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STRIKING THE BALANCE BETWEEN FORMULAS AND WATER IN THE TARIFFS

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MARTINA BROCKMEIER, MARIANNE KURZWEIL AND JANINE PELIKAN*

Abstract

In the current round of negotiations by members of the World Trade Organisation (WTO), member countries committed themselves to substantially improving market access and reducing export subsidies and trade-distorting domestic support. The Doha Work Programme adopted by the WTO in 2004 defines the modalities for the negotiations, but there are still many open questions: What will be the magnitude of the tariff cuts? Which products will be defined as 'sensitive'? In addition, the difference between bound and applied tariff rates could be a criterion for defining sensitive products. Does the 'water in the tariffs' – which some define as any gap between the applied rate and the actual rate of protection, where the actual rate is lower – lead to an implicit preferential treatment for developing countries? How will sectors with different gaps between applied and bound rates be affected?

This paper seeks to discuss and answer these questions. It analyses the effects of market access taking applied and bound rates into account. An extended version of the Global Trade Analysis Project model is used to first project a base run including the Agenda 2000, EU enlargement, the Everything but Arms agreement and the EU's Mid-Term Review along with the WTO negotiations. Here, a differentiation is made between two experiments, both of which implement a more rigorous version of the Harbinson 1½ proposal. The difference between the experiments shows the effects of water in the tariffs, which are summarised in the conclusions.

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Contents

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1. Introduction

The WTO initiated a new round of trade negotiations on agriculture and services in 2000. According to the Doha mandate adopted on 14 November 2001, the WTO members committed themselves to substantially improving market access, reducing with the view towards phasing out all forms of export subsidies and to substantially reducing trade-distorting domestic support (WTO, 2001). Furthermore, it was decided that non-trade concerns and special and differential treatment for developing countries should be an integral part of the negotiations. After this agreement on the Doha mandate, a tenacious negotiation process started to reach a consensus on modalities for further negotiations. In July 2004 the WTO General Council finally adopted the Doha Work Programme or so-called 'Oshima text', which defines the modalities for further negotiations (WTO, 2004).

Although it seemed as if the disputing parties had reached an agreement, the outcome of this agreement is still highly uncertain. In contrast to the former proposals (e.g. the Harbinson proposal) the content of this recently adopted agreement is very vague. It was decided to use a tiered formula for tariff cuts, with deeper cuts for higher tariffs. Beyond that, the proposal contains almost exclusively qualitative information about tariff cuts, the abolition of export subsidies, etc., but does not make any concrete statements regarding the time horizon or magnitude of protection cuts. Also, nothing was said about the concept that will be used to convert non-ad valorem tariffs, e.g. specific tariffs to ad valorem equivalents (AVEs). Here, WTO negotiators recently decided on a complex concept that utilises unit value data from two different databases, namely the WTO's Integrated Database (IDB) and the COMTRADE database of the United Nations (*Agra Europe Weekly*, 2005, A2).[1]

As a result of the mostly qualitative consistency of the Doha Work Programme, there are still many open questions: What will be the magnitude of the tariff cuts? Which products will be defined as 'sensitive'?[2] In addition, the difference between bound and applied tariff rates could be a criterion for defining sensitive products. Does the 'water in the tariffs' lead to an implicit

[1] The WTO's IDB provides import unit-value data, while the COMTRADE database of the United Nations supplies world unit values. If the difference between both values is less than 40%, the IDB values are employed in the calculation. But if the difference is greater then 40%, AVEs are calculated on the basis of both data sources. AVEs differing by more than 20% will be adjusted using a ratio of 82.5% (COMTRADE price) and 17.5% (IDB price) for basic agricultural products. For processed products the ratio of 60% to 40% is used. The price calculation for sugar, however, remains to be negotiated (Agra Europe, 2005, A2).

[2] According to the Oshima text, WTO members are allowed to "designate an appropriate number, to be negotiated, of tariff lines to be treated as sensitive" (WTO, 2004, p. A/6). It is most likely that countries select products with high tariffs and high trade and production volumes as sensitive (Jean, 2004, p. 9).

preferential treatment for developing countries? How will sectors with different gaps between applied and bound rates be affected?

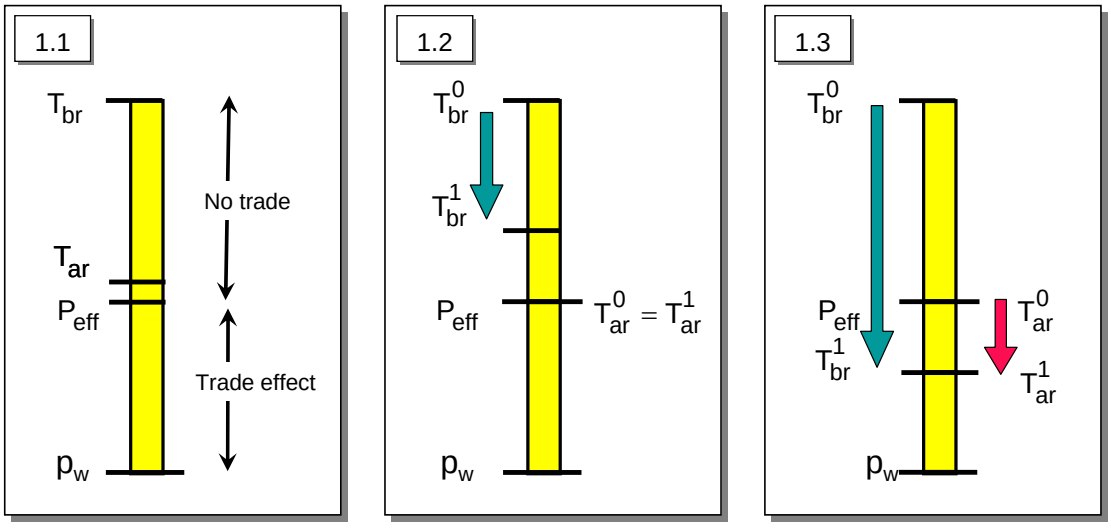
This paper seeks to discuss and answer these questions. Particularly, the paper analyses the impact of water in the tariffs in developed and developing countries. For this reason, section 2 first discusses the role of water in the tariffs in WTO scenarios. In section 3 the methodological instrument, the Global Trade Analysis Project (GTAP), together with the theoretical extensions used for the calculations is introduced. Thereafter, model design and experiments are introduced in section 4, while results and conclusions are presented in sections 5 and 6.

2. Bound and applied tariffs in WTO scenarios

Applied tariffs represent the duties faced by an exporting country. Depending on the trade status of the trading partners, the applied rates might be most-favoured nation (MFN) or preferential rates. In any case, applied rates determine trade flows. WTO tariff negotiations are, however, based on bound tariffs, which result from former WTO negotiations or from the WTO accession process. These are ceilings for applied tariffs and thus represent the maximum tariff that can be imposed on imports of a particular product. Although WTO negotiations focus on bound tariffs, the economic effects of tariff-cutting formulas clearly depend on changes in applied tariffs. For this reason it is necessary to consider both the applied and the bound tariffs available when WTO scenarios are implemented.

The difference between bound and applied duties or effective protection is called 'water in the tariffs'.[3] The effective protection is equal to the amount by which the internal market price exceeds the world market price before tariffs (Podbury & Roberts, 2003, p. 5). Figure 1 (1.1) shows a situation wherein the applied rate is assumed to be prohibitive, e.g. the applied rate lies above the effective protection.

*Figure 1. Bound rates, applied rates, effective protection and water in the tariffs**



* T = tariffs, br = bound rates, ar = applied rates, P_{eff} = effective protection. To simplify matters, it is assumed that the effective protection is equal to the applied rate in Figures 1.2 and 1.3.

[3] There is disagreement over the definition of the term 'water in the tariffs' in the literature. For example, Martin & Wang (2004) define water in the tariffs as any gap between the applied rate and the actual rate of protection, where the actual rate is lower (Martin & Wang, 2004). Additionally, the term water in the tariffs is not equivalent to the term 'binding overhang', which defines the difference between the bound and the MFN rate (Francois & Martin, 2003).

Imports will therefore be unchanged, if the reduction of the bound rate is too low and results in a new bound rate that lies above the effective protection or above the applied rate (Figure 1 (1.2)). There will be a trade effect, however, if tariff cuts exceed the water in the tariffs (Figure 1 (1.3)).

