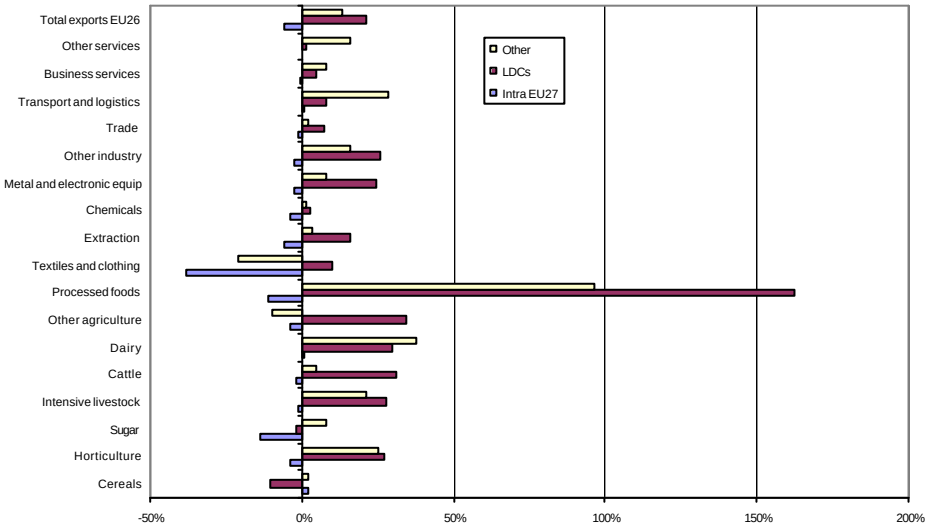
Because there is no positive growth to be expected from intra-EU trade, European exports can only by increased by expansion in non-EU markets. Exports to LDCs grow with 21% and exports to the other regions grow with 13%. Although these growth figures are high, this is insufficient to significantly boost total exports as their weight in total EU27 exports is limited.

Figure 4-3: Percentage change in EU27 imports by source (50% linear cuts in tariffs and domestic agricultural support)



Source: Model simulations

Figure 4-4: Percentage change in EU27 exports by destination (50% linear cuts in tariffs and domestic agricultural support)



Source: Model simulations.

LDCs obtain the highest growth in exports (30%). They are simulated to expand exports to all destinations, but the largest trade surge is observed for intra-LDC trade. Global trade creation in this experiment amounts to 12% in short run and 15% in long run. While the

trade increase materialises already in the short run for the EU and other developed economies, LDCs see even larger growth in their exports in the longer term. Dynamic capital accumulation enables them to specialise more in exportable goods.

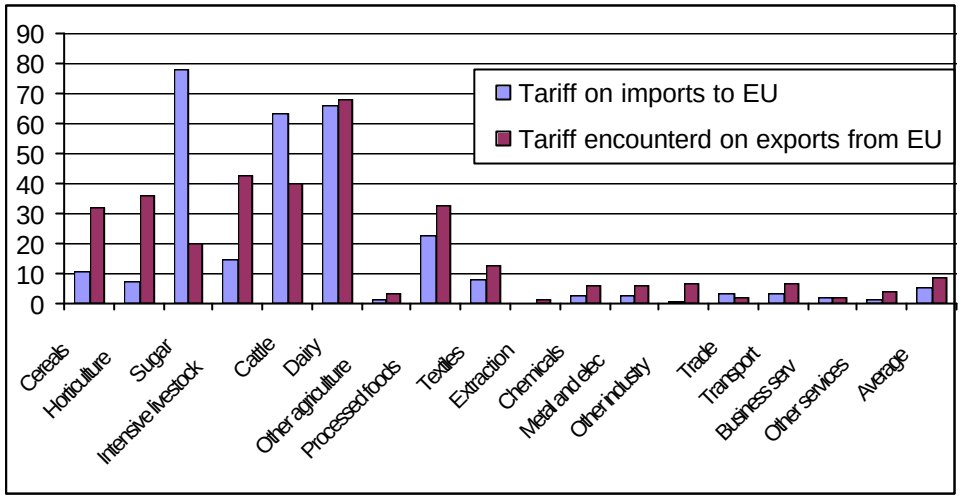
On balance, imports into the EU increase slightly faster than exports. What does this imply for individual industries in the European Union? A rise of imports in some highly protected sectors is to be expected. The pre-simulation landscape of import tariffs shows that the average import barriers for agricultural products (cereals, sugar, cattle, dairy and processed food) and textiles are the highest. Figure 4-3 shows that simulated imports rise as expected for these industries. The import growth for sugar and dairy is lower than might be expected on the basis of the initial import protection. This is caused by the output quota system, which limits the production decline as long as there are positive quota rents. The immediate impact of increased import competition is lower quota rents, and therefore lower internal EU prices. Production would only fall dramatically if quota rents were fully eroded, and this is not the case in our simulations. The lower internal prices make EU a less attractive export destination, and hence imports raise less than expected.

The pre-simulation landscape of import tariffs also shows that average barriers encountered on EU exports are sometimes higher than the barriers erected by the EU (Figure 4-5). Hence, we can expect a growth of extra-EU exports to some destinations. Export growth may even occur for agricultural exports that are currently subject to export subsidies, which we reduce in the liberalisation scenario.