Water in the tariffs will lead to country-specific reduction commitments. Owing to the ceiling-binding option, developing countries were allowed to implement the tariff binding without reference to former protection levels. As a result, the bound tariffs in developing countries are much higher than in developed countries (Anderson & Martin, 2005, pp. 14). Higher water in the tariffs in developing countries could result in smaller or zero reduction commitments for their applied tariffs. Therefore, developing countries could experience an implicit preferential treatment that might be added to the special and differential treatment already granted. The gap between applied and bound rates also varies among the sectors within a country, so that some sectors are discriminated against while others are favoured. Podbury & Roberts (2003) find that the gaps between applied and bound rates are not very high in the markets for butter, cheese or beef. Since protection levels in industrialised countries are very high for these sectors, tariff cuts will have a great effect while other sectors with higher water in the tariffs experience only small effects. Furthermore, the gap between bound and applied tariff rates gives countries the possibility to raise tariffs and thereby to protect their agricultural sectors from fluctuations on the world market. Varying applied tariffs under high bound tariffs can therefore contribute to greater instability on the world market (Gibson et al., 2001, p. 21).

How can tariff cuts be calculated and implemented in partial or general equilibrium models? There are several alternative ways to do this. First, scenarios can be built at the most detailed tariff-line level. Here, applied and bound rates at the 8- or 6-digit tariff-line level are used to calculate the shocks necessary to implement the tariff cuts of the WTO negotiations (e.g. the tariff cuts of the Harbinson proposal). Thereafter, the shocks[4] are aggregated to the prevailing sector aggregation of the partial or general equilibrium model using import weights or other aggregation schemes. This procedure has the advantage of being as close as possible to the negotiation process, which in most cases indeed takes place at the 8- or 6- HS digit level. Additionally, it takes account of the tariff peaks that are most clearly identifiable at the detailed tariff-line level. An aggregation to a higher tariff level, e.g. the model's sector aggregation level, typically smoothes out the tariff peaks that most likely result in lower tariff cuts.

To build scenarios from the most detailed tariff-line level, however, requires a huge amount of resources in the form of access to the prevailing databases (e.g. TRAINS, COMTRADE, etc.) and in the form of human resources. Additionally, the work needs to be done for each WTO scenario, e.g. if tariff cuts for market access are based on the Swiss formula instead of the tiered formula suggested by the Harbinson proposal. Thus, a second, less resource-intensive alternative to implement WTO scenarios would be to first aggregate applied and bound rates from the 8- or 6- HS digit level to the partial or general equilibrium model's sector aggregation using an appropriate aggregation scheme. With both applied and bound rates available at the model's sector level, alternative WTO scenarios could easily be established. Do the results of these two approaches differ? The answer is clearly yes. But the most interesting question is the extent to which the results differ. To our knowledge, there is currently no publication available that tackles this problem. Yet several authors have established simulations that take bound and

[4] There are several different ways to accomplish these shocks. Besides aggregating the shocks from the 8- or 6-digit level, it would also be possible to aggregate the new applied rate that results after the shock is implemented (T_{ar}^{1} in Figure 1 (1.2 and 1.3)) from the 8- or 6-digit level to a model's sector aggregation. An additional step would then involve the calculation of the shocks at the aggregation level of the model. The two procedures will deliver identical results providing the same aggregation scheme is utilised.

applied rates into account. Walkenhorst & Dihel (2003) implemented bound and applied tariffs for several agricultural sectors of OECD countries and selected non-OECD countries in Version 5 of the GTAP database. Anderson et al. (2005) examine five Doha partial liberalisation scenarios with the World Bank's Linkage model[5] and the underlying GTAP database (Version 6.04). The database includes trade data from 2001 provided by MacMaps. For their analysis they add bound tariffs to the database and implement the tariff cuts at the 6-digit level. Also, Jean et al. (2005) analyse WTO tariff cuts according to a tiered formula on the 6-digit level by considering bound and applied tariffs. The analysis is also based on the GTAP 6 database. The same database (Version 6.05) is used by Anderson & Martin (2005) and by Hertel & Ivanic (2005). Both studies utilise bound and applied tariff rates and consider simulations with the GTAP-AGR model.[6]

3. GTAP framework

3.1 Standard GTAP model

The analyses in this paper are based on the Global Trade Analysis Project (GTAP) model, a comparative, static, standard multi-regional general equilibrium model. This model provides an elaborate representation of the economy including the linkages between the farming, agribusiness, industrial, and service sectors of the economy. The use of the non-homothetic constant difference of elasticity (CDE) functional form to handle private household preferences, the explicit treatment of international trade and transport margins and a global banking sector that links global savings and consumption are innovative in GTAP. Trade is represented by bilateral trade matrices based on the Armington assumption. Further features of the standard model are perfect competition in all markets as well as a profit- and utility-maximising behaviour of producers and consumers. All policy interventions are represented by price wedges. The framework of the standard GTAP model is well documented in the GTAP book (Hertel, 1997) and available on the Internet (www.gtap.agecon.purdue.edu/).

3.2 Extensions of the standard GTAP model

3.2.1 Policy instruments of the CAP and EU budget

Agricultural policy instruments are represented through price wedges in the standard GTAP model. Therefore, the standard GTAP model is complemented with an explicit modelling of the instruments related to the Mid-Term Review (MTR) of the EU. Following the approach of Frandsen, Gersfeld & Jensen (2002), we introduce an additional land subsidy rate into the model that is equalised across all sectors entitled to direct payments.[7] With the implementation of the MTR, the existing domestic support measures are converted into a region-specific, fully decoupled land-area payment, while budgetary outlays for total domestic support are held constant. We deliberately did not model the EU sugar policy, as this would require resources that go far beyond the scope of this paper (compare Brockmeier, Sommer & Thomsen, 2005).

The EU budget is introduced in the GTAP model using an innovative Social Accounting Matrix (SAM). This SAM not only covers the expenditures and revenues of existing agents (e.g.

[5] The linkage model is a recursive dynamic and global, economy-wide model. For a detailed description see van der Mensbrugghe (2004).

[6] This model is an extended version of the standard GTAP model, which includes new econometric information.

[7] We are grateful to Hans Jensen for his support in implementing the decoupling.

producers, government, private households, etc.), but also of the European Agricultural Guidance and Guarantee Fund (EAGGF). This EU budget receives 75% of the import duties for agricultural and non-agricultural products from producers, private households, the government and the capital account. Additional revenues result from an endogenously calculated GDP-related tax that flows from the regional household level to the EU budget. Here, all EU member countries face an equal GDP tax rate. The revenues of the EU budget are used to cover agricultural output and export subsidies as well as direct payments. In contrast to these product-specific instruments, expenditures for structural policies are not covered within the EU budget module. As a result of their characteristics and specific aims, structural funds cannot be allocated to certain commodities. This strongly hampers their implementation into a product-specific model like GTAP.

Obviously, the revenues of the EU budget from one member country are not identical with the expenditures of the EU budget for the same member country. A comparison of the revenues and expenditures of each member state therefore shows the net transfer that takes place within the EU financial system. Analogous to capital transfer, the net transfer within the EU is part of the current account balance, which makes up the difference between exports and imports of goods and services. Yet the sum of net transfers of all member countries equals zero, since the EU budget is balanced through the endogenous GDP tax rate.

In the standard GTAP model, EAGGF revenues and expenditures are organised through the regional household. All components of the EU budget are therefore introduced with the help of dummy variables allowing an easy shift from the regional household level to the EU budget and vice versa. Consequently, a preliminary simulation is employed to move the GTAP database from the initial situation without the EU budget to a new equilibrium in which the EU budget is in charge of the EAGGF (Brockmeier, 2003, pp. 100-12).

3.2.2 Projection module

In addition to changes in the political environment of an economy, macroeconomic developments such as technical progress are of great importance for the growth of an economy. In order to take these changes into account, corresponding trends are incorporated into the analysis at hand. For this purpose an approach by Walmsley et al. (2000) is used, which allows the inclusion of exogenous projections of the global and regional GDP and factor endowment into the extended GTAP model. In the simulations, technical progress is generated endogenously by the model, enabling the projected growth pattern.

4. Simulations

4.1 Database and aggregation

The simulations are based on the GTAP database Version 6.04 with 2001 as the base year. The database consists of bilateral trade, transport and protection matrices that link 57 sectors in 87 countries or regions. In order to keep the calculation effort within a reasonable scope, the database is aggregated into 14 regions and 16 sectors (see Tables A1 and A2, appendix). The regional sets are put together with regard to geographical nearness, developmental status or membership in a certain regional agreement. With regard to the sector aggregation, it was important to distinguish between primary and processed agricultural production sectors as well as between production commodities regulated through a quota and sensitive products.

4.2 Extending the GTAP database: Including bound tariffs

The most recent GTAP database (Version 6.04) includes applied tariffs, which are based on MAcMap (Market Access Map). The source files of MAcMap come from the TRAINS, the WTO and the AMAD databases. The applied rates of the newest GTAP database version takes preferences, AVEs and tariff rate quotas (TRQs) into account. Information on preferences is taken from the TRAINS database and is augmented with data from national sources. AVEs are calculated on the basis of the median unit value of worldwide exporters using an average flow of the years 2000 to 2003. Finally, TRQs are taken into account utilising the filled rate from the AMAD database. If the filled rate is smaller than 90%, the in-quota tariff is used. The out-of-quota rate is employed if the filled rate is higher than 100%. If the filled rate is higher than 90%, but smaller than 100%, a simple average of the in-quota and out-of-quota rate is applied (Bouët et al., 2004).

Nevertheless, comparable bound rates at the 6-digit or at the GTAP database aggregation level are not yet publicly available. Accordingly, the GTAP database used for calculations in this paper is extended by bound tariff data. Tariff data up to a 10-digit level is provided by the Economic Research Service (ERS) of the USDA. They include agricultural ad valorem and non-ad valorem bound tariffs from chapters 1-24 of the Harmonized System 1996 (HS96) with the exception of chapter 3, which includes fish and crustaceans. Specific tariffs, expressed for example in € per kilogram and compound tariffs consisting of a combination of ad valorem and non-ad valorem tariff rates are converted into AVEs. The calculation of AVEs is based on average world-import unit values (Gibson et al., 2001, p. 6ff.).

Some bound tariff data are provided at the 8- or 10-digit levels. These tariff lines are aggregated to the 6-digit level using the simple average.[8] All 2-, 4- or 6-digit tariffs are aggregated to the GTAP level using import trade weights. This is done with the help of source generic world-import values from the COMTRADE database of the year 2001. But intra-EU trade is excluded from the COMTRADE data.

Import weighting is the most commonly used aggregation scheme, also utilised to aggregate the applied rates included in the GTAP database Version 6.04. Advantageously, trade weights take the relative importance of trade flows into account. Furthermore, the welfare implications are accurately addressed with this method. In contrast, the import-weighted aggregation scheme leads to an endogenous bias, as the weight for every individual tariff decreases with an increase of the tariff. Accordingly, prohibitive tariffs impeding market access and thereby reducing the trade volumes to zero are not taken into account by import weighting. Trade barriers are therefore underestimated with this method.[9]

4.3 Experiments

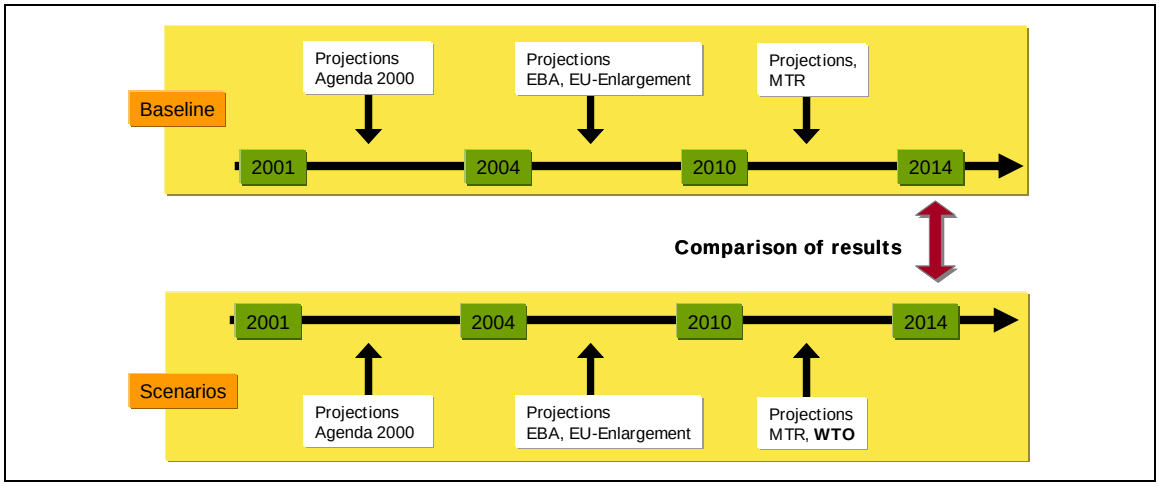
Before the actual simulations are carried out, it is necessary to conduct some pre-simulations to implement the extended model structure and to update the protection rates (see Figure 2 and Box A1 in the appendix). This includes CAP instruments and the common budget of the EU. Based on the results of the pre-simulation, a base run is conducted that represents a projection of the exogenous variables population, GDP and factor endowment up to the year 2014. Additionally, the Agenda 2000 (2004), EU enlargement and the Everything but Arms (EBA) agreement (2010), as well as the MTR (2014), are implemented (for details see Box A1). The

[8] This procedure was used because of missing data on bilateral trade values at the 8- or 10-digit levels.

[9] In contrast to this study, Walkenhorst & Dihel (2003) used simple averages for the tariff aggregation to avoid biases from the interdependence of tariff levels and trade flows. The simple unweighted average, however, does not take the relative importance of particular tariffs into account.

base run only considers political intervention in the EU-15 and in the candidate countries. Developments in other regions, such as the US Farm Bill, are not taken into account.

Figure 2. Base run and simulations



Parallel to the base run, a scenario is implemented as well. It takes account of the same projections and policy shocks (Agenda 2000, EU enlargement, the EBA agreement and the MTR), but in the time period from 2010 to 2014, it additionally includes simulations related to the WTO round. The 'July package' leaves a lot of room for speculation about how market access will be enabled through agricultural trade negotiations. Thus, in the following two experiments, a variation of the Harbinson 1½ proposal with reinforced reductions in each band is implemented (Table 1).

Table 1. Tariff reduction in the simulations

	Initial tariff rate (ad valorem)	**Average reduction rate**
Developed countries	> 90%	-75%
	≤ 90% and > 15%	-70%
	≤ 15%	-55%
Developing countries	> 120%	-60%
	≤ 120% and > 60%	-50%
	≤ 60% and >20%	-40%
	≤ 20%	-35%

In experiments 1 and 2 all countries implement a cut of the import tariffs according to Table 1, while export subsidies are completely abolished. In experiment 1 (BD & APP), cuts are implemented taking bound rates into account. Thus, a cut of the applied import tariff is only introduced if the new bound rate is below the applied rate after the respective average reduction rate is implemented (see Figure 1 (1.3)). In experiment 2 (APP_ONLY), the cuts presented in Table 1 are carried out on applied rates. The difference between experiments 1 and 2 can be used to identify the impact of the water in the tariffs. Additionally, we introduce a cut of 50% (34%) for manufactures and services in developed (developing) countries.

5. Results

This section discusses the results of the two experiments analysing the impact of the water in the tariffs. The results are presented in millions of US$ for the year 2001 of the GTAP database. The calculations are based on the software GEMPACK (Version 8.0), RunGTAP and AnalyseGE (Harrison & Pearson, 1996).

In the following, we mainly focus on the trade balance. The appendices provide detailed results for the output of production and prices (Tables A4 to A5) on a disaggregated country level. Changes in the output of production are mainly induced by the changes in the trade regime. The output results show a pattern that is similar to the changes in the trade balance and are only discussed rudimentarily.

5.1 Trade balance for the EU-27

Table 2 reports the changes in the regional trade balance by commodity for experiments 1 and 2. The change in the trade balance represents the change in the value of fob exports minus the value of cif imports owing to the scenario considered in millions of US$. When summed across regions, this gives the change in the international trade margin supplied for each product.[10] In contrast, a summation across commodities will yield a trade balance of zero for the region. This is a result of the macro closure, which assumes that all changes in investments are financed by domestic savings. As a consequence, any changes in imports are constrained to be offset by an equal change in aggregated exports.

Examination of the entries in Table 2 shows that the biggest changes in the EU-27 occur in the highly protected beef, milk, sugar and other food sectors. Other sectors, such as cereals, vegetables and fruit also experience a decrease in export values relative to imports, although these sectors are only moderately protected. By contrast, Table 2 reveals a slightly positive development of the EU trade balance for oilseeds, other animal and other meat. The second part of Table 2 presents the changes in the trade balance that result from experiment 2, which applies the same tariff cuts as in experiment 1, but does not take bound rates into account. A comparison between experiments 1 and 2 clearly discloses that the differences are not very pronounced for the EU. A significant divergence can only be observed for cereals, milk, and vegetables and fruit. Water in the tariffs does not seem to be of much importance for the commodities of the EU.