Remarkable is the surge of trade in processed food. While it is consistent with recent empirical observations on the shifting composition of agri-food trade towards more trade in processed products (Hertel et al, 1999, Berkum and van Meijl, 2001), the explanation of this simulation result can be found in the data modelling assumptions.

Figure 4-5 shows that the average tariff on processed food in the EU27 equals a significant 23% of the value of the product. But also processed food products exported from the EU have to climb an even higher barrier: 33%. Consequently, a simulated tariff reduction of 50% leads to a notable reduction of import prices, both in the EU as elsewhere. Another factor contributing to the expansion of trade is the assumption of scale economies in the processed food industry. Scale economies tend to promote more regional specialisation, and therefore they lead to more trade. As production is more concentrated in certain regions, rather than being spread out over diverse locations each serving a relatively narrow home market, more trade between regions will occur. An export-oriented region, with an existing specialisation in this sector can be expected to see food processing activities expanding. Within the EU this leads to the Netherlands, and to a lesser extent France, to expand in processed foods, while other EU regions see a slight contraction of the industry (Table 4-6). Other regions seeing an expanding food processing industry are South America and Australia-New Zealand. All these regions have already a comparative advantage in processed food (see Francois and van Tongeren 2002) and protection encountered on their exports is relatively high. An expanding processed food sector stimulates both domestic production and imports of primary agriculture from LDCs.

Figure 4-5: Average import tariffs (%) on extra-EU trade (base situation)



Source: GTAP database, author's calculations

Note: Tariffs are given as trade-weighted averages of *ad valorem* tariff equivalents.

Trade (both exports and imports) between the EU and LDCs is growing relatively faster in our experiments than trade with developed countries. Already low trade barriers amongst OECD countries explain this. An interesting case is Textile and Clothing. Recall that our experiment assumes that MFA is already phased out (this is part of the baseline simulation), and the trade liberalisation experiment subsequently lowers the import tariffs on textiles and clothing. This greatly boosts exports from LDCs into the EU, and it crowds out the imports from developed economies.

The services industries are the only sub sector within the EU that does not see intra-trade shrinking. Especially transport services display positive growth rates in wake of rising trade volumes.

The greater openness to imports and the opening of new export opportunities for products form the EU has some consequences for the development of output. These output developments are triggered on the one hand by trade developments induced by reduction in trade protection and, on the other hand, by the importance of international trade in sales. Only when a relatively large share of domestic production is exported, does export growth coincide with growth in production. Table 4-6 shows the percent change in output for the EU regions. As can be expected from the initial high protection on agricultural products, output developments for cereals are negative for all EU countries. Those EU members that rely heavily on imports and face heavy import competition, such as Germany, Rest EU15 and especially the Netherlands (see self-sufficiency index in Annex table A-3), witness the highest reduction in production. Production in France is decreasing as it faces stiffer competition on EU markets. For the Central and Eastern European countries production is

almost unaltered because they are self-sufficient and an increase in trade does not change domestic production. The cattle and beef sector in the EU declines due to increased imports from especially South America and NAFTA. Production in the quota regulated dairy and sugar sectors does not change in the EU regions because production stays on quota and quota rents decline but remain positive. The development in production of processed food is explained before. The big net exporters within the EU, France and especially the Netherlands, increase output while output contracts in the other regions.

Textile production in the EU decreases due to increased import competition from China and India. This is especially affecting the only big net exporting textile producer within the enlarged EU, Central and Eastern European Countries (CEEC), whose production declines with 36%. However, we have to be aware that the enlargement impact is already part of the baseline. During the enlargement process textile production in CEEC countries expanded rapidly, driven by increased exports to the EU15 countries. The new WTO round erodes the preferences associated wit EU membership reduces and therefore reverses the process. A similar observation could be made for textile and clothing imports from Turkey, which currently enjoys preferential access to EU markets.

Table 4-6: Percent change output (volume index), linear 50% cuts

	Netherlands	France	Germany	Rest of EU15	CEEC candidate countries
Cereals	-19	-10	-12	-12	2
Horticulture	-1	4	4	4	2
Sugar	0	0	0	0	-4
Intensive livestock	1	2	-1	1	1
Cattle	-2	-8	-5	-8	0
Dairy	0	0	0	0	3
Other agriculture	0	2	0	0	6
Processed foods	8	3	-3	-1	1
Textiles	7	-11	-24	-26	-36
Extraction	-2	-3	-1	-2	6
Chemicals	-2	0	-1	-1	2
Metal and elec	-15	1	1	-1	454
Other industry	-2	1	-2	0	47
Trade	0	0	0	0	3
Transport	18	1	0	5	17
Business serv	0	-1	0	0	4
Other services	0	0	0	0	3

Source: Model simulations.

For manufacturing and services, we simulate rather limited production responses within the EU. Small production effects are observed for trade services, business services and other services. Although these sectors obtain a positive growth in their exports, this does not significantly influence their production because these services are still predominantly

operating at the national level. Their exports and imports form are a relatively small share of production (Their self-sufficiency indicator equals about 1 for all services sectors in every EU region).

An exception is transport and logistics, where we observe notable production increases within the EU due increased trade volumes. The transport and logistics sector facilitates the shipment and distribution of larger trade volumes. Production expands especially in the Netherlands.

Within manufacturing the only big change in production is in the Metal and electro technical industries, which contract in the Netherlands and expand in CEECs. One should not overestimate the effect in CEECs. The sector in the CEECs is very small and it partly recovers from the simulated production slump during the enlargement process.

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