Where does the negative development of the trade balance for highly protected EU food products come from? A more detailed analysis can be conducted based on the decomposition that splits the total change in its single components. These represent the so-called ‘subtotals’ that are attributable to changes in individual exogenous variables, e.g. the tariff cuts. Figure 3 shows this decomposition for the changes in the EU’s trade balance of food products in experiment 1.

[10] These margins are supplied by the other service sectors in each region, which therefore show a positive global trade balance equal to the value of margins on all international trade engendered by the experiment in question.

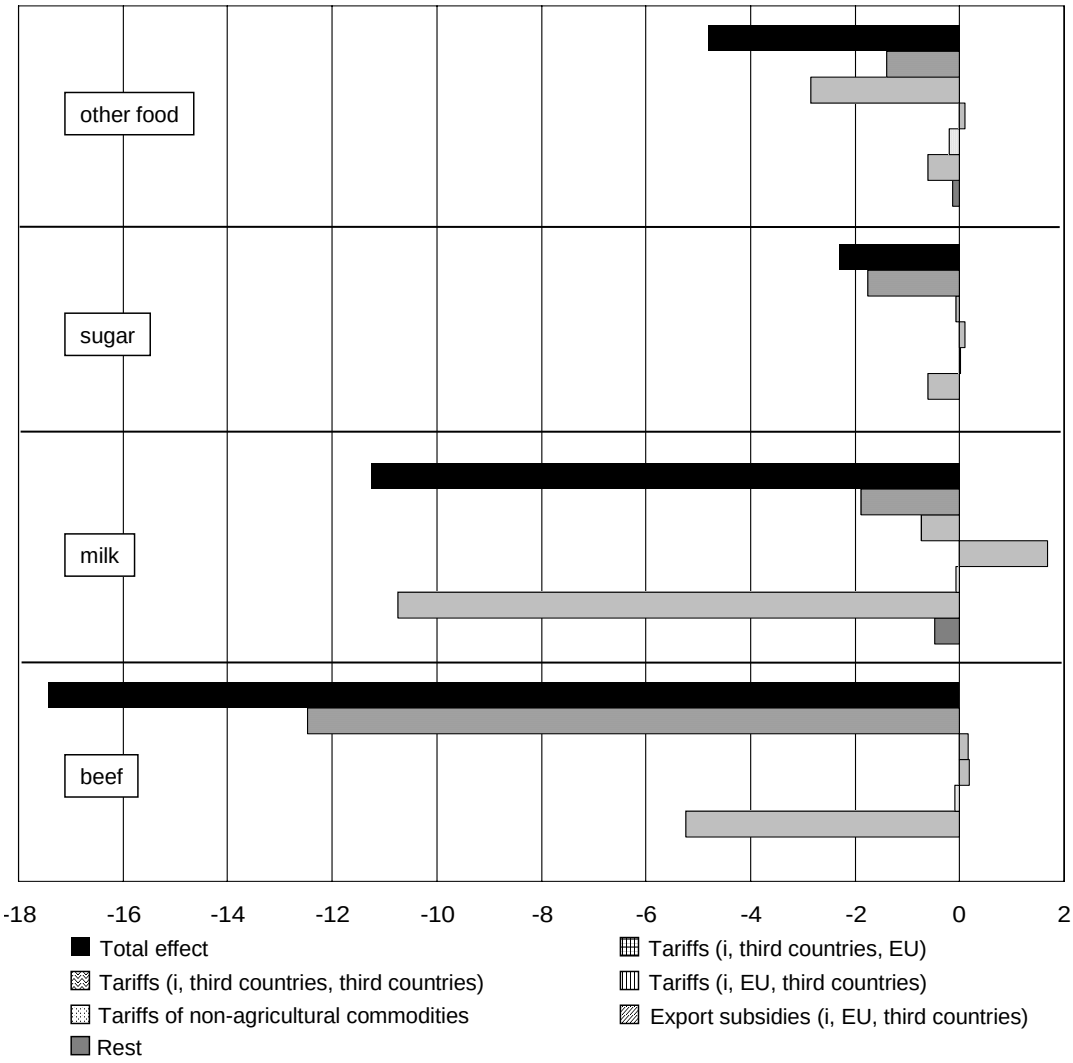
Table 2. Changes in the trade balance in experiments 1 and 2 (million US$)

	EU27	USA	Japan	Oceania	IC WTO	Brazil	India	Zimbab-we	Bangla-desh	Rest of ACP	Rest of LDC	WTO DC	ROW
	Experiment 01												
cereals	-1426	-2575	81	-447	298	2246	-42	-4	0	-257	-61	2191	-305
oilseeds	311	1610	109	-100	-397	-30	-6	-6	-1	-89	77	-1575	-34
sugar beet & cane	26	7	1	0	1	0	0	0	0	-9	3	-56	1
paddy rice	14	1277	-5830	320	8	-99	-28	0	-5	-62	-509	4136	-41
vegetables & fruits	-1262	-597	326	-310	211	-220	75	-8	-17	-70	-53	1969	-88
cattle	396	-501	104	-139	213	-34	0	-1	0	-42	-2	78	-31
other animal	187	-485	140	-72	223	-121	1	-2	-2	-30	-21	274	-90
raw milk	90	-1	5	-4	14	-6	12	0	0	-13	-17	-13	-67
beef	-17423	2482	-2482	301	745	9201	1165	190	0	314	129	2833	2025
other meat	1331	4711	-4983	-150	-1754	-1610	8	-6	1	-105	285	1609	212
milk	-11262	966	-624	3489	-1577	34	267	7	39	469	556	6587	1502
sugar	-2308	-727	-759	546	42	197	58	106	1	1747	-1613	2483	95
other food	-4806	269	-2282	731	-184	-446	-467	-14	-107	-326	-80	8438	-1000
other primary	4706	2940	2086	-282	458	-794	-2787	38	-160	-319	-379	-6870	-1233
manufactures	18698	-17581	13583	-3989	-1378	-7966	798	-301	365	-1695	1935	-15324	-1281
services	12728	8203	528	105	3078	-353	945	3	-115	489	-251	-6760	335
	Experiment 02												
cereals	-1135	-76	78	-333	647	1882	-11	-4	1	-178	23	-1218	-56
oilseeds	369	1287	129	-97	-353	83	-62	-6	2	-71	86	-1478	-21
sugar beet & cane	32	7	1	0	-18	0	0	0	0	-9	4	-53	1
paddy rice	19	1143	-5886	301	7	-94	19	0	-4	-62	-532	4331	-50
vegetables & fruits	-775	-796	319	-128	348	-227	-999	-8	-15	-61	223	1698	-36
cattle	444	-727	82	-206	292	-34	0	-1	0	-39	5	278	-31
other animal	167	-522	136	-121	189	-126	23	-2	-2	-22	-34	410	-89
raw milk	32	-5	5	-5	2	-6	92	0	0	-9	-21	-5	-81
beef	-17461	2846	-2335	861	659	9198	1344	192	0	255	121	1680	2038
other meat	1511	5810	-4846	-97	-1583	-1417	44	-8	1	-341	263	-207	255
milk	-9751	1135	-1296	4152	-1821	6	126	4	44	288	546	5259	1583
sugar	-2324	-692	-748	568	74	308	31	103	-1	1810	-1644	2230	80
other food	-4671	1197	-4863	736	-223	80	-4688	-25	-119	-469	-125	11632	-286
other primary	4667	1759	2314	-511	480	-818	-1914	47	-156	-255	-392	-6460	-1303
manufactures	15510	-20646	15706	-4953	-1823	-8390	4616	-297	362	-1398	1711	-12277	-2406
services	13366	8279	1204	-167	3124	-445	1379	6	-114	561	-235	-5821	401
	Difference = Experiment 01 - Experiment 02												
cereals	-290	-2499	3	-114	-349	365	-31	0	-1	-79	-83	3409	-249
oilseeds	-58	323	-20	-2	-44	-114	56	1	-2	-18	-8	-98	-13
sugar beet & cane	-7	0	0	0	19	0	0	0	0	0	-1	-3	0
paddy rice	-5	134	56	19	1	-5	-47	0	-1	0	23	-195	9
vegetables & fruits	-487	199	6	-182	-137	8	1075	0	-2	-9	-275	271	-52
cattle	-47	226	21	67	-79	0	0	0	0	-4	-8	-200	1
other animal	21	37	4	49	34	6	-22	0	0	-8	12	-136	-1
raw milk	58	4	0	1	12	0	-80	0	0	-5	4	-8	14
beef	38	-364	-147	-561	86	3	-179	-2	0	58	8	1153	-13
other meat	-179	-1099	-137	-52	-171	-194	-36	2	0	235	22	1817	-43
milk	-1511	-169	672	-663	245	27	141	3	-5	181	10	1327	-82
sugar	15	-35	-12	-22	-32	-111	26	2	2	-62	31	253	15
other food	-135	-928	2581	-5	38	-526	4221	10	12	143	44	-3194	-713
other primary	39	1181	-228	229	-22	24	-873	-9	-4	-64	14	-411	70
manufactures	3188	3065	-2123	965	445	424	-3818	-4	3	-297	224	-3047	1125
services	-638	-76	-677	272	-46	92	-433	-3	-1	-72	-16	-939	-66

Source: Own calculations.

The black bar on top of each section shows the total effect resulting from the implementation of the WTO negotiations on the trade balance of commodity i. The bars below represent parts of the total effect that are induced by the prevailing instrument, e.g. the first bar below the black one defines the negative effect for the EU trade balance resulting from the tariff reduction for food products exported from third countries to the EU. Thus, the first expression in brackets (i) indicates the commodity in question, the second one the source of the commodity, and the final one the destination of the commodity.

Figure 3. Decomposition of the changes in the EU-27 trade balance for highly protected food products (billion US$)



Source: Own calculations.

Figure 3 clearly reveals that the negative results for the trade balance of beef and sugar is driven by the tariff reductions of agricultural commodities coming from third countries into the EU. This is not surprising, as the EU's protection level for beef and sugar is one of the highest protection levels worldwide. The tariff cuts for commodities exported from the EU to third countries accordingly only lead to small improvements of the trade balances for beef and sugar, while the elimination of export subsidies only induces comparatively small negative effects on the trade balances. In contrast, the trade balance of milk experiences a huge increase of imports relative to exports as a result of the elimination of export subsidies.

Also, the effect of the tariff reductions in third countries on the EU trade balance of milk stands out positively compared with the other food products. Responsible for this is the EU milk protection, which, among the worldwide milk protectionists, ranges at the lower end. Therefore, cuts of the EU tariffs have a lower importance compared with the elimination of export subsidies and the tariff cuts in third countries. This can also be seen from the second part of Table 2, where the loss of the EU trade balance for milk is reduced when tariff cuts are implemented on applied rates and are therefore higher. Figure 3 finally presents the decomposition of the trade balance for other food. Compared with the trade balance for beef, milk and sugar it is interesting to note that the negative effect owing to tariff cuts among third countries is comparably high.

5.2 Trade balance for third countries

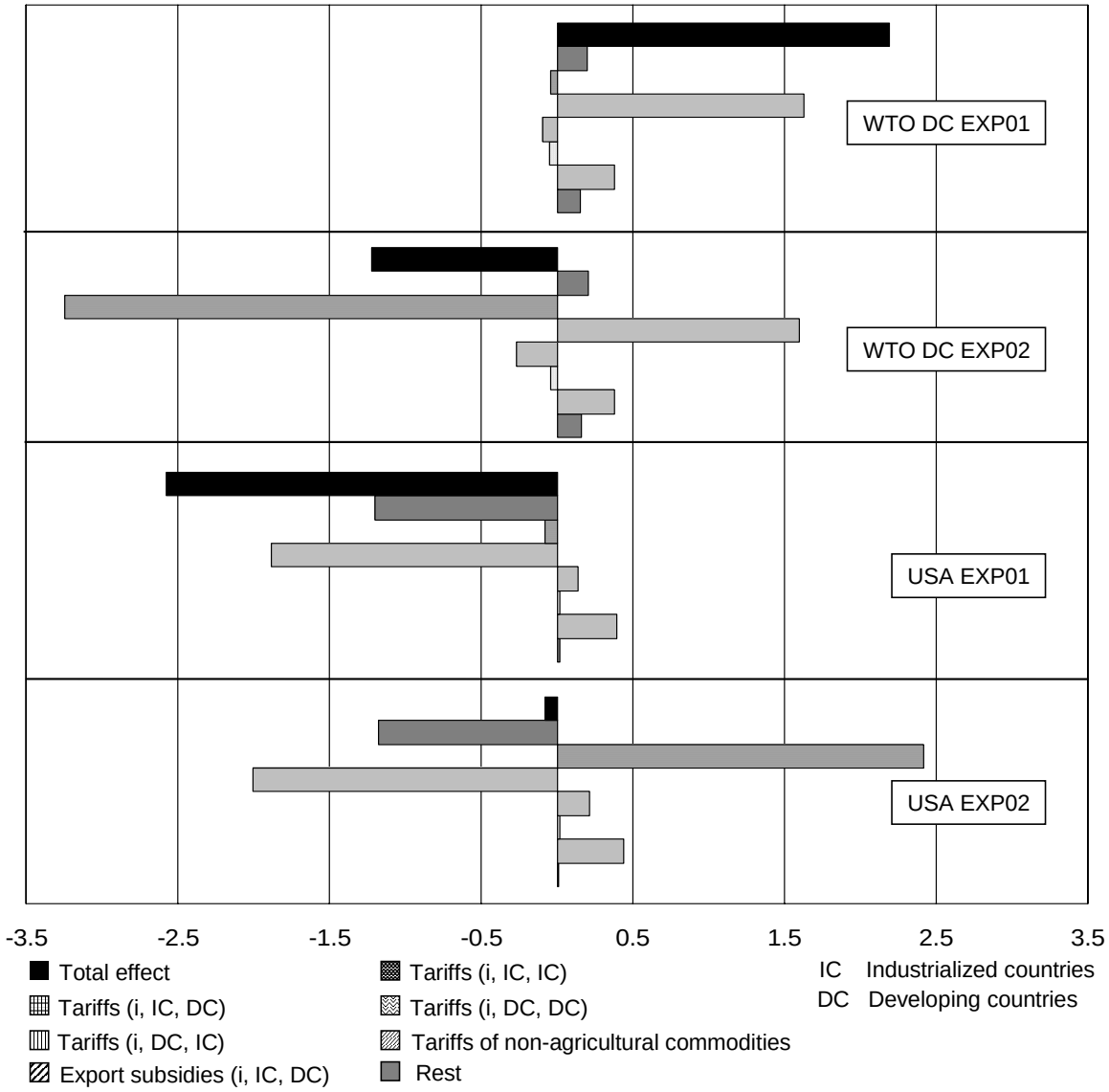
Table 2 also presents the effects of the WTO negotiations on third countries. Unsurprisingly, Japan and the other WTO industrialised countries (WTO ICs) show clear negative developments of the trade balances for their prevailing protected sectors, e.g. paddy rice, other meat, milk and other food. In contrast, effects in the US are dominated by massive losses for cereals on the one hand and considerable gains for oilseeds, paddy rice, beef, milk and other meat on the other hand. Similarly, Oceania is able to realise enormous gains for beef, milk and paddy rice, while the region's trade balance for cereals, oilseeds, and vegetables and fruit is deteriorating.

Developing countries also show significant effects that are related to the implementation of the WTO negotiations. First and foremost, Brazil accomplishes high increases of exports relative to imports for cereals and beef, while these changes are only small for sugar. In contrast, the rest of the ACP countries and the other developing countries that are WTO members show a significant enhancement of their sugar trade balance. This improvement of the trade balance is also given in most of the other agricultural sectors of the other developing WTO-member countries. Quite the opposite is true for the rest of the least-developed countries (LDCs), which particularly lose in the sugar and the paddy rice sector due to the preference erosion. Finally, Table 2 also shows the effects of the WTO negotiations on Zimbabwe and Bangladesh. Here, it is important to note that Bangladesh gains in important agricultural sectors, particularly in the sugar and milk sectors, although as an LDC it does not implement any tariff cuts. Zimbabwe also experiences a gain in the trade balance of sugar, which, however, is accompanied by a significant improvement of the beef trade balance.

The second part of Table 2 shows the effects of the WTO negotiations if tariff cuts are implemented on the applied rate. The difference between experiments 1 and 2 indicates where water in the tariffs has a sizeable effect (see Table 2, lower part). Water in the tariffs influences the outcome of the WTO negotiation in many sectors, but particularly in cereals, oilseeds, vegetables and fruit and all food products. Interestingly, in many cases it is possible to identify two countries or a subgroup of countries whose trade balance is increasing and decreasing, respectively, when tariff cuts are implemented at the applied rates, while other countries remain more or less unaffected.

For example, Japan and India experience a strong decrease of their trade balances in experiment 2, while the main gain accrues to other developing countries that are WTO members. Table 2 also reveals that the US's trade balance gains tremendously when tariff cuts are implemented on applied rates (experiment 2). In contrast, the developing WTO-member countries realise a severe deterioration of the trade balance for cereals. Similar results, although not so pronounced, can be observed for beef, other meat and milk products.

Figure 4. Decomposition of the trade balance for cereals in experiments 1 and 2 (billion US$)



Source: Own calculations.

These effects can arise from many different causes. As an example, Figure 4 decomposes the trade balance of the US and developing WTO-member countries for cereals into subtotals. Here, the decomposition is conducted by taking policy instruments in industrialised and developing countries into account. The trade balance of developing WTO-member countries for cereals shows an increase of $2.3 billion in experiment 1 (see Table 2). The upper part of Figure 4 reveals that this result is driven by a trade-facilitating effect resulting from the tariff cut between developing countries. In experiment 2, the trade balance of developing WTO-member countries deteriorates by $-1.1 billion. Figure 4 clearly demonstrates that the main reason for this decrease is the cut in import tariffs for cereals exported from industrialised countries to developing countries.

In contrast, the trade balance of the US for cereals shows a significant negative change of $-2.6 billion in experiment 1 (see Table 2). The lower part of Figure 4 reveals that this result is mainly determined by trade-facilitating effects resulting from the tariff cuts between developing

countries and between industrialised countries. The loss in the US trade balance for cereals is reduced remarkably in experiment 2 when tariff cuts are implemented considering only applied rates. Analogous to the effects for developing WTO-member countries, this effect is driven by the opening up of the developing countries' markets for imports from industrialised countries. This variation of developing countries' import tariffs applied on cereals coming from industrialised countries, however, has only an insignificant effect in experiment 1. Thus, from these experiments it can clearly be concluded that water in the tariffs matters for developing as well as for developed countries. In some cases, it can even reverse the sign of the results and therefore certainly needs to be taken into account when WTO scenarios are conducted.

6. Conclusions

The WTO negotiations of the Doha Round are a central issue in the public debate. This paper analyses the effects of market access taking applied and bound rates into account. An extended version of the GTAP model is used to first project a base run including the Agenda 2000, EU enlargement, the EBA agreement and the MTR. Additionally, the policy simulation run includes the WTO negotiations. Here, a differentiation is made between two experiments, which both implement a more rigorous version of the Harbinson 1½ proposal. While the first experiment takes bound and applied rates into account, the second only considers applied rates when the necessary shocks to implement the tariff cuts of the WTO negotiations are calculated. The difference between experiments 1 and 2 can be used to show the effect of water in the tariffs.

The results and a comparison of the two experiments reveal the following points:

- The biggest negative changes of the EU-27 trade balance occur, unsurprisingly, in the highly protected beef, milk, sugar and other food sectors, while the remaining sectors only experience moderate negative effects.
- The differences of the EU-27 results are not very pronounced between experiments 1 and 2. Water in their own or third countries' tariffs does not seem to be of high importance for the EU-27. A significant divergence can only be observed for cereals, vegetables and fruit as well as milk.
- A decomposition of the negative change in the EU-27 trade balance for food products shows that the results for beef and sugar are driven by the tariff cut for imports coming from third countries. In contrast, the elimination of EU-27 export subsidies seems to be highly relevant for the milk sector, while the other food sector is most sensitive to the reduction of tariffs among third countries.
- Japan and other industrialised WTO countries show clear negative developments for the trade balance of their prevailing highly protected sectors, e.g. paddy rice, other meat, milk and other food. In contrast, effects in the US are dominated by massive losses for cereals on the one hand and considerable gains for oilseeds, paddy rice, beef, milk and other meat on the other hand. Similarly, Oceania is able to realise enormous gains for beef, milk and paddy rice, while the region's trade balance for cereals, oilseeds, and vegetables and fruit is deteriorating.
- Brazil achieves high increases of exports relative to imports for cereals and beef, while these changes are only small for sugar. Conversely, the rest of the ACP countries and the other developing countries that are WTO members show a significant enhancement of their sugar trade balance. Zimbabwe also experiences a gain in the trade balance of sugar, which is further accompanied by a significant improvement of the beef trade balance.

- LDC countries lose particularly in the sugar and the paddy rice sectors owing to preference erosion, while Bangladesh gains in important agricultural sectors, especially in the sugar and milk sectors, although as an LDC it does not implement any tariff cuts.
- Water in the tariffs influences the outcome of the WTO negotiations in many sectors, but most notably in all food products – particularly in cereals, oilseeds, vegetables and fruit. These effects are mainly observable in the US, Japan, India and other developing WTO-member countries.
- Interestingly, in many cases it is possible to identify two countries or a subgroup of countries whose trade balance is increasing and decreasing, respectively, when tariff cuts are implemented at the applied rates, while other countries remain more or less unaffected.

Based on the experiments it can clearly be stated that water in the tariffs matters for developing, as well as developed, countries. In some cases, it can even reverse the sign of the results and therefore certainly needs to be taken into account when WTO scenarios are conducted. Additionally, it would be desirable to compare the results obtained in this study with results achieved when WTO scenarios are built from the most detailed tariff-line levels, e.g. from the 6- or 8-digit tariff-line levels. This comparison would give researchers some guidelines on where scarce resources can most efficiently be utilised in the tedious process of scenario-building.

References

Agra Europe Weekly (2005), "Market access – The critical issue for the WTO Doha Round", No. 2156, 13 May.

Anderson, K. and W. Martin (2005), *Scenarios for Global Trade Reform*, World Bank, Washington, D.C. (forthcoming).

Anderson, K., W. Martin and D. van der Mensbrugghe (2005), "Doha Merchandise Trade Reform and Developing Countries: What's at Stake?", plenary paper for the 8th Annual Conference on Global Trade Analysis, Lübeck, 8-11 June.

Bouët, A., L. Decreux, L. Fontangné, S. Jean and D. Laborde (2004), *A Consistent Ad-Valorem Equivalent Measure of Applied Protection Across the World, the MAcMap-HS6 database*, CEPII Working Paper No. 2004-22, CEPII, Paris.

Brockmeier, M. (2003), "Ökonomische Auswirkungen der EU-Osterweiterung auf den Agrar- und Ernährungssektor – Simulationen auf der Basis eines Allgemeinen Gleichgewichtsmodells", Habilitation, Wissenschaftsverlag Kiel, *Agrarökonomische Studien*, No. 22, Kiel.

Brockmeier, M., U. Sommer and K. Thomsen (2005), "Sugar Policies – An Invincible Bastion for Modelers?", seminar proceedings of the 89th EAAE Seminar, Parma, 2-4 February.

Forbes, M.D., J.M. Fry, P.A. Jomini and A. Strzelecki (2004), *An Integrated Tariff Analysis System: Software and Database*, Productivity Commission Staff Working Paper, Productivity Commission, Melbourne.

Francois, J.F. and W. Martin (2003), "Formulas for Success? Formula Approaches to Market Access Negotiations", *World Economy*, Vol. 26, No. 1, pp. 1-28.

Frandsen, F., B. Gersfeld and H. Jensen (2002), "Decoupling Support in Agriculture: Impacts of redesigning European Agricultural Support", paper presented at the 5th Annual Conference on Global Economic Analysis, Taipei (www.gtap.agecon.purdue.edu/ resources).

Gibson, P., J. Wainio, D. Whitley and M. Boman (2001), "Profiles of Tariffs in Global Agricultural Markets. Market and Trade Economic Division", ERS/USDA, *Agricultural Economic Report*, No. 796.

Harrison, J.W. and K.R. Pearson (1996), "Computing Solutions for Large General Equilibrium Models using GEMPACK", *Computational Economics*, Vol. 9, pp. 83-127.

Hertel, T. (ed.) (1997), *Global Trade Analysis: Modeling and Applications*, Cambridge, MA: Cambridge University Press.

Hertel, T.W. and M. Ivanic (2005), "Assessing the World Market Impacts of Multilateral Trade Reforms", Chapter 3 in T.W. Hertel and A.L. Winters, *Putting Development Back into the Doha Agenda: Poverty Impacts of a WTO Agreement*, forthcoming.

Jean, S. (2004), *Calculating ad-valorem equivalents tariffs in MAcMaps: Elements on the new methodology*, CEPII Working notes, CEPII, Paris, 13 February.

Jean, S., D. Laborde and W. Martin (2005), "Consequences of Alternative Formulas for Agricultural Tariff Cuts", Chapter 4 in K. Anderson and W. Martin (eds), *Agricultural Trade Reform and the Doha Development Agenda*, forthcoming.

Martin, W. and Z. Wang (2004), "Improving Market Access in Agriculture", mimeo, World Bank, Washington, D.C.

Podbury, T. and I. Roberts (2003), *Opening Agricultural Markets through Tariff Cuts in the WTO*, ABARE Report 03.2, RIRDC publication 03/011, Canberra.

Van der Mensbrugghe, D. (2004), *Linkage Technical Reference Document: Version 6.0*, World Bank, Washington, D.C.

Walkenhorst, P. and N. Dihel (2003), "Tariff bindings, unused protection and agricultural trade liberalization", *OECD Economic Studies*, No. 36, 2003/1.

Wamsley, T.L., B.V. Dimaranan and R.A. McDougall (2000), *A Base Case Scenario for the Dynamic GTAP Model*, Center for Global Trade Analysis, Purdue University, West Lafayette, IN (http://www.gtap.agecon.purdue.edu/resources/res display.asp?RecordID =417).

WTO (2001), Ministerial Declaration (WT/Min(01)/DEC/1), WTO, Geneva (www.wto.org).

———— (2004), Doha Work Programme, Decision adopted by the General Council on 1 August, 2004 (WT/L/579), WTO, Geneva (www.ige.ch/E/jurinfo/documents/ j10407e.pdf)

Appendix

Table A1. Aggregation of countries and regions

	Countries and regions	Abbreviation
1	**European Union 15** **A**ustria, Belgium, Denmark, Finland, France, Germany, Ireland, United Kingdom, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden	**EU-15**
2	**Central and Eastern European countries** Bulgaria, Czech Republic, Hungary, Malta, Poland, Romania, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Cyprus	**CEEC**
3	**United States**	**usa**
4	**Japan**	**jpn**
5	**Oceania** Australia, New Zealand	**OCEA**
6	**Other WTO members (industrialised countries)** Canada, Switzerland, Rest of EFTA, Albania, Croatia	**rWTOIC**
7	**Brazil**	**bra**
8	**India**	**ind**
9	**Zimbabwe**	**zwe**
10	**Bangladesh**	**bgd**
11	**Other African – Caribbean – Pacific – Countries** Rest of Oceania, Rest of FTAA, Rest of Caribbean, Botswana, South Africa	**rACP**
12	**Other least-developed countries** Rest of Southeast Asia, Rest of South Asia, Malawi, Mozambique, Tanzania, Zambia, Other Southern Africa, Madagascar, Uganda, Rest of Sub-Saharan Africa	**rLDC**
13	**Other WTO members (developed countries)** China, Hong Kong, Korea, Rest of East Asia, Indonesia, Malaysia, Philippines, Singapore, Thailand, Sri Lanka, Mexico, Colombia, Peru, Venezuela, Rest of Andean Pact, Argentina, Chile, Uruguay, Rest of South America, Central America, Turkey, Rest of Middle East, Morocco, Tunisia, Rest of North Africa, Rest of South African CU	**rWTODC**
14	**Rest of the world** Taiwan, Vietnam, Rest of North America, Rest of Europe, Russian Federation, Rest of FSU	**ROW**

Table A2. Aggregation of sectors

	Sectors	Abbreviation
1	**Wheat, cereal grain nec**	**CERE**
2	**Oil seeds**	**osd**
3	**Sugar cane, sugar beet**	**c_b**
4	**Paddy rice**	**pdr**
5	**Vegetables, fruit, nuts**	**v_f**
6	**Cattle, sheep, goats, horses**	**ctl**
7	**Animal products nec**	**oap**
8	**Raw milk**	**rmk**
9	**Meat: cattle, sheep, goats, horses**	**cmt**
10	**Meat products nec**	**omt**
11	**Dairy products**	**mil**
12	**Sugar**	**sgr**
13	**Food products nec, vegetables oils and fats, processed rice**	**OFOOD**
14	**Other primary sectors** Plant-based fibres, crops nec, wool, silk-worm, cocoons, forestry, fishing coal, oil, gas, minerals nec, wood products, petroleum, coal products	**OPRI**
15	**Industry** Beverages and tobacco products, textiles, wearing apparel, leather products, wood products, paper products, publishing, chemical, rubber, plastic prods, mineral products nec, ferrous metals, metals nec, metal products, motor vehicles and parts, transport equipment, electronic equipment, machinery and equipment, manufactures nec	**MNFCS**
16	**Services** Electricity, gas manufacture, distribution, water, construction, trade, transport nec, sea transport, air transport, communication, financial services nec, insurance, business services nec, recreation and other services, public admin./defence/health/education, dwellings	**SVCES**

Table A3. Change in output (%)

	EU15	CEEC	USA	Japan	Oceania	IC WTO	Brazil	India	Zimbab-we	Bangla-desh	Rest of ACP	Rest of LDC	WTO DC	ROW
	Experiment 01													
cereals	-7.58	-4.78	-5.30	-68.73	-8.15	1.05	36.31	-0.06	-1.04	-2.44	-4.50	-0.44	-0.95	-0.06
oilseeds	2.10	2.13	7.37	21.27	-13.23	-10.65	-5.02	-0.13	-8.10	-1.54	-4.00	1.32	-14.76	-0.73
sugar beet & cane	-23.61	-6.29	-3.03	-21.01	9.06	7.53	-1.56	0.49	57.03	1.91	31.95	-5.02	5.14	0.83
paddy rice	-2.66	-10.23	48.62	-44.53	94.64	51.06	-7.09	-0.83	-8.97	-0.59	-1.29	-3.52	-24.48	-1.06
vegetables & fruits	-3.44	1.08	-1.48	1.87	-2.95	4.06	-9.75	0.23	-4.89	-0.44	-1.49	0.08	1.54	-0.34
cattle	-22.26	-9.54	2.54	-23.28	-0.35	1.18	40.81	0.75	29.96	0.55	2.51	0.15	3.42	2.78
other animal	-1.44	1.70	1.94	-18.03	-3.42	-15.45	-2.28	0.58	-2.22	0.84	-0.58	1.46	1.89	1.56
raw milk	-8.66	-6.02	1.22	-3.28	28.69	-12.58	0.00	0.88	15.81	0.56	6.99	3.45	8.21	1.38
beef	-29.93	-50.61	4.02	-30.59	2.84	-4.25	64.96	74.04	178.54	23.39	3.62	4.61	6.17	38.95
other meat	-1.39	7.85	5.94	-62.42	-3.86	-31.53	-23.52	9.78	-3.27	14.94	-5.19	6.09	3.34	5.39
milk	-10.29	-28.61	1.49	-3.63	33.81	-18.57	0.16	4.52	43.71	24.52	16.24	72.57	23.97	20.39
sugar	-34.71	-9.82	-3.27	-21.11	22.08	7.49	1.79	0.95	126.00	2.11	57.50	-13.62	8.32	2.48
other food	-2.54	-1.59	0.20	-0.11	5.25	-1.00	-1.47	-1.82	0.66	-0.68	-1.70	-0.07	4.04	-1.14
other primary	0.86	2.19	0.47	1.34	-0.75	0.39	-3.19	-4.59	-1.39	-0.78	-0.62	-0.22	-0.54	-0.58
manufactures	0.49	2.49	-0.48	1.05	-3.63	-0.16	-5.12	-0.20	-7.97	0.68	-1.27	0.90	-0.50	-0.45
services	0.20	0.92	0.04	0.19	0.08	0.33	0.24	0.52	0.80	0.08	0.14	0.00	0.18	-0.01
	Experiment 02													
cereals	-6.87	-4.22	-0.35	-66.29	-7.15	3.16	30.74	-0.18	-1.25	-1.03	-2.99	0.29	-4.96	0.96
oilseeds	3.07	2.86	4.89	22.97	-14.09	-9.96	-3.57	-2.01	-8.72	-0.59	-3.65	1.47	-12.90	-0.07
sugar beet & cane	-23.61	-6.32	-3.00	-21.32	9.23	-0.66	-0.62	0.44	55.42	1.79	33.07	-5.25	4.85	0.87
paddy rice	-2.56	-9.66	41.60	-44.38	87.40	44.49	-5.61	-6.22	-8.96	-0.71	-2.67	-3.91	-23.83	-0.55
vegetables & fruits	-2.65	0.98	-2.47	1.73	-1.99	5.59	-9.80	-2.56	-4.97	-0.54	-1.20	0.79	1.63	-0.17
cattle	-22.19	-9.47	2.32	-22.67	1.23	1.28	41.23	-1.27	29.77	0.60	1.68	0.11	3.10	2.87
other animal	-1.22	1.38	2.07	-17.07	-5.04	-15.15	-1.21	1.39	-2.67	0.90	-2.61	1.20	1.75	1.80
raw milk	-8.03	-5.46	1.12	-6.28	33.43	-14.12	-0.15	2.07	7.57	0.63	4.50	3.26	6.98	1.43
beef	-30.08	-50.62	4.39	-29.01	8.60	-5.50	64.99	86.97	180.37	23.16	3.12	4.32	4.26	39.24
other meat	-1.01	6.34	7.02	-60.84	-2.80	-30.04	-21.34	116.60	-4.11	14.39	-15.28	5.70	1.46	5.68
milk	-9.36	-25.39	1.50	-8.46	39.27	-20.50	-0.16	3.92	21.59	27.29	11.87	71.62	20.47	21.39
sugar	-34.98	-9.89	-3.22	-21.41	22.71	10.86	3.91	0.14	123.64	1.96	59.75	-14.03	7.72	2.51
other food	-2.43	-1.84	0.43	-1.80	5.28	-0.95	-0.17	-16.42	-0.33	-0.84	-2.70	-0.38	4.86	-0.06
other primary	0.86	2.10	0.21	1.36	-1.30	0.36	-3.22	-2.09	-1.05	-0.73	-0.44	-0.29	-0.44	-0.64
manufactures	0.39	2.34	-0.58	1.20	-4.56	-0.27	-5.37	1.38	-7.84	0.63	-1.05	0.72	-0.38	-0.72
services	0.21	0.93	0.05	0.19	0.10	0.34	0.24	0.76	0.85	0.10	0.14	0.02	0.18	0.01

Source: Own calculations.

Table A4. Change in prices (%)

	EU15	CEEC	USA	Japan	Oceania	IC WTO	Brazil	India	Zimbab-we	Bangla-desh	Rest of ACP	Rest of LDC	WTO DC	ROW
	Experiment 01													
cereals	-7.6	-6.1	-1.7	-19.8	0.9	-4.6	19.4	-1.2	4.7	-0.7	1.0	-0.5	-1.4	0.3
oilseeds	-1.1	-3.7	2.2	-9.6	-0.7	-6.4	8.5	-1.2	5.3	-0.2	1.6	-0.1	-6.4	0.2
sugar beet & cane	-3.4	-6.3	-1.1	-12.5	5.7	-3.5	8.7	-0.8	13.8	1.1	15.0	-2.5	0.2	0.5
paddy rice	-2.5	-2.9	17.3	-20.8	30.3	6.2	8.8	-1.6	4.7	-0.3	2.7	-2.2	-12.4	0.1
vegetables & fruits	-1.5	-3.4	-0.5	-11.4	2.3	-4.6	7.7	-1.0	3.7	-0.2	2.2	-0.6	-0.9	0.4
cattle	-2.9	-7.2	0.0	-17.5	2.5	-4.2	21.0	-1.4	9.9	0.1	3.4	-0.2	-1.2	0.6
other animal	-1.9	-3.5	0.1	-8.1	2.0	-6.2	10.6	-0.9	4.4	0.2	1.9	-0.1	-2.3	0.5
raw milk	-2.2	-4.7	-0.3	-11.6	7.0	-7.8	11.1	-0.7	7.4	0.1	5.8	1.0	-0.1	0.2
beef	-1.8	-1.3	-0.2	-7.4	1.4	-5.0	11.2	-1.1	9.5	0.8	2.3	0.1	-0.3	0.6
other meat	-1.0	-1.6	-0.2	-4.1	1.0	-6.8	9.4	-0.3	7.0	0.2	1.8	0.1	-1.2	0.4
milk	-0.9	-1.6	-0.3	-3.3	3.4	-3.5	4.0	-0.8	3.6	0.6	2.9	1.6	0.2	0.3
sugar	-2.0	-1.5	-0.8	-13.9	0.5	-1.0	3.4	-0.8	12.5	1.1	2.6	-0.7	-0.5	0.7
other food	-0.8	-1.7	-0.3	-5.7	0.5	-1.9	2.1	-1.1	2.4	0.1	0.3	-0.7	-3.7	0.3
other primary	-0.1	-0.6	-0.2	-0.9	-0.2	-0.3	1.3	-3.1	1.6	0.6	-0.6	0.0	-0.2	-0.2
manufactures	-0.2	-0.6	-0.4	0.1	-0.4	-0.5	0.0	-1.6	-0.1	1.1	-0.7	0.2	-0.2	-0.3
services	-0.1	-0.5	-0.3	0.3	0.0	-0.3	0.4	-0.7	-0.1	1.6	-0.3	0.3	0.5	0.2
	Experiment 02													
cereals	-6.9	-5.6	2.0	-19.5	3.2	-2.9	18.0	-4.6	4.5	-0.3	0.6	0.1	-3.0	1.0
oilseeds	-0.4	-2.9	3.9	-9.6	1.0	-5.3	8.8	-5.8	4.9	0.0	0.6	0.6	-6.3	0.9
sugar beet & cane	-3.4	-6.0	1.4	-12.6	7.9	-4.3	8.9	-4.5	13.4	0.9	14.0	-2.2	-0.5	1.0
paddy rice	-2.3	-2.7	18.6	-20.8	31.7	6.5	9.2	-8.3	4.6	-0.5	0.8	-1.8	-12.7	1.0
vegetables & fruits	-1.3	-3.2	1.4	-11.5	4.5	-2.7	7.7	-6.0	3.5	-0.4	1.3	0.3	-1.4	1.2
cattle	-2.8	-6.8	1.9	-17.3	4.6	-3.2	21.0	-4.9	9.7	-0.1	2.1	0.1	-1.9	1.1
other animal	-1.8	-3.2	1.4	-8.1	3.3	-5.5	10.7	-4.4	4.1	0.1	0.5	0.3	-3.1	1.1
raw milk	-2.1	-4.3	1.4	-11.8	9.4	-7.1	11.0	-3.9	5.8	-0.1	3.7	1.6	-1.0	0.6
beef	-1.7	-1.3	0.6	-7.4	2.6	-4.6	11.3	-2.1	9.2	0.8	1.2	0.2	-0.8	0.8
other meat	-0.9	-1.5	0.4	-4.1	1.8	-6.7	9.5	-10.6	6.7	0.1	0.7	0.4	-1.8	0.7
milk	-0.9	-1.5	0.3	-4.0	4.7	-3.3	4.0	-3.3	2.9	0.5	1.7	1.9	-0.3	0.4
sugar	-2.0	-1.5	-0.4	-13.9	1.0	-1.5	3.5	-3.6	12.1	1.0	2.1	-0.6	-1.1	0.9
other food	-0.8	-1.6	-0.1	-5.8	1.0	-2.1	2.2	-4.0	2.2	0.0	-0.3	-0.5	-4.2	0.6
other primary	0.0	-0.5	0.0	-0.9	-0.1	-0.2	1.3	-3.7	1.5	0.6	-0.6	0.1	-0.2	-0.2
manufactures	-0.2	-0.6	-0.4	0.1	-0.2	-0.5	0.1	-2.0	-0.2	1.0	-0.8	0.2	-0.2	-0.2
services	-0.1	-0.5	-0.3	0.2	0.2	-0.3	0.5	-1.2	-0.2	1.6	-0.3	0.3	0.5	0.2

Source: Own calculations.

Box A1. Pre-simulations, Agenda 2000 and EU enlargement

Pre-simulations

CAP instruments

- complementarity approach for milk and sugar (assumption: quantity in the database represents production quotas)
- land subsidy equalised across sectors to implement a homogeneous area payment

EU's common budget

- 75% of tariff revenues as well as a share of GDP is accrued to the EU budget; determination of a uniform endogenous GDP rate
- expenses of the EAGGF paid for by the common EU budget
- net transfers among EU member states

Agenda 2000

Cereals

- reduction of intervention prices by –15%
- unification of direct payments for cereals, oilseeds and protein plants
- reduction of set-aside rate from 15% to 10%

Beef

- reduction of intervention prices by –18%
- no change in direct payments (assumption: increase in direct payments is compensated by a lower output)

Milk

- reduction of intervention prices by –15%
- retention of quota regulation
- increase of quota by 2.4%

EU enlargement

Creation of customs union

- EU-15 and the middle and south-east European countries (MOEL) abolish all bilateral trade barriers
- The MOEL establishes the trade protection of the EU-15
- production quotas for milk and sugar are fixed at the current production level of the MOEL
- no set-aside in the new member countries
- direct payments in the EU-15 remain unchanged
- 100% of the current land and animal premiums in the EU-15 are transferred to the new member states (standard procedure)
- fixation of ceilings for direct payments with endogenous adjustment of the premium rate for land and animals in the EU-15

Common EU budget

- complete integration of the MOEL in the common budget of the EU: 90% of tariff revenues as well as a share of GDP to the EU budget
- payments in the framework of the EAGGF in the MOEL through the common budget
- implementation of net transfers between the EU-15 and the MOEL

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